

# Tentative Subdivision Map Application **Eagle Canyon IV - Phase 4**

Submitted to Washoe County

May 15, 2019

ORIGINAL

Prepared for

**Lennar Reno, LLC**

10345 Professional Circle Suite 100

Reno, NV 89521

Prepared by



**WOOD RODGERS**  
DEVELOPING INNOVATIVE DESIGN SOLUTIONS

1361 Corporate Blvd • Reno, NV 89502 • Tel: 775.823.4068

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# Section 1



## Washoe County Development Application

Your entire application is a public record. If you have a concern about releasing personal information, please contact Planning and Development staff at 775.328.3600.

<b>Project Information</b>		Staff Assigned Case No.: _____	
Project Name: <b>Eagle Canyon IV - Unit 4</b>			
Project Description: An amendment to an existing approved Tentative Map that includes 137 single family residential lots			
Project Address: 0 Pyramid Way, Washoe County			
Project Area (acres or square feet): ~63.59 acres			
Project Location (with point of reference to major cross streets AND area locator):			
<small>The proposed project is located along the east side of Lemmon Drive between Nectar Street and Tupelo Street in the North Valleys Area Plan/LVS Character Mgmt Area</small>			
Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
532-020-09	63.59		
Section(s)/Township/Range: S26/T21N-R20E			
<b>Indicate any previous Washoe County approvals associated with this application:</b>			
Case No.(s). TM03-006 (Eagle Canyon IV/Spanish Springs Associates)			
<b>Applicant Information (attach additional sheets if necessary)</b>			
<b>Property Owner:</b>		<b>Professional Consultant:</b>	
Name: Lennar Reno, LLC, A Nevada Limited Liability Co		Name: Wood Rodgers, Inc.	
Address: 10345 Professional Circle Suite 100		Address: 1361 Corporate Blvd; Reno, NV	
Zip: 89521		Zip: 89502	
Phone: 775-789-3234	Fax:	Phone: 775-823-5258	Fax: 823-4066
Email: tscheideman@lennar.com		Email: shuggins@woodrodgers.com	
Cell:	Other:	Cell: 775-250-8213	Other: <input type="checkbox"/>
Contact Person: Tim Scheideman		Contact Person: Stacie Huggins	
<b>Applicant/Developer:</b>		<b>Other Persons to be Contacted:</b>	
Name: SAME AS ABOVE		Name:	
Address:		Address:	
Zip:		Zip:	
Phone:	Fax:	Phone:	Fax:
Email:		Email:	
Cell:	Other:	Cell:	Other:
Contact Person:		Contact Person:	
<b>For Office Use Only</b>			
Date Received:	Initial:	Planning Area:	
County Commission District:		Master Plan Designation(s):	
CAB(s):		Regulatory Zoning(s):	

# Property Owner Affidavit

**Applicant Name:** Lennar Reno, LLC, a Nevada Limited Liability Co

The receipt of this application at the time of submittal does not guarantee the application complies with all requirements of the Washoe County Development Code, the Washoe County Master Plan or the applicable area plan, the applicable regulatory zoning, or that the application is deemed complete and will be processed.

STATE OF NEVADA     )  
                                  )  
COUNTY OF WASHOE    )

I, Dustin Baker  
(please print name)

being duly sworn, depose and say that I am the owner\* of the property or properties involved in this application as listed below and that the foregoing statements and answers herein contained and the information herewith submitted are in all respects complete, true, and correct to the best of my knowledge and belief. I understand that no assurance or guarantee can be given by members of Planning and Development.

**(A separate Affidavit must be provided by each property owner named in the title report.)**

Assessor Parcel Number(s): 532-020-09

Printed Name Dustin Baker  
Lennar Reno, LLC  
Signed [Signature]

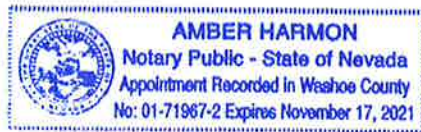
Address 10345 Professional Circle, Ste. 100  
Reno, NV 89521

Subscribed and sworn to before me this  
15<sup>th</sup> day of May, 2019.

(Notary Stamp)

Amber Harmon  
Notary Public in and for said county and state

My commission expires: 11-17-2021



\*Owner refers to the following: (Please mark appropriate box.)

- Owner
- Corporate Officer/Partner (Provide copy of record document indicating authority to sign.)
- Power of Attorney (Provide copy of Power of Attorney.)
- Owner Agent (Provide notarized letter from property owner giving legal authority to agent.)
- Property Agent (Provide copy of record document indicating authority to sign.)
- Letter from Government Agency with Stewardship

**WRITTEN CONSENT TO ACTION  
BY BOARD OF MANAGERS OF  
LENNAR RENO, LLC**

**OCTOBER 16, 2006**

---

The undersigned, constituting all of the members of the Board of Managers of LENNAR RENO, LLC, a Nevada limited liability company (the "Company"), pursuant to the provisions of the Nevada Revised Statutes, do hereby unanimously agree and consent to the adoption of, and do hereby adopt, the following resolution:

**RESOLVED**, that the following individuals be, and hereby are, elected **Vice President** of the Company to serve in such capacity, pursuant to the Operating Agreement of the Company, until the next annual meeting of the Board of Managers of the Company, or until their successors are duly elected and qualified or until their earlier resignation or removal from office.

**Dustin Barker  
Darrin Indart  
Michael Nicholls**

This Written Consent may be executed in counterparts, and all counterparts executed shall constitute one Written Consent. A facsimile of a signature to this Written Consent shall be deemed as valid as an original signature thereto.

IN WITNESS WHEREOF, the undersigned have executed this Written Consent effective as of the date first written above.

MANAGERS:

  
\_\_\_\_\_  
Edward C. Giermann

\_\_\_\_\_  
Steven E. Lane

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**Dustin Barker  
Darrin Indart  
Michael Nicholls**

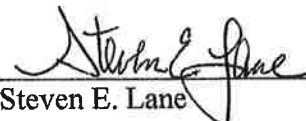
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MANAGERS:

---

Edward C. Giermann

  
Steven E. Lane

## REQUEST FOR OFFICER ELECTION/REMOVAL

**IMPORTANT NOTE:** Processing times may vary. Please allow at least five (5) business days to process this request.

1. Date of request:	2. Name of associate submitting request:
10/16/06	Rebecca Caterino

3. Entity legal name (as it appears in formation documents):
LENNAR RENO LLC

<input checked="" type="checkbox"/> ELECTION	<input type="checkbox"/> REMOVAL
--	----------------------------------

4. Basic information of associate being elected/removed:	
4a. Name:	Dustin Barker
4b. Division:	Lennar Reno
4c. Business Address:	10345 Professional Court, Ste. 100, Reno, NV 89521
5. Corporate officer title (Vice President, Assistant Secretary or Authorized Agent):	
Vice President	
5a. If Authorized Agent, list specific authorities to be granted (see attached list):	
6. Descriptive title (i.e. Division President, Division Controller, Director of Sales, etc.):	
Regional Vice President of Finance	

Effective date (the date the request is submitted will be the effective date of the election unless a future effective date is entered):

Approved by:	
Print name:	Tim Kent
Title:	Division/Regional President

Submit this form to:  
Christen M. Llera, Corporate Paralegal, Miami Legal Department  
T: 305.229.6429, F: 305.229.6650, E: [christen.llera@lennar.com](mailto:christen.llera@lennar.com)

Request for Officer Election/Removal  
Page 1 of 1

**EXHIBIT "A"**  
**LEGAL DESCRIPTION FOR**  
**EAGLE CANYON IV – UNIT IV**

All that certain real property situate within a portion of Section 26, Township 21 North, Range 20 East, M.D.M., Washoe County, Nevada being more particularly described as follows:

**BEING** Parcel C per Parcel Map No. 4492, recorded December 14, 2005 as File No. 3323108 in the Official Records of Washoe County, Nevada.

Containing 63.59 acres of land more or less.

Prepared by:  
Wood Rodgers, Inc.  
1361 Corporate Blvd.  
Reno, NV 89502



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Daniel A. Bigrigg, P.L.S.  
Nevada Certificate No. 19716

## Tentative Subdivision Map Application Supplemental Information

(All required information may be separately attached)

Chapter 110 of the Washoe County Code is commonly known as the Development Code. Specific references to tentative subdivision maps may be found in Article 608, Tentative Subdivision Maps.

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

The proposed project is located on the west side of Pyramid Highway, approximately 1/2 mile south of the intersection of Calle de la Plata and Pyramid Highway. Egyptian Dr. flanks the southern edge of the project site.

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

As this is an amendment to the existing Eagle Canyon IV tentative map, the subdivision name continues to be Eagle Canyon IV - Unit 4.

3. Density and lot design:

a. Acreage of project site	63.59 acres
b. Total number of lots	137
c. Dwelling units per acre	2.15 du/acre
d. Minimum and maximum area of proposed lots	12,000 to 36,000 square feet
e. Minimum width of proposed lots	80 feet
f. Average lot size	15,469 square feet

4. Utilities:

a. Sewer Service	Truckee Meadows Wastewater Treatment Facility
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 Communications
g. Water Service	TMWA

5. For common open space subdivisions (Article 408), please answer the following: **This is not a common open space request**
- a. Acreage of common open space:

N/A

- b. Development constraints within common open space (slope, wetlands, faults, springs, ridgelines):

N/A

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

N/A

- d. Average lot size:

N/A

- e. Proposed yard setbacks if different from standard:

N/A

- f. Justification for setback reduction or increase, if requested:

N/A

- g. Identify all proposed non-residential uses:

N/A



h. Improvements proposed for the common open space:

N/A

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

N/A

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

N/A

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

N/A

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

N/A

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

N/A

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?

The "Presumed Public Roads" map suggests that the proposed project is in an area that appears to be adjacent to public lands. Specifically, the Truckee Meadows Regional Drainage Facility is located immediately west of the project area with the Regional Channel extending along the northern project boundary. The proposed project will not modify existing access to these public lands.

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?

Yes  No If yes, within what city?

9. Will a special use permit be required for utility improvement? If so, what special use permits are required and are they submitted with the application package?

No, as this is a phase within an existing approved larger tentative map, all utilities are either currently stubbed or planned to be stubbed to the property.

10. Has an archeological survey been reviewed and approved by SHPO on the property? If yes, what were the findings?

An archaeological survey has not been conducted.

11. Indicate the type and quantity of water rights the application has or proposes to have available:

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

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

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

As this is a phase within an existing approved larger tentative map, the overall project has been designed to contribute to energy conservation by using energy efficient designs including water conservation considerations.

13. Is the subject property in an area identified Planning and Development 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:

As this is a phase within an existing approved larger tentative map, the project is not in an area containing rare or endangered plants/animals, critical breeding habitat, migration routes or winter range.

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

As this is a phase within an existing approved larger tentative map, the project does not include any private roads. The primary access points will be off of Egyptian Drive or Lanstar Drive.

Pedestrian access will be provided through the project site via streets and sidewalks.

15. Is the subject property located adjacent to an existing residential subdivision? If so, describe how the tentative map complies with each additional adopted policy and code requirement of Article 434, Regional Development Standards within Cooperative Planning Areas and all of Washoe County, in particular, grading within 50 and 200 feet of the adjacent developed properties under 5 acres and parcel matching criteria:

As this is a phase within an existing approved larger tentative map, cooperative planning standards have been considered. Specifically, the project site is adjacent to the Regional Drainage Facility and Channel, which serves as a buffer between the project and the existing neighborhood to the north. Where existing residential exists south of the project, a 40-foot wide open space buffer has been provided where the project abuts existing residential development to the south in Pyramid Ranch Estates Phase 5B. Additionally, lots within the proposed project are consistent in size and style to the existing lots south of the project.

It should also be noted that this request is an amendment to the existing tentative map specifically to address concerns related to access from Pyramid Highway as noted by Washoe County Staff.

16. 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?

The project is located in the Spanish Springs Area Plan (SSAP) and since the project is part of a larger previously approved tentative map, the project is in compliance with area plan policies.

17. 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?

Section 110.216.05 Pyramid Lake Highway - although primary access from Pyramid Highway was approved with the existing tentative map, this tentative map amendment removes the access from Pyramid Highway, bringing the project into conformance with this policy.

Section 110.216.10 Buffers - a 90 foot wide open space buffer will be provided along Pyramid Highway.

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

The project is expected to be completed in one phase.

19. 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.

Yes     No    If yes, include a separate set of attachments and maps.

20. 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.

Yes     No    If yes, include separate attachments.

### 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:**

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

~74,000 cubic yards of cut

22. 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?

~124,000 cubic yards of fill are required for the site to balance. There will be an additional 50,000 cubic yards of fill being sourced from Eagle Canyon IV Unit 5 that was left over after construction. The overall site will be balanced between cut and fill.

23. 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?

Yes, the disturbed area will be visible from all directions. A 90-foot wide landscaping buffer with trees will be provided along Pyramid Highway to mitigate visual impacts. Additionally a 40-foot wide open space buffer will be provided where the project abuts existing residential development to the south in Pyramid Ranch Estates 5B. Good neighbor fencing will be also be provided along side and rear yards in accordance with County code will help mitigate visibility of the proposed project.

24. 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?

The maximum slope will not exceed 3:1.

Best management practices such as straw wattles will be used to stabilize grading activities during construction and all disturbed slopes will permanently be either formally landscaped or seeded with a native seed mix in accordance with Washoe County Development Code.

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

The project does not require any berms.

26. 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?

A rockery retaining wall approximately 6-feet in height, is needed in the northwest corner of the site to address the grade difference between the existing path along the regional drainage canal and the proposed lots.

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

No. The proposed project does not require removal of any trees.

28. 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?

Specific seed mix for revegetation areas will be determined during final design, however, the applicant does not anticipating using mulch.

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

The proposed project does not include temporary irrigation. Dust control on flatter areas of the graded site will be provided through the use of dust palliative or other acceptable, non-irrigated means.

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

No.

**From:** [Kaneyuki, Bradley](#)  
**To:** [Kyle Castle](#)  
**Cc:** [Handrock, Wayne](#); [Smith, Dwayne E.](#); [Kaneyuki, Bradley](#)  
**Subject:** RE: Borrowed Street Name Reservations  
**Date:** Thursday, March 21, 2019 8:43:38 AM  
**Attachments:** [image001.png](#)  
[image002.png](#)  
[image003.png](#)  
[image004.png](#)  
[image005.png](#)

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To: Kyle Castles – Wood Rodgers

Using reserved street name ARMADILLO: from Stonefield IV Village development to Eagle Canyon development

Cc: Wayne Handrock, County Surveyor and Developer  
Dwayne Smith, Division Directory, CSD E. & C.P.

I see no conflict with the using the reserved street name, ARMADILLO from Stonefield IV Village development to Eagle Canyon development.

Please remember to renew the “Date Submitted” for a street name after a year (request form not required for renewals).

Reservations		
Date Submitted	Fullname	Description
8/3/2017	ARMADILLO	Stonefield IV Village 1, 3 & 4 (Wood Rodgers - Ashley Verling for Lennar Reno)

Thank you for your cooperation.

Gratefully,  
brad



**Bradley Kaneyuki**

**GIS | Tech Services**

[bradley.kaneyuki@washoecounty.us](mailto:bradley.kaneyuki@washoecounty.us) | Office: 775.328.2344 | Fax: 775.328.6133

1001 E 9<sup>th</sup> St, Reno, NV 89512



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**From:** Kyle Castle [mailto:kcastle@WoodRodgers.com]

**Sent:** Thursday, March 21, 2019 8:05 AM

**To:** Kaneyuki, Bradley <BKaneyuki@washoecounty.us>

**Cc:** Handrock, Wayne <WHandrock@washoecounty.us>; Smith, Dwayne E.

<DESmith@washoecounty.us>; Stacie Huggins <shuggins@WoodRodgers.com>

**Subject:** RE: Borrowed Street Name Reservations



[**NOTICE:** This message originated outside of Washoe County -- **DO NOT CLICK** on **links** or open **attachments** unless you are sure the content is safe.]

Brad,

We would like to use Armadillo from our Stonefield reservation for Eagle Canyon. Is there any conflict with this and would you like anything else to confirm that this is acceptable? We have to include it with our submittal and we are just trying to avoid any potential conflicts.

Thanks,

**Kyle Castle**  
**Wood Rodgers, Inc.**  
775.823.5245 Direct

---

**From:** Kaneyuki, Bradley <[BKaneyuki@washoecounty.us](mailto:BKaneyuki@washoecounty.us)>  
**Sent:** Tuesday, March 19, 2019 4:06 PM  
**To:** Kyle Castle <[kcastle@WoodRodgers.com](mailto:kcastle@WoodRodgers.com)>  
**Cc:** Handrock, Wayne <[WHandrock@washoecounty.us](mailto:WHandrock@washoecounty.us)>; Smith, Dwayne E. <[DESmith@washoecounty.us](mailto:DESmith@washoecounty.us)>; Kaneyuki, Bradley <[BKaneyuki@washoecounty.us](mailto:BKaneyuki@washoecounty.us)>  
**Subject:** RE: Borrowed Street Name Reservations

Hi Kyle,

I'm copying the e-mail below to Wayne Handrock, County Surveyor and Developer and Dwayne Smith, Division Director, Capital Projects and Engineering, Community Services Department.

I have no problem with the practice below as long as the reserved street names are renewed for reservation after one year.

brad



**Bradley Kaneyuki**  
**GIS | Tech Services**  
[bkaneyuki@washoecounty.us](mailto:bkaneyuki@washoecounty.us) | Office: 775.328.2344 | Fax: 775.328.6133  
1001 E 9<sup>th</sup> St, Reno, NV 89512



---

**From:** Kyle Castle [<mailto:kcastle@WoodRodgers.com>]  
**Sent:** Tuesday, March 19, 2019 3:28 PM  
**To:** Kaneyuki, Bradley <[BKaneyuki@washoecounty.us](mailto:BKaneyuki@washoecounty.us)>

**Cc:** Amber Harmon <[aharmon@WoodRodgers.com](mailto:aharmon@WoodRodgers.com)>

**Subject:** Borrowed Street Name Reservations

[**NOTICE:** This message originated outside of Washoe County -- **DO NOT CLICK** on **links** or open **attachments** unless you are sure the content is safe.]

Brad,

We talked on the phone a few weeks ago about using reserved street names from one site for another site. I just wanted to obtain a written confirmation from you that this is acceptable for us. In this particular case, we are going to be borrowing two street names from a stonefield reservation (Lennar) and using them at Eagle Canyon Unit 4 (Also Lennar). Could you please just confirm that this is acceptable so that we can provide those street names on the tentative map that we will be submitting next month.

Thanks,

**Kyle Castle**

**Wood Rodgers, Inc.**

1361 Corporate Boulevard

Reno, NV 89502

775.823.4068 Tel

775.823.4066 Fax

775.823.5245 Direct

[kcastle@woodrodgers.com](mailto:kcastle@woodrodgers.com)

[www.woodrodgers.com](http://www.woodrodgers.com)

Washoe County Treasurer  
Tammi Davls

Washoe County Treasurer  
P O Box 30039 Reno, NV 89520-3039  
ph: (775) 328-2510 fax: (775) 328-2500  
Email: tax@washoecounty.us

Account Detail

[Back to Account Detail](#)

[Change of Address](#)

[Print this Page](#)

**CollectionCart**

Collection Cart	Items	Total	<a href="#">Checkout</a>	<a href="#">View</a>
	0	\$0.00		

**Pay Online**

**Washoe County Parcel Information**

Parcel ID	Status	Last Update
53202009	Active	3/21/2019 2:06:46 AM
<b>Current Owner:</b> LENNAR RENO LLC		<b>SITUS:</b> 0 PYRAMID WAY WCTY NV
10345 PROFESSIONAL CIR STE 100 RENO, NV 89521		
<b>Taxing District</b> 4000	<b>Geo CD:</b>	
Legal Description		
SubdivisionName _UNSPECIFIED Lot C Township 21 Range 20		

**Tax Bill (Click on desired tax year for due dates and further details)**

Tax Year	Net Tax	Total Paid	Penalty/Fees	Interest	Balance Due
<a href="#">2018</a>	\$4,092.14	\$4,092.14	\$0.00	\$0.00	\$0.00
<a href="#">2017</a>	\$3,927.35	\$3,927.35	\$0.00	\$0.00	\$0.00
<a href="#">2016</a>	\$3,827.69	\$3,827.69	\$0.00	\$0.00	\$0.00
<a href="#">2015</a>	\$3,819.89	\$3,819.89	\$0.00	\$0.00	\$0.00
<a href="#">2014</a>	\$3,701.44	\$3,701.44	\$0.00	\$0.00	\$0.00
<b>Total</b>					<b>\$0.00</b>

**Disclaimer**

- 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.
- For your convenience, online payment is available on this site. E-check payments are accepted without a fee. However, a service fee does apply for online credit card payments. See [Payment Information](#) for details.

**Pay By Check**

Please make checks payable to:  
**WASHOE COUNTY TREASURER**

**Mailing Address:**  
P.O. Box 30039  
Reno, NV 89520-3039

**Overnight Address:**  
1001 E. Ninth St., Ste D140  
Reno, NV 89512-2845



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This site is best viewed using Google Chrome, Internet Explorer 11, Mozilla Firefox or Safari.

# Section 2

## **Project Description**

### **Background**

The Eagle Canyon IV tentative map was originally approved with 527 single family residential lots in June 2003 (TM03-006). Following approval of the Tentative Map, the project was divided into multiple phases and purchased by individual builders. As of this submittal, Phases 1 – 3 and 5 have been or are under construction.

At this time, Phase 4 is being amended to address specific concerns cited by Washoe County Engineering Staff regarding the previously approved primary access from Pyramid Highway. As a result of relocating the primary access away from Pyramid Highway, the original street layout for Phase 4 of the Eagle Canyon Unit IV tentative map has changed. It should be noted that although the street layout in Phase 4 is being modified, the number of lots proposed within this amended Phase 4 tentative map is consistent with the original number of lots planned in this area.

### **Location**

The Eagle Canyon Unit IV- Phase 4 project is located north of Eclipse Drive, south of Swallow Point Drive and west of Pyramid Highway within the Spanish Springs Area Plan. The project area is located on APN 532-020-09 which consists of 63.59± acres. The subject property is designed Medium Density Suburban in the Spanish Springs Area Plan. A Washoe County stormwater conveyance channel and sewer easement flank the northern boundary of the site. The proposed tentative map continues to be in conformance with the Spanish Springs Area Plan. *(Refer to Vicinity Map, Assessor's Parcel Map and Site Aerial in Section 3 of this submittal packet).*

### **Zoning and Master Plan Designations**

The project site is located within the Spanish Springs Suburban Character Management Area (SCMA) of the Spanish Springs Area Plan (SSAP). Specifically, the site has a Master Plan designation of Suburban Residential (SR) with corresponding zoning Medium Density Suburban (MDS). *(Refer to Existing Zoning Map, Existing Master Plan Map Exhibits in Section 3 of this submittal packet)*

### **Current Request**

The current request is to develop a 137-lot single family residential development on approximately 63.59± acres. The proposed project has been designed with a mix of lot sizes ranging from 12,000 square feet to 36,000 square feet with an average lot size of 15,469 square feet. The overall density is 2.15 units per acre and is in accordance with the allowed maximum density of 3.0 units per acre as outlined in the SMCA. The project also includes 5.9± acres of common area/open space.

The request is summarized as follows:

- An amendment to an approved **Tentative Subdivision Map** to relocate the primary access away from Pyramid Highway while supporting development of a 137-lot single-family subdivision on 63.59± acres.

### **House Design**

Homes are proposed to be one and two-story designs with minimum two car garages. House plans have not yet been formalized for this project; however, the future design will be consistent with the community character of the area. It should be noted that although the project site is located within the

Spanish Springs Area Plan Business Park Character Management Area, the Business Park design guidelines do not apply to this residential project. The guidelines listed under this section are intended to specifically address non-residential uses. This section does not address, nor include specific standards, for residential development within this area.

### **Grading**

This site is relatively flat and therefore minimal grading to construct the project will be required. The site is anticipated to excavate approximately 74,000 cubic yards of dirt with 124,000± cubic yards being imported as fill for the site to balance. Disturbed areas will be landscaped and in accordance with Washoe County requirements. *(Refer to Tentative Map Plan Set in Section 3 and Map Pocket of this submittal packet).*

### **Traffic and Circulation**

This is an amendment to an existing approved tentative map to specifically address relocating the primary access point from Pyramid Highway. The number of lots proposed and the general internal street design is consistent with the original traffic study that was accepted when the Eagle Canyon IV Tentative Map was approved.

As indicated previously, the original tentative map is being amended in order to minimize connections to Pyramid Highway. Specifically, the project has been designed to eliminate the Pyramid Highway access and redirect project traffic to Egyptian Drive via Desert Rose Drive or Lanstar Drive. An alternative route is also available via Lanstar Drive north to Calle de La Plata via Spruce Meadows.

The capacity of the existing street network was reviewed by Soleagui Engineers and a copy of the updated review was provided to Washoe County Engineering Staff. Staff reviewed the information and supported the findings. A copy of the letter from Soleagui Engineers is included in Section 4 of this application.

### **Common Areas**

As this is an amendment to an existing approved Tentative Map, this project is not considered a common open space development. However, a total of 5.9± acres of the Unit 4 subdivision will be dedicated to common open space. This includes a large natural open space buffer along the eastern project boundary where the project abuts Pyramid Highway. This natural open space buffer will include a 10-foot wide path along Pyramid Highway. Where the path extends around the southern project perimeter, it will transition to a 12-foot wide access road that will serve both ditch maintenance and pedestrian access *(refer to Tentative Map sheets for additional detail).*

All areas dedicated to common area will be maintained by a Home Owners Association (HOA) or equivalent *(Refer to Preliminary Landscaping Plan in Section 3 and the Map Pocket of this submittal packet).*

### **Landscaping**

In accordance with Section 110.412.35 all front, rear or side yards that adjoin a public street include a minimum of one tree for every fifty linear feet of street frontage. Front yard landscaping will also be provided for each lot in accordance with Washoe County Code including Section 110.208.10 which requires the use of climatic adaptive landscaping in the front yard of each new residential lot. *(Refer to Preliminary Landscaping Plan in Section 3 and the Map Pocket of this submittal packet)*

**Fencing**

With construction of the homes, standard, 6-foot high, solid fencing will be provided along rear and side lot lines throughout the development. In keeping with the original conditions of approval for Eagle Canyon IV, all rear yard fencing provided along Pyramid Highway will be vinyl composition.

**Water, Sewer and Utilities**

The site will be served by Truckee Meadows Water Authority (TMWA) and is within the TMWA service area.

Sewer service is anticipated to be provided by Washoe County with treatment at the Truckee Meadow Water Reclamation Facility (TMWRF). The proposed project is anticipated to generate approximately 110,970 gallons per day at peak flow, which is consistent with the previously approved tentative map and final sewer analysis prepared for the overall Eagle Canyon IV project. A sanitary sewer letter is provided in Section 4 of this application packet.

**Schools**

The project request is expected to add an additional 28 Elementary School students (Alyce Taylor Elementary School), 12 Middle School students (Shaw Middle School), and 13 High School students (Spanish Springs High School).

**Police and Fire Service**

Fire service is currently provided to the surrounding area by Truckee Meadows Fire District. The closest fire station is Truckee Meadows Fire Station 46 located approximately 1.5 miles away at the intersection of La Posada Drive and Rockwell Boulevard. Police is provided by Washoe County Sheriff.

**Development Statistics Summary**

The following is a summary of the development statistics of the site:

Total Site Area:	63.59± acres
Total Dwelling Units:	137 single family residences
Gross Density:	2.15± d.u./acre
Total Lot Area:	48.6± acres (76.4%±)
Total Right of Way Area:	9.1± acres (14.3%±)
Total Common Area/Open Space	5.9± acres (9.3%±)

**Site Analysis**

*Land Use:* The site is currently undeveloped with a Master Plan designation of Suburban Residential and corresponding zoning designation of Medium Density Suburban (MDS). The proposed land use is single family residential, which meets the policies of the Master Plan and Zoning designations. Surrounding property designations are shown on the Zoning Map included in Section 3 of this application.

*Existing Structures:* The subject site is currently undeveloped and does not include any structures.

*Existing Vegetation:* The subject site consists primarily of native shrubs, sagebrush and desert grasses.

*Topography:* The project site is in a nearly flat area with gentle sloping from the northeast to southwest. The entire site is free of steep slopes with no slope over 15%.

*Soil:* The subject site is located within the northwestern portion of Spanish Springs. Soils associated with future development are generally consists of complex blends of sands, silts, and clays. A soils report is included in Section 4 of this application.

*Natural Drainageways:* There are no natural drainageways on or adjacent to the site.

*Wetlands and Water Bodies:* There are no wetlands on the site.

*Flood Hazards:* The entire site is located out of the FEMA mapped 100-year Floodplain. Any FEMA Flood zone designations are identified on the Tentative Map.

*Seismic Hazards:* There are no known seismic hazards on or near the subject site.

*Avalanche Hazards:* There are no known avalanche or other landslide hazards on the site.

*Sensitive Habitat and Migration Routes:* There are no sensitive habitats or migrations routes on the site.

*Easements:* Refer to Tentative Map sheets for easements.

*Utilities:* Refer to Tentative Map Utility Sheets.

*Appropriate Access Points:* The subject site will be accessed from Egyptian Drive where it will connect to a future extension of Lanstar Drive. All proposed streets and intersections will be designed in accordance with Washoe County Code.



---

**TENTATIVE MAP FINDINGS**

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

The proposed map is consistent with the current Master Plan designation of Suburban Residential and meets all applicable goals and policies of the Washoe County Master Plan and the Spanish Springs 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;**

The proposed subdivision is consistent with the Master Plan including those regarding regulatory zones, lot sizes, street design, landscape design, and lighting. The proposed subdivision is particularly consistent with the Spanish Springs Area Plan as related to the Spanish Springs Suburban Character Management Area goals and policies including dwelling units per acre, transportation, scenic/recreational/cultural resources, and natural resources.

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

The project site is generally flat gently sloping from northeast to southwest making it physically suited for the residential developed as designed. Existing infrastructure is surrounding the project site and the number of dwellings and configuration of the proposed subdivision is consistent with the requirements of the master plan.

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

In accordance with Article 702, and since this is an amendment to an approved tentative map to specifically address project access, the public infrastructure necessary to support the project is available concurrently with the impacts of the project without causing the level of service to fall below adopted standards. The site has been anticipated for development for many years (reference TM03-006 Eagle Canyon IV) and with the surrounding phases developed or under construction, utilities sufficient to support the proposed lots are available. Any new facilities/infrastructure needed for the project will be designed to Washoe County standards to ensure that all required services are provided to all new dwelling units.

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

The proposed subdivision is not located within an environmentally sensitive location. In fact, the site is surrounded by development and has been anticipated for infill development for several years. The improvements associated with the project are not anticipated to cause substantial environmental damage or harm to endangered plants or wildlife habitats.

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

The proposed subdivision is designed in accordance with environmental and health laws and regulations concerning water and air pollution, solid waste disposal, water service and sewer service. All necessary infrastructure is currently located adjacent to the project. All new infrastructure required to serve the proposed project will be constructed to service all new dwelling units. Refer to attached engineering reports in Section 4 of this application packet for detailed information.

- (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;**

As this is an existing approved tentative map, any existing easements, including the access and waterline easement along Egyptian Drive, have been incorporated into the proposed project design. As designed, the proposed project will not conflict with easements for public access through or adjacent to the property. This specifically includes the roadway, drainage and PUD easement providing access from the site via Desert Rose Drive.

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

As this is an existing, approved tentative map, access to and from the site and surrounding properties has been incorporated. Most of the adjacent land is developed and access to this land is generally not necessary, however, the revised tentative map removed the primary access from Pyramid Highway and added a new access point utilizing an existing access easement at Desert Rose Drive. Desert Rose Drive will connect to Egyptian Drive which provides direct access to Pyramid Highway. As designed, a secondary access is included via Lanstar Drive to Spruce Meadow Drive, which connects to W. Calle De La Plata and ultimately Pyramid Highway. Per the letter from Solaegui Engineers, this existing roadway network can accommodate the proposed project traffic as planned.

All roads within Eagle Canyon V – Unit 4 will be paved and will include adequate access to ensure safe, emergency access is available.

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

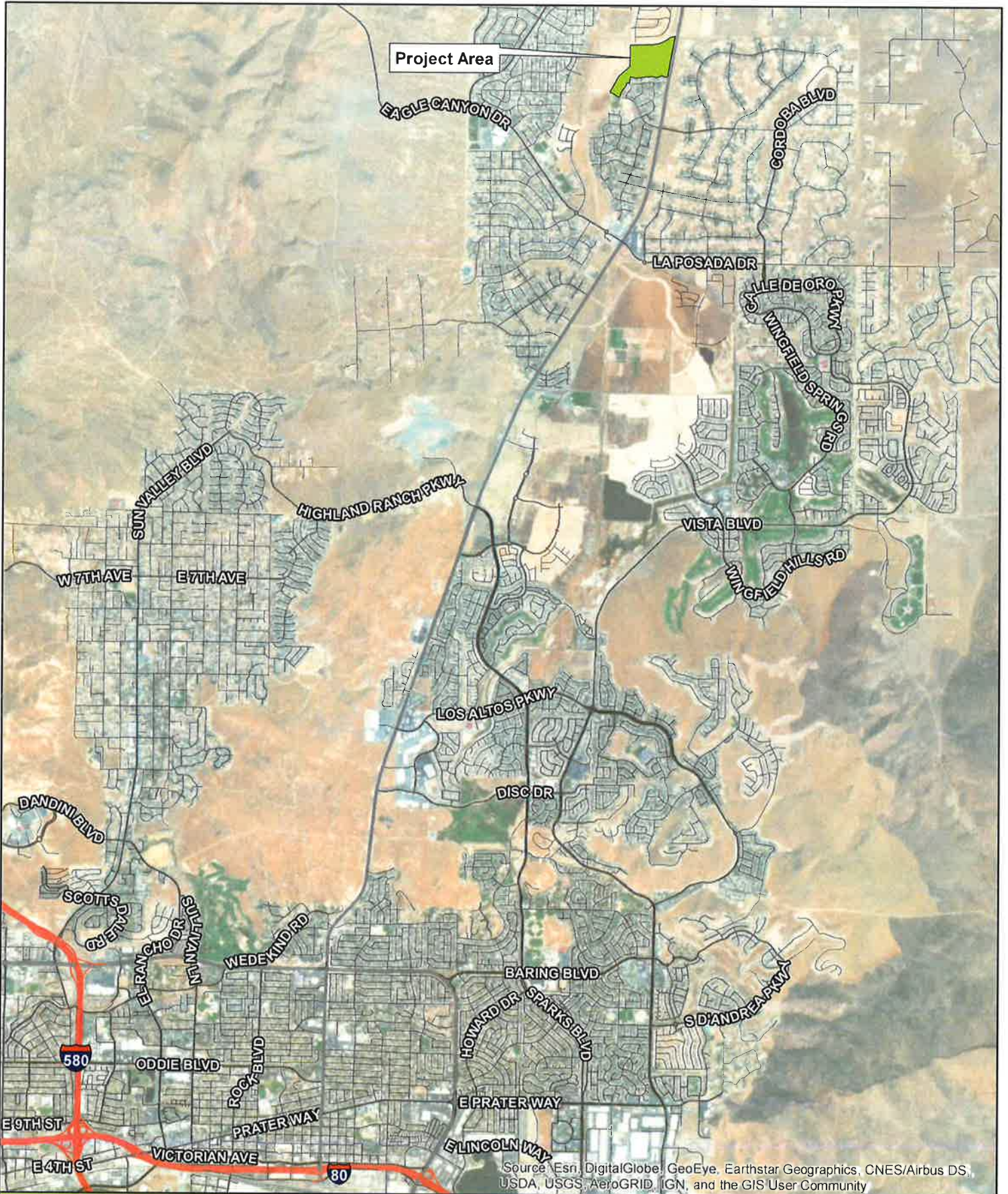
All common open space or drainage channels will be maintained by a Homeowners Association, or equivalent, as approved by Washoe County.

- (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.**

At this time, specific building designs are not available for the project. It is anticipated that new high-performance building and material technologies will be used for energy efficiency.

# Section 3





Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



## Vicinity Map

### Eagle Canyon IV TM

March, 2019



**WOOD RODGERS**

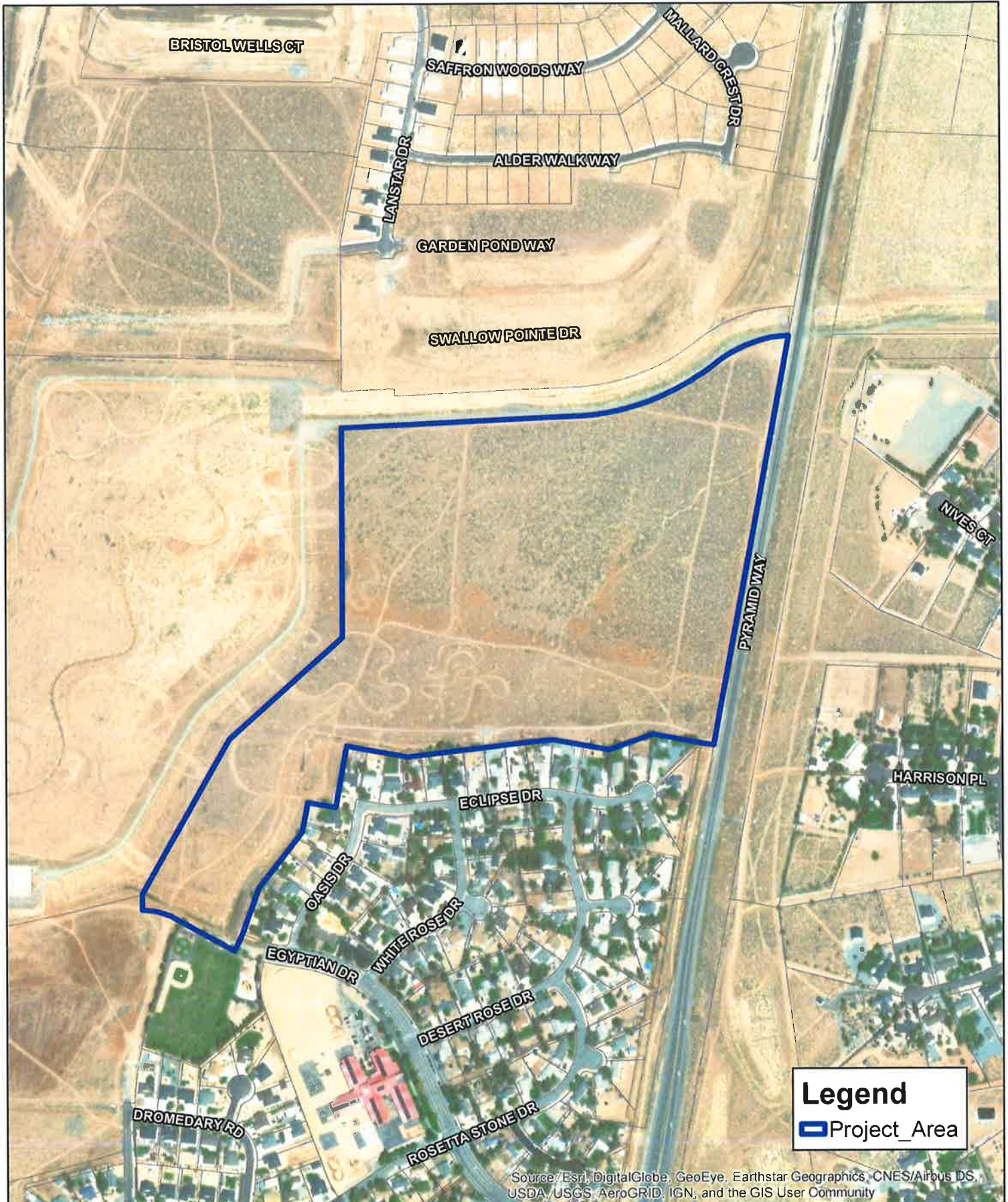
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

1361 Corporate Boulevard  
Reno, NV 89502

Tel: 775.823.4068  
Fax: 775.823.4068

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

# Aerial Map

## Eagle Canyon IV TM

March, 2019



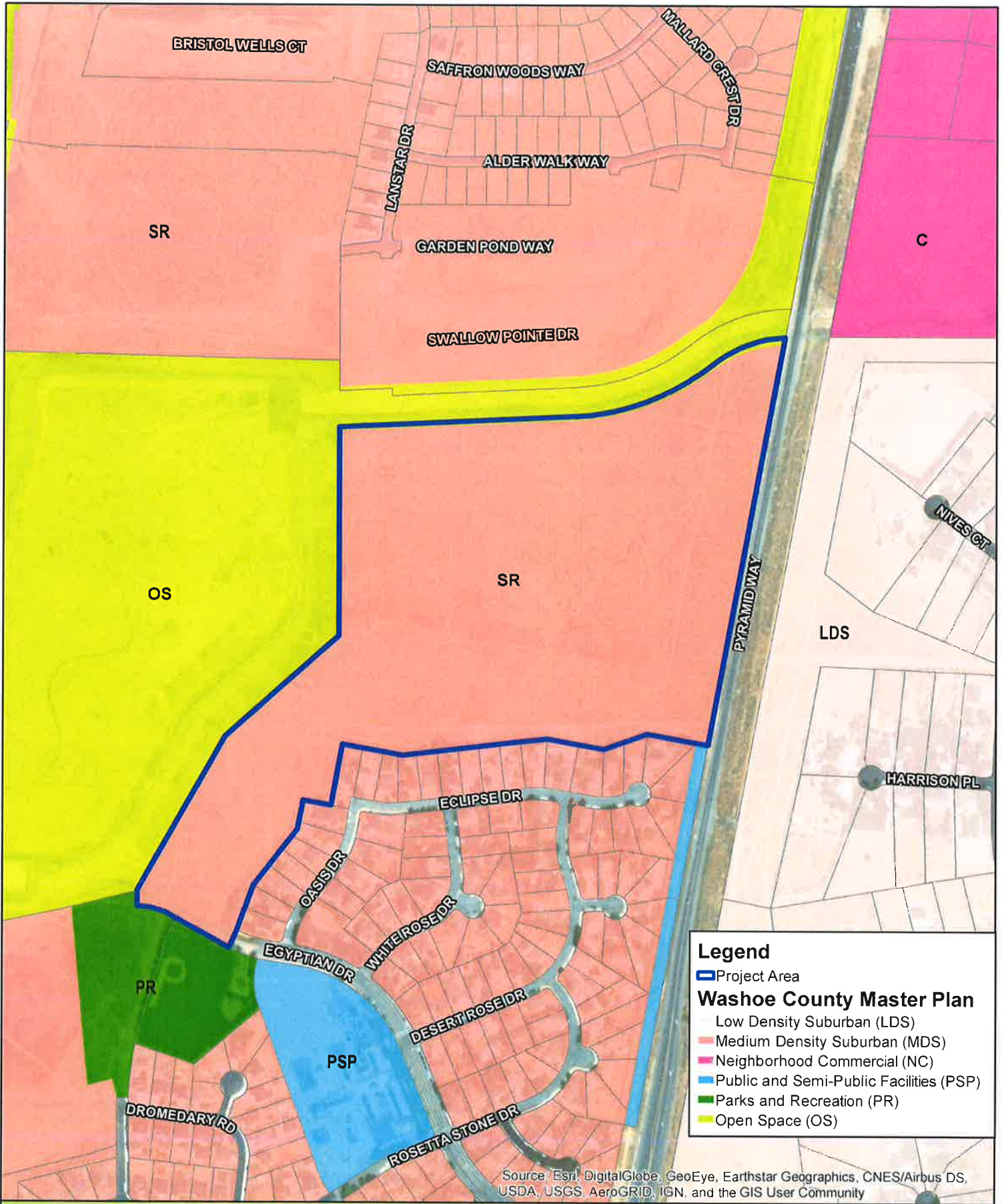
**Legend**

Project\_Area



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 Reno, NV 89502                      Fax: 775.823.4066





**Legend**

- Project Area
- Washoe County Master Plan**
  - Low Density Suburban (LDS)
  - Medium Density Suburban (MDS)
  - Neighborhood Commercial (NC)
  - Public and Semi-Public Facilities (PSP)
  - Parks and Recreation (PR)
  - Open Space (OS)

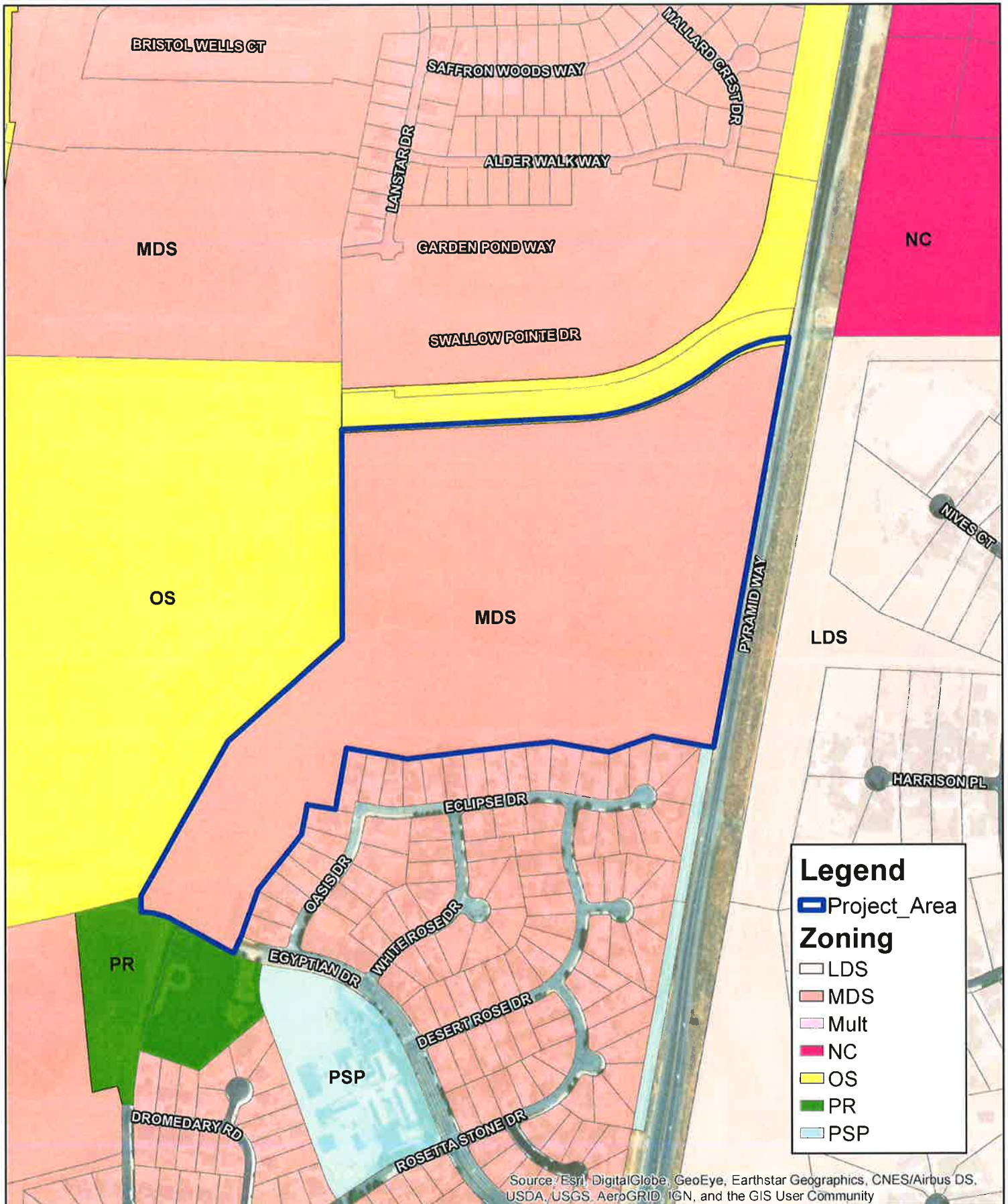
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Existing Master Plan**  
**Eagle Canyon IV TM**  
 March, 2019



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# Existing Zoning

Eagle Canyon IV TM

March, 2019



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Assessor's Map Number  
**532-02**

STATE OF NEVADA  
**WASHOE COUNTY**  
ASSESSORS OFFICE  
Michael E. Clark, Assessor  
1001 East Main Street  
Reno, Nevada 89512  
(775) 326-2321



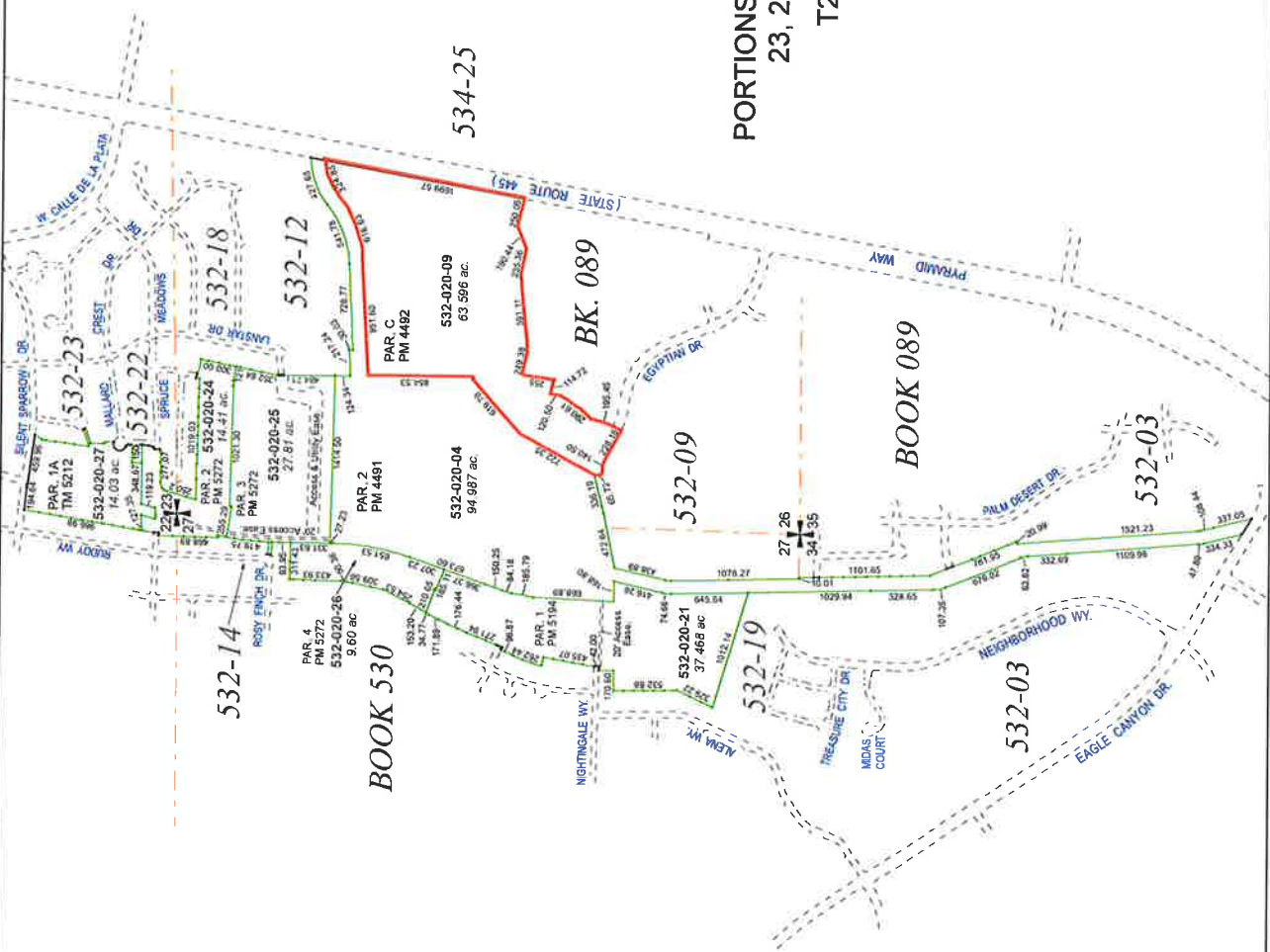
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1 inch = 1,000 feet



created by: KSB 10/20/2013  
last updated: JMO 6/13/17 JMO 6/20/17  
area previously shown on map(s)  
530-28, 089-16

NOTE: This map was prepared for the use of the Assessor's Office and is for assessment purposes only. It does not represent a survey of the premises. No liability is assumed for any errors or omissions, or for any inaccuracies or inaccuracies of the data furnished hereon.

**PORTIONS OF SECTIONS 22,  
23, 26, 27, 34 & 35  
T21N - R20E**





Assessor's Map Number  
**089-40**

STATE OF NEVADA  
**WASHOE COUNTY  
ASSESSOR'S OFFICE**  
Joshua G. Wilson, Assessor  
1001 East Main Street  
Reno, Nevada, 89512  
(775) 325-2231



Scale: 0 25 50 75 100 Feet  
1 inch = 100 feet



created by: TWT 12/1/2011  
last updated:

area previously shown on map(s)  
**089-16**

NOTE: This map was prepared for the use of the Washoe County Assessor for assessment and is not intended for any other purpose. It is based on a survey of the premises. No liability is assumed as to the sufficiency or accuracy of the data obtained thereon.

# Pyramid Ranch Estates - Unit 5A (#2797) POR. OF SOUTH 1/2 OF SEC. 26 T21N - R20E



Offered for Dedication  
on LDC #1552201  
June 24, 1992

# SITE PLAN FOR EAGLE CANYON IV UNIT 1-5 LENNAR COMMUNITIES

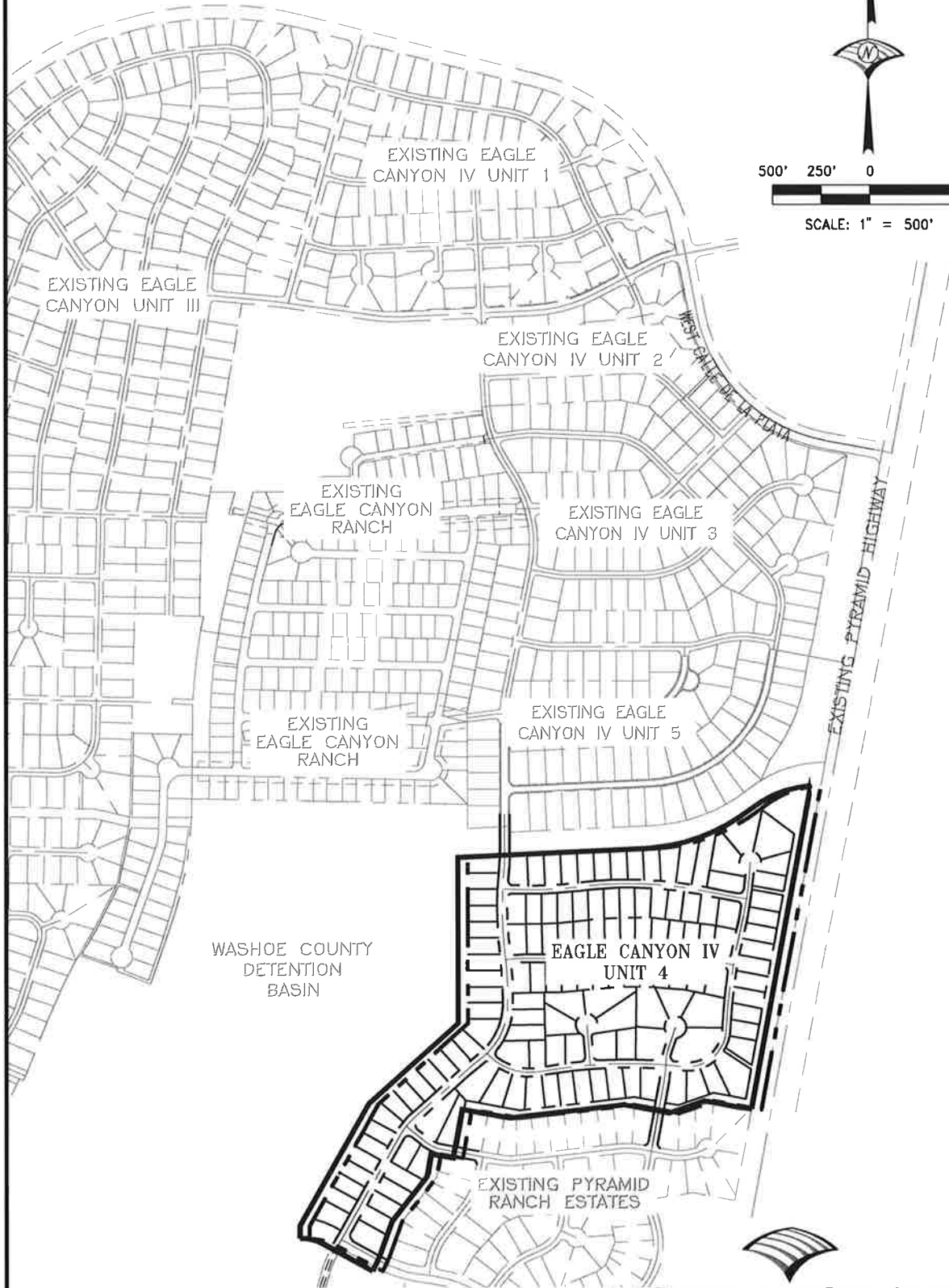
WASHOE COUNTY

NEVADA

APRIL, 2019



SCALE: 1" = 500'



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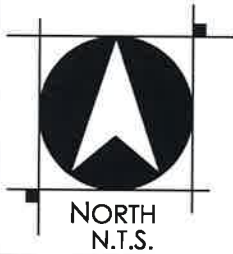
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Fax 775.823.4068

# COLOR SITE PLAN

# EAGLE CANYON IV UNIT 4

WASHOE COUNTY, NEVADA

MAY, 2019



NORTH  
N.T.S.



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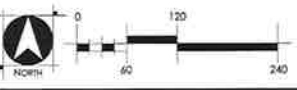




# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LOT AND BLOCK SHEET



EAGLE CANYON IV UNIT 4  
LOT AND BLOCK SHEET

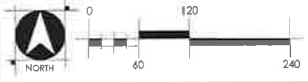
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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LOT AND BLOCK SHEET

932-000-04  
WASHOE COUNTY



EAGLE CANYON IV UNIT 4  
LOT AND BLOCK SHEET

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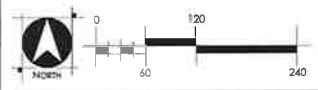
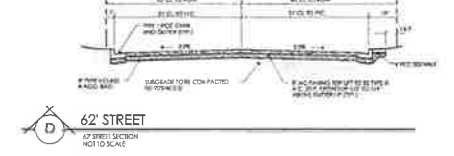
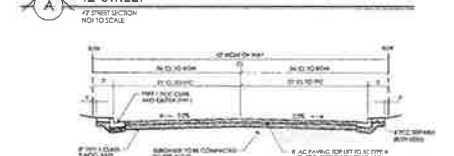
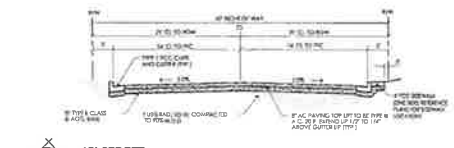
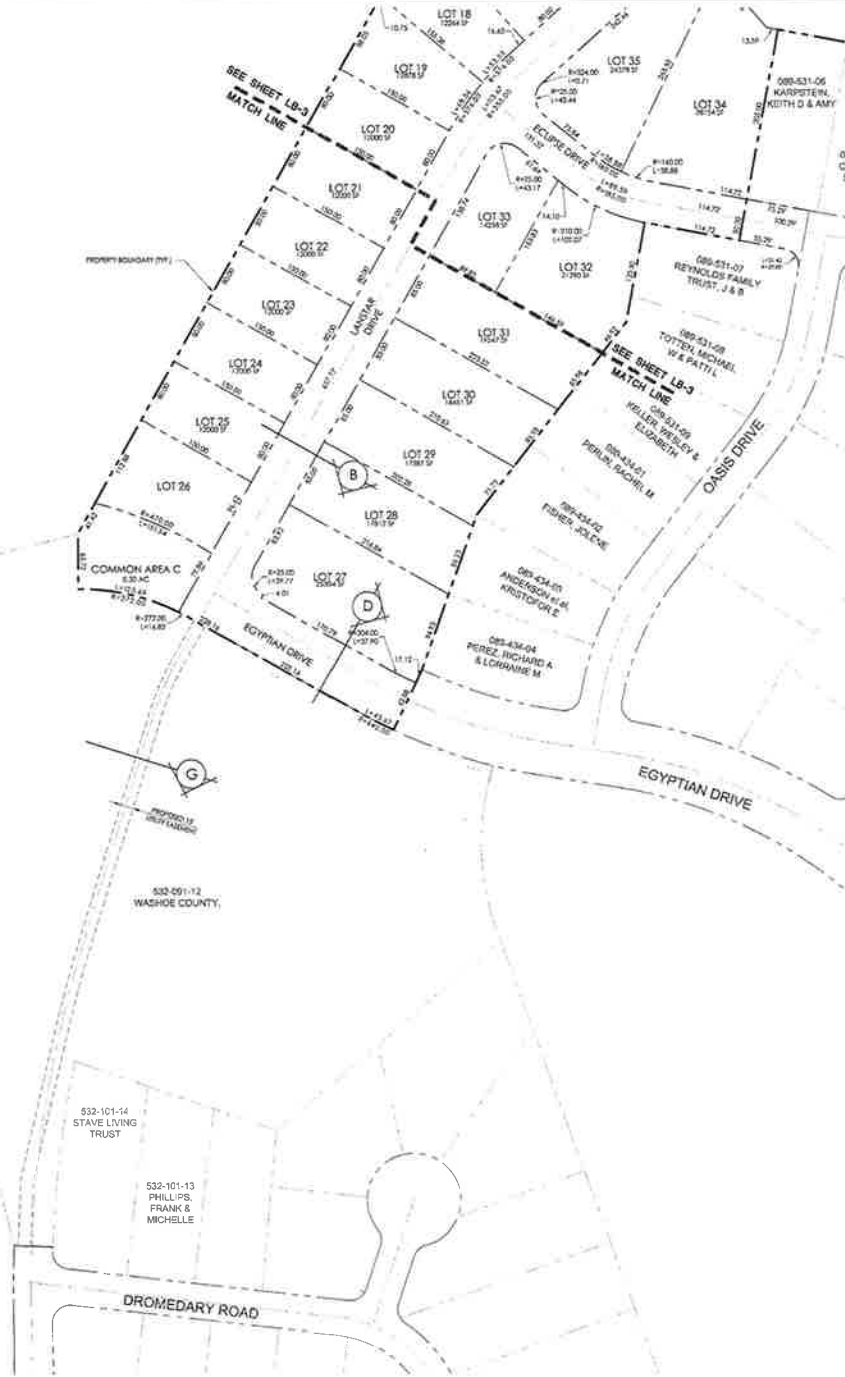
166037 MAY 10, 2019  
SHEET LB-2 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LOT AND BLOCK SHEET

532-090-04  
WASHOE COUNTY



EAGLE CANYON IV UNIT 4  
LOT AND BLOCK SHEET



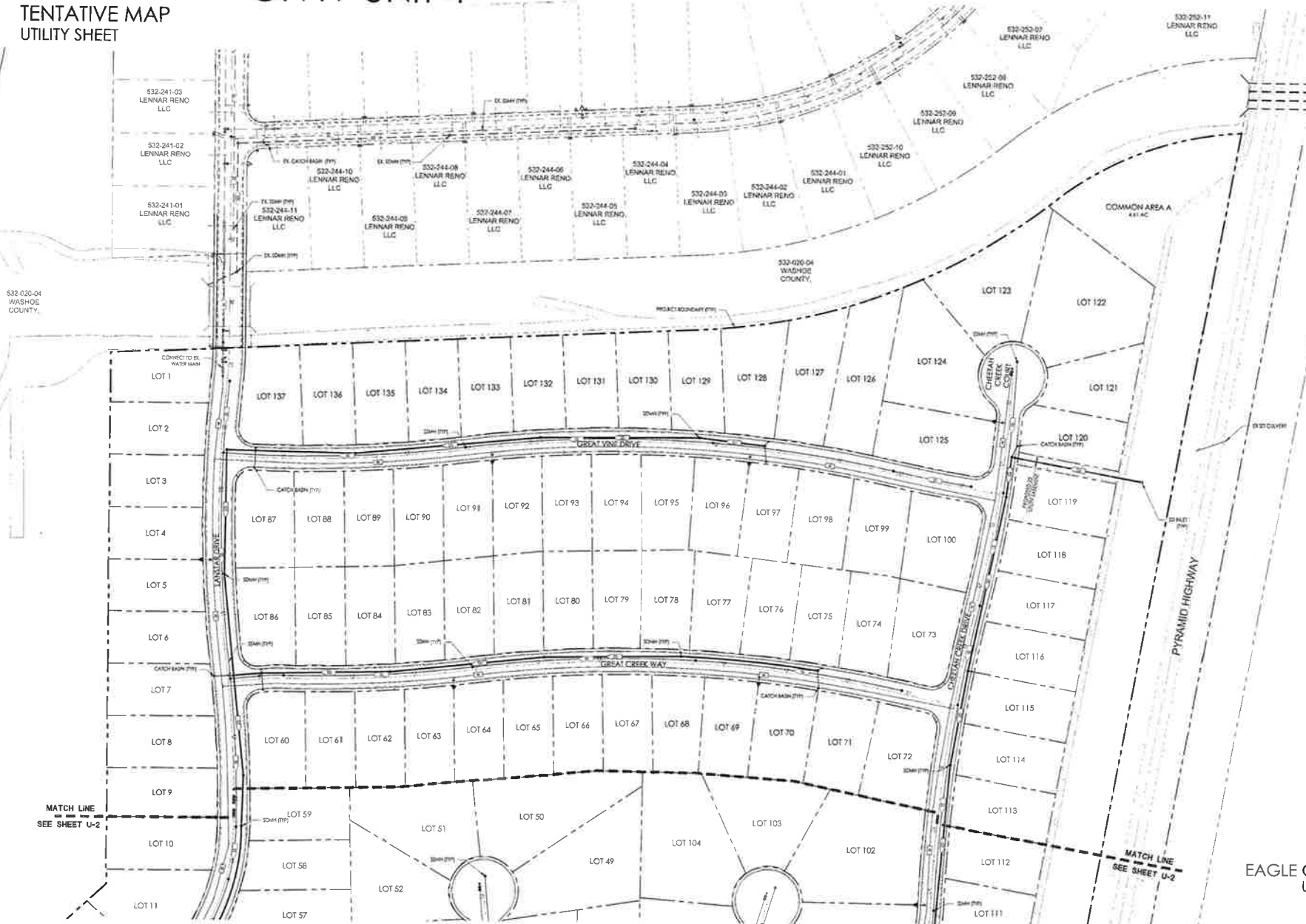
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Tel 775.823.4088 Fax 775.823.4066

1660.037 MAY 10, 2019  
SHEET LB-3 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET



MATCH LINE  
SEE SHEET U-2

MATCH LINE  
SEE SHEET U-2



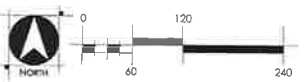
EAGLE CANYON IV UNIT 4  
UTILITY SHEET



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1660.037 MAY 10, 2019

SHEET U-1 OF 14



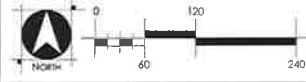


# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET

532-020-04  
WASHOE COUNTY



EAGLE CANYON IV UNIT 4  
UTILITY SHEET



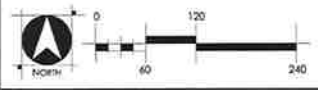
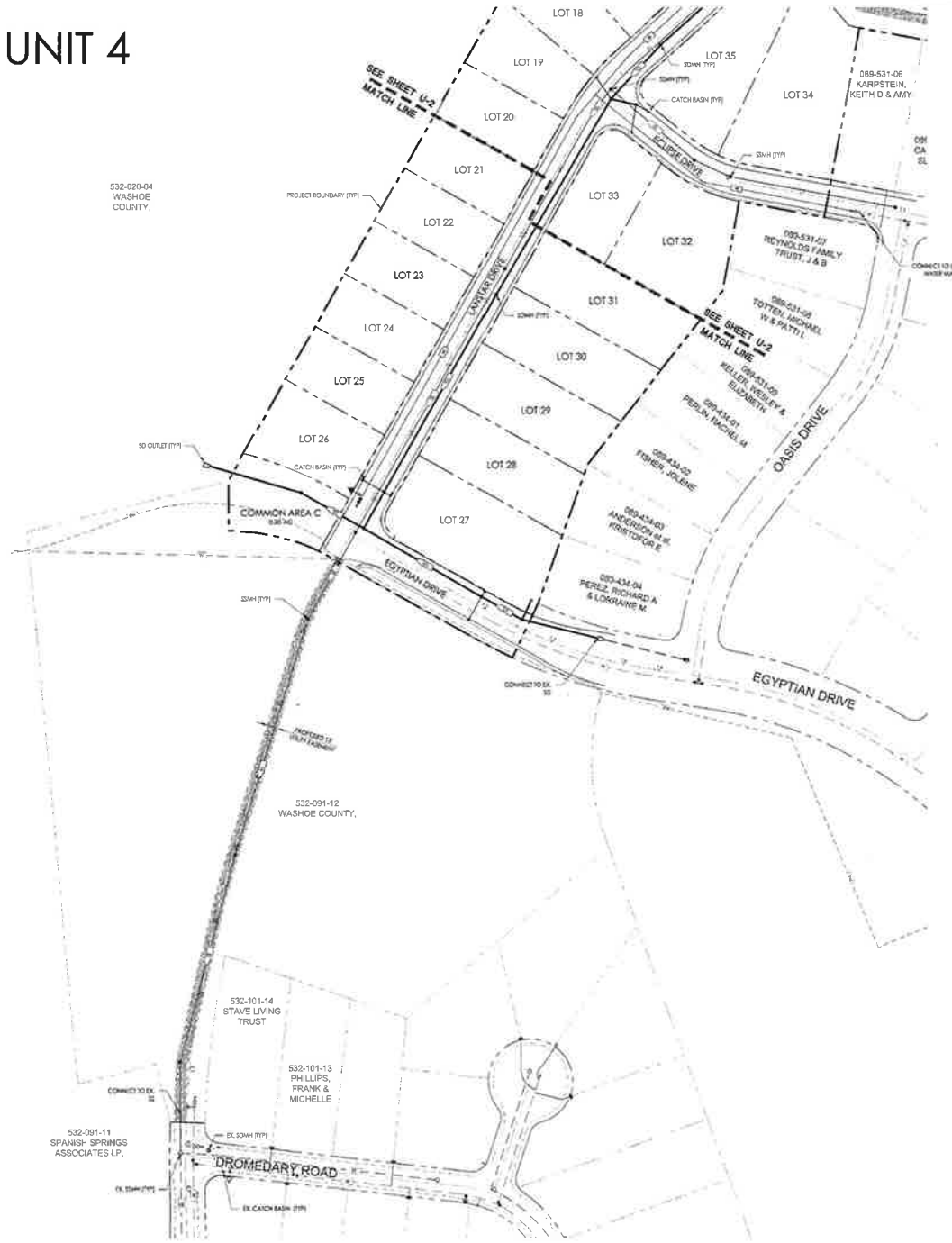
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1660.037 MAY 10, 2019  
SHEET U-2 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET



EAGLE CANYON IV UNIT 4  
UTILITY SHEET



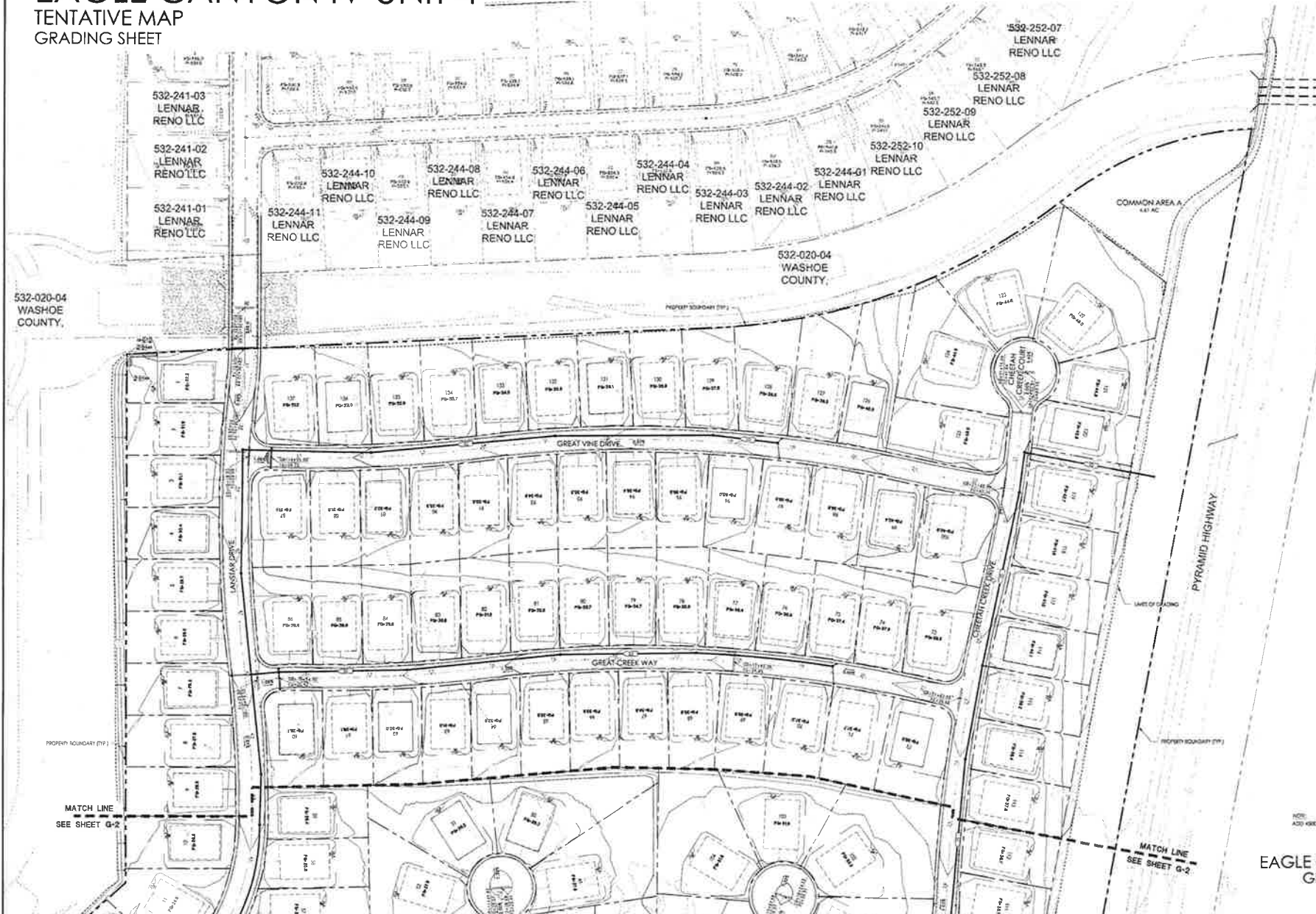
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1660.037 MAY 10, 2019  
SHEET U-3 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### GRADING SHEET



**GRADING STATISTICS**

ESTIMATED CUT	74,000 CY
ESTIMATED FILL	12,000 CY
ESTIMATED FILL AND CUT	30,000 CY
AREA OF DISTURBANCE	85.1 AC
NET SLOPE AREA	55.1 AC

NOTE:  
ADD 48" TO ALL PG. ELEVATIONS

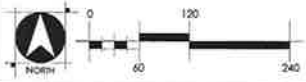
## EAGLE CANYON IV UNIT 4

### GRADING SHEET



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1660.037 SHEET G-1 OF 14 MAY 10, 2019

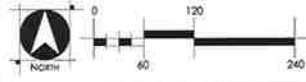


# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### GRADING SHEET

532-020-04  
WASHOE COUNTY



EAGLE CANYON IV UNIT 4  
GRADING SHEET

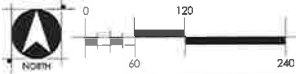
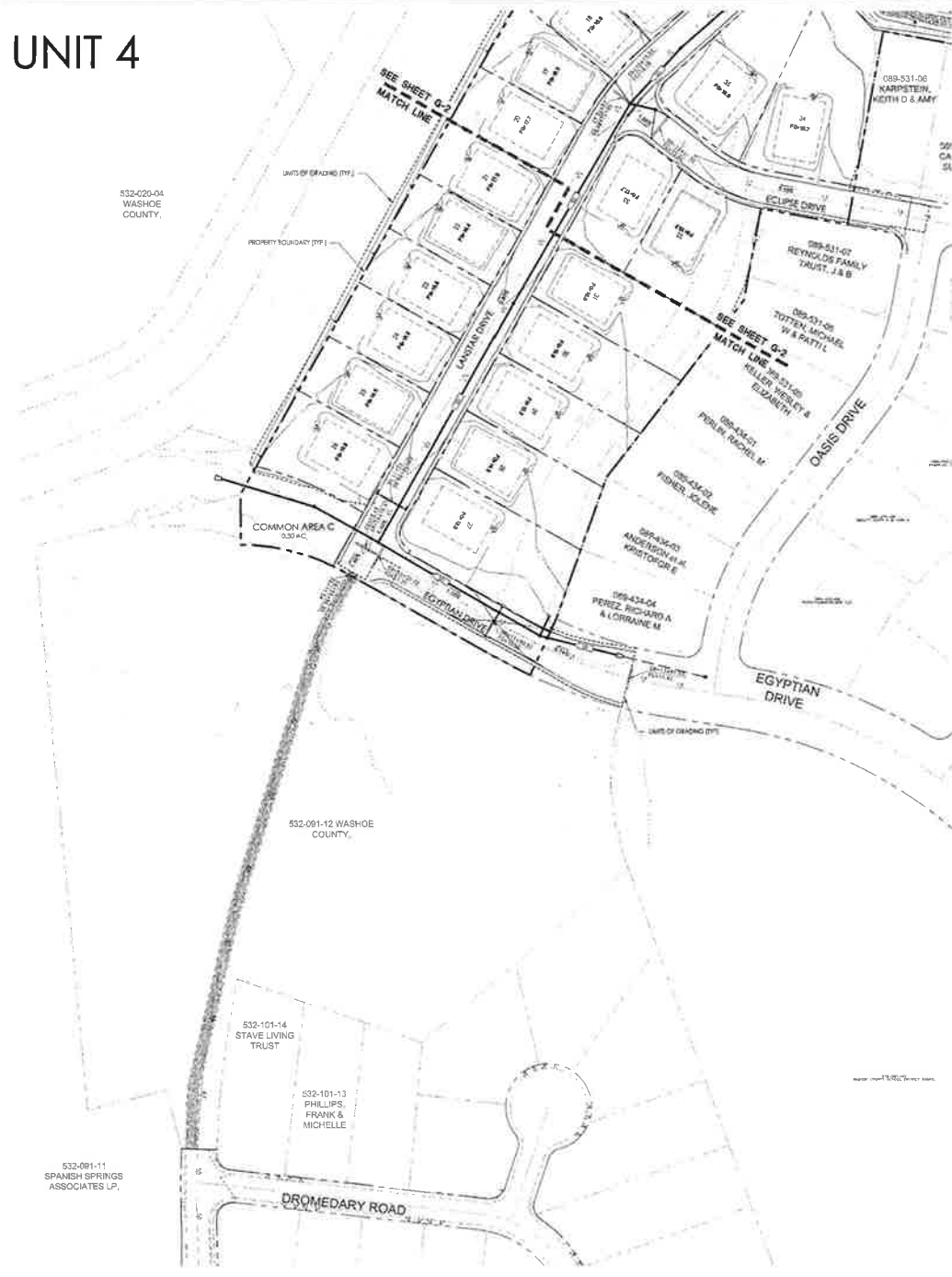
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1660.037 MAY 10, 2019  
SHEET G-2 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### GRADING SHEET



NOTE:  
ADD 400 TO ALL PG. ELEVATIONS

## EAGLE CANYON IV UNIT 4

### GRADING SHEET



**WOOD RODGERS**  
 BUILDING RELATIONSHIPS ONE PROJECT AT A TIME  
 1361 Corporate Blvd Reno, NV 89502 Tel 775.823.4068  
 Fax 775.823.4066

1660.037 MAY 10, 2019  
 SHEET G-3 OF 14



# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LANDSCAPE SHEET



**LEGEND:**

	PAVED AREA
	COMMON AREA
	LOT AREA
	PAD
	SCALELINE
	TREE

**LANDSCAPING GENERAL NOTES**

1) ALL PLANTING AND IRRIGATION SHALL BE IN ACCORDANCE WITH LOCAL GOVERNING CODES.

2) FINAL PLANT SELECTION AND LAYOUT WILL BE BASED ON SOUND HORTICULTURE PRACTICES RELATING TO MICRO-CLIMATE, SOIL, AND WATER REGIMES. ALL TREES WILL BE STAGED TO AS TO SEASON, LIFESPAN AND RUMIN FOLLOWING INSTALLATION. PLANT SIZE AND QUALITY AT THE TIME OF PLANTING WILL BE PER THE AMERICAN STANDARD FOR NURSERY STOCK.

3) ALL PLANTER BEDS WILL RECEIVE 2" TOP DRESSING OF MULCH WITH WEED CONTROL.

4) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. TURF GRASS WILL BE IRRIGATED USING LOW ANGLE SPRAY ROTARY AND/OR WHEEL RIGIDS TO REDUCE WIND DRIFT. CONIFER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURE REQUIREMENTS OF EACH SPECIES. THE IRRIGATION SYSTEM WILL BE DESIGNED TO ALLOW FULL IRRIGATION OF THE SITE BASED ON A THREEDAY WEEKLY WATERING SCHEDULE. A REDUCED PRESSURE FRIE BACKFLOW PREVENTER (RFP) WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.

5) LANDSCAPE REQUIREMENTS PER WASHOE COUNTY DEVELOPMENT CODE ZONING: MEDIUM RESIDENTIAL.

6) SUPERVISION PERMITS: NEW RESIDENTIAL SUBDIVISION. (REGARDLESS OF NUMBER OF OVERLAPPING LOTS PER PARCEL, SHALL PROVIDE AT LEAST ONE (1) TREE PER 1000 SQ. LINEAR FEET OF PERIMETER FRONTAGE ADJOINING AN ARTERIAL OR COLLECTOR ROADWAY IN THE WASHOE COUNTY DEVELOPMENT PLAN SHEET AND UTM PLAN SYSTEM MAP.

**TREE CALCULATIONS**

RESIDENTIAL STREET TREES REQUIRED: 1:11  
 1 PER 30 FT OF STREET FRONTAGE

## EAGLE CANYON IV UNIT 4

### LANDSCAPE SHEET

**WOOD RODGERS**  
 BUILDING RELATIONSHIPS ONE PROJECT AT A TIME

1361 Corporate Blvd Tel 775.823.4068  
 Reno, NV 89502 Fax 775.823.4066

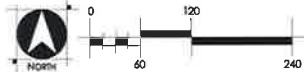
1660.037 MAY 10, 2019  
 SHEET LS-1 OF 14



# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LANDSCAPE SHEET



EAGLE CANYON IV UNIT 4  
LANDSCAPE SHEET



**WOOD RODGERS**  
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME  
1381 Corporate Blvd Reno, NV 89502 Tel 775.823.4068 Fax 775.823.4068

1660.037 MAY 10, 2019

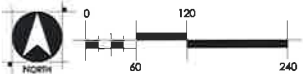
SHEET LS-2 OF 14

# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LANDSCAPE SHEET

532-020-04  
WASHOE COUNTY,



EAGLE CANYON IV UNIT 4  
LANDSCAPE SHEET



**WOOD RODGERS**  
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME  
1381 Corporate Blvd Reno, NV 89502  
Tel: 775.823.4068 Fax: 775.823.4068

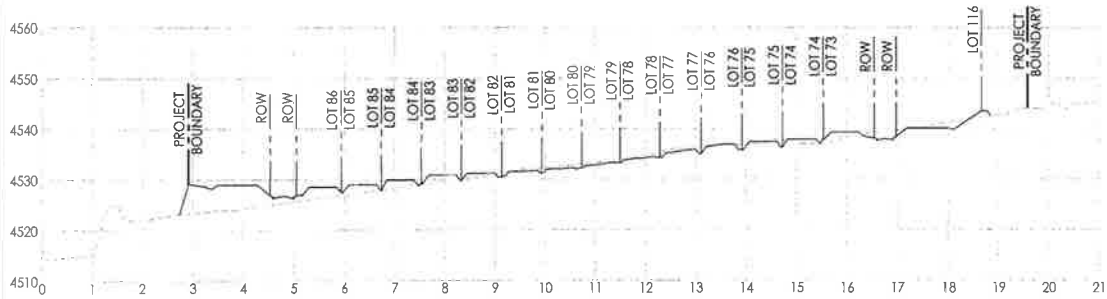
1660 037 MAY 10, 2019  
SHEET LS-3 OF 14



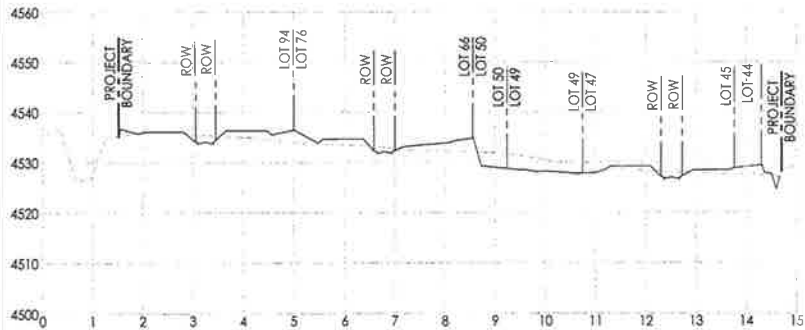
# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### CROSS SECTIONS



CROSS SECTION B  
SCALE: 1"=40' HORIZ.  
1"=10' VERT.



CROSS SECTION A  
SCALE: 1"=40' HORIZ.  
1"=10' VERT.



EAGLE CANYON IV UNIT 4  
CROSS SECTIONS



**WOOD RODGERS**  
BUILDING RELATIONSHIPS. ONE PROJECT AT A TIME.  
1361 Corporate Blvd Tel: 775.823.4088  
Reno, NV 89502 Fax: 775.823.4066

1660.037 MAY 10, 2019  
SHEET CS-1 OF 14

# Section 4

DOC # 4482039

06/23/2015 12:35:17 PM

Requested By  
TRUCKEE MEADOWS WATER AUTHORITY  
Washoe County Recorder  
Lawrence R. Burtness - Recorder  
Fee: \$25.00 RPTT: \$0.00  
Page 1 of 9

APN: 532-120-01, 532-020-09

**When Recorded, Return to:**

Truckee Meadows Water Authority  
Attn: Heather Edmunson, SR/WA, Land Agent  
P O Box 30013  
Reno, NV 89520-3013  
TMWA WO: 15-4349



**RETAIL WATER SERVICE AREA ANNEXATION AGREEMENT**

THIS AGREEMENT, entered into this 23<sup>rd</sup> day of June, 2015 ("Effective Date"), by and between TRUCKEE MEADOWS WATER AUTHORITY (the "Authority"), a Joint Powers Authority entity created pursuant to a cooperative agreement among the cities of Reno, Nevada, Sparks, Nevada and Washoe County, Nevada pursuant to N.R.S. Chapter 277, and MS RIALTO EAGLE CANYON NORTH NV, LLC, a Delaware limited liability company (referred to as "Developer" or "Owner" in this Agreement and exhibits attached hereto, and together with Authority collectively hereinafter referred to as "Parties");

WITNESSETH:

WHEREAS, Owner owns certain real property more particularly described on Exhibit "A" and shown on Exhibit "A-1" attached hereto and incorporated herein by this reference ("Property"), currently located outside of Authority's retail water service area;

WHEREAS, Owner desires the Authority to expand its retail water service area to provide water service to the Property

WHEREAS, the expansion of Authority's retail water service area may require dedication of certain real property or water system facility improvements to facilitate the efficient management and operation of Authority's system to include the Property in its retail water service area;

WHEREAS, Authority is willing to expand its retail water service area to include water service to the Property and Owner agrees to the expansion of Authority's retail water service area upon the terms and conditions set forth in this Agreement, subject to and on the express condition that Owner fully and completely perform the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and conditions herein contained, the Parties agree as follows:

1. Expansion of Water Service area. Authority agrees to expand its retail water service area as set forth in Exhibit "A" attached hereto to provide water service for the Property; provided, however, that such expansion of the Authority's retail water service area is specifically conditioned upon execution of this Agreement by Owner and the Authority, and the complete and satisfactory

performance of the terms and conditions in Section 2 herein by Owner and its permitted successors and assigns, to the extent applicable.

2. Conditions to Annexation. The following conditions must be satisfied within the time frames stipulated below or this Agreement shall automatically terminate, and the Property shall be deemed de-annexed from the Authority retail service area.

2.1 Construction/Dedication of Facility Improvements. The Authority has determined that additions, improvements and/or modifications to its Water System Facilities are required to expand its retail water service area to include the Property. Owner is responsible for all costs related to, and except as otherwise provided herein, shall install and construct the off-site additions, improvements and modifications to the Authority's Water System Facilities as delineated in Exhibit "B" attached hereto and incorporated herein by this reference. Owner shall submit a complete Application for New or Modified Water Service and enter a Water Service Agreement with Authority for the completion of the foregoing Water Facilities (or portions thereof, for phased development) no later than twenty-four (24) months from the Effective Date of this Annexation Agreement, or this Agreement shall automatically terminate, and the Property shall be deemed de-annexed from the Authority retail service area. For phased development, Owner shall continue to submit complete Applications for New or Modified Water Service and enter into Water Service Agreements for subsequent phases no later than twenty-four months from the Effective Date of the previous Water Service Agreement, or this Agreement shall automatically terminate and portions of the Property not actively receiving water service from Authority shall be deemed de-annexed from the Authority retail service area. Authority shall have no obligation to provide water service to any portion of the Property until required water system facilities are completed to the satisfaction of Authority.

2.2 Dedication of Real Property. No dedication of real property is required as a condition of expanding the Authority's retail water service area to include the Property.

3. Conditions of Water Service. Owner acknowledges and agrees that this Agreement merely addresses conditions required for the expansion of Authority's retail water service area, and that Owner must independently comply with all applicable requirements in Authority's Rules before the Authority has any obligation to provide water service to the Property, including without limitation (i) submitting and receiving approval from the Authority of appropriate applications for service; (ii) dedicating sufficient Water Resources to the Authority and receiving a Will Serve Commitment for service to the Property; (iii) in addition to any dedication requirements in Section 2 of this Agreement, dedicating appropriate easements and other real property required for service; (iv) in addition to any dedication requirements in Section 2 of this Agreement, installing, constructing and dedicating subdivision or on-site water system facility additions, improvements or modifications or further additions, improvements, extensions or modifications to Authority's Water System Facilities as necessary to provide the requested new service(s) or modification of service(s) to the Property; and (v) satisfying such other terms and conditions pursuant to the Authority's Rules and any requirements of any local governmental entity with jurisdiction over the Property as necessary to obtain a Will-Serve Commitment letter from the Authority for the delivery of water to the Property. Owner shall submit such applications and execute such other documents required by Authority's Rules and procedures prior to being eligible for the delivery of water to the Property. All such conditions, dedications, additions, improvements, extensions and modifications shall be made in accordance with the

Authority's Rules and regulations in effect at the time Authority and Owner enter into any agreement or agreements for the specific dedication, additions, improvements or modifications required to provide water service to the Property.

4. General Terms

4.1 Owner acknowledges and agrees that it is entering this Agreement voluntarily, that the expansion of Authority's service area is specifically conditioned on Owner's performance of all terms and conditions contained herein, and that if any of the provisions of this Agreement are deemed unenforceable or if Owner fails to perform any of its obligations hereunder, Authority is under no obligation to expand its service area to include any portion of the Property for which the Authority has not previously entered an agreement to provide water service. Nothing in this paragraph shall be construed to grant Owner a right, and Owner specifically waives any right, if any exists, to dispute any of the terms and conditions of this Agreement under Rule 8 in Authority's Rules, as such may be amended from time to time. Upon annexation of the Property, the Parties acknowledge and agree that both are bound by the terms and conditions of the rules and regulations adopted by Authority, as the rules and regulations may be amended from time to time, and as such rules may exist at the time service is applied for or requested for the Property or certain phases of the Property.

4.2. Any written notices or communications required hereunder shall be served by placing such notices in the U.S. Mail, postage prepaid, properly addressed to the following:

To: Authority	Truckee Meadows Water Authority Attn. General Manager P.O. Box 30013 Reno, NV 89520-3013
To: Owner	MS Rialto Eagle Canyon North NV, LLC Attn: Tim Scheideman 10345 Professional Circle, Suite 100 Reno, NV 89521

4.3. This Agreement shall inure to and be binding upon the parties, their respective successors and assigns.

4.4. This Agreement shall not be modified except in writing, signed by all parties.

4.5. This Agreement represents the entire agreement between the Parties related to the expansion of the Authority's retail water service area and supersedes all prior representations and agreements whether written or oral with respect to the covenants and conditions provided herein; provided, however, that the obligations set forth in this Agreement shall be in addition to, and do not supersede or replace, any obligations that may be imposed upon Owner under Authority's Rules.

4.6 This Agreement and terms and conditions herein shall run with the land and be binding upon and inure to the benefit and burden of the parties to the agreement and their heirs, successors and assigns and any future owners of the Property.

4.7 Neither this Agreement nor any of the terms set forth herein shall be effective or binding on Authority until this Agreement is executed by Authority, and the Authority will be under no obligation to execute this Agreement if not executed and returned by Owners to the Authority by September 10, 2015.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement the day and year first above written.

TRUCKEE MEADOWS WATER  
AUTHORITY, A Joint Powers Authority

MS RIALTO EAGLE CANYON  
NORTH NV, LLC, A Delaware  
Limited Liability Company

By: Mark Foree  
MARK FOREE, General Manager

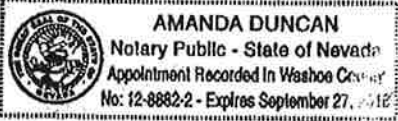
By: SEE ATTACHED PAGE

Name: \_\_\_\_\_

Title: \_\_\_\_\_

STATE OF NEVADA )  
                                  ) ss  
COUNTY OF WASHOE )

This instrument was acknowledged before me on June 23rd, 2015, by MARK FOREE as General Manager, of Truckee Meadows Water Authority, on behalf of said Joint Powers Authority therein named.

  
AMANDA DUNCAN  
Notary Public - State of Nevada  
Appointment Recorded In Washoe County  
No: 12-8882-2 - Expires September 27, 2016  
9/27/2016 AD

Amanda Duncan  
NOTARY PUBLIC

STATE OF Nevada )  
                                  ) ss  
COUNTY OF Washoe )

This instrument was acknowledged before me on June 23, 2015, by Dustin Barboer, as Vice President, of MS RIALTO EAGLE CANYON NORTH NV, LLC on behalf of said Delaware limited liability company therein named.

  
NOLA SPEIGEL  
Notary Public, State of Nevada  
Appointment No. 10-1640-2  
My Appt. Expires Mar 26, 2018

Nola Speigel  
NOTARY PUBLIC

MS RIALTO EAGLE CANYON NV, LLC, a  
Delaware limited liability company

By: MS RIALTO RESIDENTIAL HOLDINGS,  
LLC, a Delaware limited liability company,  
its member

By: MSR HOLDING COMPANY, LLC,  
a Delaware limited liability  
company, its member

By: U.S.HOME CORPORATION, a  
Delaware corporation, its Manager

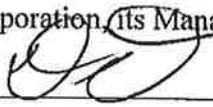
By:   
Name: Dustin Barker  
Title: Vice President

EXHIBIT "A"  
DESCRIPTION OF PROPERTY

REAL PROPERTY IN THE UNINCORPORATED AREA OF THE COUNTY OF WASHOE,  
STATE OF NEVADA, DESCRIBED AS FOLLOWS:

PARCEL ONE:

PARCEL B-1, AS SHOWN ON THE OFFICIAL MAP OF "EAGLE CANYON IV-UNIT 2", FILED  
IN THE OFFICE OF THE RECORDER OF WASHOE COUNTY, NEVADA, ON MAY 11, 2006  
AS FILE NO. 3386313, TRACT MAP 4647.

EXCEPTING THEREFROM ALL WATER RIGHTS, AGGREGATES, MINERALS, GAS, OIL,  
COAL, HYDROCARBON, SHALE STEAM, GEOTHERMAL AND OTHER SUBTERRANEAN  
RIGHTS IN SAID LAND, WITHOUT HOWEVER, THE RIGHT OF SURFACE ENTRY, AS  
RESERVED BY SPANISH SPRINGS ASSOCIATES LIMITED PARTNERSHIP IN THE DEED  
RECORDED DECEMBER 28, 2005, AS INSTRUMENT NO. 3329706, WASHOE COUNTY  
OFFICIAL RECORDS.

APN: 532-120-01

PARCEL TWO:

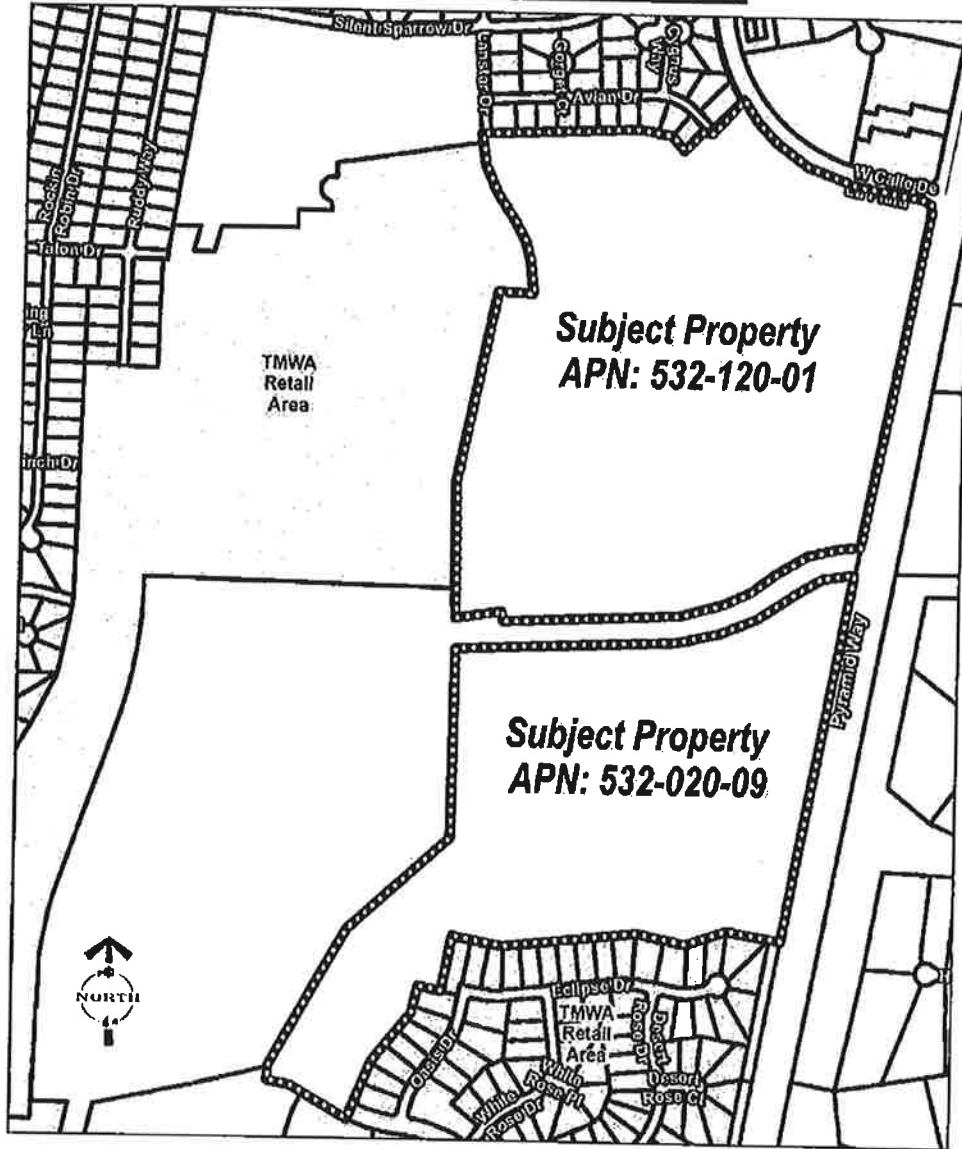
PARCEL C OF PARCEL MAP NO. 4492, "3<sup>RD</sup> PARCEL MAP FOR SPANISH SPRINGS  
ASSOCIATES LIMITED PARTNERSHIP", RECORDED DECEMBER 14, 2005, OFFICIAL  
RECORDS, WASHOE COUNTY, STATE OF NEVADA, AS DOCUMENT NO. 3323108.

APN: 532-020-09

[LEGAL DESCRIPTION WAS REFERENCED FROM THAT CERTAIN GRANT, BARGAIN  
AND SALE DEED RECORDED AS DOCUMENT NO. 3598473 ON NOVEMBER 29, 2007 IN  
THE OFFICE OF THE COUNTY RECORDER OF WASHOE COUNTY, STATE OF NEVADA.]



**EXHIBIT A-1**



**ANNEXATION EXHIBIT MAP FOR  
MS RIALTO EAGLE CANYON NORTH NV,  
LLC, A NEVADA LIMITED  
LIABILITY COMPANY  
APN: 532-020-09, 532-120-01**

## EXHIBIT B

### EAGLE CANYON IV SUBDIVISION – UNITS 3, 4 AND 5 SUMMARY OF MAJOR FACILITY REQUIREMENTS AND APPROXIMATE COSTS TO BE PAID BY DEVELOPER

**Table 1: Estimated Major Water Facility Costs**

Facility Description	Quantity	Unit	Unit Cost	Total Cost	Comments
Pressure Regulating Station	one	each	\$60,000	\$60,000	Rule 5
Area 12 Facility Charge	367.5	per gpm	\$5,789	\$2,127,458	Rate Schedule WSF
Supply and Treatment Facility Charge	367.5	per gpm	\$4,163	\$1,529,902	Rate Schedule WSF
<b>Estimated Cost</b>				<b>\$3,717,360</b>	2015 planning level estimate only

Notes:

1. Water System Facility Charges are determined based on the maximum day demand (MDD) of the development. The above MDD is estimated and will be determined at the time final development plans are submitted with a formal application for water service. All facility requirements listed above are preliminary and are subject to change during the final planning and design process.
2. Review of conceptual plans or tentative maps by TMWA does not constitute an application for service, nor implies a commitment by TMWA for planning, design or construction of the water facilities necessary for service. The extent of required off-site and on-site water Infrastructure Improvements will be determined by TMWA upon receiving a specific development proposal or complete application for service and upon review and approval of a water facilities plan by the local health authority. Because the NAC 445A Water System regulations are subject to interpretation, TMWA cannot guarantee that a subsequent water facility plan will be approved by the health authority or that a timely review and approval of the Project will be made. The Applicant should carefully consider the financial risk associated with committing resources to their project prior to receiving all required approvals. After submittal of a complete Application for Service, the required facilities, the cost of these facilities and associated fees will be estimated and will be included as part of the Water Service Agreement necessary for the Project. All fees must be paid to TMWA prior to water delivery to the Project.



## WASHOE COUNTY RECORDER

OFFICE OF THE COUNTY RECORDER  
LAWRENCE R. BURTNES, RECORDER

1001 E. NINTH STREET  
POST OFFICE BOX 11130  
RENO, NEVADA 89520-0027  
PHONE (775) 328-3661  
FAX (775) 325-8010

### LEGIBILITY NOTICE

The Washoe County Recorder's Office has determined that the attached document may not be suitable for recording by the method used by the Recorder to preserve the Recorder's records. The customer was advised that copies reproduced from the recorded document would not be legible. However, the customer demanded that the document be recorded without delay as the parties rights may be adversely affected because of a delay in recording. Therefore, pursuant to NRS 247.120 (3), the County Recorder accepted the document conditionally, based on the undersigned's representation (1) that a suitable copy will be submitted at a later date (2) it is impossible or impracticable to submit a more suitable copy.

By my signing below, I acknowledge that I have been advised that once the document has been microfilmed it may not reproduce a legible copy.

A handwritten signature in cursive script, appearing to read "Amanda Duncan".

Signature

A handwritten date "6/23/2015" in cursive script.


Date

The name "Amanda Duncan" printed in a standard serif font.

Printed Name

Date: May 11, 2015

To: Karen Meyer

From: Susan Whittet 

RE: 15-4349, Eagle Canyon IV, Units 3, 4 & 5 - 330 Single Family Residence Lots  
Assessor's Parcel Numbers APN: 532-120-01, 532-020-09

Applicant: MS Rialto Eagle Canyon North NV, LLC

The New Business/Water Resource team will answer the following assumptions on each new discovery:

- Is the property within Truckee Meadows Water Authority's water service territory?
- Does the property have Truckee River water rights appurtenant to the property or resource credits associated with the property?
  - If yes, what is the status of the water right: Agricultural or Municipal and Domestic use?
- Estimated water demand for residential and or commercial projects.
- Any special conditions, or issues, that are a concern to TMWA or the customer.

The following information is provided to complete the Discovery as requested:

- The subject parcels (APN 532-120-01, 532-020-09) are **not** within Truckee Meadows Water Authority's (TMWA's) service territory. An annexation is required; which is paralleling this discovery.
- There are no Truckee River decreed water rights appurtenant to this project. The Applicant and/or owner will be required to follow TMWA's current rules, specifically Rule 7, and pay all fees associated with the water rights needed in order to obtain a will serve commitment letter. Washoe County Division of Water Resources records show that the owner/applicant owns permitted water rights. Those water rights would need to be dedicated by applicant/owner towards the project. Any remaining water rights required for the project, may be purchased from TMWA. Ground or surface water rights dedicated by the applicant/owner for this project must be permitted and must be reviewed and deemed acceptable by TMWA.
- Based on the information provided, 330 Single Family Residential (SFR) lots are estimated to require a domestic demand as follows: **Unit 3 (125 lots) = 70.58AF, Unit 4 (137 lots) = 77.01AF, Unit 5 = (68 lots) = 39.25AF**. Plans were not submitted for irrigation with your new business application; therefore, the estimated demand calculation can only be provided for the proposed single family residential lots. Once final plans are submitted, a more accurate demand will be calculated. *Please note, additional dedication may be required for irrigation and for domestic use if residential lots are not sewerred back to the Truckee River.*
- Any existing right of ways and public easements would need to be reviewed, and if needed the property owner will need to grant TMWA the proper easements and/or land dedications to provide water service to the subject properties. Property owner will be required, at its sole expense, to provide TMWA with a current preliminary title report for all subject properties. Owner will represent and warrant such property offered for dedication or easements to TMWA shall be free and clear of all liens and encumbrances. Owner is solely responsible for obtaining all appropriate permits, licenses, construction easements, subordination agreements, consents from lenders, and other necessary rights from all necessary parties to dedicate property or easements with title acceptable to TMWA.

To run the macro ctrl+I

EAGLE CANYON IV UNIT 3  
SURFACE WATER RIGHTS AND METER FUND CONTRIBUTION  
CALCULATION WORKSHEET

Line No.	Lot Number	Lot Size	Demand Calculation
1	1	11,754	0.51
2	2	12,395	0.52
3	3	12,473	0.53
4	4	12,103	0.52
5	5	12,687	0.53
6	6	11,926	0.52
7	7	13,141	0.54
8	8	13,867	0.55
9	9	16,596	0.59
10	10	22,118	0.64
11	11	16,640	0.59
12	12	14,758	0.56
13	13	13,969	0.55
14	14	13,181	0.54
15	15	13,321	0.54
16	16	12,149	0.52
17	17	14,213	0.55
18	18	22,779	0.65
19	19	16,396	0.58
20	20	14,875	0.56
21	21	14,398	0.56
22	22	13,921	0.55
23	23	16,138	0.58
24	24	16,676	0.59
25	25	16,654	0.59
26	26	17,632	0.60
27	27	12,800	0.53
28	28	12,800	0.53
29	29	12,800	0.53
30	30	12,800	0.53
31	31	12,800	0.53
32	32	17,722	0.60
33	33	18,693	0.61
34	34	14,181	0.55
35	35	14,181	0.55
36	36	14,181	0.55
37	37	14,181	0.55
38	38	14,181	0.55
39	39	14,181	0.55
40	40	15,241	0.57
41	41	15,899	0.58
42	42	15,877	0.58
43	43	14,374	0.56
44	44	12,787	0.53
45	45	12,710	0.53
46	46	13,020	0.54
47	47	13,020	0.54
48	48	13,020	0.54
49	49	13,640	0.55
50	50	15,035	0.57
51	51	13,923	0.55
52	52	14,111	0.55
53	53	14,218	0.55
54	54	15,715	0.58
55	55	16,772	0.59
56	56	14,036	0.55
57	57	28,653	0.69
58	58	25,304	0.67
59	59	14,201	0.55
60	60	16,627	0.59
61	61	19,160	0.62
62	62	15,920	0.58
63	63	22,022	0.64
64	64	26,462	0.68
65	65	19,041	0.62
66	66	17,472	0.60
67	67	14,195	0.55
68	68	14,195	0.55
69	69	14,195	0.55
70	70	14,195	0.55
71	71	14,195	0.55
72	72	14,195	0.55
73	73	16,977	0.59
74	74	17,897	0.60
75	75	15,020	0.57

76	76	18,103	0.61
77	77	15,614	0.57
78	78	13,363	0.54
79	79	13,363	0.54
80	80	13,363	0.54
81	81	13,871	0.55
82	82	15,180	0.57
83	83	17,714	0.60
84	84	17,690	0.60
85	85	16,739	0.59
86	86	15,678	0.58
87	87	17,875	0.60
88	88	12,762	0.53
89	89	12,264	0.52
90	90	12,797	0.53
91	91	13,753	0.55
92	92	14,494	0.56
93	93	19,088	0.62
94	94	18,165	0.61
95	95	18,165	0.61
96	96	18,112	0.61
97	97	24,007	0.66
98	98	18,911	0.61
99	99	13,567	0.54
100	100	13,430	0.54
101	101	14,924	0.56
102	102	14,973	0.57
103	103	17,480	0.60
104	104	18,268	0.61
105	105	17,328	0.60
106	106	14,189	0.55
107	107	14,179	0.55
108	108	13,938	0.55
109	109	13,782	0.55
110	110	15,740	0.58
111	111	14,237	0.55
112	112	12,555	0.53
113	113	12,056	0.52
114	114	12,056	0.52
115	115	12,056	0.52
116	116	12,056	0.52
117	117	12,316	0.52
118	118	13,664	0.55
119	119	15,348	0.57
120	120	12,624	0.53
121	121	12,628	0.53
122	122	12,090	0.52
123	123	12,090	0.52
124	124	12,090	0.52
125	125	<u>16,267</u>	<u>0.58</u>
		1,902,587	70.58
	Landscape Demand		0.00
	Less: Demand Credits		<u>0.00</u>
	NET PROJECT DEMAND		70.58

Water Rights (0.11 AF per AF of total demand) 7.76

TOTAL WATER RIGHTS REQUIRED 78.34

Price of Water Rights per AF	\$0	\$	0
Meter Contribution (per AF of NET PROJECT DEMAND)	\$1,830	\$	129,161
Will Serve Letter Preparation		\$	100
TOTAL TO TRUCKEE MEADOWS WATER AUTHORITY		\$	<u>129,261</u>
			=====

SUBMITTEE: MS Rialto Eagle Canyon North NV PHONE: (775) 834-8208  
 c/o Lennar Reno, LLC  
 APN: 532-120-01, 532-020-09 DATE: 5/11/2015  
 PROJ NO: 15-4349 CALC BY: Susan Whittet  
 REMARKS: PRICE OF WATER RIGHTS SUBJECT TO CHANGE.  
 PLEASE CALL TO VERIFY CURRENT PRICE.



To run the macro ctrl+l

EAGLE CANYON IV UNIT 4  
SURFACE WATER RIGHTS AND METER FUND CONTRIBUTION  
CALCULATION WORKSHEET

Line No.	Lot Number	Lot Size	Demand Calculation
1	1	13,635	0.55
2	2	13,860	0.55
3	3	13,860	0.55
4	4	13,860	0.55
5	5	13,860	0.55
6	6	13,860	0.55
7	7	13,860	0.55
8	8	13,860	0.55
9	9	15,510	0.57
10	10	17,305	0.60
11	11	12,340	0.52
12	12	13,219	0.54
13	13	12,781	0.53
14	14	12,761	0.53
15	15	12,761	0.53
16	16	12,750	0.53
17	17	16,289	0.58
18	18	12,736	0.53
19	19	12,734	0.53
20	20	12,737	0.53
21	21	12,740	0.53
22	22	12,743	0.53
23	23	12,745	0.53
24	24	14,899	0.56
25	25	21,162	0.64
26	26	21,162	0.64
27	27	17,817	0.60
28	28	18,462	0.61
29	29	19,560	0.62
30	30	18,712	0.61
31	31	16,869	0.59
32	32	14,347	0.56
33	33	22,367	0.65
34	34	16,936	0.59
35	35	14,178	0.55
36	36	13,616	0.55
37	37	20,131	0.63
38	38	18,903	0.61
39	39	16,144	0.58
40	40	15,138	0.57
41	41	15,138	0.57
42	42	15,138	0.57
43	43	15,138	0.57
44	44	15,138	0.57
45	45	18,440	0.61
46	46	16,539	0.59
47	47	16,837	0.59
48	48	17,710	0.60
49	49	14,695	0.56
50	50	17,689	0.60
51	51	16,930	0.59
52	52	15,114	0.57
53	53	14,407	0.56
54	54	14,402	0.56
55	55	14,687	0.56

56	56	13,537	0.54
57	57	19,366	0.62
58	58	15,794	0.58
59	59	18,794	0.61
60	60	12,193	0.52
61	61	12,372	0.52
62	62	12,860	0.53
63	63	18,568	0.61
64	64	20,240	0.63
65	65	24,816	0.67
66	66	12,948	0.53
67	67	13,647	0.55
68	68	14,897	0.56
69	69	10,840	0.49
70	70	17,466	0.60
71	71	17,702	0.60
72	72	15,805	0.58
73	73	12,859	0.53
74	74	19,523	0.62
75	75	13,641	0.55
76	76	12,325	0.52
77	77	12,325	0.52
78	78	14,500	0.56
79	79	13,050	0.54
80	80	13,050	0.54
81	81	13,050	0.54
82	82	13,050	0.54
83	83	12,346	0.52
84	84	14,592	0.56
85	85	16,028	0.58
86	86	14,113	0.55
87	87	13,601	0.54
88	88	14,827	0.56
89	89	18,040	0.60
90	90	22,420	0.65
91	91	21,479	0.64
92	92	17,019	0.59
93	93	13,981	0.55
94	94	13,701	0.55
95	95	13,098	0.54
96	96	12,379	0.52
97	97	12,346	0.52
98	98	12,346	0.52
99	99	12,346	0.52
100	100	12,346	0.52
101	101	12,346	0.52
102	102	12,346	0.52
103	103	12,346	0.52
104	104	12,346	0.52
105	105	13,664	0.55
106	106	13,758	0.55
107	107	12,430	0.53
108	108	12,345	0.52
109	109	12,574	0.53
110	110	13,209	0.54
111	111	13,545	0.54
112	112	13,881	0.55
113	113	14,217	0.55
114	114	14,553	0.56
115	115	14,889	0.56
116	116	15,225	0.57
117	117	12,862	0.53
118	118	13,347	0.54
119	119	12,213	0.52
120	120	14,806	0.56
121	121	16,447	0.59
122	122	27,243	0.68
123	123	26,867	0.68
124	124	16,591	0.59
125	125	15,615	0.57
126	126	14,752	0.56
127	127	14,099	0.55

128	128	14,518	0.56
129	129	13,191	0.54
130	130	13,175	0.54
131	131	13,175	0.54
132	132	13,175	0.54
133	133	13,175	0.54
134	134	13,175	0.54
135	135	13,457	0.54
136	136	13,961	0.55
137	137	13,987	0.55
		2,060,944	77.01
	Landscape Demand		0.00
	Less: Demand Credits		0.00
	NET PROJECT DEMAND		77.01

Water Rights (0.11 AF per AF of total demand) 8.47

TOTAL WATER RIGHTS REQUIRED 85.48

Meter Contribution (per AF of NET PROJECT DEMAND)	\$1,830	\$	140,928
Will Serve Letter Preparation		\$	100
TOTAL TO TRUCKEE MEADOWS WATER AUTHORITY		\$	<u>141,028</u>
			=====

SUBMITTEE: MS Rialto Eagle Canyon North NV      PHONE: (775) 834-8208  
                  c/o Lennar Reno, LLC  
APN: 532-120-01, 532-020-09      DATE: 5/11/2015  
PROJ NO: 15-4349      ALCED BY: Susan Whittet  
REMARKS: PRICE OF WATER RIGHTS SUBJECT TO CHANGE.  
                  PLEASE CALL TO VERIFY CURRENT PRICE.

To run the macro ctrl+

EAGLE CANYON IV UNIT 5  
SURFACE WATER RIGHTS AND METER FUND CONTRIBUTION  
CALCULATION WORKSHEET

Line No.	Lot Number	Lot Size	Demand Calculation
1	1	17,287	0.60
2	2	17,901	0.60
3	3	12,628	0.53
4	4	12,600	0.53
5	5	12,600	0.53
6	6	12,600	0.53
7	7	12,300	0.52
8	8	14,060	0.55
9	9	14,284	0.56
10	10	15,765	0.58
11	11	18,723	0.61
12	12	14,025	0.55
13	13	14,025	0.55
14	14	14,025	0.55
15	15	14,025	0.55
16	16	18,647	0.61
17	17	19,692	0.62
18	18	16,792	0.59
19	19	16,792	0.59
20	20	16,792	0.59
21	21	16,792	0.59
22	22	16,792	0.59
23	23	16,792	0.59
24	24	16,792	0.59
25	25	18,476	0.61
26	26	18,949	0.61
27	27	19,653	0.62
28	28	19,028	0.62
29	29	19,466	0.62
30	30	19,019	0.62
31	31	17,470	0.60
32	32	15,431	0.57
33	33	15,433	0.57
34	34	15,422	0.57
35	35	15,436	0.57
36	36	13,736	0.55
37	37	13,736	0.55
38	38	15,949	0.58
39	39	14,439	0.56
40	40	16,624	0.59
41	41	13,965	0.55
42	42	15,958	0.58
43	43	17,061	0.59
44	44	16,619	0.59
45	45	15,524	0.57
46	46	17,572	0.60
47	47	15,400	0.57
48	48	15,400	0.57
49	49	15,400	0.57
50	50	15,400	0.57
51	51	15,400	0.57
52	52	15,400	0.57
53	53	15,400	0.57
54	54	16,656	0.59
55	55	15,675	0.58
56	56	14,752	0.56
57	57	14,388	0.56
58	58	14,024	0.55
59	59	13,661	0.55
60	60	13,297	0.54
61	61	12,934	0.53
62	62	15,132	0.57
63	63	18,644	0.61
64	64	21,750	0.64

65	65	17,835	0.60
66	66	21,450	0.64
67	67	16,406	0.58
68	68	<u>15,182</u>	<u>0.57</u>
		1,087,283	39.25
		Landscape Demand	0.00
		Less: Demand Credits	<u>0.00</u>
		NET PROJECT DEMAND	39.25
		Water Rights (0.11 AF per AF of total demand)	<u>4.32</u>
		TOTAL WATER RIGHTS REQUIRED	<u>43.57</u>

Meter Contribution (per AF of NET PROJECT DEMAND)	\$1,830	\$	71,828
Will Serve Letter Preparation		\$	100
TOTAL TO TRUCKEE MEADOWS WATER AUTHORITY		\$	<u>71,928</u>
			=====

SUBMITTEE: MS Rialto Eagle Canyon North, NV      PHONE: (775) 834-8208  
c/o Lennar Reno, LLC

APN: 532-120-01, 532-020-09      DATE: 5/11/2015

PROJ NO: 15-4349      ALCED BY: Susan Whittet

REMARKS: PRICE OF WATER RIGHTS SUBJECT TO CHANGE.  
PLEASE CALL TO VERIFY CURRENT PRICE.

SOLAEGUI  
ENGINEERS

December 10, 2018

Mitchell Fink  
Washoe County Engineering Division  
1001 E. 9th Street  
Reno, Nevada 89521

RE: Eagle Canyon IV Update

Dear Mitchell:

This letter contains an updated review of projected traffic loadings on internal subdivision streets within the Eagle Canyon IV and V subdivisions in Spanish Springs. This update is provided due to the proposed elimination of a planned Eagle Canyon IV access roadway intersecting Pyramid Highway and the addition of a new access from the extension of Desert Rose Drive.

The proposed study area includes the portions of the Eagle Canyon IV and V subdivisions located west of Pyramid Highway, south of Silent Sparrow Drive, and southwest of Calle De La Plata. Primary access to the study area will be provided from Spruce Meadows Drive via Calle De La Plata, Cygnus Way and Lanstar Drive via Silent Sparrow Drive, the proposed extension of Desert Rose Drive via Egyptian Drive, and from the extension of Lanstar Drive to Egyptian Drive. Figure 1 graphically shows the study area and primary access roads.

The information contained in this letter includes trip generation calculations, trip distribution, trip assignment, and subsequent analysis of traffic loadings on the study area internal subdivision streets and two critical off-site streets. These items are discussed below.

Trip Generation

The Eagle Canyon IV and V subdivisions will include a combined total of approximately 609 single family dwelling units located within the study area. The Eagle Canyon V dwelling units located outside of the study area were not included in the trip generation analysis since access to these lots will be provided from streets outside of the study area. Trip generation was calculated based on trip generation equations obtained from the Tenth Edition of *ITE Trip Generation* (2017) for Land Use 210: Single Family Detached Housing. Table 1 shows a summary of the average daily traffic (ADT) volumes and peak hour volumes generated by the study area dwelling units. The trip generation calculation sheets are attached.

TABLE 1 TRIP GENERATION							
LAND USE	ADT	AM PEAK HOUR			PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Detached Housing (609 D.U.)	5,480	109	328	437	363	213	576



### Trip Distribution

The distribution of the trips generated by Eagle Canyon IV and V to Pyramid Highway was estimated based on existing peak hour traffic patterns and the locations of attractions and productions of project trips. It is anticipated that 95% of the study area traffic volume will approach/depart from Pyramid Highway to the south and the remaining 5% will approach/depart from Pyramid Highway to the north.

### Trip Assignment

The average daily traffic volumes shown in Table 1 were assigned to the access roadways and internal street network based on calculated travel times. Travel times were estimated based on posted speed limits and anticipated intersection delays with the Calle De La Plata/Spruce Meadows Drive intersection continuing to operate with right-in/right-out movements. The attached Figure 2 shows the projected average daily traffic volumes on the study area access roadways and internal streets at buildout of the 609 dwelling units.

It should be noted that some homes located in the northern portion of the study area have been constructed and many others are under construction. This construction activity makes it difficult to determine the number of occupied homes and volume of traffic on the existing study area streets that is generated by the occupied homes. It was for this reason that trip generation, distribution, and assignment calculations were performed for the full 609 dwelling units.

### Study Area Street Traffic Loading Review

The study area streets were reviewed for capacity based on Washoe County street standards. Washoe County street standards indicate that local streets can carry a maximum of 1,000 ADT and two-lane collector streets can carry a maximum of 7,300 ADT. However, collector streets with residential driveway access are reduced to a maximum capacity of 2,000 ADT.

The projected average daily traffic volumes shown on Figure 2 indicate that all on-site streets, with the exception of portions of Spruce Meadows Drive and Lanstar Drive are anticipated to carry traffic volumes of less than 1,000 ADT which indicate the need for local streets. The future segment of Lanstar Drive between Egyptian Drive and Garden Pond Way is anticipated to carry between 1,000 and 2,000 ADT which indicates the need for a collector street with residential driveway access permitted.

Spruce Meadows Drive has been constructed as a collector from Calle De La Plata to west of Lanstar Drive. This segment of roadway contains residential driveways which results in a maximum capacity of 2,000 ADT. The two segments of Spruce Meadows Drive between Calle De La Plata and Avian Drive and between Mallard Crest Drive and Lanstar Drive are anticipated to serve between 1,000 and 2,000 ADT which meet the collector with residential driveway access threshold.

The segment of Spruce Meadows Drive between Avian Drive and Mallard Crest Drive is anticipated to carry 2,020 ADT which slightly exceeds the 2,000 ADT threshold. Previous analysis of the study area streets, that included the planned full-movement access at Pyramid Highway, shows that the segment of Spruce Meadows Drive between Avian Drive and Mallard Crest Drive would serve less than 2,000 ADT and subsequently meet the collector with residential driveway access threshold. Eliminating the Pyramid Highway access is anticipated to provide a greater benefit to the public. An additional access on Pyramid Highway is likely to introduce potential for conflict and friction within the traffic stream and therefore increase the potential for accidents. It is suggested that the existing segment of Spruce Meadows Drive between Avian Drive and Mallard Crest Drive be allowed to slightly exceed the 2,000 ADT threshold. Figure 3 graphically shows the recommended street sections for the study area subdivision streets.

### Off-Site Street Traffic Loading Review

Off-site segments of Egyptian Drive and Desert Rose Drive were also reviewed for right-of-way requirements based on Washoe County street standards.

Egyptian Drive appears to be a minor arterial based on its 80 foot right-of-way width. Washoe County street standards indicate that residential driveway access is not allowed on minor arterials. However, two residential lots near Rosetta Stone Drive have driveway access on Egyptian Drive. Washoe County street standards also specify that the maximum ADT for minor arterials is dependent on the Regional Transportation Commission's (RTC) access control designation. Egyptian Drive is not classified as a regional roadway in the RTC's 2040 Regional Transportation Plan so no access control designation is specified. Capacity ranges for an arterial street were therefore reviewed based on previous versions of RTC's Regional Transportation Plan. Level of service C capacity thresholds range from 6,500 ADT for a two-lane ultra-low access control arterial to 17,300 ADT for a two-lane high access control arterials. Traffic counts conducted in November of 2018 indicate an existing traffic volume of 2,270 ADT on Egyptian Drive southeast of Rosetta Stone Drive. Buildout of the study area dwelling units is anticipated to add 2,520 ADT to this same segment which amounts to a total volume of 4,790 ADT. The buildout traffic volume of 4,790 ADT will fall below the LOS C threshold of 6,500 ADT for the lowest access control category of arterial street.

The off-site segment of Desert Rose Drive appears has a 50 foot right-of-way which signifies a local street section with a maximum capacity of 1,000 ADT. Traffic counts conducted in November of 2018 indicate an existing traffic volume of 185 ADT on Desert Rose Drive northeast of Egyptian Drive. Buildout of the study area dwelling units with the extension of Desert Rose Drive is anticipated to add 555 ADT to this same segment which amounts to a total volume of 740 ADT. The existing local street segment of Desert Rose Drive has sufficient capacity to serve the buildout traffic volumes.

We trust that this information will meet your requirements. Please contact us with any questions or concerns.

Very Truly Yours  
SOLAEGUI ENGINEERS, LTD  
PAUL W. SOLAEGUI  
CIVIL ENGINEER  
STATE OF NEVADA  
No. 7163  
Paul W. Solaegui, P.E.  
12-10-18  
EXP 6-30-20

Enclosures  
Letters\Eagle Canyon IV

# Single-Family Detached Housing (210)

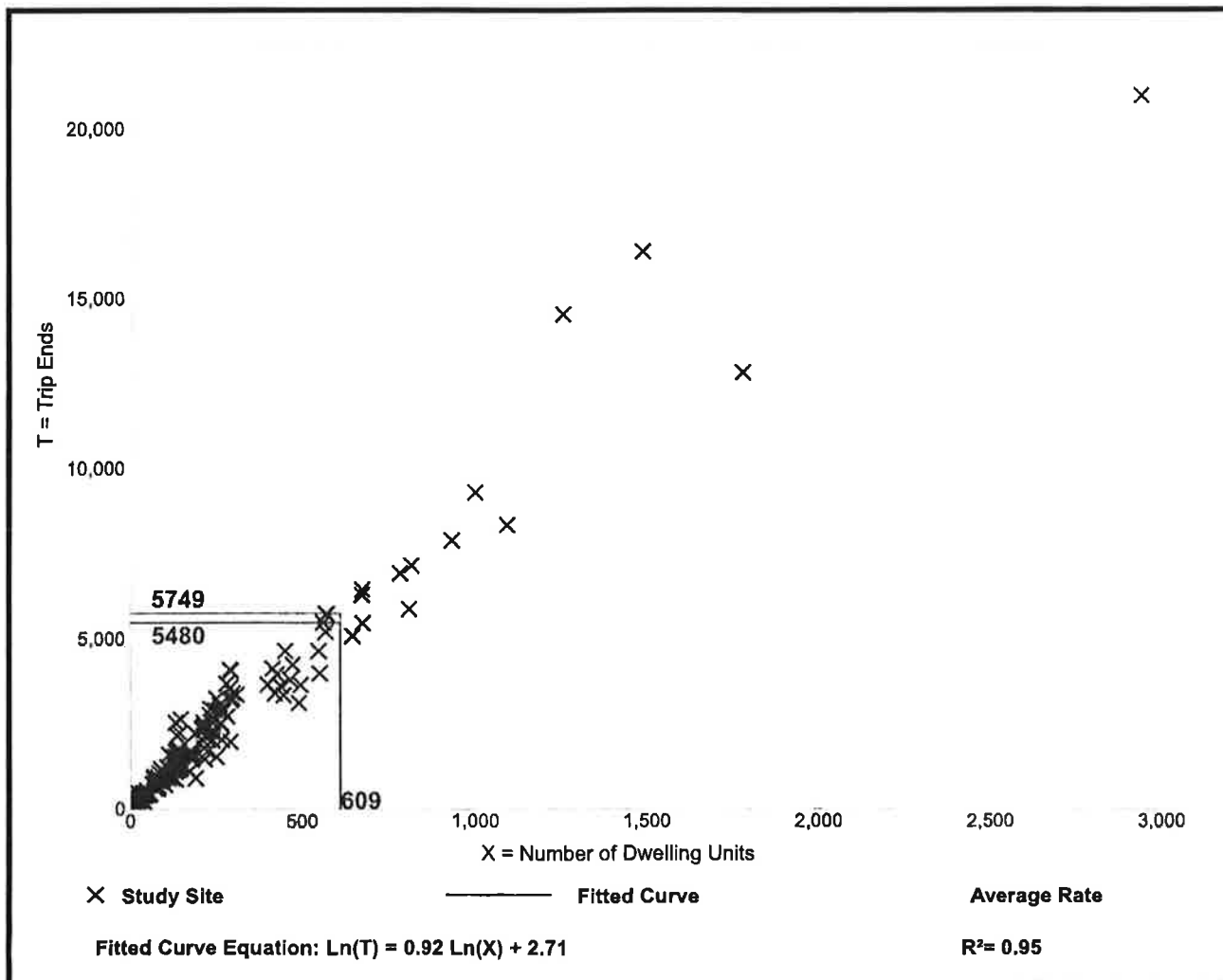
**Vehicle Trip Ends vs: Dwelling Units**  
**On a: Weekday**

**Setting/Location: General Urban/Suburban**  
Number of Studies: 159  
Avg. Num. of Dwelling Units: 264  
Directional Distribution: 50% entering, 50% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
9.44	4.81 - 19.39	2.10

## Data Plot and Equation



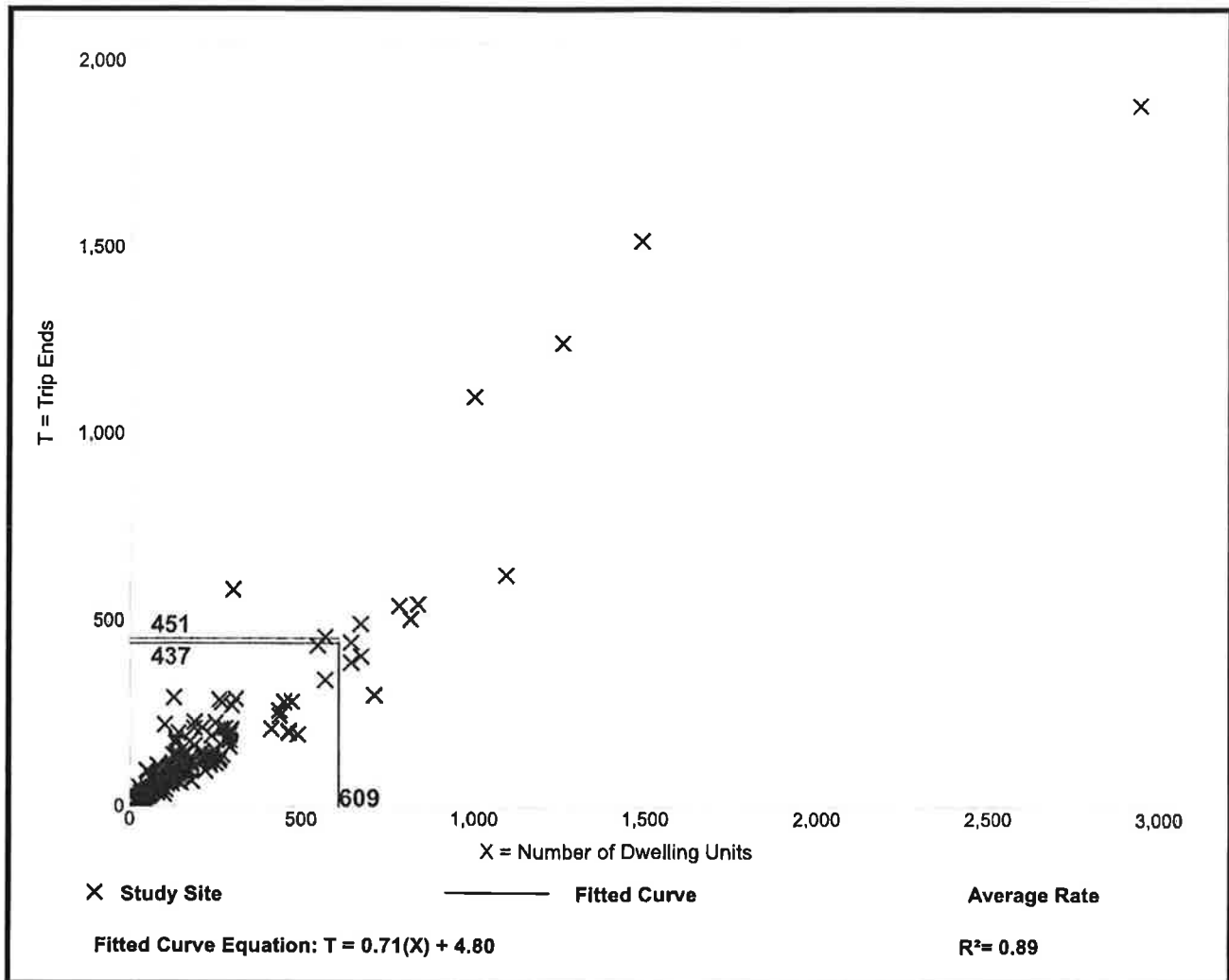
# Single-Family Detached Housing (210)

**Vehicle Trip Ends vs: Dwelling Units**  
**On a: Weekday,**  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 7 and 9 a.m.**  
**Setting/Location: General Urban/Suburban**  
 Number of Studies: 173  
 Avg. Num. of Dwelling Units: 219  
 Directional Distribution: 25% entering, 75% exiting

## Vehicle Trip Generation per Dwelling Unit

Average Rate	Range of Rates	Standard Deviation
0.74	0.33 - 2.27	0.27

## Data Plot and Equation



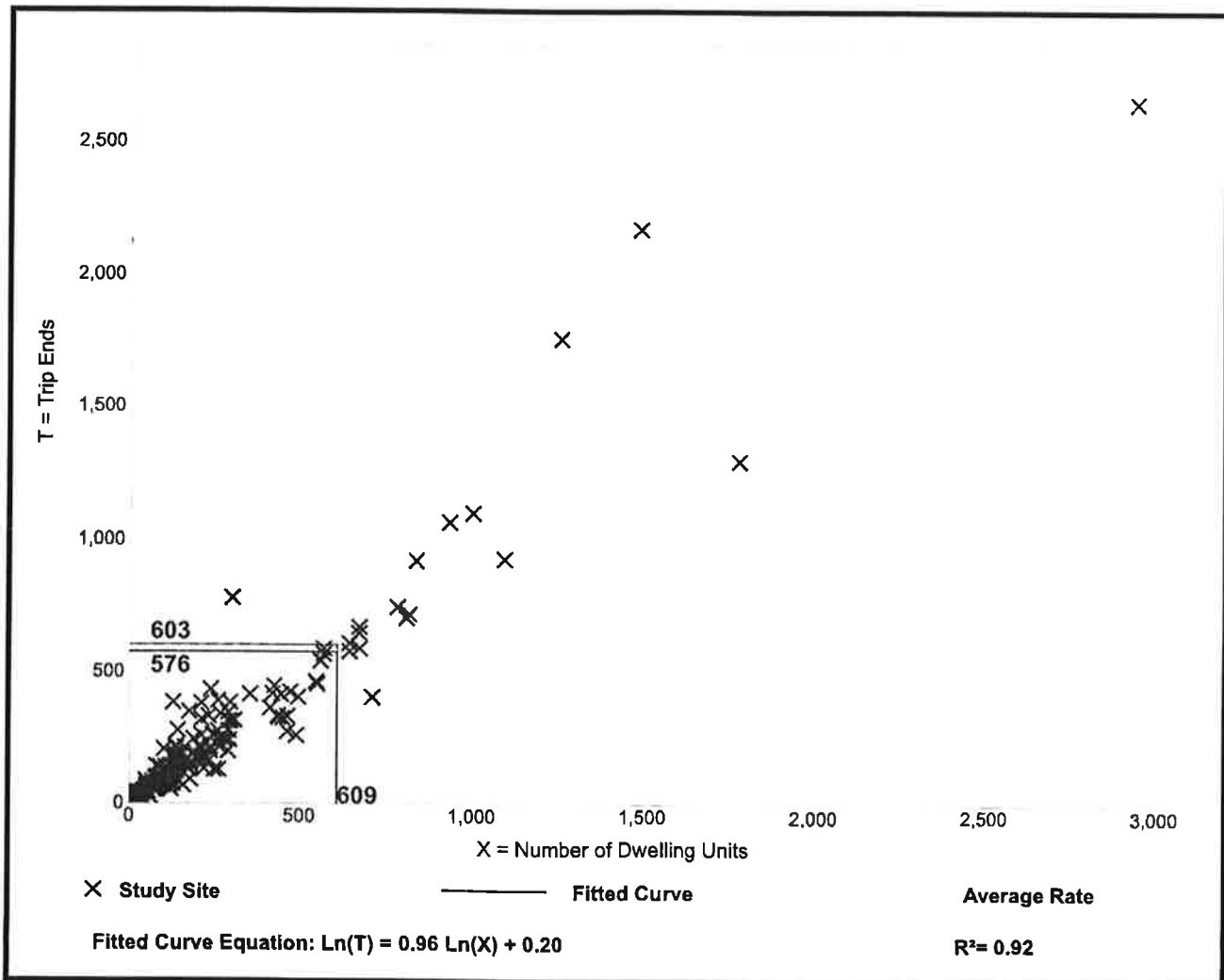
# Single-Family Detached Housing (210)

**Vehicle Trip Ends vs: Dwelling Units**  
**On a: Weekday,**  
**Peak Hour of Adjacent Street Traffic,**  
**One Hour Between 4 and 6 p.m.**  
**Setting/Location: General Urban/Suburban**  
 Number of Studies: 190  
 Avg. Num. of Dwelling Units: 242  
 Directional Distribution: 63% entering, 37% exiting

## Vehicle Trip Generation per Dwelling Unit

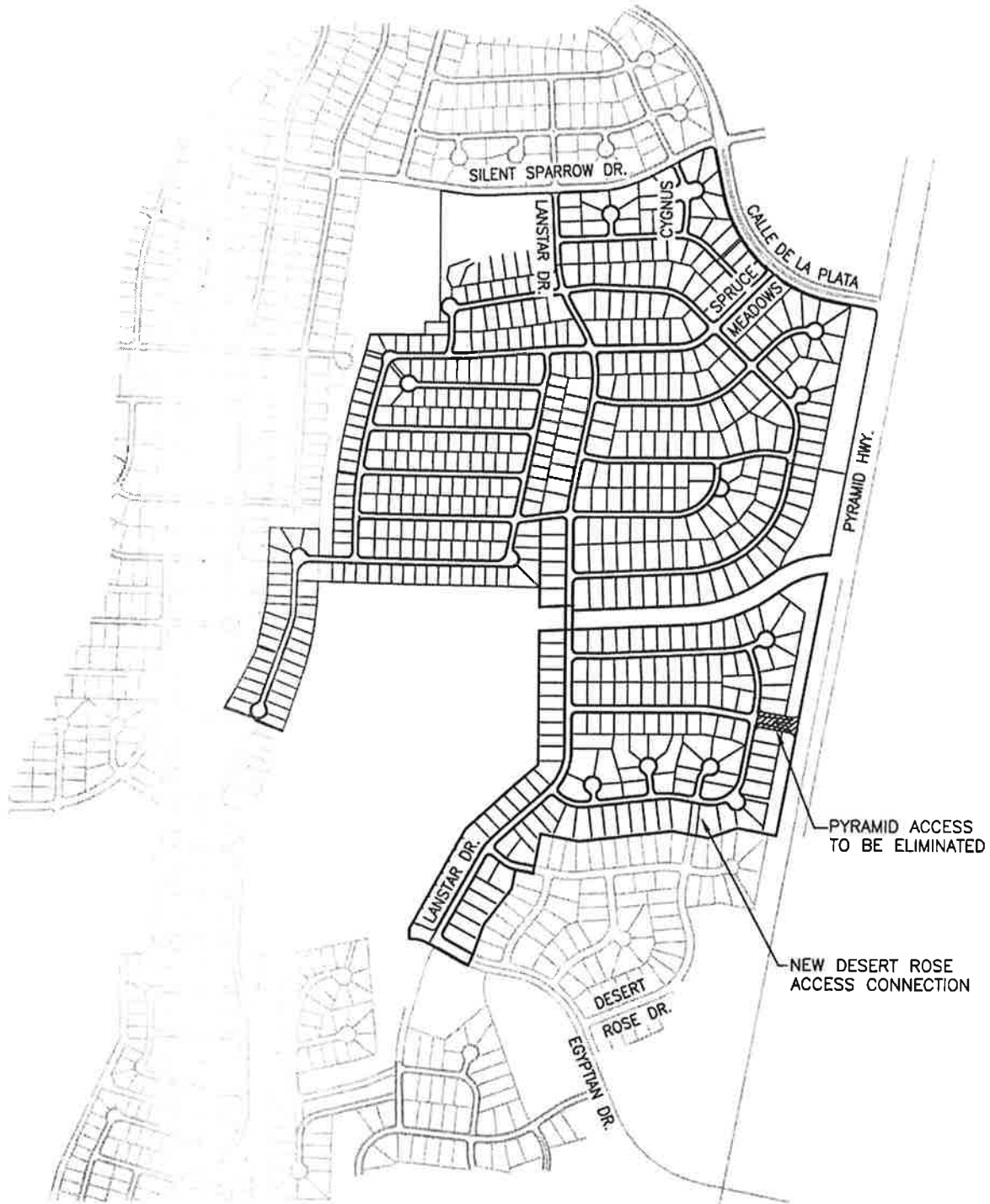
Average Rate	Range of Rates	Standard Deviation
0.99	0.44 - 2.98	0.31

## Data Plot and Equation



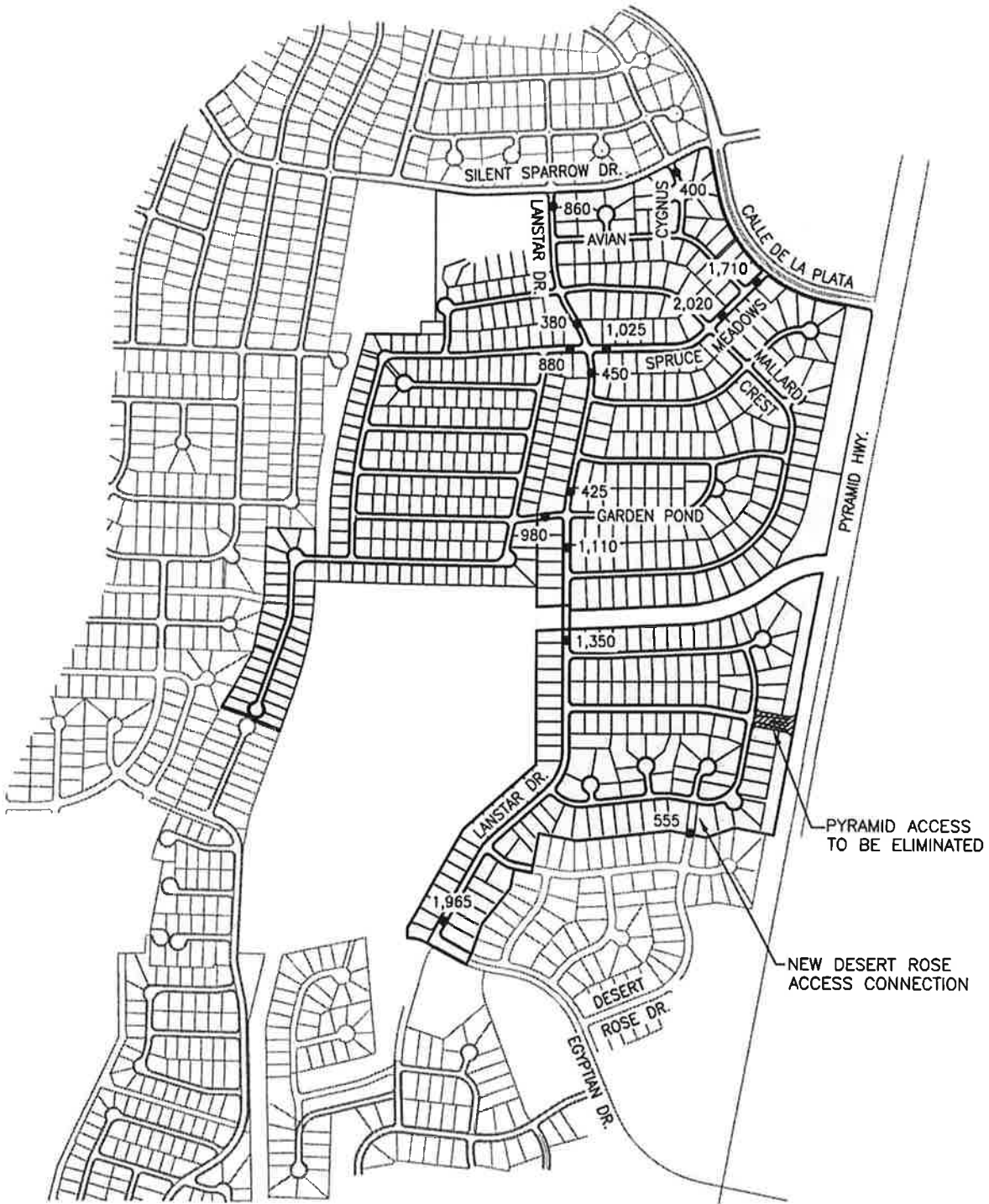


LEGEND  
STUDY AREA



EAGLE CANYON IV  
STUDY AREA  
FIGURE 1

LEGEND  
STUDY AREA



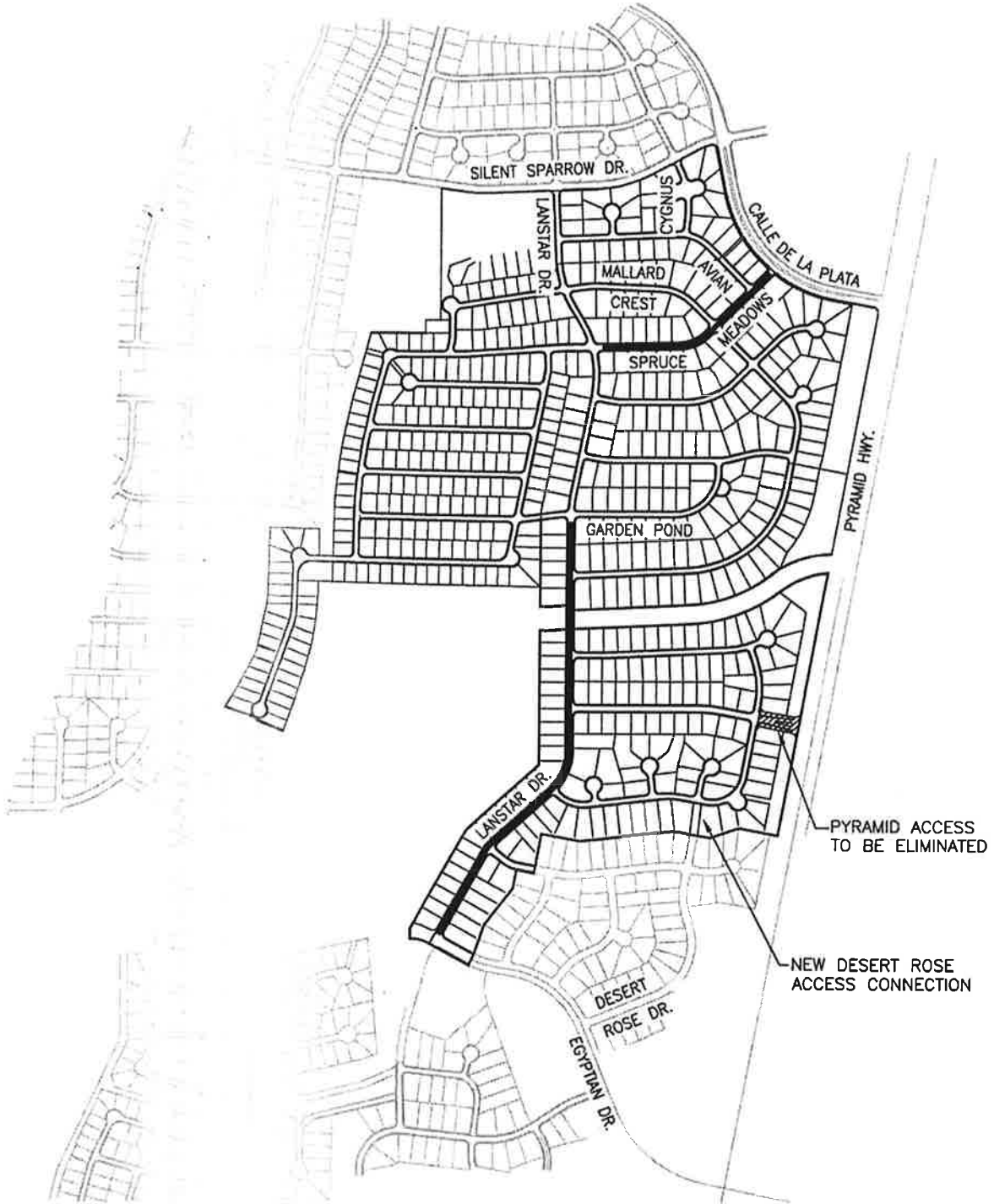
EAGLE CANYON IV  
PROJECTED AVERAGE DAILY TRAFFIC VOLUMES  
FIGURE 2

LEGEND

== LOCAL STREET

— COLLECTOR WITH RESIDENTIAL  
ACCESS PERMITTED

N.T.S.



EAGLE CANYON IV  
STUDY AREA STREET RECOMMENDATIONS  
FIGURE 3



May 15, 2019

Washoe County  
1001 E. Ninth Street  
Reno, NV 89520

**RE: Eagle Canyon IV Unit 4 Tentative Map  
Drainage Letter**

To Whom it May Concern,

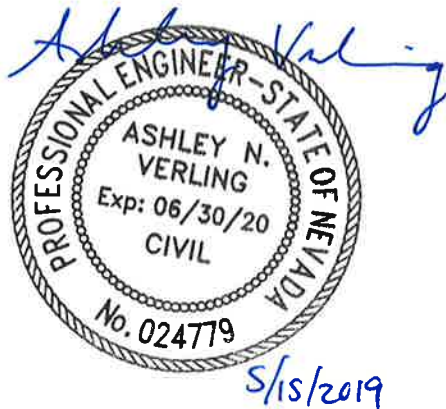
The drainage for Eagle Canyon IV Unit 4 has been previously studied as a part of the "Technical Drainage Report for Eagle Canyon IV Units 3, 4, & 5" prepared by Wood Rodgers Inc. and revised on December 1, 2016. A copy of this report can be provided if requested. Due to the fact that Unit 4 is isolated from Units 3 and 5 in terms of drainage, any revisions to the drainage system in Unit 4 will not affect the other units currently under construction.

The lot count for Eagle Canyon IV Unit 4 has not changed as a part of this tentative map. The major revisions include the removal of the access off of Pyramid Highway and an additional access being added as an extension of Desert Rose Drive. The general drainage patterns for Unit 4 are the same as they were in the master report mentioned above. Final pipe sizing will be included as a revision to the master report when the final improvement plans for the project are submitted. In addition, a small channel and path have been added behind the southern lots on the project to help mitigate the grading differences between the proposed and existing lots.

The original hydraulic basin map as well as a revised map are being provided to detail the difference in the drainage basins. As this unit was included in the master hydrology plan for the area, there will be no negative impacts on downstream improvements.

Should you have any questions or wish to discuss this further, please do not hesitate to contact me at 853-7456 or [averling@woodrogers.com](mailto:averling@woodrogers.com).

Sincerely,  
**WOOD RODGERS, INC.**



Ashley Verling, P.E.



# EAGLE CANYON IV & V

MS RIALTO EAGLE CANYON  
NORTH NV LLC

WASHOE COUNTY

NEVADA

APRIL, 2016

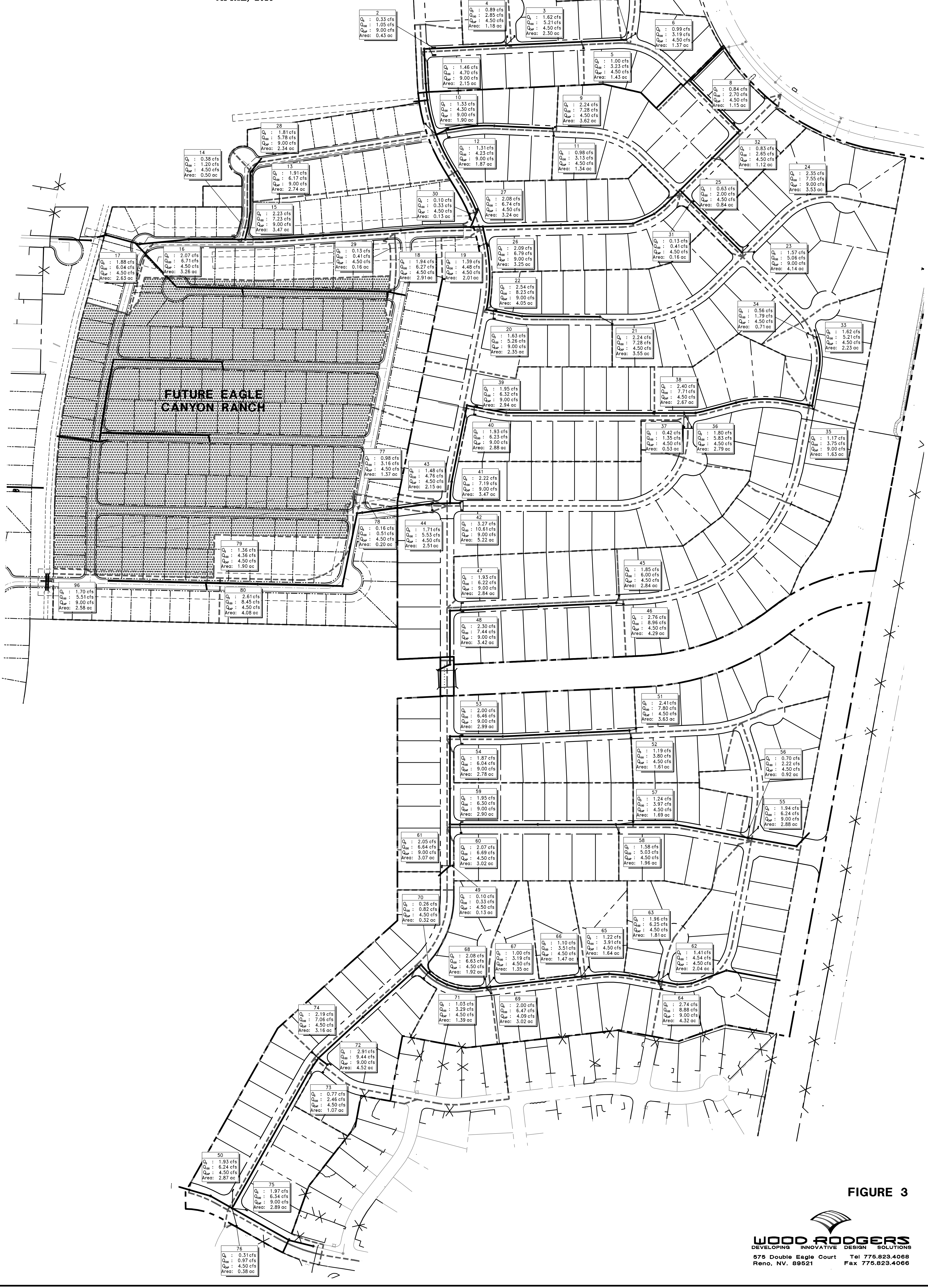
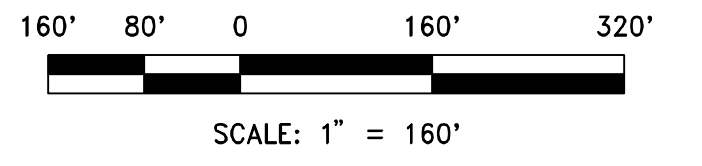


FIGURE 3

C:\Users\Public\Temp\Appl\BBA\_VCS\_MASTER\_HYDROL\_REV.dwg 4/19/16 2:40pm akaiser



# EAGLE CANYON IV & V

MS RIALTO EAGLE CANYON  
NORTH NV LLC

WASHOE COUNTY

NEVADA

MAY, 2019

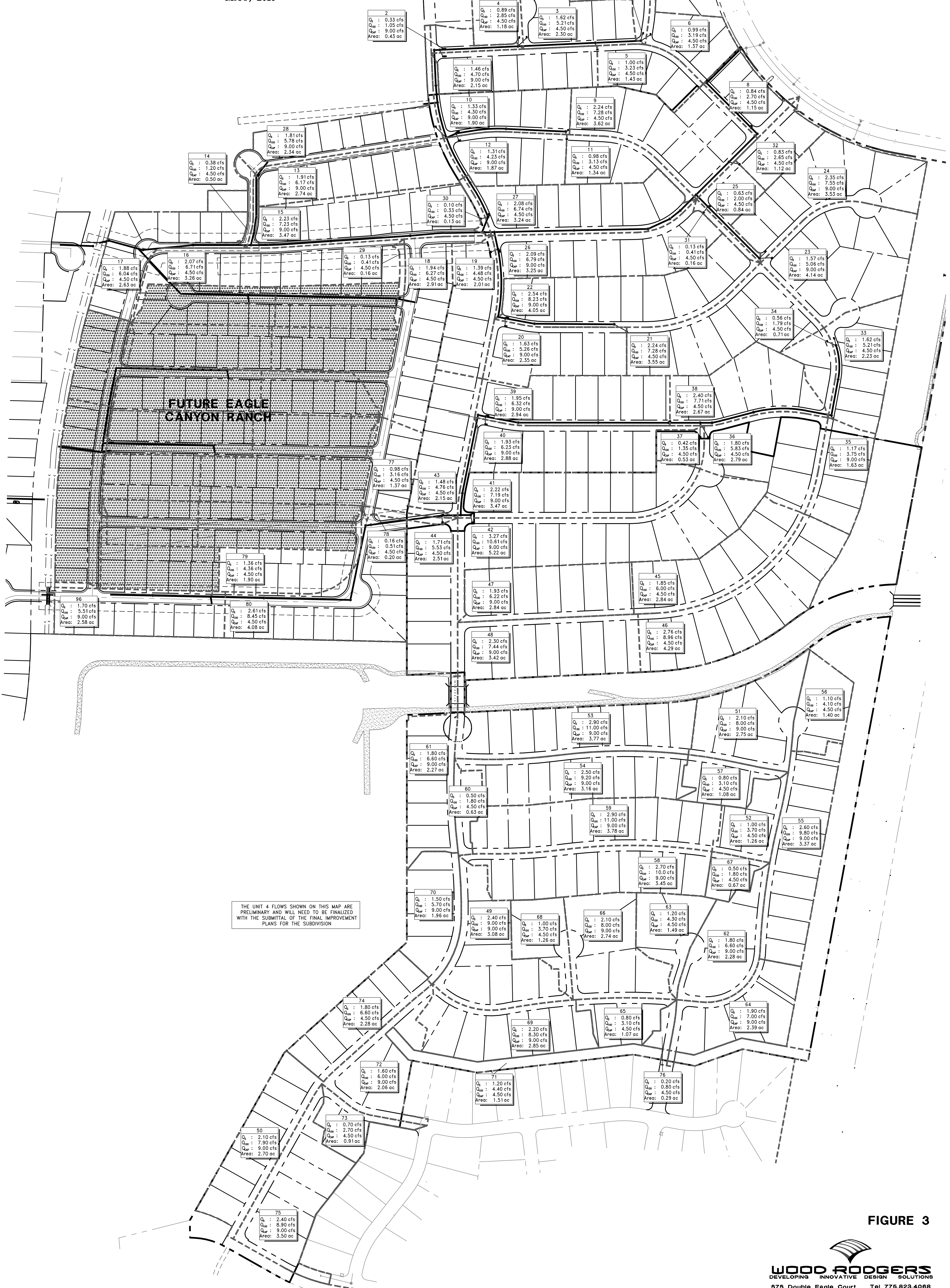
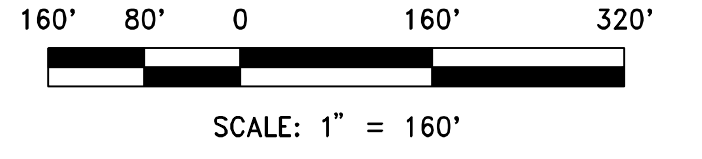


FIGURE 3

**SANITARY SEWER REPORT**

**Eagle Canyon IV  
Unit 4**

*Prepared for:*

**Lennar Reno, LLC  
10345 Professional Circle, Ste. 100  
Reno, NV 89521  
(775) 789-3233**

*Prepared by:*

**Wood Rodgers, Inc.  
1361 Corporate Blvd.  
Reno, NV 89502  
(775) 823-4068**



May, 2019



**WOOD RODGERS**  
BUILDING RELATIONSHIPS ONE PROJECT AT A TIME



## **I. INTRODUCTION**

This report presents the proposed sewer plan for Eagle Canyon IV Unit 4. The objective of this study is to establish sewer peak flow rates for use as the basis of design of the sewer collection system within the Eagle Canyon and existing Pyramid Ranch communities.

## **II. GENERAL INFORMATION- SITE LOCATION AND DESCRIPTION**

The Eagle Canyon IV Unit 4 site is bordered to the east by Pyramid Highway, to the west and north by the Washoe County drainage and detention pond, and to the south by the existing Pyramid Ranch Estates. It is in the Spanish Springs Valley, northeast Sparks, Washoe County, Nevada.

The proposed Eagle Canyon IV Unit 4 subdivision will consist of 137 single family units over approximately 63.6 acres. Access is being provided via a connection to an existing collector roadway, Lanstar Drive, along with a series of local access roadways. Sewer flows for this site are completely independent of the flows for the other units of Eagle Canyon IV and Eagle Canyon Ranch. It is proposed for this phase to tie into the existing Pyramid Ranch Estates sewer line at the end of Sand Dune Drive to the south of the site.

## **III. PROPOSED SEWAGE FLOW RATES**

As mentioned previously, Eagle Canyon IV Unit 4 will serve a total of 137 single family homes. Using this number and a sewer flow value of 270 gpd/unit as described in the Washoe County Development Code, along with a peaking factor of 3.0, this phase will generate a total flow of 110,970 gpd.

The 8" proposed sewer pipe within the subdivision will run at a minimum 0.44% slope which provides a ½ full velocity of 2.5 ft/s. At 80% full, the pipes will have a maximum capacity of 548,564 gpd which is sufficient to serve the flows from the proposed subdivision. The FlowMaster calculations are provided in the Appendix of this report.

These flows will be discharged into an existing 8" pipe located south of the proposed site that was designed to carry the flows from the existing and proposed sites. This flow will make its way through Pyramid Ranch Estates to the intersection of Eagle Canyon Road and Pyramid Highway where it is ultimately picked up by the Sparks interceptor.

## **IV. CONCLUSION**

This report presented the proposed sewer plan for the Eagle Canyon IV Unit 4 subdivision. A peak daily flow was established based on information obtained from the Washoe County Design Standards and it was shown that the capacity provided by the proposed pipes in this subdivision are sufficient to accept the generated flows.

## **Appendix**

## Worksheet for Half Full Minimum Velocity

### Project Description

Friction Method                      Manning Formula  
Solve For                                Discharge

### Input Data

Roughness Coefficient                      0.012  
Channel Slope                                0.44000 %  
Normal Depth                                4.00 in  
Diameter                                      8.00 in

### Results

Discharge                                    280605 gal/day  
Flow Area                                    0.17 ft<sup>2</sup>  
Wetted Perimeter                            1.05 ft  
Hydraulic Radius                            2.00 in  
Top Width                                    0.67 ft  
Critical Depth                                0.31 ft  
Percent Full                                 50.0 %  
Critical Slope                                0.00581 ft/ft  
Velocity                                      2.49 ft/s  
Velocity Head                                0.10 ft  
Specific Energy                              0.43 ft  
Froude Number                               0.86  
Maximum Discharge                         0.93 ft<sup>3</sup>/s  
Discharge Full                               0.87 ft<sup>3</sup>/s  
Slope Full                                    0.00110 ft/ft  
Flow Type                                    SubCritical

### GVF Input Data

Downstream Depth                         0.00 in  
Length                                      0.00 ft  
Number Of Steps                             0

### GVF Output Data

Upstream Depth                            0.00 in  
Profile Description  
Profile Headloss                            0.00 ft  
Average End Depth Over Rise             0.00 %  
Normal Depth Over Rise                   50.00 %  
Downstream Velocity                        Infinity ft/s

---

## Worksheet for Half Full Minimum Velocity

---

### GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	in
Critical Depth	0.31	ft
Channel Slope	0.44000	%
Critical Slope	0.00581	ft/ft

## Worksheet for 80% Full Maximum Capacity

### Project Description

Friction Method                      Manning Formula  
Solve For                                Discharge

### Input Data

Roughness Coefficient                      0.012  
Channel Slope                                0.44000 %  
Normal Depth                                6.40 in  
Diameter                                        8.00 in

### Results

Discharge                                      548564 gal/day  
Flow Area                                      0.30 ft<sup>2</sup>  
Wetted Perimeter                            1.48 ft  
Hydraulic Radius                            2.43 in  
Top Width                                      0.53 ft  
Critical Depth                                0.44 ft  
Percent Full                                  80.0 %  
Critical Slope                                0.00720 ft/ft  
Velocity                                        2.84 ft/s  
Velocity Head                                0.12 ft  
Specific Energy                              0.66 ft  
Froude Number                                0.67  
Maximum Discharge                        0.93 ft<sup>3</sup>/s  
Discharge Full                                0.87 ft<sup>3</sup>/s  
Slope Full                                      0.00420 ft/ft  
Flow Type                                      SubCritical

### GVF Input Data

Downstream Depth                        0.00 in  
Length                                        0.00 ft  
Number Of Steps                            0

### GVF Output Data

Upstream Depth                            0.00 in  
Profile Description  
Profile Headloss                            0.00 ft  
Average End Depth Over Rise            0.00 %  
Normal Depth Over Rise                80.00 %  
Downstream Velocity                      Infinity ft/s

---

## Worksheet for 80% Full Maximum Capacity

---

### GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	6.40	in
Critical Depth	0.44	ft
Channel Slope	0.44000	%
Critical Slope	0.00720	ft/ft



April 1, 2018  
Project No.: 1660037

Mr. Tim Scheideman  
Director of Land Development – Northern Nevada  
**LENNAR RENO, LLC**  
10345 Professional Circle, Suite 100  
Reno, NV 89521

Re: Structural Slab-on-Grade Design and Update  
Eagle Canyon IV Unit 4  
APN 532-020-09  
Washoe County, Nevada

Ref: Preliminary Geotechnical Investigation  
Eagle Canyon IV  
Reno, Nevada  
Matrix Construction Services, Inc.  
Job No.: 1064.01  
July 2004

Post Tensioning Institute (PTI)  
Standard Requirements for Design and  
Analysis of Shallow Post-Tensioned Concrete  
Foundations on Expansive Soils  
PTI DC10.5-12

Wire Reinforcement Institute (WRI)  
Design of Slab-on-Ground Foundations  
TF 700-R-03 (Update)

Dear Mr. Scheideman:

Wood Rodgers, Incorporated is pleased to submit the following update to the referenced Eagle Canyon IV report. The purpose of this letter is to recommend structural slab-on-grade design values and to address any code changes or geotechnical considerations associated with the project. The opinions and recommendations provided in our original geotechnical report have not been modified or altered except where specifically addressed in this update. Unless specifically modified herein, the referenced geotechnical report is considered valid and is presented in Appendix D of this report for ease of reference.

#### **EXPLORATION**

The project was explored on September 20, 2018, by excavating a series of 5 test pits using a Case 550 backhoe. The approximate locations of the test pits are shown on Plate A-1 – Site Map. The maximum depth of test pit advance was 10 feet below the existing ground surface.



Wood Rodgers' personnel examined and classified all soils in the field in general accordance with ASTM D2488 (Description and Identification of Soils). During exploration, representative bulk samples were placed in sealed plastic bags and returned to our Reno, Nevada laboratory for testing. Additional soil classifications, as well as verification of the field classifications, were subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described below in the Laboratory Testing section. Logs of the test pits are presented as Plate A-2. A USCS chart has been included as Plate A-3 - Unified Soil Classification and Key to Soil Descriptions.

### LABORATORY TESTING

All soil testing performed in the Wood Rodgers' laboratory is conducted in accordance with the standards and methods described in Volume 4.08 (Soil and Rock; Dimension Stone; Geosynthetics) of the ASTM Standards. Samples of significant soil types were analyzed to determine their in-situ moisture contents (ASTM D2216) and plasticity indices (ASTM D4318). Soil water characteristic curves for desorption (ASTM D6836) were developed to aid in structural slab design. Additional testing included chemical testing to indicate the potential for corrosion to concrete and steel elements. The results of our laboratory tests are presented in Appendix A on Plates A-4a thru A-4d. Table 1 also presents a summary of the test data.

Table 1 - Summary of Test Data

Test Hole	Depth (Ft.)	Moisture (%)	Liquid Limit	Plastic Index	USCS
ASTM Standard		D2216	D4318		D2487
TP-1	0 - 1	5.9	25	8	SC
TP-1	2 - 4	6.8	25	5	SC-SM
TP-5	1.5 - 4	10.6	40	19	CL

### DISCUSSION AND RECOMMENDATIONS

The test pits were advanced at the approximate locations shown on the site plan. All test pits were backfilled upon completion of the field portion of our study. The backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under Grading and Filling. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the test pits, the backfill should be removed and re-compacted in accordance with the requirements contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

The Stormwater Pollution Prevention Plan (SWPPP) will be the responsibility of the general contractor and/or owner. Recommendations presented herein regarding moisture conditioning are for the benefit of creating a targeted fill behavior. Moisture conditioning recommendations are not intended to direct the contractor in their means and methods for dust and SWPPP control.

**Soil Profile Type Amplification Factors**

In accordance with the Northern Nevada Amendments of the 2012 IRC, Site Class D has been assigned to the project. Based on a representative latitude and longitude of the site (39.665°N, -119.712°E), the USGS seismic design values based on ASCE 7-10 are presented in Table 2. The seismic design values are presented in Appendix B of this report.

Table 2 - Summary of ASCE 7-10 Seismic Design Values

Lat.	Lon.	S <sub>s</sub>	S <sub>1</sub>	SDC	F <sub>a</sub>	F <sub>v</sub>	S <sub>MS</sub>	S <sub>M1</sub>	S <sub>DS</sub>	S <sub>D1</sub>	F <sub>PGA</sub>	PGA <sub>M</sub>
39.665	-119.712	1.415	0.476	D2	1.0	1.524	1.415	0.726	0.944	0.484	1.0	0.534

**Structural Slab-on-Grade Foundations**

The design values presented in Table 3 have been developed for use when considering design of structural foundations. Analyses developed during our design process have been attached with this report in Appendix C. The design profile for Table 3 has been based on test pit number TP-5 of the 9/20/18 investigation and the subsequent grading that occurred. If significant time passes between this geotechnical report and constructing foundations, it is important that additional analysis be performed to determine if the design soil moisture profile has changed appreciably. No over-excavation of clay soils is required for structural slab-on-grade foundations.

Table 3 - Structural Slab-on-Grade Design Recommendations

Design Values	Condition		Center Lift	Edge Lift
Post-Tensioning Institute (PTI)	Edge Moisture Variation - e <sub>m</sub> (ft.)		8.5	4.4
	Differential Soil Movement - y <sub>m</sub> (in.)		-1.46	2.20
Design Values	Effective P.I.	C <sub>s</sub>	C <sub>w</sub>	C <sub>o</sub>
Wire Reinforcement Institute (WRI)	18	1	15	1

Soil chlorides shall be mitigated per Section 4.3.2.2 – Soil Chlorides from the referenced PTI manual. Test results obtained during our investigation have been attached with this report in Appendix A.

An allowable bearing value of 1,500 pounds per square foot may be utilized for design. This value may be increased by a factor of 1.33 when considering wind or seismic loading.

Turn downs for structural slabs must extend to a depth of 2-feet below finished adjacent exterior grade or be designed to resist the effects of frost-heave (such as insulation as presented in ASCE 32). It should be pointed out, however, that potential movement due to frost-heave would be in addition to edge-lift caused by clay activity and therefore the design edge-lift value should consider the cumulative effects of the two influences. In addition, the 2012 Northern Nevada Code Amendments require that deflection calculations "would need to show that the maximum combined frost and expansive soil heaving, as localized at slab edges, with resultant non-uniformly distributed deflections, as well as whole slab deflections would not result in super structure racking or excessive truss, roof, or wall frame movement." Minimum slab thickness and recommended turn-down should be established by the structural engineer. In addition, the project area is in a cold region for which special cold weather design considerations may be warranted for post-tensioned slabs and residences left unheated for an extended period of time.

The preferred slab profile has been selected to consist of a 15-mil moisture vapor barrier covered by a minimum two inch layer of compact Type 2 Class B aggregate base placed near optimum and compacted by at least 3-complete passes with a vibroplate. Per Figure R6.2 (PTI DC10.5-12), Table 4 presents the recommended coefficients of friction,  $\mu$ , for first and average subsequent movements based on the design slab support profile. A sand layer or size No. 67 concrete aggregate is not recommended for direct slab support. If location of the polyethylene sheeting significantly impacts the design or tensioning protocol, we recommend placement of the barrier be indicated as a special inspection item. For the WRI protocol, pre-stress losses are not significant; therefore, the coefficient of friction should be taken as 0.45 for WRI slabs cast on aggregate base. A k-value of 100 pci may be used for design.

Table 4 - Coefficient of Friction,  $\mu$ , for 5-inch Slabs

Material	First Movement	Average Subsequent Movements
Aggregate Base	1.95	1.37
Structural Fill	1.72	0.88
Polyethylene Sheeting <sup>1</sup>	0.88	0.55

<sup>1</sup>For normal construction practice,  $\mu = 0.75$

Excessive shrinkage cracking can precipitate the need for changes in design considerations. When considering non-structural slabs, crack control joint spacing is typically limited to 10 to 12 feet in our locale due to the combined effects of our local aggregates and environmental considerations. If this

spacing seems aggressive when considering shrinkage, PTI suggests the designer consider increasing the minimum pre-stress force. Post-tensioned foundations, when compared to conventionally reinforced slabs, are expected to deform. The flexibility of the slab distributes localized soil movement to a more uniform slab shape; however, it is important that other consultants be cognizant of this behavior so that their products and design can be made compatible with a flexible foundation system. Typically, roof trusses, load concentrations, architectural features spanning between the active and non-active zones, non-flexible exterior siding, brittle floor coverings, and areas that slope to drain and utility connections warrant closer scrutiny.

Post-construction practices must be incorporated to help ensure the successful performance of the structural slabs. To help minimize movements in soils due to post-construction factors, not climate related, the following maintenance procedures are required:

- Uniform landscaping should be provided adjacent to the perimeter of the foundation, and excellent drainage provided and maintained away from the residence. Never allow water to pond adjacent to the structure.
- A clay plug should be placed at the edge of the foundation if filled with granular material.
- Recommended positive drainage is a minimum of six inches of fall in ten feet, and impervious surfaces within ten feet of the building foundation should be sloped a minimum of two percent away from the foundation.
- Water should be applied in a uniform, systematic manner as equally as possible on all sides of the residence to keep the soil moist. Areas without ground cover may require more moisture due to the potential for increased evaporation.
- Soaker hoses, if used, should be placed 18" to 30" from foundation edge. Sprinklers should not be allowed to spray directly on foundation.
- Trees should not be planted within 10 feet of the structure.
- Check gutters and downspouts to be sure they are clear and water discharges a minimum of five feet from foundation.
- The foundation perimeter should be observed during extreme hot and dry periods to help insure that adequate watering is being provided to prevent the soil from separating from the foundation.

It is recommended that a yearly survey of foundations is conducted and any maintenance necessary to improve drainage and prevent ponding of water adjacent to these structures is performed. This is especially important during the first ten years after construction because that is usually when the most severe adjustment between the new foundation and supporting soil occurs. Following the above listed procedures should help limit detrimental foundation movement caused by expansive soils.

### Retaining Walls

Recommended lateral earth pressures for consideration in the design of retaining structures are presented in Table 5. Changes in earth pressures due to seismic influences were assessed via the Mononobe-Okabe protocol. In addition, we have assumed that some displacement is allowable during the design event, and our recommended values have therefore been based on 50% of the USGS' predicted PGA. The values presented in Table 5 do not consider hydrostatic pressures or surcharge loading. Traffic loading should be modeled by increasing the wall backfill load by an additional height of two feet. Unless confined by slab or pavement, the surface foot of soil should be ignored when considering passive resistance.

Table 5 - Lateral Earth Pressures

Condition	Active (psf/f)		Passive (psf/f)		At Rest
	Static	Pseudo-Static	Static	Pseudo-Static	
Level	37	60	325	250	55

Excessive retaining wall pressures can be developed due to heavy compaction equipment proximate to the wall during backfill placement. Therefore, due care during placement and compaction of backfill is required. Backfill behind retaining structures should be compacted to not less than 90 percent of the soils' maximum dry density. French drains, a drainage backfill geotextile such as Mirafi 140 N, or a pre-manufactured drain system such as Tensor® DC1200 may be utilized if buildup of hydrostatic pressure is possible. Soil preparation for retaining wall foundations and allowable bearing capacities shall be consistent with the Site Preparation, Grading and Filling, and Foundations sections of this report.

### Non-Structural Concrete Slabs

A 4-inch minimum compacted base course (Type 2, Class B, Standard Specifications for Public Works Construction) compacted to 95% relative compaction is recommended beneath standard (non-post-tensioned) concrete slabs-on-grade subject solely to foot traffic. The recommended base course section should be increased to 6-inches where vehicle traffic is anticipated. All dedicated and public easement improvements shall be constructed in accordance with the Washoe County standards and the Standard Specifications for Public Works Construction.

Wood Rodgers does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, if a vapor retarder/barrier system more rigorous than the requirements of the IRC is desired, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate. If special conditions

Mr. Scheideman  
LENNAR RENO, LLC  
April 1, 2019  
Page 7 of 9

do not exist, Wood Rodgers typically recommends a moisture vapor barrier, consisting of Stego Wrap (15 mil), or equal, to be placed beneath the aggregate base course as part of the moisture vapor system.

All concrete placement and curing should be performed in accordance with procedures outlined by the American Concrete Institute. 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. Western Nevada is a region with absorptive aggregates and exceptionally low relative humidity. As a consequence, concrete flatwork will shrink and curl in a manner which is not typical of other US regions. Proper sub-grade preparation and placement of reinforcement are imperative. Joint spacing, locally, is typically on 10 to 12 foot centers. Cracking that occurs within the slab on grade will often reflect through overlying improvements even if adequate substrate preparation has occurred.

Sulfate testing on the native soils in the immediate area during this investigation yielded results in the negligible range. However, the referenced geotechnical report mentions of moderate soluble sodium sulfate levels present in the project vicinity and recommends the use of Type II cement, a maximum water cement ratio of 0.50, and a 28-day minimum compressive strength of 4000 psi. Therefore, we recommend reevaluating the sulfate levels on the site soils during the mass grading operation to provide recommendations on cement type and mixture properties.

Additionally, ACI 318-11, Table 4.2.1 rates the severity of corrosion as Moderate or Exposure Class C1. The definition for Moderate or Exposure Class C1 is defined as *"Concrete exposed to moisture but not to external sources of chlorides."* External sources of chlorides include exposure to deicing chemicals. ACI indicates that this chloride exposure would elevate the exposure class to Severe or Exposure Class C2 which would require a minimum compressive strength of 5,000 psi and a maximum water to cement ratio of 0.40 for exterior slabs-on-grade.

Resistivity, pH, chlorides, oxidation-reduction potential, sulfides and moisture were tested to aid others in the assessment of potential corrosivity to ductile iron pipe and/or steel reinforcement; refer to Appendix A, Plate A-4c for test methods and results.

Wood Rodgers, Inc. is not a corrosion engineering firm. Therefore, a corrosion engineer or structural engineer knowledgeable in the project steel specifications should be consulted for final assessments of corrosion potential at the site.



**Structural Pavement Sections**

Table 6 presents minimum structural pavement sections for the development based on planned use. These sections have been developed with the expectation that the separation requirements presented in the referenced report have been satisfied. Structural pavement sections are designed based on estimated traffic for the proposed residential development and a minimum R-Value of the native subgrade soil equal to 8. The upper three-feet below the base course section will consist of 1-foot of structural fill / subbase (R-Value = 30 min.) and 2-feet of native subgrade soil. A weighted R-Value of that section below the base course (equal to ~15) was utilized for design purposes. Pavement design analyses were conducted following the AASHTO low volume road design guidelines and RTC Flexible Pavement Design Guidelines and is presented on Plate A-5 of this report.

Washoe County's local streets and collector streets may service a maximum Average Daily Traffic (A.D.T.) per two travel lanes of 1,000 and 7,300, respectively.

Table 6 - Structural Pavement Sections

Condition	Pavement Thickness (In.)	Pavement Type <sup>1</sup>	Type II Class B Base Course Thickness (In.) <sup>2</sup>
Local Street	3 <sup>3</sup>	Type 3 + Lime	6
Collector Street	4	2" Type 3 + Lime / 2" Type 2 + Lime	6
Pavers	Installed per Manufacturer's Recommendations		

<sup>1</sup> Per the Standard Specifications for Public Works Construction

<sup>2</sup> Base Course thickness is in addition to structural fill separation requirements

<sup>3</sup> 3-inches provides a 50% reliability. If 75% reliability is desired, we recommend using 4-inches of pavement thickness consisting of 2" Type 3 + Lime / 2" Type 2 + Lime.

All roadway construction shall be in accordance with the approved plans, the Standard Specifications for Public Works Construction, and Washoe County's standard details. Roadway subgrade shall be prepared in accordance with the requirements of this report. The Contractor should submit a pavement mix design to the Owner, for approval, at least 5 working days prior to paving. When pavement is placed directly adjacent to concrete flatwork, the finish compacted grade of the pavement should be at least ½ of an inch higher than the edge of adjacent concrete surface to allow adequate compaction of the pavement without damaging the concrete. Pavers are recommended for private improvements around the residences due to the expansive nature of the on-site soils.

Mr. Scheideman  
LENNAR RENO, LLC  
April 1, 2019  
Page 9 of 9

**CONCLUSION**

We appreciate the opportunity to provide this update for the benefit of Lennar Reno, LLC. Please contact our office should you have any questions or comments.

Sincerely,

**WOOD RODGERS, INCORPORATED**

Justin M. McDougall  
Associate  
Project Engineer  
RE Number: 24474  
Expires: 12/31/2019



*Sandeep Pandey*  
Sandeep Pandey, PE  
Project Engineer

Enclosures

- Appendix A - Geotechnical Plates
- Appendix B - USGS Design Maps Detailed Report
- Appendix C - VOLFLO Analyses
- Appendix D - Previous Report

**APPENDIX A  
GEOTECHNICAL PLATES**



Image Reference: Google Earth, Accessed 10/2018

  
**WOOD RODGERS**  
 1361 Corporate Boulevard, Reno, NV 89502  
 Phone 775.823.4068 Fax 775.823.4066

**VICINITY MAP**

**Geotechnical Investigation**  
**EAGLE CANYON IV UNIT 4**  
**LENNAR HOMES, LLC.**  
**SPARKS, WASHOE COUNTY, NV**  
 Project No.: 1660037  
 Date: 10/18/18

**PLATE**  
**A-1a**



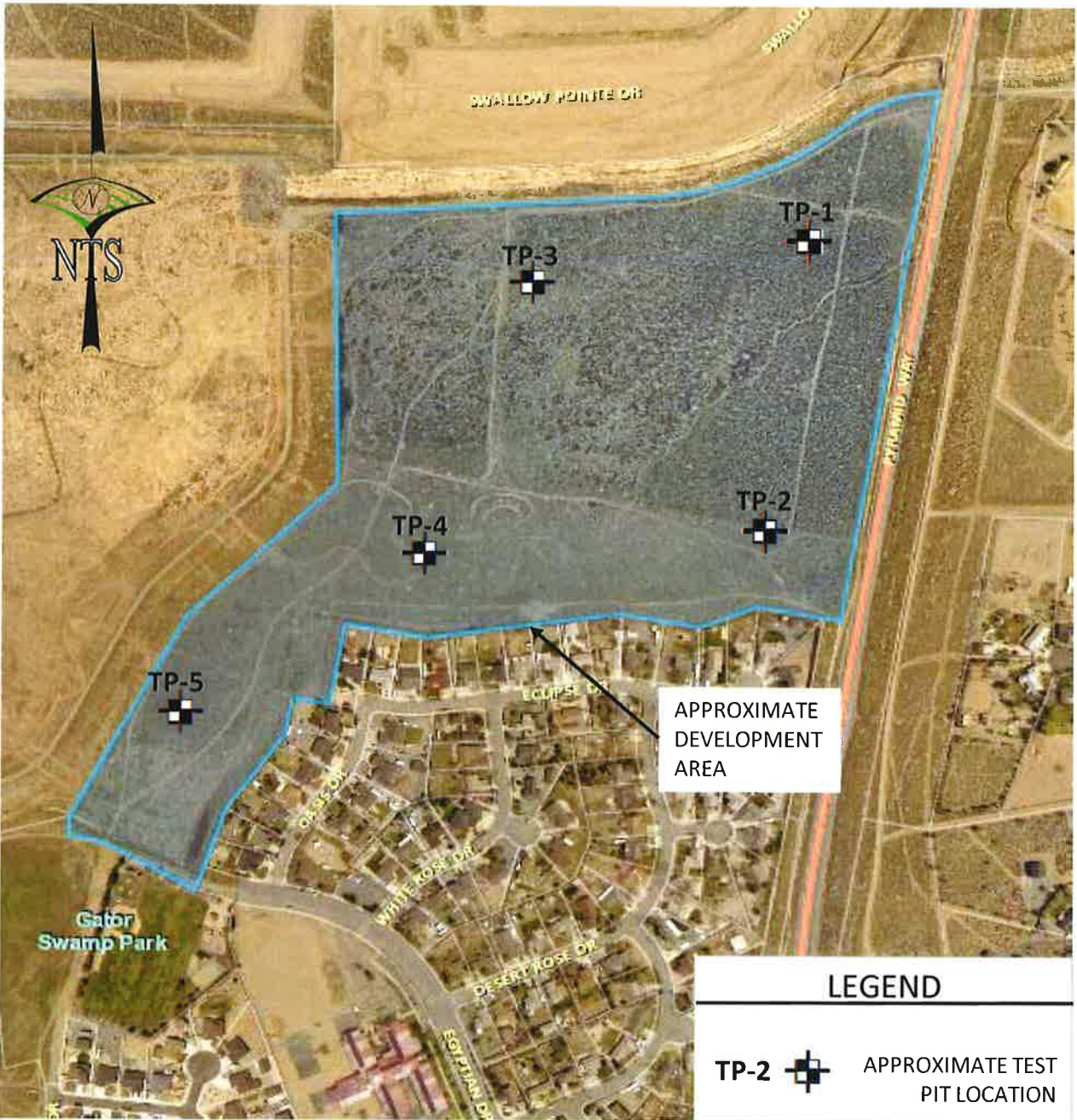


Image Reference: Google Earth, Imagery Date: 8/11/2107, Accessed 10/16/2018



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**SITE MAP**

**Geotechnical Investigation**  
**EAGLE CANYON IV UNIT 4**  
**LENNAR HOMES, LLC.**  
**SPARKS, WASHOE COUNTY, NV**

Project No.: 1660037  
 Date: 10/18/18

**PLATE**  
**A-1b**



Wood Rodgers  
1361 Corporate Blvd  
Reno, NV 89502  
Telephone: 775-823-4068  
Fax: 775-823-4066

# TEST PIT NUMBER TP-1

CLIENT <u>Lennar Reno, LLC</u>	PROJECT NAME <u>Eagle Canyon IV Unit 4</u>
PROJECT NUMBER <u>1660037</u>	PROJECT LOCATION <u>Washoe County, Nevada</u>
DATE STARTED <u>9/20/18</u> COMPLETED <u>9/20/18</u>	GROUND ELEVATION <u>4545 ft</u> TEST PIT SIZE <u>24 inches</u>
EXCAVATION CONTRACTOR <u>Campbell Construction</u>	GROUND WATER LEVELS:
EXCAVATION METHOD <u>Case 550</u>	AT TIME OF EXCAVATION <u>--- No Free Water Encountered</u>
LOGGED BY <u>Sandeep Pandey</u> CHECKED BY <u>Justin McDougal</u>	AT END OF EXCAVATION <u>--- No Free Water Encountered</u>
NOTES:	AFTER EXCAVATION <u>--- No Free Water Encountered</u>

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 4/1/19 09:02 - \\RENOSRV04\PRODUCTION\DATA\JOBS-RENO\OBS1660\_EAGLE CANYON IV\_UNIT\GEOTECH\GINT\EAGLE CANYON IV 4.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)	
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
0.0		CLAYEY SAND, (SC) dense, slightly moist, brown, low plasticity	GB 1A					5.90	25	17	8	28.3	
~1.2		SILTY, CLAYEY SAND, (SC-SM) dense, slightly moist, light brown to brown, slightly plastic											
2.5			GB 1B						6.80	25	20	5	47.3
~3.8				GB 1C									
7.5		CLAYEY SAND TO SILTY SAND, (SC-SM) dense, dry to slightly moist, light brown to brown, slight to low plasticity	GB 1D										
10.0													

Bottom of Test Pit at 10.0 Feet.





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 Reno, NV 89502  
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 Fax: 775-823-4066

# TEST PIT NUMBER TP-2

**CLIENT** Lennar Reno, LLC **PROJECT NAME** Eagle Canyon IV Unit 4  
**PROJECT NUMBER** 1660037 **PROJECT LOCATION** Washoe County, Nevada  
**DATE STARTED** 9/20/18 **COMPLETED** 9/20/18 **GROUND ELEVATION** 4538 ft **TEST PIT SIZE** 24 inches  
**EXCAVATION CONTRACTOR** Campbell Construction **GROUND WATER LEVELS:**  
**EXCAVATION METHOD** Case 550 **AT TIME OF EXCAVATION** --- No Free Water Encountered  
**LOGGED BY** Sandeep Pandey **CHECKED BY** Justin McDougal **AT END OF EXCAVATION** --- No Free Water Encountered  
**NOTES:** --- No Free Water Encountered **AFTER EXCAVATION** --- No Free Water Encountered

GEO TECH BH COLUMNS - GINT STD US LAB.GDT - 4/1/19 09:02 - \\RENOSRV04\PRODUCTION\DATA\OBS-RENO\OBS1660\_EAGLE CANYON IV\_UNIT\GEO TECH\GINT\EAGLE CANYON IV 4.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SANDY LEAN CLAY TO CLAYEY SAND, (CL-SC) medium dense to dense, slightly moist, brown, low to medium plasticity	GB 2A									
2.5		CLAYEY SAND, (SC) medium dense to dense, slightly moist, light brown to brown, low to medium plasticity	GB 2B									
7.5		POORLY GRADED SAND TO SILTY SAND, (SP-SM) medium dense, moist, brown, non-plastic, cobbles up to 12 inches in diameter	GB 2C									
10.0												

Bottom of Test Pit at 10.0 Feet.



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**TEST PIT NUMBER TP-3**  
 PAGE 1 OF 1

CLIENT Lennar Reno, LLC PROJECT NAME Eagle Canyon IV Unit 4  
 PROJECT NUMBER 1660037 PROJECT LOCATION Washoe County, Nevada  
 DATE STARTED 9/20/18 COMPLETED 9/20/18 GROUND ELEVATION 4536 ft TEST PIT SIZE 24 inches  
 EXCAVATION CONTRACTOR Campbell Construction GROUND WATER LEVELS:  
 EXCAVATION METHOD Case 550 AT TIME OF EXCAVATION --- No Free Water Encountered  
 LOGGED BY Sandeep Pandey CHECKED BY Justin McDougal AT END OF EXCAVATION --- No Free Water Encountered  
 NOTES: \_\_\_\_\_ AFTER EXCAVATION --- No Free Water Encountered

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 4/17/19 08.02 - \\RENOSRV04\PRODUCTION\DATA\JOBS-RENO\JOBS1660\_EAGLE CANYON IV\_UNIT\GEO\GINT\EAGLE CANYON IV 4.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SILTY, CLAYEY SAND, (SC-SM) medium dense, dry to slightly moist, light brown, slight plasticity, increasing gravel										
2.5			GB 3A									
5.0		SANDY LEAN CLAY, (CL) stiff, slightly moist, tan to light brown, medium plasticity	GB 3B									
7.5												
10.0		CLAYEY SAND, (SC) dense, slightly moist, tan to light brown, low plasticity										

Bottom of Test Pit at 10.0 Feet.



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 Reno, NV 89502  
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 Fax: 775-823-4066

# TEST PIT NUMBER TP-4

CLIENT Lennar Reno, LLC PROJECT NAME Eagle Canyon IV Unit 4  
 PROJECT NUMBER 1660037 PROJECT LOCATION Washoe County, Nevada  
 DATE STARTED 9/20/18 COMPLETED 9/20/18 GROUND ELEVATION 4526 ft TEST PIT SIZE 24 inches  
 EXCAVATION CONTRACTOR Campbell Construction GROUND WATER LEVELS:  
 EXCAVATION METHOD Case 550 AT TIME OF EXCAVATION --- No Free Water Encountered  
 LOGGED BY Sandeep Pandey CHECKED BY Justin McDougal AT END OF EXCAVATION --- No Free Water Encountered  
 NOTES: AFTER EXCAVATION --- No Free Water Encountered

GEOTECH BH COLUMNS - GINT STD US LAB.GDT - 4/1/19 09:02 - \\IRENOSRV04\PRODUCTION\DATA\JOBS-RENO\JOBS\1660\_EAGLECANYON\IV\_UNIT4\GEOTECH\GINT\EAGLE\_CANYON\_IV\_4.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		SANDY LEAN CLAY TO CLAYEY SAND, (CL-SC) medium dense, moist, light brown to brown, medium plasticity	GB 4A									
2.5		SANDY LEAN CLAY, (CL) medium stiff, slightly moist, light brown to brown, medium plasticity	GB 4B									
5.0		CLAYEY SAND, (SC) dense, slightly moist, brown, low plasticity										
7.5												
10.0												

Bottom of Test Pit at 10.0 Feet.



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# TEST PIT NUMBER TP-5

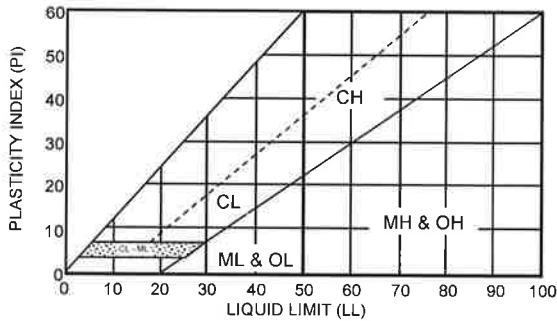
CLIENT Lennar Reno, LLC PROJECT NAME Eagle Canyon IV Unit 4  
 PROJECT NUMBER 1660037 PROJECT LOCATION Washoe County, Nevada  
 DATE STARTED 9/20/18 COMPLETED 9/20/18 GROUND ELEVATION 4517 ft TEST PIT SIZE 24 inches  
 EXCAVATION CONTRACTOR Campbell Construction GROUND WATER LEVELS:  
 EXCAVATION METHOD Case 550 AT TIME OF EXCAVATION --- No Free Water Encountered  
 LOGGED BY Sandeep Pandey CHECKED BY Justin McDougal AT END OF EXCAVATION --- No Free Water Encountered  
 NOTES: AFTER EXCAVATION --- No Free Water Encountered

GEOTECH BH COLUMNS - GINT STD US LAB GDT - 4/1/19 09:02 - \\RENOSRV04\PRODUCTION\DATA\OBS-RENO\OBS1680\_EAGLE CANYON IV\_UNIT4\GEO\TECH\GINT\EAGLE CANYON IV 4.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	R-VALUE	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS			FINES CONTENT (%)
									LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	
0.0		LEAN CLAY WITH SAND, (CL) very stiff, slightly moist to moist, dark brown, medium plasticity										
2.5			GB 5A					10.6	40	21	19	72.8
5.0		POORLY GRADED SAND TO SILTY SAND, (SP-SM) dense, slightly moist, light brown to brown, slight to low plasticity	GB 5B									
7.5		SILTY, CLAYEY SAND, (SC-SM) dense, slightly moist, light brown to brown, low plasticity										
10.0		SANDY LEAN CLAY, (CL) very stiff, moist, dark brown, medium plasticity										

Bottom of Test Pit at 10.0 Feet.

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
				SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL
FINE-GRAINED SOILS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILT AND CLAY  LIQUID LIMIT 50% OR LESS			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
	SILT AND CLAY  LIQUID LIMIT GREATER THAN 50%			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOLID, ELASTIC SILTS
				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

  
**WOOD RODGERS**  
 1361 Corporate Boulevard, Reno, NV 89502  
 Phone 775.823.4068 Fax 775.823.4066

**UNIFIED SOIL  
CLASSIFICATION  
AND  
KEY TO SOIL DESCRIPTIONS**

**Geotechnical Investigation**  
**EAGLE CANYON IV UNIT 4**  
**LENNAR HOMES, LLC.**  
**SPARKS, WASHOE COUNTY, NV**  
 Project No.: 1660037  
 Date: 10/18/18

**PLATE  
A-3**





Wood Rodgers, Inc  
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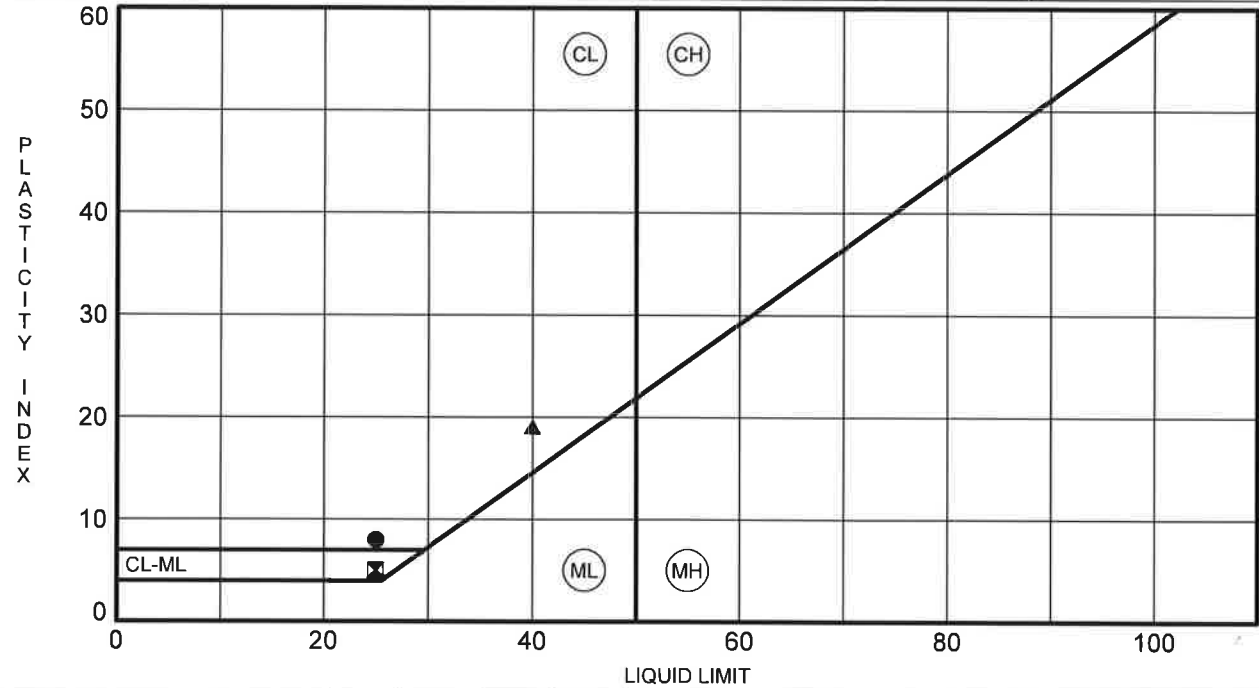
# ATTERBERG LIMITS' RESULTS

CLIENT Lennar Reno, LLC

PROJECT NAME Eagle Canyon IV Unit 4

PROJECT NUMBER 1660037

PROJECT LOCATION Washoe County, Nevada



TEST PIT	DEPTH	LL	PL	PI	Fines	Classification
● TP-1	0.0	25	17	8	28	CLAYEY SAND(SC)
☒ TP-1	2.0	25	20	5	47	SILTY, CLAYEY SAND(SC-SM)
▲ TP-5	1.5	40	21	19	73	LEAN CLAY with SAND(CL)

ATTERBERG LIMITS - GINT STD US LAB.GDT - 9/28/18 14:35 - I:\WOODRODGERS.LOC\PRODUCTION\DATA\JOBS-RENO\JOBS1660 - EAGLE CANYON IV UNIT 4\GEO\TECH\GINT\EAGLE CANYON IV 4.GPJ



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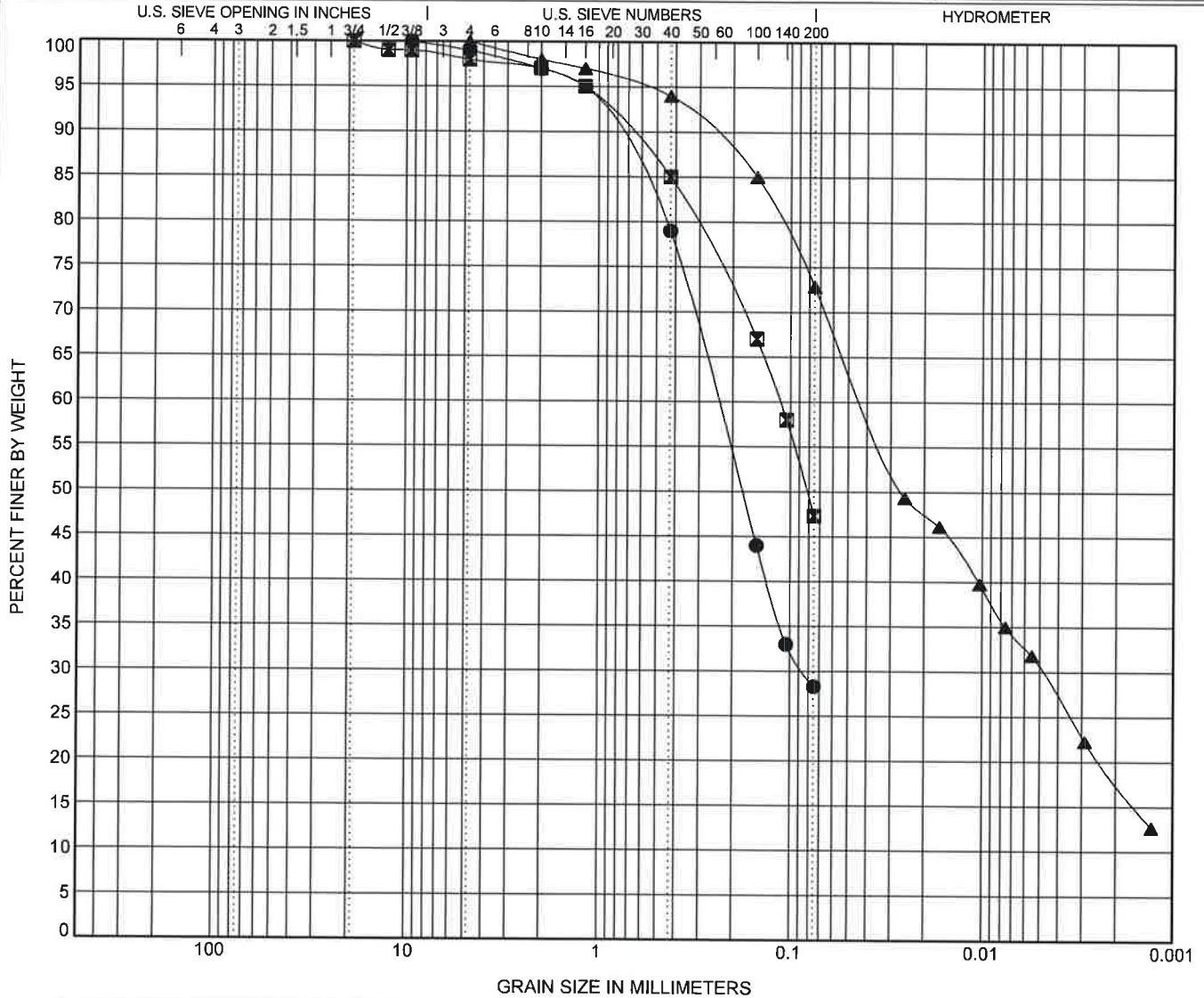
# GRAIN SIZE DISTRIBUTION

CLIENT Lennar Reno, LLC

PROJECT NAME Eagle Canyon IV Unit 4

PROJECT NUMBER 1660037

PROJECT LOCATION Washoe County, Nevada



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

TEST PIT	DEPTH	Classification					LL	PL	PI	Cc	Cu
● TP-1	0.0	CLAYEY SAND(SC)					25	17	8		
☒ TP-1	2.0	SILTY, CLAYEY SAND(SC-SM)					25	20	5		
▲ TP-5	1.5	LEAN CLAY with SAND(CL)					40	21	19		
TEST PIT	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● TP-1	0.0	9.5	0.241	0.085		1.0	70.7	28.3			
☒ TP-1	2.0	19	0.114			2.0	50.7	47.3			
▲ TP-5	1.5	4.75	0.041	0.005		0.0	27.2	42.4	30.4		

GRAIN SIZE - GINT STD US LAB.GDT - 9/28/18 14:35 - I:\WOODRODGERS\LOC\PRODUCTION\DATA\JOBS-RENO\JOBS\1660\_EAGLE CANYON IV\UNIT 4\GEO\TECH\INT\EAGLE CANYON IV 4.GPJ





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

## Analytical Report

Workorder#: **18091144**  
 Date Reported: **10/4/2018**

**Client:** Wood Rodgers **Sampled By:** B. LaBar  
**Project Name:** Eagle Canyon Geotech / 1660037  
**PO #:** LAB 3961

**Laboratory Accreditation Number:** NV015/CA2990

Laboratory ID	Client Sample ID	Date/Time Sampled	Date Received
18091144-01	TP-2 @ 2'-4' / TP-5 @ 1.5'-4'	09/21/2018 10:39	9/24/2018

Parameter	Method	Result	Units	PQL	Analyst	Date/Time Analyzed	Data Flag
Chloride	EPA 300.0	<5	mg/Kg	5	JF	10/01/2018 16:33	
Oxidation-Reduction Potential	SM 2580B	474	mV		KK	10/03/2018 9:40	
pH	SW-846 9045D	7.81	pH Units		KK	10/01/2018 10:04	
pH Temperature	SW-846 9045D	23.0	°C		KK	10/01/2018 10:04	
Resistivity	AASHTO T288	1500	Ohms-cm		KK	09/25/2018 16:06	
Sodium	ASTM D2791	< 0.01	%	0.01	KK	09/28/2018 11:17	
Sodium Sulfate as Na2SO4	Calculation	< 0.01	%	0.01	KK	09/28/2018 13:00	
Sulfate	SM4500 SO4E	< 0.01	%	0.01	KK	09/28/2018 11:22	
Sulfide	AWWA C105	Negative	POS/NEG		KK	09/25/2018 15:52	



**WOOD RODGERS**

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### CHEMICAL TESTING RESULTS

**Geotechnical Investigation**

**EAGLE CANYON IV UNIT 4**

**LENNAR HOMES, LLC.**

**SPARKS, WASHOE COUNTY, NV**

Project No.: 1660037

Date: 10/18/18

<b>PLATE A-4c</b>
-----------------------



Daniel B. Stephens & Associates, Inc.

### Summary of Water Potential

Sample Number	Moisture Content (%, g/g)	Water Potential (-cm water)	Water Potential (pF)
TP-5 (1.5'-4') (12.3%)	12.29	70,978	4.85
TP-5 (1.5'-4') (21.7%)	21.66	4,079	3.61
TP-5 (1.5'-4') (29.3%)	29.26	1,428	3.15



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**WATER  
POTENTIAL  
TESTING  
RESULTS**

**Geotechnical Investigation**

**EAGLE CANYON IV UNIT 4**

**LENNAR HOMES, LLC.**

**SPARKS, WASHOE COUNTY, NV**

Project No.: 1660037

Date: 10/18/18

**PLATE  
A-4d**

ESAL RANGE	
High	700,000 - 1,000,000
Medium	400,000 - 600,000
Low (125 - 750 Residences)	50,000 - 300,000

ESAL DETERMINATION		
Design Life (yrs)	L	20
Number of Lots	N	137
Average Daily Two Way Trips per Lot	T <sub>d</sub>	10
Percent Heavy Trucks	T	2
Average Truck Factor	T <sub>f</sub>	0.9
Construction Traffic (Trips per Lot)	T <sub>c</sub>	50
Construction Truck Factor	T <sub>cf</sub>	1.2
ESAL <sub>20</sub>		98,229

STRUCTURAL NUMBER (CLIMATE ZONE V)			
Relative Quality of Roadbed Soil	Traffic Level	Reliability	
		50% SN	75% SN
Very Good (R>35)	High	2.4 - 2.6	2.7 - 2.8
	Medium	2.2 - 2.4	2.4 - 2.6
	Low	1.6 - 2.1	1.7 - 2.2
Good (R>15)	High	2.7 - 2.9	3.0 - 3.1
	Medium	2.5 - 2.7	2.6 - 2.9
	Low	1.8 - 2.4	2.0 - 2.5
Fair (R>10)	High	2.9 - 3.1	3.2 - 3.3
	Medium	2.6 - 2.8	2.8 - 3.1
	Low	1.9 - 2.5	2.1 - 2.7
Poor (R>7)	High	3.2 - 3.4	3.5 - 3.6
	Medium	2.9 - 3.2	3.1 - 3.4
	Low	2.2 - 2.8	2.3 - 2.9
Very Poor (R>5)	High	3.4 - 3.6	3.7 - 3.8
	Medium	3.1 - 3.3	3.3 - 3.6
	Low	2.3 - 3.0	2.5 - 3.1

Material Type	Reference	Structural Coefficient	Thickness (in)	Thickness (in)	Thickness (in)	Thickness (in)
Plantmix Surface	AC	0.39	4	3	0	0
Plantmix Base	PB	0.32	0	0	0	0
Cement Treated	CTB	0.2	0	0	0	0
Type 2 Class B	AB	0.12	6	6	0	0
Structural Fill	SF	0.07	0	0	0	0
Structural Number for Section			2.3	1.9	0.0	0.0



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**STRUCTURAL  
 PAVEMENT  
 SECTION  
 DESIGN  
 (Low Volume  
 Roads)**

**Geotechnical Investigation  
 EAGLE CANYON IV UNIT 4  
 LENNAR HOMES, LLC.  
 SPARKS, WASHOE COUNTY, NV**  
 Project No.: 1660037  
 Date: 04/01/19

<b>PLATE A-5</b>
----------------------

**APPENDIX B**  
**USGS DESIGN MAPS DETAILED REPORT**

# USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.66541°N, 119.71227°W)

Site Class D – “Stiff Soil”, Risk Category I/II/III

## Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain  $S_s$ ) and 1.3 (to obtain  $S_1$ ). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From **Figure 22-1**<sup>[1]</sup>

$$S_s = 1.415 \text{ g}$$

From **Figure 22-2**<sup>[2]</sup>

$$S_1 = 0.476 \text{ g}$$

## Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3-1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf

Any profile with more than 10 ft of soil having the characteristics:

- Plasticity index  $PI > 20$ ,
- Moisture content  $w \geq 40\%$ , and
- Undrained shear strength  $\bar{s}_u < 500$  psf

F. Soils requiring site response analysis in accordance with Section 21.1

See Section 20.3.1

$$\text{For SI: } 1\text{ft/s} = 0.3048 \text{ m/s } \quad 1\text{lb/ft}^2 = 0.0479 \text{ kN/m}^2$$

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE<sub>R</sub>) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F<sub>s</sub>

Site Class	Mapped MCE <sub>R</sub> Spectral Response Acceleration Parameter at Short Period				
	S <sub>s</sub> ≤ 0.25	S <sub>s</sub> = 0.50	S <sub>s</sub> = 0.75	S <sub>s</sub> = 1.00	S <sub>s</sub> ≥ 1.25
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S<sub>s</sub>

**For Site Class = D and S<sub>s</sub> = 1.415 g, F<sub>s</sub> = 1.000**

Table 11.4-2: Site Coefficient F<sub>v</sub>

Site Class	Mapped MCE <sub>R</sub> Spectral Response Acceleration Parameter at 1-s Period				
	S <sub>1</sub> ≤ 0.10	S <sub>1</sub> = 0.20	S <sub>1</sub> = 0.30	S <sub>1</sub> = 0.40	S <sub>1</sub> ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S<sub>1</sub>

**For Site Class = D and S<sub>1</sub> = 0.476 g, F<sub>v</sub> = 1.524**

Equation (11.4-1):

$$S_{MS} = F_a S_s = 1.000 \times 1.415 = 1.415 \text{ g}$$

Equation (11.4-2):

$$S_{M1} = F_v S_1 = 1.524 \times 0.476 = 0.726 \text{ g}$$

### Section 11.4.4 — Design Spectral Acceleration Parameters

Equation (11.4-3):

$$S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.415 = 0.944 \text{ g}$$

Equation (11.4-4):

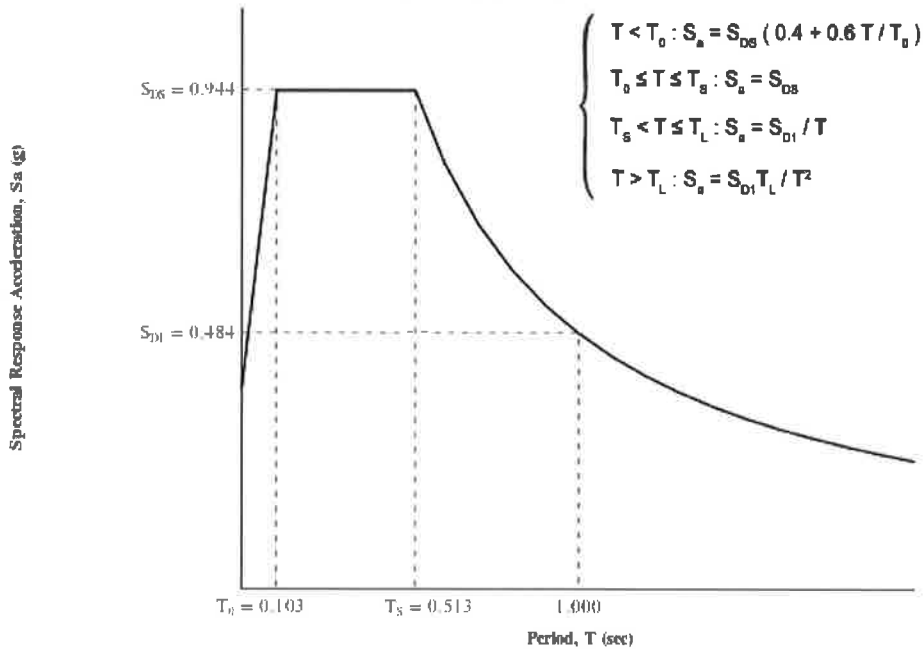
$$S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.726 = 0.484 \text{ g}$$

### Section 11.4.5 — Design Response Spectrum

From Figure 22-12<sup>[3]</sup>

$T_L = 6$  seconds

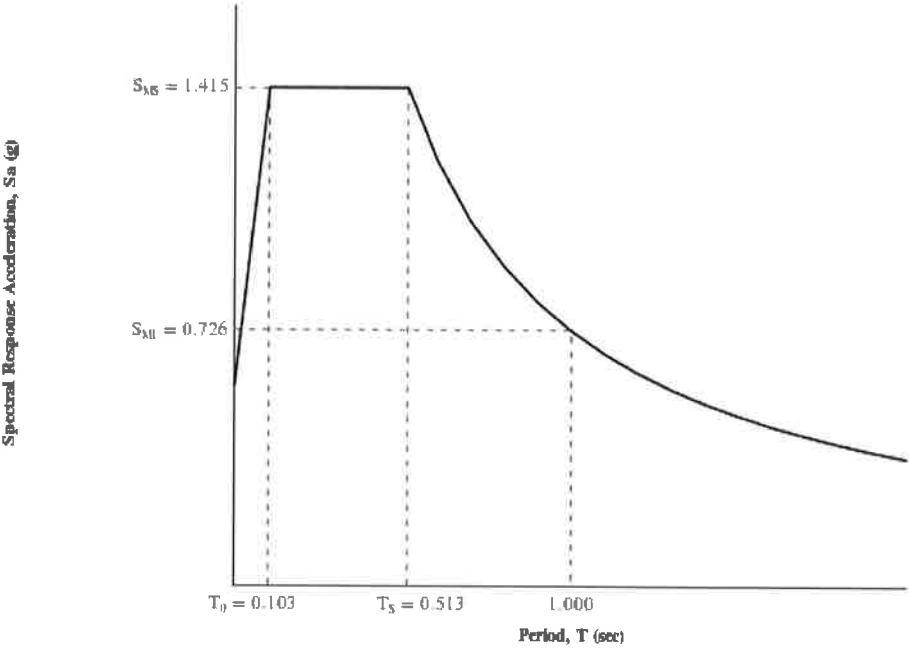
Figure 11.4-1: Design Response Spectrum





### Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE<sub>R</sub>) Response Spectrum

The MCE<sub>R</sub> Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From **Figure 22-7**<sup>[4]</sup>

$$PGA = 0.534$$

**Equation (11.8-1):**

$$PGA_M = F_{PGA}PGA = 1.000 \times 0.534 = 0.534 \text{ g}$$

Table 11.8-1: Site Coefficient  $F_{PGA}$

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

**For Site Class = D and PGA = 0.534 g,  $F_{PGA} = 1.000$**

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From **Figure 22-17**<sup>[5]</sup>

$$C_{RS} = 0.955$$

From **Figure 22-18**<sup>[6]</sup>

$$C_{R1} = 0.953$$

## Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF $S_{DS}$	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \leq S_{DS} < 0.33g$	B	B	C
$0.33g \leq S_{DS} < 0.50g$	C	C	D
$0.50g \leq S_{DS}$	D	D	D

For Risk Category = I and  $S_{DS} = 0.944 g$ , Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF $S_{D1}$	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \leq S_{D1} < 0.133g$	B	B	C
$0.133g \leq S_{D1} < 0.20g$	C	C	D
$0.20g \leq S_{D1}$	D	D	D

For Risk Category = I and  $S_{D1} = 0.484 g$ , Seismic Design Category = D

Note: When  $S_1$  is greater than or equal to  $0.75g$ , the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category  $\equiv$  "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

### References

- Figure 22-1:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-1.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf)
- Figure 22-2:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-2.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf)
- Figure 22-12:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-12.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf)
- Figure 22-7:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-7.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf)
- Figure 22-17:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-17.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf)
- Figure 22-18:  
[https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010\\_ASCE-7\\_Figure\\_22-18.pdf](https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf)

APPENDIX C  
VOLFLO ANALYSES

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## SHRINK CALCULATION

**Ym Center (Shrink) = -1.46 inches ( -3.70 centimeters )**  
**Em Center = 8.50 feet ( 259.08 centimeters )**



	Shrink at distance X from edge of slab										
	Shrink at Slab Edge	0.9 ft	1.7 ft	2.6 ft	3.4 ft	4.3 ft	5.1 ft	6.0 ft	6.8 ft	7.7 ft	Shrink at Em
	0.0 ft	26 cm	52 cm	78 cm	104 cm	130 cm	155 cm	181 cm	207 cm	233 cm	259 cm
inches	-1.46	-1.27	-1.09	-0.92	-0.76	-0.60	-0.45	-0.31	-0.19	-0.09	0.00
cm	-3.70	-3.24	-2.78	-2.34	-1.92	-1.52	-1.14	-0.80	-0.49	-0.22	0.00

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

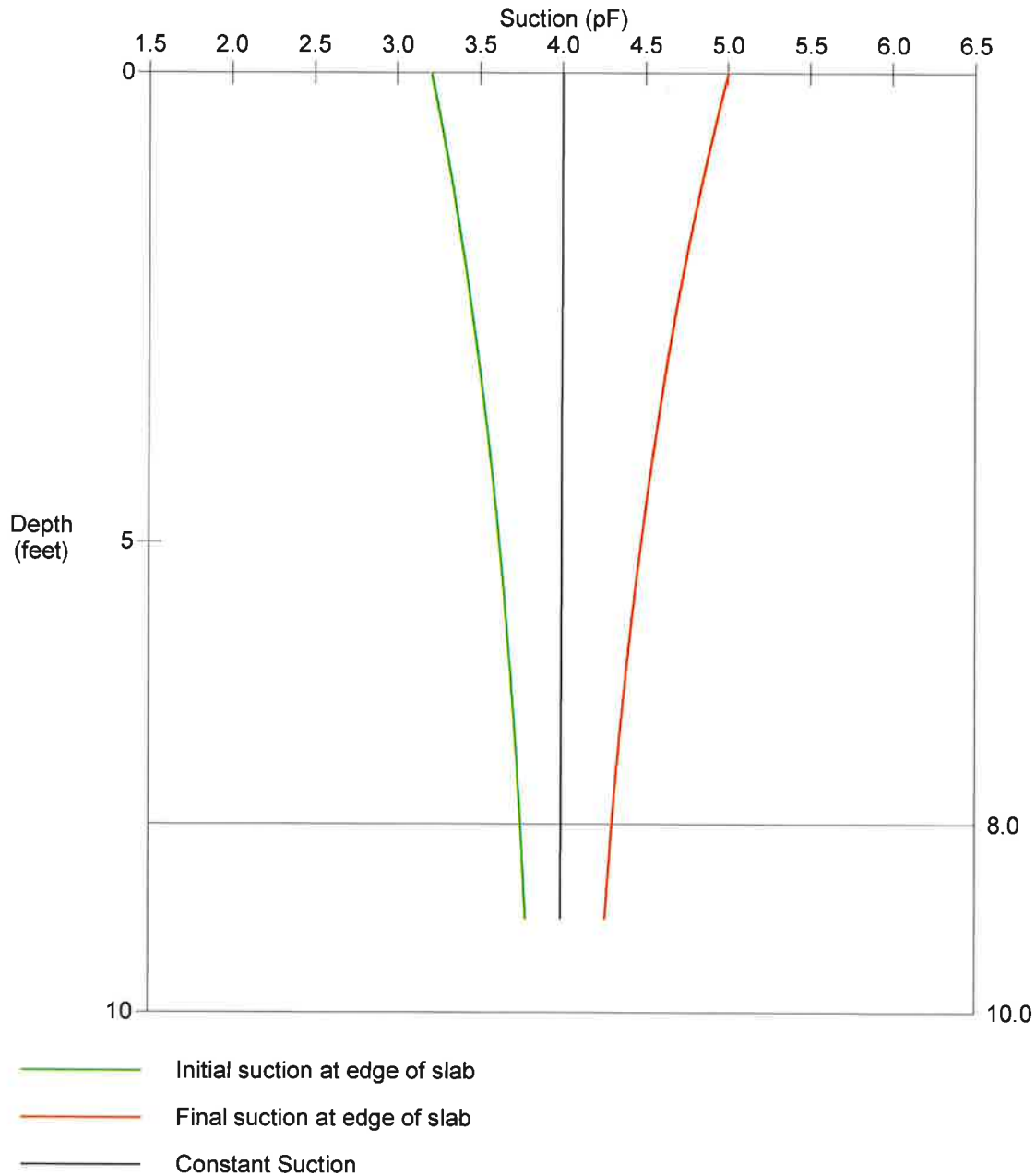
Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
Project Engineer : J. McDougal

Project Number : 1660037  
Project Date : March 31, 2019  
Report Date : April, 2019  
Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## SUCTION PROFILES





# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## LAYER GEOTECHNICAL PROPERTIES

Layer	Gamma0 (Mean)	Fine Clay Cor. Fact.	Coarse-Grain Cor. Fact.	GammaH (Mean)	GammaH (Shrink)	GammaH (Swell)
1	0.140	0.274	1.000	0.038	0.037	0.040
2	0.010	0.333	1.000	0.003	0.003	0.003

Layer	Alpha (Mean)	Alpha (Shrink)	Alpha (Swell)	S	P	KoHo
1	0.004263	0.004280	0.004244	-11.300	0.000665	0.000289
2	0.005153	0.005153	0.005153	-14.158	0.000671	0.000291

### Gamma0 Determination Per PTI 3rd Edition Manual

Layer	% Fine Clay	PI	PI/ %fc	LL	LL/ %fc	Zone Chart	Gamma0 (Mean)
1	27.40	19	0.69	40	1.46	3	0.140
2			USER INPUT GAMMA0				

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## SUMMARY OF INPUT DATA - Soil Properties

### Layer Thickness and description

Layer Number	Layer Thickness	Depth to Bottom	Layer Description
1	8.0 ft	8.0 ft	CL
2	2.0 ft	10.0 ft	SC-SM

### Layer Geotechnical Properties

Layer Number	Liquid Limit	Plastic Limit	% Pass. #200	% Finer 2 mic.	Dry Den. (lb/ft <sup>3</sup> )	Gamma 100	Ko Drying	Ko Wetting	Fabric Factor
1	40	21	73.0	20.0	110.0	CALC	0.33	0.67	1.0
2	30	25	30.0	10.0	115.0	0.01	0.33	0.67	1.0

### Coarse-Grained Soil Correction

Layer Number	% Pass. #10	(Gs) coarse	Wet Den. (lb/ft <sup>3</sup> )
1		Not Calculated	
2		Not Calculated	

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## SUMMARY OF INPUT DATA - Suction at Edge of Slab

### Initial Suction Profile ---- Default Wet Design Envelope

Suction value at surface : 3.2 pF

### Final Suction Profile ---- Default Dry Design Envelope

Suction Value at Surface : 5.0 pF

### Constant Suction

Constant suction : 4.0 pF  
 Depth to constant suction : 9.0 ft

### Moisture Barriers

Vertical barrier depth : 0.0 ft  
 Apply vertical barrier to : Neither Profile  
 Horizontal barrier length : 0.0 ft

**VOLFLO 1.5**  
Geostructural Tool Kit, Inc.

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Project Number : 1660037  
Project Date : March 31, 2019  
Report Date : April, 2019  
Report Number :

Geotechnical Report : Wood Rodgers, Inc.

**SUMMARY OF INPUT DATA - Em**

**Em Distance**

Determined per Modified PTI method  
Thornthwaite Moisture Index

-40

**Suction Profile at Em** ---- Constant Suction Profile

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

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 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Shrink (in)
0.0	3.20	4.00	5.00	0.00
0.1	3.21	4.00	4.99	-0.04
0.2	3.22	4.00	4.97	-0.04
0.3	3.23	4.00	4.96	-0.04
0.4	3.25	4.00	4.94	-0.04
0.5	3.26	4.00	4.93	-0.04
0.6	3.27	4.00	4.91	-0.04
0.7	3.28	4.00	4.90	-0.04
0.8	3.29	4.00	4.89	-0.04
0.9	3.30	4.00	4.87	-0.03
1.0	3.31	4.00	4.86	-0.03
1.1	3.32	4.00	4.85	-0.03
1.2	3.33	4.00	4.84	-0.03
1.3	3.34	4.00	4.82	-0.03
1.4	3.35	4.00	4.81	-0.03
1.5	3.36	4.00	4.80	-0.03
1.6	3.37	4.00	4.79	-0.03
1.7	3.38	4.00	4.78	-0.03
1.8	3.38	4.00	4.76	-0.03
1.9	3.39	4.00	4.75	-0.03
2.0	3.40	4.00	4.74	-0.03
2.1	3.41	4.00	4.73	-0.03
2.2	3.42	4.00	4.72	-0.03
2.3	3.43	4.00	4.71	-0.03
2.4	3.44	4.00	4.70	-0.03
2.5	3.44	4.00	4.69	-0.03
2.6	3.45	4.00	4.68	-0.03
2.7	3.46	4.00	4.67	-0.03
2.8	3.47	4.00	4.66	-0.02
2.9	3.47	4.00	4.65	-0.02
3.0	3.48	4.00	4.64	-0.02
3.1	3.49	4.00	4.63	-0.02
3.2	3.50	4.00	4.62	-0.02
3.3	3.50	4.00	4.61	-0.02
3.4	3.51	4.00	4.60	-0.02
3.5	3.52	4.00	4.59	-0.02
3.6	3.52	4.00	4.58	-0.02
3.7	3.53	4.00	4.57	-0.02
3.8	3.54	3.99	4.57	-0.02
3.9	3.54	3.99	4.56	-0.02

# VOLFLO 1.5

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 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Shrink (in)
4.0	3.55	3.99	4.55	-0.02
4.1	3.56	3.99	4.54	-0.02
4.2	3.56	3.99	4.53	-0.02
4.3	3.57	3.99	4.52	-0.02
4.4	3.58	3.99	4.52	-0.01
4.5	3.58	3.99	4.51	-0.01
4.6	3.59	3.99	4.50	-0.01
4.7	3.59	3.99	4.49	-0.01
4.8	3.60	3.99	4.49	-0.01
4.9	3.61	3.99	4.48	-0.01
5.0	3.61	3.99	4.47	-0.01
5.1	3.62	3.99	4.46	-0.01
5.2	3.62	3.99	4.46	-0.01
5.3	3.63	3.99	4.45	-0.01
5.4	3.63	3.99	4.44	-0.01
5.5	3.64	3.99	4.44	-0.01
5.6	3.64	3.99	4.43	-0.01
5.7	3.65	3.99	4.42	-0.01
5.8	3.65	3.99	4.42	-0.01
5.9	3.66	3.99	4.41	-0.01
6.0	3.66	3.99	4.40	-0.01
6.1	3.67	3.99	4.40	-0.01
6.2	3.67	3.99	4.39	-0.01
6.3	3.68	3.99	4.39	-0.01
6.4	3.68	3.99	4.38	-0.01
6.5	3.68	3.99	4.37	-0.01
6.6	3.69	3.99	4.37	-0.01
6.7	3.69	3.99	4.36	0.00
6.8	3.70	3.99	4.36	0.00
6.9	3.70	3.99	4.35	0.00
7.0	3.71	3.99	4.35	0.00
7.1	3.71	3.99	4.34	0.00
7.2	3.71	3.99	4.34	0.00
7.3	3.72	3.99	4.33	0.00
7.4	3.72	3.99	4.33	0.00
7.5	3.73	3.99	4.32	0.00
7.6	3.73	3.99	4.32	0.00
7.7	3.73	3.99	4.31	0.00
7.8	3.74	3.99	4.31	0.00
7.9	3.74	3.99	4.30	0.00

# VOLFLO 1.5

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 Project Date : March 31, 2019  
 Report Date : April, 2019  
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Geotechnical Report : Wood Rodgers, Inc.

## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Shrink (in)
8.0	3.74	3.99	4.30	0.00
8.1	3.75	3.99	4.29	0.00
8.2	3.75	3.99	4.29	0.00
8.3	3.75	3.99	4.28	0.00
8.4	3.76	3.99	4.28	0.00
8.5	3.76	3.99	4.28	0.00
8.6	3.76	3.99	4.27	0.00
8.7	3.76	3.99	4.27	0.00
8.8	3.77	3.99	4.26	0.00
8.9	3.77	3.99	4.26	0.00
9.0	3.77	3.99	4.26	0.00



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Project Date : March 31, 2019  
Report Date : April, 2019  
Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## INITIAL SUCTION PROFILES

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
0	0.0	3.20	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.00
3	0.1	3.21	3.29	3.37	3.45	3.53	3.61	3.68	3.76	3.84	3.92	4.00
6	0.2	3.22	3.30	3.38	3.46	3.53	3.61	3.69	3.77	3.84	3.92	4.00
9	0.3	3.23	3.31	3.39	3.46	3.54	3.62	3.69	3.77	3.85	3.92	4.00
12	0.4	3.25	3.32	3.40	3.47	3.55	3.62	3.70	3.77	3.85	3.92	4.00
15	0.5	3.26	3.33	3.40	3.48	3.55	3.63	3.70	3.78	3.85	3.93	4.00
18	0.6	3.27	3.34	3.41	3.49	3.56	3.63	3.71	3.78	3.85	3.93	4.00
21	0.7	3.28	3.35	3.42	3.49	3.57	3.64	3.71	3.78	3.85	3.93	4.00
24	0.8	3.29	3.36	3.43	3.50	3.57	3.64	3.71	3.79	3.86	3.93	4.00
27	0.9	3.30	3.37	3.44	3.51	3.58	3.65	3.72	3.79	3.86	3.93	4.00
30	1.0	3.31	3.38	3.45	3.52	3.58	3.65	3.72	3.79	3.86	3.93	4.00
34	1.1	3.32	3.39	3.45	3.52	3.59	3.66	3.73	3.79	3.86	3.93	4.00
37	1.2	3.33	3.40	3.46	3.53	3.60	3.66	3.73	3.80	3.86	3.93	4.00
40	1.3	3.34	3.40	3.47	3.54	3.60	3.67	3.73	3.80	3.87	3.93	4.00
43	1.4	3.35	3.41	3.48	3.54	3.61	3.67	3.74	3.80	3.87	3.93	4.00
46	1.5	3.36	3.42	3.48	3.55	3.61	3.68	3.74	3.81	3.87	3.93	4.00
49	1.6	3.37	3.43	3.49	3.56	3.62	3.68	3.75	3.81	3.87	3.93	4.00
52	1.7	3.38	3.44	3.50	3.56	3.62	3.69	3.75	3.81	3.87	3.94	4.00
55	1.8	3.38	3.45	3.51	3.57	3.63	3.69	3.75	3.81	3.87	3.94	4.00
58	1.9	3.39	3.45	3.51	3.57	3.63	3.70	3.76	3.82	3.88	3.94	4.00
61	2.0	3.40	3.46	3.52	3.58	3.64	3.70	3.76	3.82	3.88	3.94	4.00
64	2.1	3.41	3.47	3.53	3.59	3.65	3.70	3.76	3.82	3.88	3.94	4.00
67	2.2	3.42	3.48	3.53	3.59	3.65	3.71	3.77	3.82	3.88	3.94	4.00
70	2.3	3.43	3.48	3.54	3.60	3.65	3.71	3.77	3.83	3.88	3.94	4.00
73	2.4	3.44	3.49	3.55	3.60	3.66	3.72	3.77	3.83	3.88	3.94	4.00
76	2.5	3.44	3.50	3.55	3.61	3.66	3.72	3.78	3.83	3.89	3.94	4.00
79	2.6	3.45	3.51	3.56	3.61	3.67	3.72	3.78	3.83	3.89	3.94	4.00
82	2.7	3.46	3.51	3.57	3.62	3.67	3.73	3.78	3.84	3.89	3.94	4.00
85	2.8	3.47	3.52	3.57	3.63	3.68	3.73	3.78	3.84	3.89	3.94	4.00
88	2.9	3.47	3.53	3.58	3.63	3.68	3.74	3.79	3.84	3.89	3.94	4.00
91	3.0	3.48	3.53	3.58	3.64	3.69	3.74	3.79	3.84	3.89	3.94	4.00
94	3.1	3.49	3.54	3.59	3.64	3.69	3.74	3.79	3.84	3.89	3.95	4.00
98	3.2	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00
101	3.3	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00
104	3.4	3.51	3.56	3.61	3.66	3.70	3.75	3.80	3.85	3.90	3.95	4.00
107	3.5	3.52	3.57	3.61	3.66	3.71	3.76	3.80	3.85	3.90	3.95	4.00
110	3.6	3.52	3.57	3.62	3.67	3.71	3.76	3.81	3.85	3.90	3.95	4.00
113	3.7	3.53	3.58	3.62	3.67	3.72	3.76	3.81	3.86	3.90	3.95	4.00
116	3.8	3.54	3.58	3.63	3.68	3.72	3.77	3.81	3.86	3.90	3.95	3.99
119	3.9	3.54	3.59	3.63	3.68	3.72	3.77	3.81	3.86	3.90	3.95	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
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 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## INITIAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
122	4.0	3.55	3.60	3.64	3.68	3.73	3.77	3.82	3.86	3.91	3.95	3.99
125	4.1	3.56	3.60	3.64	3.69	3.73	3.78	3.82	3.86	3.91	3.95	3.99
128	4.2	3.56	3.61	3.65	3.69	3.74	3.78	3.82	3.87	3.91	3.95	3.99
131	4.3	3.57	3.61	3.65	3.70	3.74	3.78	3.82	3.87	3.91	3.95	3.99
134	4.4	3.58	3.62	3.66	3.70	3.74	3.79	3.83	3.87	3.91	3.95	3.99
137	4.5	3.58	3.62	3.66	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
140	4.6	3.59	3.63	3.67	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
143	4.7	3.59	3.63	3.67	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
146	4.8	3.60	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.91	3.95	3.99
149	4.9	3.61	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.92	3.95	3.99
152	5.0	3.61	3.65	3.69	3.73	3.76	3.80	3.84	3.88	3.92	3.96	3.99
155	5.1	3.62	3.65	3.69	3.73	3.77	3.80	3.84	3.88	3.92	3.96	3.99
158	5.2	3.62	3.66	3.70	3.73	3.77	3.81	3.84	3.88	3.92	3.96	3.99
162	5.3	3.63	3.66	3.70	3.74	3.77	3.81	3.85	3.88	3.92	3.96	3.99
165	5.4	3.63	3.67	3.70	3.74	3.78	3.81	3.85	3.88	3.92	3.96	3.99
168	5.5	3.64	3.67	3.71	3.74	3.78	3.81	3.85	3.89	3.92	3.96	3.99
171	5.6	3.64	3.68	3.71	3.75	3.78	3.82	3.85	3.89	3.92	3.96	3.99
174	5.7	3.65	3.68	3.72	3.75	3.79	3.82	3.85	3.89	3.92	3.96	3.99
177	5.8	3.65	3.69	3.72	3.75	3.79	3.82	3.86	3.89	3.92	3.96	3.99
180	5.9	3.66	3.69	3.72	3.76	3.79	3.82	3.86	3.89	3.93	3.96	3.99
183	6.0	3.66	3.69	3.73	3.76	3.79	3.83	3.86	3.89	3.93	3.96	3.99
186	6.1	3.67	3.70	3.73	3.76	3.80	3.83	3.86	3.89	3.93	3.96	3.99
189	6.2	3.67	3.70	3.74	3.77	3.80	3.83	3.86	3.90	3.93	3.96	3.99
192	6.3	3.68	3.71	3.74	3.77	3.80	3.83	3.87	3.90	3.93	3.96	3.99
195	6.4	3.68	3.71	3.74	3.77	3.80	3.84	3.87	3.90	3.93	3.96	3.99
198	6.5	3.68	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
201	6.6	3.69	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
204	6.7	3.69	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
207	6.8	3.70	3.73	3.76	3.79	3.81	3.84	3.87	3.90	3.93	3.96	3.99
210	6.9	3.70	3.73	3.76	3.79	3.82	3.85	3.88	3.90	3.93	3.96	3.99
213	7.0	3.71	3.73	3.76	3.79	3.82	3.85	3.88	3.91	3.93	3.96	3.99
216	7.1	3.71	3.74	3.77	3.79	3.82	3.85	3.88	3.91	3.93	3.96	3.99
219	7.2	3.71	3.74	3.77	3.80	3.82	3.85	3.88	3.91	3.94	3.96	3.99
223	7.3	3.72	3.74	3.77	3.80	3.83	3.85	3.88	3.91	3.94	3.96	3.99
226	7.4	3.72	3.75	3.78	3.80	3.83	3.86	3.88	3.91	3.94	3.96	3.99
229	7.5	3.73	3.75	3.78	3.80	3.83	3.86	3.88	3.91	3.94	3.96	3.99
232	7.6	3.73	3.76	3.78	3.81	3.83	3.86	3.89	3.91	3.94	3.96	3.99
235	7.7	3.73	3.76	3.78	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99
238	7.8	3.74	3.76	3.79	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99
241	7.9	3.74	3.76	3.79	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## INITIAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
244	8.0	3.74	3.77	3.79	3.82	3.84	3.87	3.89	3.92	3.94	3.96	3.99
247	8.1	3.75	3.77	3.79	3.82	3.84	3.87	3.89	3.92	3.94	3.96	3.99
250	8.2	3.75	3.77	3.80	3.82	3.85	3.87	3.89	3.92	3.94	3.97	3.99
253	8.3	3.75	3.78	3.80	3.82	3.85	3.87	3.89	3.92	3.94	3.97	3.99
256	8.4	3.76	3.78	3.80	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
259	8.5	3.76	3.78	3.80	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
262	8.6	3.76	3.78	3.81	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
265	8.7	3.76	3.79	3.81	3.83	3.85	3.88	3.90	3.92	3.94	3.97	3.99
268	8.8	3.77	3.79	3.81	3.83	3.86	3.88	3.90	3.92	3.94	3.97	3.99
271	8.9	3.77	3.79	3.81	3.84	3.86	3.88	3.90	3.92	3.94	3.97	3.99
274	9.0	3.77	3.79	3.82	3.84	3.86	3.88	3.90	3.92	3.94	3.97	3.99

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 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
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Geotechnical Report : Wood Rodgers, Inc.

## FINAL SUCTION PROFILES

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
0	0.0	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10	4.00
3	0.1	4.99	4.89	4.79	4.69	4.59	4.49	4.39	4.30	4.20	4.10	4.00
6	0.2	4.97	4.87	4.78	4.68	4.58	4.49	4.39	4.29	4.19	4.10	4.00
9	0.3	4.96	4.86	4.76	4.67	4.57	4.48	4.38	4.29	4.19	4.10	4.00
12	0.4	4.94	4.85	4.75	4.66	4.57	4.47	4.38	4.28	4.19	4.09	4.00
15	0.5	4.93	4.84	4.74	4.65	4.56	4.46	4.37	4.28	4.19	4.09	4.00
18	0.6	4.91	4.82	4.73	4.64	4.55	4.46	4.37	4.27	4.18	4.09	4.00
21	0.7	4.90	4.81	4.72	4.63	4.54	4.45	4.36	4.27	4.18	4.09	4.00
24	0.8	4.89	4.80	4.71	4.62	4.53	4.44	4.35	4.27	4.18	4.09	4.00
27	0.9	4.87	4.79	4.70	4.61	4.52	4.44	4.35	4.26	4.17	4.09	4.00
30	1.0	4.86	4.78	4.69	4.60	4.52	4.43	4.34	4.26	4.17	4.08	4.00
34	1.1	4.85	4.76	4.68	4.59	4.51	4.42	4.34	4.25	4.17	4.08	4.00
37	1.2	4.84	4.75	4.67	4.58	4.50	4.42	4.33	4.25	4.17	4.08	4.00
40	1.3	4.82	4.74	4.66	4.58	4.49	4.41	4.33	4.25	4.16	4.08	4.00
43	1.4	4.81	4.73	4.65	4.57	4.49	4.40	4.32	4.24	4.16	4.08	4.00
46	1.5	4.80	4.72	4.64	4.56	4.48	4.40	4.32	4.24	4.16	4.08	4.00
49	1.6	4.79	4.71	4.63	4.55	4.47	4.39	4.31	4.23	4.16	4.08	4.00
52	1.7	4.78	4.70	4.62	4.54	4.46	4.39	4.31	4.23	4.15	4.08	4.00
55	1.8	4.76	4.69	4.61	4.53	4.46	4.38	4.30	4.23	4.15	4.07	4.00
58	1.9	4.75	4.68	4.60	4.53	4.45	4.38	4.30	4.22	4.15	4.07	4.00
61	2.0	4.74	4.67	4.59	4.52	4.44	4.37	4.30	4.22	4.15	4.07	4.00
64	2.1	4.73	4.66	4.58	4.51	4.44	4.36	4.29	4.22	4.14	4.07	4.00
67	2.2	4.72	4.65	4.58	4.50	4.43	4.36	4.29	4.21	4.14	4.07	4.00
70	2.3	4.71	4.64	4.57	4.50	4.42	4.35	4.28	4.21	4.14	4.07	4.00
73	2.4	4.70	4.63	4.56	4.49	4.42	4.35	4.28	4.21	4.14	4.07	4.00
76	2.5	4.69	4.62	4.55	4.48	4.41	4.34	4.27	4.20	4.14	4.07	4.00
79	2.6	4.68	4.61	4.54	4.47	4.41	4.34	4.27	4.20	4.13	4.06	4.00
82	2.7	4.67	4.60	4.53	4.47	4.40	4.33	4.27	4.20	4.13	4.06	4.00
85	2.8	4.66	4.59	4.53	4.46	4.39	4.33	4.26	4.19	4.13	4.06	4.00
88	2.9	4.65	4.58	4.52	4.45	4.39	4.32	4.26	4.19	4.13	4.06	4.00
91	3.0	4.64	4.57	4.51	4.45	4.38	4.32	4.25	4.19	4.12	4.06	4.00
94	3.1	4.63	4.57	4.50	4.44	4.38	4.31	4.25	4.19	4.12	4.06	4.00
98	3.2	4.62	4.56	4.49	4.43	4.37	4.31	4.25	4.18	4.12	4.06	4.00
101	3.3	4.61	4.55	4.49	4.43	4.36	4.30	4.24	4.18	4.12	4.06	4.00
104	3.4	4.60	4.54	4.48	4.42	4.36	4.30	4.24	4.18	4.12	4.06	4.00
107	3.5	4.59	4.53	4.47	4.41	4.35	4.29	4.23	4.17	4.11	4.06	4.00
110	3.6	4.58	4.52	4.47	4.41	4.35	4.29	4.23	4.17	4.11	4.05	4.00
113	3.7	4.57	4.52	4.46	4.40	4.34	4.28	4.23	4.17	4.11	4.05	4.00
116	3.8	4.57	4.51	4.45	4.39	4.34	4.28	4.22	4.17	4.11	4.05	3.99
119	3.9	4.56	4.50	4.44	4.39	4.33	4.28	4.22	4.16	4.11	4.05	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## FINAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
122	4.0	4.55	4.49	4.44	4.38	4.33	4.27	4.22	4.16	4.11	4.05	3.99
125	4.1	4.54	4.49	4.43	4.38	4.32	4.27	4.21	4.16	4.10	4.05	3.99
128	4.2	4.53	4.48	4.43	4.37	4.32	4.26	4.21	4.16	4.10	4.05	3.99
131	4.3	4.52	4.47	4.42	4.37	4.31	4.26	4.21	4.15	4.10	4.05	3.99
134	4.4	4.52	4.46	4.41	4.36	4.31	4.26	4.20	4.15	4.10	4.05	3.99
137	4.5	4.51	4.46	4.41	4.35	4.30	4.25	4.20	4.15	4.10	4.05	3.99
140	4.6	4.50	4.45	4.40	4.35	4.30	4.25	4.20	4.15	4.10	4.04	3.99
143	4.7	4.49	4.44	4.39	4.34	4.29	4.24	4.19	4.14	4.09	4.04	3.99
146	4.8	4.49	4.44	4.39	4.34	4.29	4.24	4.19	4.14	4.09	4.04	3.99
149	4.9	4.48	4.43	4.38	4.33	4.28	4.24	4.19	4.14	4.09	4.04	3.99
152	5.0	4.47	4.42	4.38	4.33	4.28	4.23	4.18	4.14	4.09	4.04	3.99
155	5.1	4.46	4.42	4.37	4.32	4.28	4.23	4.18	4.13	4.09	4.04	3.99
158	5.2	4.46	4.41	4.36	4.32	4.27	4.23	4.18	4.13	4.09	4.04	3.99
162	5.3	4.45	4.40	4.36	4.31	4.27	4.22	4.18	4.13	4.08	4.04	3.99
165	5.4	4.44	4.40	4.35	4.31	4.26	4.22	4.17	4.13	4.08	4.04	3.99
168	5.5	4.44	4.39	4.35	4.30	4.26	4.21	4.17	4.13	4.08	4.04	3.99
171	5.6	4.43	4.39	4.34	4.30	4.26	4.21	4.17	4.12	4.08	4.04	3.99
174	5.7	4.42	4.38	4.34	4.29	4.25	4.21	4.17	4.12	4.08	4.04	3.99
177	5.8	4.42	4.37	4.33	4.29	4.25	4.20	4.16	4.12	4.08	4.03	3.99
180	5.9	4.41	4.37	4.33	4.29	4.24	4.20	4.16	4.12	4.08	4.03	3.99
183	6.0	4.40	4.36	4.32	4.28	4.24	4.20	4.16	4.12	4.07	4.03	3.99
186	6.1	4.40	4.36	4.32	4.28	4.24	4.20	4.15	4.11	4.07	4.03	3.99
189	6.2	4.39	4.35	4.31	4.27	4.23	4.19	4.15	4.11	4.07	4.03	3.99
192	6.3	4.39	4.35	4.31	4.27	4.23	4.19	4.15	4.11	4.07	4.03	3.99
195	6.4	4.38	4.34	4.30	4.26	4.22	4.19	4.15	4.11	4.07	4.03	3.99
198	6.5	4.37	4.34	4.30	4.26	4.22	4.18	4.14	4.11	4.07	4.03	3.99
201	6.6	4.37	4.33	4.29	4.26	4.22	4.18	4.14	4.10	4.07	4.03	3.99
204	6.7	4.36	4.33	4.29	4.25	4.21	4.18	4.14	4.10	4.07	4.03	3.99
207	6.8	4.36	4.32	4.28	4.25	4.21	4.17	4.14	4.10	4.06	4.03	3.99
210	6.9	4.35	4.32	4.28	4.24	4.21	4.17	4.14	4.10	4.06	4.03	3.99
213	7.0	4.35	4.31	4.28	4.24	4.20	4.17	4.13	4.10	4.06	4.03	3.99
216	7.1	4.34	4.31	4.27	4.24	4.20	4.17	4.13	4.10	4.06	4.03	3.99
219	7.2	4.34	4.30	4.27	4.23	4.20	4.16	4.13	4.09	4.06	4.02	3.99
223	7.3	4.33	4.30	4.26	4.23	4.19	4.16	4.13	4.09	4.06	4.02	3.99
226	7.4	4.33	4.29	4.26	4.23	4.19	4.16	4.12	4.09	4.06	4.02	3.99
229	7.5	4.32	4.29	4.25	4.22	4.19	4.16	4.12	4.09	4.06	4.02	3.99
232	7.6	4.32	4.28	4.25	4.22	4.19	4.15	4.12	4.09	4.06	4.02	3.99
235	7.7	4.31	4.28	4.25	4.21	4.18	4.15	4.12	4.09	4.05	4.02	3.99
238	7.8	4.31	4.27	4.24	4.21	4.18	4.15	4.12	4.08	4.05	4.02	3.99
241	7.9	4.30	4.27	4.24	4.21	4.18	4.15	4.11	4.08	4.05	4.02	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
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Geotechnical Report : Wood Rodgers, Inc.

## FINAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.9 ft 26 cm	1.7 ft 52 cm	2.6 ft 78 cm	3.4 ft 104 cm	4.3 ft 130 cm	5.1 ft 155 cm	6.0 ft 181 cm	6.8 ft 207 cm	7.7 ft 233 cm	8.5 ft 259 cm
244	8.0	4.30	4.27	4.24	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
247	8.1	4.29	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
250	8.2	4.29	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
253	8.3	4.28	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
256	8.4	4.28	4.25	4.22	4.19	4.16	4.13	4.11	4.08	4.05	4.02	3.99
259	8.5	4.28	4.25	4.22	4.19	4.16	4.13	4.10	4.07	4.05	4.02	3.99
262	8.6	4.27	4.24	4.22	4.19	4.16	4.13	4.10	4.07	4.05	4.02	3.99
265	8.7	4.27	4.24	4.21	4.18	4.16	4.13	4.10	4.07	4.04	4.02	3.99
268	8.8	4.26	4.24	4.21	4.18	4.15	4.13	4.10	4.07	4.04	4.02	3.99
271	8.9	4.26	4.23	4.21	4.18	4.15	4.12	4.10	4.07	4.04	4.02	3.99
274	9.0	4.26	4.23	4.20	4.18	4.15	4.12	4.10	4.07	4.04	4.01	3.99

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## SWELL CALCULATION

**Ym Edge (Swell) = 2.20 inches ( 5.58 centimeters )**  
**Em Edge = 4.40 feet ( 134.11 centimeters )**



	Swell at distance X from edge of slab											
	Swell at Slab Edge	0.4 ft	0.9 ft	1.3 ft	1.8 ft	2.2 ft	2.6 ft	3.1 ft	3.5 ft	4.0 ft	4.4 ft	Swell at Em
	0.0 ft	13 cm	27 cm	40 cm	54 cm	67 cm	80 cm	94 cm	107 cm	121 cm	134 cm	
	0 cm											
inches	2.20	1.90	1.62	1.35	1.09	0.85	0.63	0.43	0.26	0.11	0.00	
cm	5.58	4.83	4.11	3.42	2.77	2.16	1.60	1.09	0.66	0.29	0.00	



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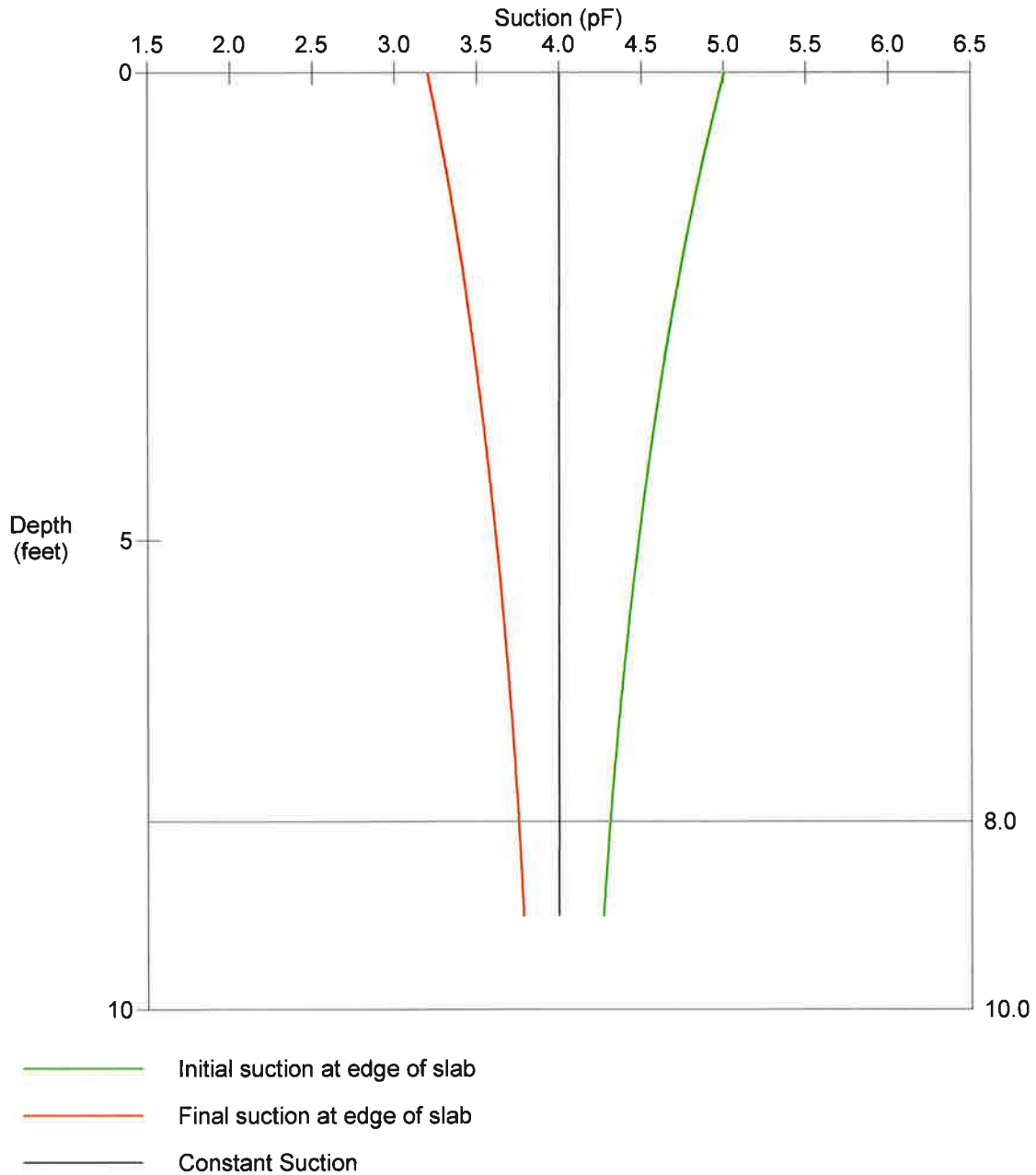
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## SUCTION PROFILES



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## LAYER GEOTECHNICAL PROPERTIES

Layer	Gamma0 (Mean)	Fine Clay Cor. Fact.	Coarse-Grain Cor. Fact.	GammaH (Mean)	GammaH (Shrink)	GammaH (Swell)
1	0.140	0.274	1.000	0.038	0.037	0.040
2	0.010	0.333	1.000	0.003	0.003	0.003

Layer	Alpha (Mean)	Alpha (Shrink)	Alpha (Swell)	S	P	KoHo
1	0.004263	0.004280	0.004244	-11.300	0.000665	0.000289
2	0.005153	0.005153	0.005153	-14.158	0.000671	0.000291

### Gamma0 Determination Per PTI 3rd Edition Manual

Layer	% Fine Clay	PI	PI/ %fc	LL	LL/ %fc	Zone Chart	Gamma0 (Mean)
1	27.40	19	0.69	40	1.46	3	0.140
2			USER INPUT GAMMA0				

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

Registered To : Wood Rodgers

Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## SUMMARY OF INPUT DATA - Soil Properties

### Layer Thickness and description

Layer Number	Layer Thickness	Depth to Bottom	Layer Description
1	8.0 ft	8.0 ft	CL
2	2.0 ft	10.0 ft	SC-SM

### Layer Geotechnical Properties

Layer Number	Liquid Limit	Plastic Limit	% Pass. #200	% Finer 2 mic.	Dry Den. (lb/ft <sup>3</sup> )	Gamma 100	Ko Drying	Ko Wetting	Fabric Factor
1	40	21	73.0	20.0	110.0	CALC	0.33	0.67	1.0
2	30	25	30.0	10.0	115.0	0.01	0.33	0.67	1.0

<u>Coarse-Grained Soil Correction</u>			
Layer Number	% Pass. #10	(Gs) coarse	Wet Den. (lb/ft <sup>3</sup> )
1	Not Calculated		
2	Not Calculated		

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## SUMMARY OF INPUT DATA - Suction at Edge of Slab

### Initial Suction Profile ---- Default Dry Design Envelope

Suction value at surface : 5.0 pF

### Final Suction Profile ---- Default Wet Design Envelope

Suction value at surface 3.2 pF

### Constant Suction

Constant suction : 4.0 pF  
Depth to constant suction : 9.0 ft

### Moisture Barriers

Vertical barrier depth : 0.0 ft  
Apply vertical barrier to : Neither Profile

Horizontal barrier length : 0.0 ft

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## SUMMARY OF INPUT DATA - Em

### Em Distance

Determined per Modified PTI method  
Thornthwaite Moisture Index

-40

Suction Profile at Em ---- Constant Suction Profile

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## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Swell (in)
0.0	5.00	4.00	3.20	0.00
0.1	4.99	4.00	3.21	0.07
0.2	4.97	4.00	3.22	0.07
0.3	4.96	4.00	3.23	0.07
0.4	4.94	4.00	3.25	0.06
0.5	4.93	4.00	3.26	0.06
0.6	4.91	4.00	3.27	0.06
0.7	4.90	4.00	3.28	0.06
0.8	4.89	4.00	3.29	0.06
0.9	4.87	4.00	3.30	0.06
1.0	4.86	4.00	3.31	0.06
1.1	4.85	4.00	3.32	0.06
1.2	4.84	4.00	3.33	0.06
1.3	4.82	4.00	3.34	0.06
1.4	4.81	4.00	3.35	0.06
1.5	4.80	4.00	3.36	0.06
1.6	4.79	4.00	3.37	0.05
1.7	4.78	4.00	3.38	0.05
1.8	4.76	4.00	3.38	0.05
1.9	4.75	4.00	3.39	0.05
2.0	4.74	4.00	3.40	0.05
2.1	4.73	4.00	3.41	0.05
2.2	4.72	4.00	3.42	0.05
2.3	4.71	4.00	3.43	0.04
2.4	4.70	4.00	3.44	0.04
2.5	4.69	4.00	3.44	0.04
2.6	4.68	4.00	3.45	0.04
2.7	4.67	4.00	3.46	0.04
2.8	4.66	4.00	3.47	0.04
2.9	4.65	4.00	3.47	0.04
3.0	4.64	4.00	3.48	0.03
3.1	4.63	4.00	3.49	0.03
3.2	4.62	4.00	3.50	0.03
3.3	4.61	4.00	3.50	0.03
3.4	4.60	4.00	3.51	0.03
3.5	4.59	4.00	3.52	0.03
3.6	4.58	4.00	3.52	0.03
3.7	4.57	4.00	3.53	0.03
3.8	4.57	3.99	3.54	0.03
3.9	4.56	3.99	3.54	0.02

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Geotechnical Report : Wood Rodgers, Inc.

## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Swell (in)
4.0	4.55	3.99	3.55	0.02
4.1	4.54	3.99	3.56	0.02
4.2	4.53	3.99	3.56	0.02
4.3	4.52	3.99	3.57	0.02
4.4	4.52	3.99	3.58	0.02
4.5	4.51	3.99	3.58	0.02
4.6	4.50	3.99	3.59	0.02
4.7	4.49	3.99	3.59	0.02
4.8	4.49	3.99	3.60	0.02
4.9	4.48	3.99	3.61	0.02
5.0	4.47	3.99	3.61	0.01
5.1	4.46	3.99	3.62	0.01
5.2	4.46	3.99	3.62	0.01
5.3	4.45	3.99	3.63	0.01
5.4	4.44	3.99	3.63	0.01
5.5	4.44	3.99	3.64	0.01
5.6	4.43	3.99	3.64	0.01
5.7	4.42	3.99	3.65	0.01
5.8	4.42	3.99	3.65	0.01
5.9	4.41	3.99	3.66	0.01
6.0	4.40	3.99	3.66	0.01
6.1	4.40	3.99	3.67	0.01
6.2	4.39	3.99	3.67	0.01
6.3	4.39	3.99	3.68	0.01
6.4	4.38	3.99	3.68	0.00
6.5	4.37	3.99	3.68	0.00
6.6	4.37	3.99	3.69	0.00
6.7	4.36	3.99	3.69	0.00
6.8	4.36	3.99	3.70	0.00
6.9	4.35	3.99	3.70	0.00
7.0	4.35	3.99	3.71	0.00
7.1	4.34	3.99	3.71	0.00
7.2	4.34	3.99	3.71	0.00
7.3	4.33	3.99	3.72	0.00
7.4	4.33	3.99	3.72	0.00
7.5	4.32	3.99	3.73	0.00
7.6	4.32	3.99	3.73	0.00
7.7	4.31	3.99	3.73	0.00
7.8	4.31	3.99	3.74	0.00
7.9	4.30	3.99	3.74	0.00



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 Project Date : March 31, 2019  
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## Suction Profiles

Depth (ft)	Initial Suction @ Edge	Suction	Final Suction @ Edge	Swell (in)
8.0	4.30	3.99	3.74	0.00
8.1	4.29	3.99	3.75	0.00
8.2	4.29	3.99	3.75	0.00
8.3	4.28	3.99	3.75	0.00
8.4	4.28	3.99	3.76	0.00
8.5	4.28	3.99	3.76	0.00
8.6	4.27	3.99	3.76	0.00
8.7	4.27	3.99	3.76	0.00
8.8	4.26	3.99	3.77	0.00
8.9	4.26	3.99	3.77	0.00
9.0	4.26	3.99	3.77	0.00

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## INITIAL SUCTION PROFILES

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.4 ft 13 cm	0.9 ft 27 cm	1.3 ft 40 cm	1.8 ft 54 cm	2.2 ft 67 cm	2.6 ft 80 cm	3.1 ft 94 cm	3.5 ft 107 cm	4.0 ft 121 cm	4.4 ft 134 cm
0	0.0	5.00	4.90	4.80	4.70	4.60	4.50	4.40	4.30	4.20	4.10	4.00
3	0.1	4.99	4.89	4.79	4.69	4.59	4.49	4.39	4.30	4.20	4.10	4.00
6	0.2	4.97	4.87	4.78	4.68	4.58	4.49	4.39	4.29	4.19	4.10	4.00
9	0.3	4.96	4.86	4.76	4.67	4.57	4.48	4.38	4.29	4.19	4.10	4.00
12	0.4	4.94	4.85	4.75	4.66	4.57	4.47	4.38	4.28	4.19	4.09	4.00
15	0.5	4.93	4.84	4.74	4.65	4.56	4.46	4.37	4.28	4.19	4.09	4.00
18	0.6	4.91	4.82	4.73	4.64	4.55	4.46	4.37	4.27	4.18	4.09	4.00
21	0.7	4.90	4.81	4.72	4.63	4.54	4.45	4.36	4.27	4.18	4.09	4.00
24	0.8	4.89	4.80	4.71	4.62	4.53	4.44	4.35	4.27	4.18	4.09	4.00
27	0.9	4.87	4.79	4.70	4.61	4.52	4.44	4.35	4.26	4.17	4.09	4.00
30	1.0	4.86	4.78	4.69	4.60	4.52	4.43	4.34	4.26	4.17	4.08	4.00
34	1.1	4.85	4.76	4.68	4.59	4.51	4.42	4.34	4.25	4.17	4.08	4.00
37	1.2	4.84	4.75	4.67	4.58	4.50	4.42	4.33	4.25	4.17	4.08	4.00
40	1.3	4.82	4.74	4.66	4.58	4.49	4.41	4.33	4.25	4.16	4.08	4.00
43	1.4	4.81	4.73	4.65	4.57	4.49	4.40	4.32	4.24	4.16	4.08	4.00
46	1.5	4.80	4.72	4.64	4.56	4.48	4.40	4.32	4.24	4.16	4.08	4.00
49	1.6	4.79	4.71	4.63	4.55	4.47	4.39	4.31	4.23	4.16	4.08	4.00
52	1.7	4.78	4.70	4.62	4.54	4.46	4.39	4.31	4.23	4.15	4.08	4.00
55	1.8	4.76	4.69	4.61	4.53	4.46	4.38	4.30	4.23	4.15	4.07	4.00
58	1.9	4.75	4.68	4.60	4.53	4.45	4.38	4.30	4.22	4.15	4.07	4.00
61	2.0	4.74	4.67	4.59	4.52	4.44	4.37	4.30	4.22	4.15	4.07	4.00
64	2.1	4.73	4.66	4.58	4.51	4.44	4.36	4.29	4.22	4.14	4.07	4.00
67	2.2	4.72	4.65	4.58	4.50	4.43	4.36	4.29	4.21	4.14	4.07	4.00
70	2.3	4.71	4.64	4.57	4.50	4.42	4.35	4.28	4.21	4.14	4.07	4.00
73	2.4	4.70	4.63	4.56	4.49	4.42	4.35	4.28	4.21	4.14	4.07	4.00
76	2.5	4.69	4.62	4.55	4.48	4.41	4.34	4.27	4.20	4.14	4.07	4.00
79	2.6	4.68	4.61	4.54	4.47	4.41	4.34	4.27	4.20	4.13	4.06	4.00
82	2.7	4.67	4.60	4.53	4.47	4.40	4.33	4.27	4.20	4.13	4.06	4.00
85	2.8	4.66	4.59	4.53	4.46	4.39	4.33	4.26	4.19	4.13	4.06	4.00
88	2.9	4.65	4.58	4.52	4.45	4.39	4.32	4.26	4.19	4.13	4.06	4.00
91	3.0	4.64	4.57	4.51	4.45	4.38	4.32	4.25	4.19	4.12	4.06	4.00
94	3.1	4.63	4.57	4.50	4.44	4.38	4.31	4.25	4.19	4.12	4.06	4.00
98	3.2	4.62	4.56	4.49	4.43	4.37	4.31	4.25	4.18	4.12	4.06	4.00
101	3.3	4.61	4.55	4.49	4.43	4.36	4.30	4.24	4.18	4.12	4.06	4.00
104	3.4	4.60	4.54	4.48	4.42	4.36	4.30	4.24	4.18	4.12	4.06	4.00
107	3.5	4.59	4.53	4.47	4.41	4.35	4.29	4.23	4.17	4.11	4.06	4.00
110	3.6	4.58	4.52	4.47	4.41	4.35	4.29	4.23	4.17	4.11	4.05	4.00
113	3.7	4.57	4.52	4.46	4.40	4.34	4.28	4.23	4.17	4.11	4.05	4.00
116	3.8	4.57	4.51	4.45	4.39	4.34	4.28	4.22	4.17	4.11	4.05	3.99
119	3.9	4.56	4.50	4.44	4.39	4.33	4.28	4.22	4.16	4.11	4.05	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
Project Engineer : J. McDougal

Project Number : 1660037  
Project Date : March 31, 2019  
Report Date : April, 2019  
Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## INITIAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.4 ft 13 cm	0.9 ft 27 cm	1.3 ft 40 cm	1.8 ft 54 cm	2.2 ft 67 cm	2.6 ft 80 cm	3.1 ft 94 cm	3.5 ft 107 cm	4.0 ft 121 cm	4.4 ft 134 cm
122	4.0	4.55	4.49	4.44	4.38	4.33	4.27	4.22	4.16	4.11	4.05	3.99
125	4.1	4.54	4.49	4.43	4.38	4.32	4.27	4.21	4.16	4.10	4.05	3.99
128	4.2	4.53	4.48	4.43	4.37	4.32	4.26	4.21	4.16	4.10	4.05	3.99
131	4.3	4.52	4.47	4.42	4.37	4.31	4.26	4.21	4.15	4.10	4.05	3.99
134	4.4	4.52	4.46	4.41	4.36	4.31	4.26	4.20	4.15	4.10	4.05	3.99
137	4.5	4.51	4.46	4.41	4.35	4.30	4.25	4.20	4.15	4.10	4.05	3.99
140	4.6	4.50	4.45	4.40	4.35	4.30	4.25	4.20	4.15	4.10	4.04	3.99
143	4.7	4.49	4.44	4.39	4.34	4.29	4.24	4.19	4.14	4.09	4.04	3.99
146	4.8	4.49	4.44	4.39	4.34	4.29	4.24	4.19	4.14	4.09	4.04	3.99
149	4.9	4.48	4.43	4.38	4.33	4.28	4.24	4.19	4.14	4.09	4.04	3.99
152	5.0	4.47	4.42	4.38	4.33	4.28	4.23	4.18	4.14	4.09	4.04	3.99
155	5.1	4.46	4.42	4.37	4.32	4.28	4.23	4.18	4.13	4.09	4.04	3.99
158	5.2	4.46	4.41	4.36	4.32	4.27	4.23	4.18	4.13	4.09	4.04	3.99
162	5.3	4.45	4.40	4.36	4.31	4.27	4.22	4.18	4.13	4.08	4.04	3.99
165	5.4	4.44	4.40	4.35	4.31	4.26	4.22	4.17	4.13	4.08	4.04	3.99
168	5.5	4.44	4.39	4.35	4.30	4.26	4.21	4.17	4.13	4.08	4.04	3.99
171	5.6	4.43	4.39	4.34	4.30	4.26	4.21	4.17	4.12	4.08	4.04	3.99
174	5.7	4.42	4.38	4.34	4.29	4.25	4.21	4.17	4.12	4.08	4.04	3.99
177	5.8	4.42	4.37	4.33	4.29	4.25	4.20	4.16	4.12	4.08	4.03	3.99
180	5.9	4.41	4.37	4.33	4.29	4.24	4.20	4.16	4.12	4.08	4.03	3.99
183	6.0	4.40	4.36	4.32	4.28	4.24	4.20	4.16	4.12	4.07	4.03	3.99
186	6.1	4.40	4.36	4.32	4.28	4.24	4.20	4.15	4.11	4.07	4.03	3.99
189	6.2	4.39	4.35	4.31	4.27	4.23	4.19	4.15	4.11	4.07	4.03	3.99
192	6.3	4.39	4.35	4.31	4.27	4.23	4.19	4.15	4.11	4.07	4.03	3.99
195	6.4	4.38	4.34	4.30	4.26	4.22	4.19	4.15	4.11	4.07	4.03	3.99
198	6.5	4.37	4.34	4.30	4.26	4.22	4.18	4.14	4.11	4.07	4.03	3.99
201	6.6	4.37	4.33	4.29	4.26	4.22	4.18	4.14	4.10	4.07	4.03	3.99
204	6.7	4.36	4.33	4.29	4.25	4.21	4.18	4.14	4.10	4.07	4.03	3.99
207	6.8	4.36	4.32	4.28	4.25	4.21	4.17	4.14	4.10	4.06	4.03	3.99
210	6.9	4.35	4.32	4.28	4.24	4.21	4.17	4.14	4.10	4.06	4.03	3.99
213	7.0	4.35	4.31	4.28	4.24	4.20	4.17	4.13	4.10	4.06	4.03	3.99
216	7.1	4.34	4.31	4.27	4.24	4.20	4.17	4.13	4.10	4.06	4.03	3.99
219	7.2	4.34	4.30	4.27	4.23	4.20	4.16	4.13	4.09	4.06	4.02	3.99
223	7.3	4.33	4.30	4.26	4.23	4.19	4.16	4.13	4.09	4.06	4.02	3.99
226	7.4	4.33	4.29	4.26	4.23	4.19	4.16	4.12	4.09	4.06	4.02	3.99
229	7.5	4.32	4.29	4.25	4.22	4.19	4.16	4.12	4.09	4.06	4.02	3.99
232	7.6	4.32	4.28	4.25	4.22	4.19	4.15	4.12	4.09	4.06	4.02	3.99
235	7.7	4.31	4.28	4.25	4.21	4.18	4.15	4.12	4.09	4.05	4.02	3.99
238	7.8	4.31	4.27	4.24	4.21	4.18	4.15	4.12	4.08	4.05	4.02	3.99
241	7.9	4.30	4.27	4.24	4.21	4.18	4.15	4.11	4.08	4.05	4.02	3.99

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Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

Project Title : Eagle Canyon IV - Phase 4  
 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
 Report Date : April, 2019  
 Report Number :

Geotechnical Report : Wood Rodgers, Inc.

## INITIAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.4 ft 13 cm	0.9 ft 27 cm	1.3 ft 40 cm	1.8 ft 54 cm	2.2 ft 67 cm	2.6 ft 80 cm	3.1 ft 94 cm	3.5 ft 107 cm	4.0 ft 121 cm	4.4 ft 134 cm
244	8.0	4.30	4.27	4.24	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
247	8.1	4.29	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
250	8.2	4.29	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
253	8.3	4.28	4.26	4.23	4.20	4.17	4.14	4.11	4.08	4.05	4.02	3.99
256	8.4	4.28	4.25	4.22	4.19	4.16	4.13	4.11	4.08	4.05	4.02	3.99
259	8.5	4.28	4.25	4.22	4.19	4.16	4.13	4.10	4.07	4.05	4.02	3.99
262	8.6	4.27	4.24	4.22	4.19	4.16	4.13	4.10	4.07	4.05	4.02	3.99
265	8.7	4.27	4.24	4.21	4.18	4.16	4.13	4.10	4.07	4.04	4.02	3.99
268	8.8	4.26	4.24	4.21	4.18	4.15	4.13	4.10	4.07	4.04	4.02	3.99
271	8.9	4.26	4.23	4.21	4.18	4.15	4.12	4.10	4.07	4.04	4.02	3.99
274	9.0	4.26	4.23	4.20	4.18	4.15	4.12	4.10	4.07	4.04	4.01	3.99

# VOLFLO 1.5

Geostructural Tool Kit, Inc.

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Serial Number : 200-100-086

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 Project Engineer : J. McDougal

Project Number : 1660037  
 Project Date : March 31, 2019  
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## FINAL SUCTION PROFILES

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.4 ft 13 cm	0.9 ft 27 cm	1.3 ft 40 cm	1.8 ft 54 cm	2.2 ft 67 cm	2.6 ft 80 cm	3.1 ft 94 cm	3.5 ft 107 cm	4.0 ft 121 cm	4.4 ft 134 cm
0	0.0	3.20	3.28	3.36	3.44	3.52	3.60	3.68	3.76	3.84	3.92	4.00
3	0.1	3.21	3.29	3.37	3.45	3.53	3.61	3.68	3.76	3.84	3.92	4.00
6	0.2	3.22	3.30	3.38	3.46	3.53	3.61	3.69	3.77	3.84	3.92	4.00
9	0.3	3.23	3.31	3.39	3.46	3.54	3.62	3.69	3.77	3.85	3.92	4.00
12	0.4	3.25	3.32	3.40	3.47	3.55	3.62	3.70	3.77	3.85	3.92	4.00
15	0.5	3.26	3.33	3.40	3.48	3.55	3.63	3.70	3.78	3.85	3.93	4.00
18	0.6	3.27	3.34	3.41	3.49	3.56	3.63	3.71	3.78	3.85	3.93	4.00
21	0.7	3.28	3.35	3.42	3.49	3.57	3.64	3.71	3.78	3.85	3.93	4.00
24	0.8	3.29	3.36	3.43	3.50	3.57	3.64	3.71	3.79	3.86	3.93	4.00
27	0.9	3.30	3.37	3.44	3.51	3.58	3.65	3.72	3.79	3.86	3.93	4.00
30	1.0	3.31	3.38	3.45	3.52	3.58	3.65	3.72	3.79	3.86	3.93	4.00
34	1.1	3.32	3.39	3.45	3.52	3.59	3.66	3.73	3.79	3.86	3.93	4.00
37	1.2	3.33	3.40	3.46	3.53	3.60	3.66	3.73	3.80	3.86	3.93	4.00
40	1.3	3.34	3.40	3.47	3.54	3.60	3.67	3.73	3.80	3.87	3.93	4.00
43	1.4	3.35	3.41	3.48	3.54	3.61	3.67	3.74	3.80	3.87	3.93	4.00
46	1.5	3.36	3.42	3.48	3.55	3.61	3.68	3.74	3.81	3.87	3.93	4.00
49	1.6	3.37	3.43	3.49	3.56	3.62	3.68	3.75	3.81	3.87	3.93	4.00
52	1.7	3.38	3.44	3.50	3.56	3.62	3.69	3.75	3.81	3.87	3.94	4.00
55	1.8	3.38	3.45	3.51	3.57	3.63	3.69	3.75	3.81	3.87	3.94	4.00
58	1.9	3.39	3.45	3.51	3.57	3.63	3.70	3.76	3.82	3.88	3.94	4.00
61	2.0	3.40	3.46	3.52	3.58	3.64	3.70	3.76	3.82	3.88	3.94	4.00
64	2.1	3.41	3.47	3.53	3.59	3.65	3.70	3.76	3.82	3.88	3.94	4.00
67	2.2	3.42	3.48	3.53	3.59	3.65	3.71	3.77	3.82	3.88	3.94	4.00
70	2.3	3.43	3.48	3.54	3.60	3.65	3.71	3.77	3.83	3.88	3.94	4.00
73	2.4	3.44	3.49	3.55	3.60	3.66	3.72	3.77	3.83	3.88	3.94	4.00
76	2.5	3.44	3.50	3.55	3.61	3.66	3.72	3.78	3.83	3.89	3.94	4.00
79	2.6	3.45	3.51	3.56	3.61	3.67	3.72	3.78	3.83	3.89	3.94	4.00
82	2.7	3.46	3.51	3.57	3.62	3.67	3.73	3.78	3.84	3.89	3.94	4.00
85	2.8	3.47	3.52	3.57	3.63	3.68	3.73	3.78	3.84	3.89	3.94	4.00
88	2.9	3.47	3.53	3.58	3.63	3.68	3.74	3.79	3.84	3.89	3.94	4.00
91	3.0	3.48	3.53	3.58	3.64	3.69	3.74	3.79	3.84	3.89	3.94	4.00
94	3.1	3.49	3.54	3.59	3.64	3.69	3.74	3.79	3.84	3.89	3.95	4.00
98	3.2	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00
101	3.3	3.50	3.55	3.60	3.65	3.70	3.75	3.80	3.85	3.90	3.95	4.00
104	3.4	3.51	3.56	3.61	3.66	3.70	3.75	3.80	3.85	3.90	3.95	4.00
107	3.5	3.52	3.57	3.61	3.66	3.71	3.76	3.80	3.85	3.90	3.95	4.00
110	3.6	3.52	3.57	3.62	3.67	3.71	3.76	3.81	3.85	3.90	3.95	4.00
113	3.7	3.53	3.58	3.62	3.67	3.72	3.76	3.81	3.86	3.90	3.95	4.00
116	3.8	3.54	3.58	3.63	3.68	3.72	3.77	3.81	3.86	3.90	3.95	3.99
119	3.9	3.54	3.59	3.63	3.68	3.72	3.77	3.81	3.86	3.90	3.95	3.99

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## FINAL SUCTION PROFILES (cont.)

Depth (cm)	Depth (ft)	0.0 ft 0 cm	0.4 ft 13 cm	0.9 ft 27 cm	1.3 ft 40 cm	1.8 ft 54 cm	2.2 ft 67 cm	2.6 ft 80 cm	3.1 ft 94 cm	3.5 ft 107 cm	4.0 ft 121 cm	4.4 ft 134 cm
122	4.0	3.55	3.60	3.64	3.68	3.73	3.77	3.82	3.86	3.91	3.95	3.99
125	4.1	3.56	3.60	3.64	3.69	3.73	3.78	3.82	3.86	3.91	3.95	3.99
128	4.2	3.56	3.61	3.65	3.69	3.74	3.78	3.82	3.87	3.91	3.95	3.99
131	4.3	3.57	3.61	3.65	3.70	3.74	3.78	3.82	3.87	3.91	3.95	3.99
134	4.4	3.58	3.62	3.66	3.70	3.74	3.79	3.83	3.87	3.91	3.95	3.99
137	4.5	3.58	3.62	3.66	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
140	4.6	3.59	3.63	3.67	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
143	4.7	3.59	3.63	3.67	3.71	3.75	3.79	3.83	3.87	3.91	3.95	3.99
146	4.8	3.60	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.91	3.95	3.99
149	4.9	3.61	3.64	3.68	3.72	3.76	3.80	3.84	3.88	3.92	3.95	3.99
152	5.0	3.61	3.65	3.69	3.73	3.76	3.80	3.84	3.88	3.92	3.96	3.99
155	5.1	3.62	3.65	3.69	3.73	3.77	3.80	3.84	3.88	3.92	3.96	3.99
158	5.2	3.62	3.66	3.70	3.73	3.77	3.81	3.84	3.88	3.92	3.96	3.99
162	5.3	3.63	3.66	3.70	3.74	3.77	3.81	3.85	3.88	3.92	3.96	3.99
165	5.4	3.63	3.67	3.70	3.74	3.78	3.81	3.85	3.88	3.92	3.96	3.99
168	5.5	3.64	3.67	3.71	3.74	3.78	3.81	3.85	3.89	3.92	3.96	3.99
171	5.6	3.64	3.68	3.71	3.75	3.78	3.82	3.85	3.89	3.92	3.96	3.99
174	5.7	3.65	3.68	3.72	3.75	3.79	3.82	3.85	3.89	3.92	3.96	3.99
177	5.8	3.65	3.69	3.72	3.75	3.79	3.82	3.86	3.89	3.92	3.96	3.99
180	5.9	3.66	3.69	3.72	3.76	3.79	3.82	3.86	3.89	3.93	3.96	3.99
183	6.0	3.66	3.69	3.73	3.76	3.79	3.83	3.86	3.89	3.93	3.96	3.99
186	6.1	3.67	3.70	3.73	3.76	3.80	3.83	3.86	3.89	3.93	3.96	3.99
189	6.2	3.67	3.70	3.74	3.77	3.80	3.83	3.86	3.90	3.93	3.96	3.99
192	6.3	3.68	3.71	3.74	3.77	3.80	3.83	3.87	3.90	3.93	3.96	3.99
195	6.4	3.68	3.71	3.74	3.77	3.80	3.84	3.87	3.90	3.93	3.96	3.99
198	6.5	3.68	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
201	6.6	3.69	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
204	6.7	3.69	3.72	3.75	3.78	3.81	3.84	3.87	3.90	3.93	3.96	3.99
207	6.8	3.70	3.73	3.76	3.79	3.81	3.84	3.87	3.90	3.93	3.96	3.99
210	6.9	3.70	3.73	3.76	3.79	3.82	3.85	3.88	3.90	3.93	3.96	3.99
213	7.0	3.71	3.73	3.76	3.79	3.82	3.85	3.88	3.91	3.93	3.96	3.99
216	7.1	3.71	3.74	3.77	3.79	3.82	3.85	3.88	3.91	3.93	3.96	3.99
219	7.2	3.71	3.74	3.77	3.80	3.82	3.85	3.88	3.91	3.94	3.96	3.99
223	7.3	3.72	3.74	3.77	3.80	3.83	3.85	3.88	3.91	3.94	3.96	3.99
226	7.4	3.72	3.75	3.78	3.80	3.83	3.86	3.88	3.91	3.94	3.96	3.99
229	7.5	3.73	3.75	3.78	3.80	3.83	3.86	3.88	3.91	3.94	3.96	3.99
232	7.6	3.73	3.76	3.78	3.81	3.83	3.86	3.89	3.91	3.94	3.96	3.99
235	7.7	3.73	3.76	3.78	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99
238	7.8	3.74	3.76	3.79	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99
241	7.9	3.74	3.76	3.79	3.81	3.84	3.86	3.89	3.91	3.94	3.96	3.99

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244	8.0	3.74	3.77	3.79	3.82	3.84	3.87	3.89	3.92	3.94	3.96	3.99
247	8.1	3.75	3.77	3.79	3.82	3.84	3.87	3.89	3.92	3.94	3.96	3.99
250	8.2	3.75	3.77	3.80	3.82	3.85	3.87	3.89	3.92	3.94	3.97	3.99
253	8.3	3.75	3.78	3.80	3.82	3.85	3.87	3.89	3.92	3.94	3.97	3.99
256	8.4	3.76	3.78	3.80	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
259	8.5	3.76	3.78	3.80	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
262	8.6	3.76	3.78	3.81	3.83	3.85	3.87	3.90	3.92	3.94	3.97	3.99
265	8.7	3.76	3.79	3.81	3.83	3.85	3.88	3.90	3.92	3.94	3.97	3.99
268	8.8	3.77	3.79	3.81	3.83	3.86	3.88	3.90	3.92	3.94	3.97	3.99
271	8.9	3.77	3.79	3.81	3.84	3.86	3.88	3.90	3.92	3.94	3.97	3.99
274	9.0	3.77	3.79	3.82	3.84	3.86	3.88	3.90	3.92	3.94	3.97	3.99



APPENDIX D  
PREVIOUS REPORT

**PRELIMINARY GEOTECHNICAL  
INVESTIGATION  
EAGLE CANYON IV  
RENO, NEVADA**

**PREPARED FOR:**

**BARKER COLEMAN CONSTRUCTION**  
Mr. Karl Matzoll, PE  
**Matrix Engineering and Consulting, Inc.**  
4741 Caughlin Parkway, Suite 1B  
Reno, Nevada 89509

**July 2004**

**MATRIX CONSTRUCTION SERVICES**  
**I N C O R P O R A T E D**

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# MATRIX CONSTRUCTION SERVICES

I N C O R P O R A T E D

July 22, 2004  
Project Number: 1064.01

**BARKER COLEMAN CONSTRUCTION**  
c/o Mr. Karl Matzoll, P.E.  
**MATRIX ENGINEERING & CONSULTING INC.**  
4741 Caughlin Parkway, Suite 1B  
Reno, Nevada 89509

**RE: PRELIMINARY GEOTECHNICAL INVESTIGATION  
EAGLE CANYON IV  
RENO, NEVADA**

Dear Mr. Matzoll:

Matrix Construction Services, Inc. is pleased to present the results of our preliminary geotechnical investigation for the referenced residential subdivision to be constructed in Reno, Nevada. The site is an irregular parcel of approximately 250 acres located in Washoe County, Nevada. The Pyramid Lake Highway and West Calle De La Plata form the eastern and northern boundaries, respectively and provide access to the parcel.

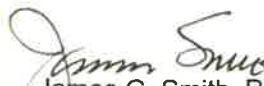
In general, the soil profile consisted of sandy silt and sandy clay overlying low plasticity silt deposits grading into clayey and silty sand. Foundations can bear directly on the native granular or fine-grained soils or structural fill. Based on our exploration program and a preliminary cut/fill plan by Matrix Engineering, clay soils will be generated during grading and selective placement will be required. In addition, where clay soils are encountered near footing or road grades, overexcavation and replacement with structural fill will be required.

The following report presents our findings, discusses our methods, and provides preliminary geotechnical recommendations for design and construction of the project as currently planned. The recommendations presented herein are intended to reduce the risk of structural distress due to expansion and/or consolidation of the native soils and structural fill.

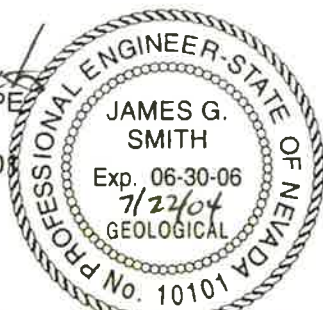
We wish to thank you for the opportunity to provide you with our services, and look forward to working with you during construction.


Sincerely,

**MATRIX CONSTRUCTION SERVICES**  
I N C O R P O R A T E D

  
James G. Smith, PE  
Principal  
R.E. Number 1010  
Expires 6-30-06

JGS:MJS:er



  
Mischelle J. Smith, PE  
Project Engineer

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**PRELIMINARY GEOTECHNICAL INVESTIGATION**  
**EAGLE CANYON IV**  
**Reno, Nevada**

**INTRODUCTION**

Presented herein are the results of Matrix Construction Services' geotechnical exploration, laboratory testing, and associated geotechnical design recommendations for the proposed residential development, Eagle Canyon IV, to be located in Washoe County, Nevada. These recommendations are based on surface and subsurface conditions encountered in our explorations, and on details of the proposed project as described in this report. The objectives of this study were to:

1. Determine general soil and ground water conditions pertaining to design and construction of the proposed subdivision.
2. Provide recommendations for design and construction of the project, as related to these geotechnical conditions.

The area covered by this report is shown in Figure 1 and on Plate A-1 (Site Plan & Approximate Test Pit Locations) in Appendix A. Our study included field exploration, laboratory testing, and engineering analyses to identify the physical and mechanical properties of the various on-site materials. Results of our field exploration and testing programs are included in this report and form the basis for all conclusions and recommendations.

**PROJECT DESCRIPTION**

The site is an irregular parcel of approximately 250 acres located in Washoe County, Nevada. The development is contained in Sections 23 and 26, Township 21N, Range 20E, M.D.M. The Pyramid Lake Highway and West Calle De La Plata form the eastern and northern boundaries, respectively, and provide access to the parcel. Undeveloped land and Eagle Canyon III surround most of the parcel.



**Figure 1 – Project Vicinity and Parcel Layout**

The project consists of developing a 527 lot single-family residential subdivision. Homes will be one to two-story, wood-framed, with raised floor construction. Foundation loads are anticipated to be light.

All street improvements will be dedicated to Washoe County. Underground utilities will be provided by a variety of public and private companies.

The development will be phased for a balance of cut and fills with little or no required import. Based on the tentative grading plan, cuts and fills will range from 1 to 6 feet.

## SITE CONDITIONS

The project is located within the north-central portion of the Spanish Springs Valley. Based on topographic information obtained from the Reno Navigator web page, the site slopes westerly at a gradient of approximately 10 percent, with total elevation differential across the site approaching 40 feet. Vegetation consists of sagebrush from 1 to 4 feet in height and grasses. Several dirt roads cross the property.



Figure 2 – Looking southeast from northwest corner

## EXPLORATION

The project was explored in May 2004 by excavating a series of 14 test pits using a Cat EL300 trackhoe. The approximate locations of the test pits are shown on Plate A-1 – Site Map and Approximate Exploration Locations. The maximum depth of test pit advance was 12 feet below the existing ground surface. Bulk samples for index testing were collected from the trench walls at specific depths in each soil horizon. Pocket penetrometer testing was performed in fine-grained soil strata to provide an indication of in-place unconfined compressive strength.

Matrix Construction Services' personnel examined and classified all soils in the field in general accordance with ASTM D 2488 (Description and Identification of Soils). During exploration,

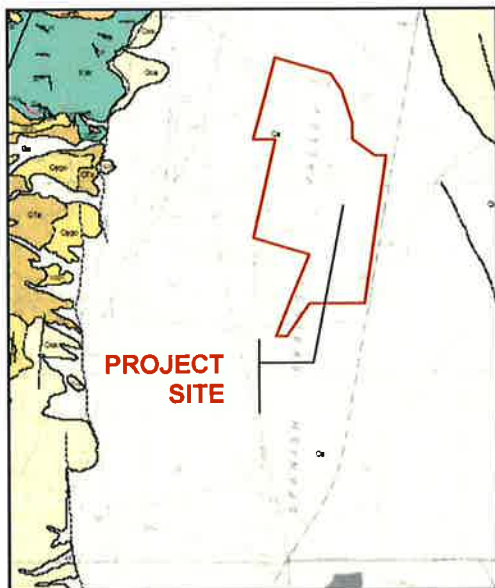
representative bulk samples were placed in sealed plastic bags and returned to our Reno, Nevada laboratory for testing. Additional soil classifications, as well as verification of the field classifications, were subsequently performed in accordance with ASTM 2487 (Unified Soil Classification System [USCS]) upon completion of laboratory testing as described below in the **Laboratory Testing** section. Logs of the test boring and test pits are presented as Plate A-2. A USCS chart has been included as Plate A-3 - Graphic Soils Classification Chart.

## LABORATORY TESTING

All soil testing performed in the Matrix Construction Services' laboratory is conducted in accordance with the standards and methods described in Volume 4.08 (Soil and Rock; Dimension Stone; Geosynthetics) of the ASTM Standards.

Samples of significant soil types were analyzed to determine their in-situ moisture contents (ASTM D 2216), grain size distributions (ASTM D 422), and plasticity indices (ASTM D 4318). Results of these tests are shown on Plate B-1 - Index Test Results. The test results were used to classify the soils according to the USCS (ASTM D 2487) and to verify the field logs, which were then updated.

## GEOLOGIC AND GENERAL SOIL AND GROUNDWATER CONDITIONS



**Figure 3** – Portion of the Preliminary Griffith Canyon Geologic Map covering project site.

The Preliminary Geologic Map of the Griffith Canyon Quadrangle (Garside and Nials, 1998) indicates that the project site is located within Holocene Alluvium, typically restricted to the valley bottoms, such as Spanish Springs Valley. The unit is classified as unconsolidated sand and gravelly sand deposited as sheet wash in low gradient alluvial plains.

In general, the soil profile consisted of sandy silt and sandy clay overlying low plasticity silt deposits grading into clayey and silty sand.

Free water was not encountered in any of our test pits. Moisture contents of the in-place soils ranged from dry to moist.



## SEISMIC HAZARDS

The Spanish Springs Valley area lies sandwiched between the Pah Rah Range to the east and Hungry Mountain to the west, within the Western extreme of the Basin and Range physiographic province. The Basin and Range is bounded by the seismically active zones of the Wasatch Front and the eastern front of the Sierra Nevada Mountains to the east and west, respectively.

No faults have been mapped crossing the parcel, and the previously referenced preliminary geologic map indicates that the closest fault is a northwest-southeast trending fault located approximately 1000 feet west, as shown in Figure 3. The faults in the surrounding area queried and concealed by the Holocene Deposits.

The criteria for Quaternary earthquake fault evaluation has been formulated by a professional committee for the State of Nevada Seismic Safety Council, but has not yet been adopted by the State or Counties. These guidelines define active faults as those with evidence of displacement within the past 11,000 years (Holocene time). Those faults with evidence of displacement during Pleistocene time (11,000 to 2,000,000 years before present) are generally considered potentially active. Based on these definitions, the faults in the vicinity of the project would be considered potentially active.

A liquefaction study was not part of this report. The *Planning Scenario for a Major Earthquake in Western Nevada* does not map the project vicinity in an area of liquefaction susceptibility. In Nevada there is no specific policy, which requires structures to be designed to resist liquefaction. Such designs tend to be very costly and are usually limited to structures associated with a public safety function.

## DISCUSSION AND RECOMMENDATIONS

### General Information

For purposes of this project, the following definitions shall be utilized:

- ◆ Fine-grained soil possesses more than 40 percent by weight passing the number 200 sieve and exhibits a plasticity index lower than 15.



- ◆ Clay soil possesses more than 30 percent passing the number 200 sieve and exhibits a plasticity index greater than 15.
- ◆ Granular soil does not meeting the above criteria and has a maximum particle size less than 6-inches.

The soil profile encountered generally consists of a complex interbedding of clay, silty, and sand. Moisture changes can cause differential movements within structural elements supported by clay or silt soils. One construction method to reduce the potential for differential movement is to separate structural elements from the questionable soil with structural fill. The structural fill layer provides a surcharge on the clay soil, reduces the potential for moisture changes and subsequent volume changes within the clay or silt soil, and distributes any differential movement in the underlying soils over a wider area reducing the amount of distress observed.

The recommendations provided herein, particularly under **Site Preparation, Grading and Filling, Foundation Design, Site Drainage and Quality Control** are intended to reduce risks of structural distress related to consolidation or expansion of native soils and/or structural fills. These recommendations, along with proper design and construction of the planned structure(s) and associated improvements, work together as a system to improve overall performance. If any aspect of this system is ignored or poorly implemented, the performance of the project will suffer. Barker Coleman has Matrix Construction Services, Inc., under contract to provide construction testing and observation services.

Any evaluation of the site for the presence of surface or subsurface hazardous substances is beyond the scope of this study. When suspected hazardous substances are encountered during routine geotechnical investigations, they are noted in the exploration logs and reported to the client. No such substances were identified during our exploration.

The test pits were excavated by backhoe at the locations shown on the site plan. All test pits were backfilled upon completion of the field portion of our study. The backfill was compacted to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements presented herein under Grading and Filling. If structures, concrete flatwork, pavement, utilities or other improvements are to be located in the vicinity of any of the test pits, the backfill should be removed and re-compacted in accordance with the requirements

contained in the soils report. Failure to properly compact backfill could result in excessive settlement of improvements located over test pits.

All structures should be designed for Seismic Zone 3. Structural areas referred to in this report include all areas of buildings, concrete slabs, asphalt pavements, as well as pads for any minor structures. All compaction requirements presented in this report are relative to ASTM D 1557<sup>1</sup>.

### **Soil Profile Type Amplification Factors**

The project is located within Seismic Zone 3, an area with a strong potential for ground shaking. In accordance with 1997 UBC guidelines, there are 6 different soil profile type amplification factors ranging from  $S_a$  to  $S_f$ . The recommended soil profile type amplification factor is based on two criteria: density (for soils based on SPT blow count data) or hardness (for bedrock sites), and soil and/or bedrock classification for sites with soil profiles that have been determined to a depth of 100-feet. However, if the soil profile has not been characterized to a depth of 100-feet, the UBC allows the use of a default soil type of  $S_d$ .

### **Site Preparation**

All vegetation and topsoil is to be stripped and grubbed from structural areas. A minimum stripping depth of 0.3 feet is anticipated. Vegetation could be placed in backyard non-structural fill areas at least 5 feet away from the structure footprint. Concentration of the vegetation must be avoided, since placing large concentrated layers of vegetation could lead to excessive settlement and subsequent surface depressions.

All areas to receive structural fill or structural loading should be densified to a minimum depth of 8-inches to at least 90 percent relative compaction in accordance with ASTM D 1557. It is recommended that soils have moisture contents of plus or minus 3 percent of optimum moisture (ASTM D1557) prior to densification. ***Clay soils should be scarified to a minimum depth of 12 inches, and moisture conditioned to 2 to 4 percent over optimum, prior to compaction. It is mandatory that this moisture content be maintained by periodic surface wetting, or other methods, until the surface is covered by, at least, one lift of structural fill.*** Higher moisture contents will be acceptable if the soil horizon is stable and density can be achieved in

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<sup>1</sup> • Relative compaction refers to the ratio (percentage of the in-place density of a soil divided by the same soil's maximum dry density) as determined by the ASTM D 1557 laboratory test procedure. Optimum moisture content is the corresponding moisture content of the same soil at its maximum dry density.

subsequent structural fill lifts. Scarification and moisture conditioning may be required to achieve the required soil moisture content recommendations.

After the densification process, a firm, stable surface should be produced. Unstable soils due to excessive moisture content may be encountered and should be scarified and allowed to dry, over-excavated and replaced with structural fill, or stabilized with a geotextile or an imported rock fill.

### **Foundation Grade and Concrete Slab-On-Grade Subgrade Soils Preparation**

Foundations can bear directly on native soils (granular or fine-grained) or structural fill. A separation layer consisting of either native granular or fine-grained soils placed as structural fill or import structural fill is recommended below structural elements overlying clay soils. The potential expansiveness of the clay soil depends primarily on the initial moisture content, plasticity index, and percent of clay fines. Soils with higher plasticity indexes generally will have a higher potential for expansion. Based on our laboratory test results, soils with plastic indices ranging from Non-Plastic to 19 were encountered.

Where the soil's Plasticity Index exceeds 15, a separation layer between bottom of footing and slabs-on-grade of 1.5 feet and 1 foot, respectively, is required. If over-excavation is required to achieve the designated separation thickness, the over-excavation should extend laterally from the edge of the foundation at least the depth of the over-excavation. For concrete slabs-on-grade, the over-excavation should extend at least 1-foot beyond the edge of the slab. Prior to the placement of structural fill or structural loading, soils should be prepared in accordance with the Site Preparation section of this report.

### **Trenching and Excavation**

Temporary trenches with near vertical sidewalls should be relatively stable to a depth of approximately five feet. Excavations to greater depths will require shoring or laying back of sidewalls to maintain adequate stability. Regulations amended in Part 1926, Volume 54, Number 209 of the Federal Register (Table B-1, October 31, 1989) require that the temporary sidewall slopes be no greater than those presented in Table 1.

<b>TABLE 1 - MAXIMUM ALLOWABLE TEMPORARY SLOPES</b>		
<b><u>Soil or Rock Type</u></b>	<b>Maximum Allowable Slopes<sup>1</sup> For Deep Excavations Less Than 20 Feet Deep<sup>2</sup></b>	
<b>Stable Rock</b>	Vertical	(90 degrees)
<b>Type A<sup>3</sup></b> - cohesive, non-fissured soils, with an unconfined compressive strength of 1.5 tons per square foot (tsf) or greater	3H:4V	(53 degrees)
<b>Type B</b> - cohesive soils with an unconfined compressive strength between 0.5 and 1.5 tsf	1H:1V	(45 degrees)
<b>Type C</b> - unconfined compressive strength below 0.5 tsf	3H:2V	(34 degrees)
<b>NOTES:</b>		
1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off. Numerous additional factors and exclusions are included in the formal definitions.		
2. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.		
3. A short-term (open 24 hours or less) maximum allowable slope of 1H:2V (63 degrees) is allowed in excavations in Type A soil that are 12 feet or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet in depth shall be 3H:4V (53 degrees).		

Based on the results of our exploration, it is our opinion that the bulk of the site soils appear to be predominately Type B, although variations exist. Areas with poorly graded sands with silt were encountered and these soils are classified as a Type C soil. All trenching should be performed and stabilized in accordance with local, state, and OSHA standards. Bank stability is the responsibility of the contractor, who is present at the site, able to observe changes in ground conditions, and has control over personnel and equipment.

### **Grading and Filling**

Structural fill is defined as any material placed below structural elements, including; foundations, concrete slabs-on-grade, pavements, or any structure that derives support from the underlying soil. Granular and fine-grained soil free of vegetation, organic matter, and other deleterious material can be used as structural fill. If imported structural fill is required, it should be free of vegetation, organic matter, and other deleterious material and meet the requirements of Table 2.

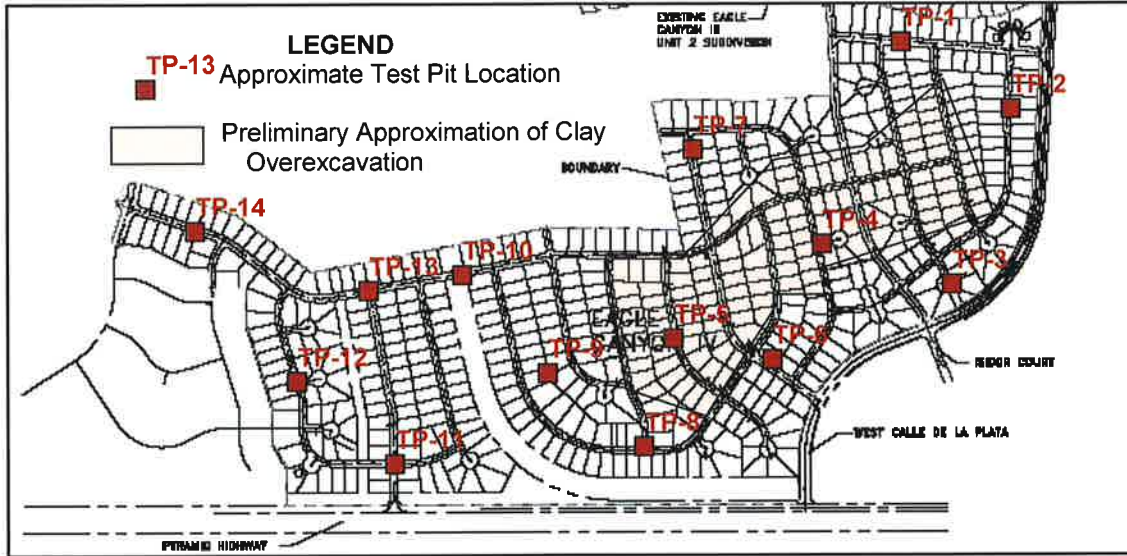
<b>TABLE 2 - GUIDELINE SPECIFICATION FOR IMPORTED STRUCTURAL FILL</b>		
<u>Sieve Size</u>	<u>Percent by Weight Passing</u>	
6 Inch	100	
¾ Inch	70 – 100	
No. 40	15 – 70	
No. 200	10 – 40	
<u>Percent Passing No. 200 Sieve</u>	<u>MAXIMUM LIQUID LIMIT</u>	<u>Maximum Plastic Index</u>
10 – 20	40	15
21 – 40	35	10

Adjustments to the recommended limits presented in Table 2 can be provided to allow the use of other granular, non-expansive material, including rock fills. Any such adjustments must be made and approved by the geological engineer, in writing, prior to importing fill to the site. Rock fills must consist of a 12-inch-minus, well-graded soil, placed and compacted in maximum 15-inch thick lifts. A soil fill or 3-inch minus rock fill is normally used for the final 12 inches of pad fills to facilitate fine grading and utility trenching.

Structural fill should be placed in maximum 12-inch thick (loose) level lifts or layers and densified to at least 90 percent relative compaction. The required moisture content of the soils prior to densification depends on the soil type and the moisture-density relationship test results (ASTM D1557). However, soils should have moisture contents of at least plus or minus 3 percent of optimum moisture (ASTM D1557). Higher moisture contents are acceptable if the soil lifts are stable and required relative compaction can be attained in the soil lift and subsequent soil lifts. Structural fill, used as a separation fill between foundations and clay soils should have at least 15 percent by dry weight passing the No. 200 sieve.

Clay soils may be placed in non-structural areas or in structural areas at least 2.5 feet below footing grade. Clay fill thickness shall not exceed two feet in structural areas. Clay fill soils shall be moisture conditioned to at least optimum and compacted to not less than 88 percent of the soil's maximum dry density.

Based on the results of our preliminary exploration program and on a preliminary cut/fill plan generated by Matrix Engineering, Figure 4 delineates a critical area where localized overexcavation of the clay soil may be required. These areas will be evaluated more closely during performance of the design level geotechnical report for the individual phases.



**Figure 4 – Preliminary approximation of clay overexcavation limits**

The exterior face of any embankment should be constructed with an inclination of no steeper than 2H:1V. The surface of the slope should be compacted to the same percent compaction as the body of the fill. This may be accomplished by compacting the surface of the embankment as it is constructed or by overbuilding the fill and cutting back to its compacted core. However, the cut away material should be placed and compacted as outlined above rather than left at the base of the slope.

### Foundations

It is our understanding that spread footings will be utilized for this project. Provided the foundation soils have been prepared in accordance with the recommendations of this report, the bearing pressures presented in Table 3 can be utilized for design.

<b>TABLE 3 – FOUNDATION ALLOWABLE BEARING PRESSURES</b>	
Loading Conditions	Maximum Soil Net Allowable Bearing Pressures <sup>1</sup> (pounds per square foot)
Dead Loads plus full time live loads	2,000
Dead Loads plus live loads, plus transient wind, or seismic loads.	2,700
<b>NOTES:</b>	
1. The net allowable bearing pressure is that pressure at the base of the footing in excess of the adjacent overburden pressure.	

For frost protection, footings should all be set at least two feet below adjacent outside or unheated interior finish grades. Footings not located within frost prone areas should be placed at least 12 inches below surrounding ground or slab level for confinement. Regardless of loading, individual pad foundations and continuous spread foundations should be at least 18 and 12 inches wide, respectively, or as required by code.

Lateral loads, such as wind or seismic, may be resisted by passive soil pressure and friction on the bottom of the footing. The recommended coefficient of base friction is 0.38, and has been reduced by a factor of 1.5 on the ultimate soil strength. Design values for active and passive equivalent fluid pressures are 33 and 300 pounds per square foot per foot of depth, respectively. In designing for passive pressure, the upper one-foot of the soil profile should not be included unless confined by a concrete slab, or pavement. These design values are based on spread footings bearing on native granular soils, native fine-grained soils, or structural fill and backfilled with structural fill.

If loose, soft, wet, or disturbed soils are encountered at the foundation subgrade, these soils should be removed to expose suitable foundation soils, and the resulting over-excavation backfilled with compacted structural fill. The base of all excavations should be dry and free of loose materials at the time of concrete placement.

Total settlement for the structures is anticipated to be on the order of  $\frac{3}{4}$  inches, or less. Differential settlement between foundations with similar loads and sizes is anticipated to be  $\frac{1}{2}$  of the total settlement.

### **Slope Stability and Erosion Control**

Stability of cut and filled surfaces involves two separate aspects. The first concerns true slope stability related to mass wasting, landslides or the enmasse downward movement of soil or rock. Cut and fill slopes, with gradients of 2H:1V (horizontal to vertical) or flatter, are suitable for the project soils.

The second aspect of stability involves erosion potential and is dependent on numerous factors involving grain size distribution, cohesion, moisture content, slope angle and the velocity of the water or wind on the ground surface. Erosion protection should be in accordance with the City of Reno *Public Works Design Manual*.

Temporary (during construction) and permanent (after construction) erosion control will be required for all disturbed areas. The contractor shall prevent dust from being generated during construction in compliance with all applicable city, county, state and federal regulations, and shall submit an acceptable dust control plan to the Washoe County District Health Department prior to starting site preparation or earthwork. The project specifications should include an indemnification by the contractor of the owner and engineer for any dust generation during the construction period. The owner will be responsible for mitigation of dust after his acceptance of the project.

### **Site Drainage**

Adequate surface drainage must be constructed and maintained away from the structures. The permanent finish slopes away from the structure should be sufficient to allow water to drain away quickly from and prevent any ponding of water adjacent to the structure. All runoff should be collected within permanent drainage paths that can convey water off the property. A system of roof gutters and downspouts is recommended to collect roof drainage and direct it away from the foundations.

Crawl space moisture is commonly associated with raised floor construction. Introduction of this moisture is due to several sources including, but not limited to: excessive landscape irrigation, poor site drainage, excessive precipitation, or leakage pools, ponds, irrigation lines, etc. In addition, it is common for water to seep into fill material, perch on the native or compacted soils, travel along the surface of the native or compacted soils, and daylight where the cut/fill line is exposed. This perched water can daylight in any number of locations such as slope faces, roadway subgrade, and crawl spaces.

Foundation and stem wall backfill should be densified to at least 90 percent relative compaction in accordance with the requirements given in Section 9.4 – Grading and Filling. Compacting the backfill material decreases permeability and reduces the amount of irrigation and storm water available to enter under floor areas.

We recommend the developer collect the moisture via drainage swales excavated along the interior of the perimeter footing and sloped the water to the sewer lateral and gravel bed the lateral from the crawl space to the sewer main. The trench should start out a minimum depth of 3 inches below footing grade and slope to the sewer lateral at approximately 1 percent, and



should be backfilled with drain rock. Once the swales are constructed, the entire crawl space should be covered with a moisture barrier (visqueen sheeting). Refer to Appendix D for a construction detail of the proposed drainage swale alternative.

Crawl space drainage systems are not a guarantee against sporadic wetting caused by large storms, unusually large and/or rapid snowmelt or plumbing leaks. The purpose of a crawl space drainage system is to reduce the amount of moisture that accumulates in the crawl space under normal conditions and to drain the moisture caused by an unusual condition within a few days or possibly weeks. Positive crawl space drainage does not insure that soils are dry, only that ponding water is not normally present. As with other design features of the residence, maintenance is required.

Moist to wet soils are normal in crawl spaces, particularly in the vicinity of the perimeter footings. Any perceived harmful effects from this moisture are usually alleviated by the proper installation of a visqueen vapor retarder placed over the crawl space surface. Crawl space vents should be open all year to help facilitate the evaporation and reduction of moisture.

### **Concrete Slabs**

A compacted base with a minimum R-value of 60 shall underlie private concrete slabs-on-grade. Type 2, Class B aggregate base is the preferred alternative. However, other material types such as decomposed granite, or native poorly graded sand with silt meeting the R-value requirement is acceptable within private improvements such as patios, private walks, and driveways. The base material should be 6 inches beneath driveways and 4 inches beneath private flatwork. All dedicated and public easement improvements shall be constructed in accordance with the Standard Specifications for Public Works Construction.

We recommend that all concrete placement and curing be performed in accordance with procedures outlined by the American Concrete Institute. 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.

### **Corrosive Soil Potential Tests**

Moderate soluble sodium sulfate levels, as defined per the 1997 UBC, are present in the project vicinity. However due to their sporadic presence, evaluation of the need for specialized

concrete is difficult until mass grading has been completed. Typically sulfate levels in this area can approach moderate which would necessitate the use of Type II cement, a maximum water cement ratio of 0.50, and a 28-day minimum compressive strength of 4000 psi. Random soluble sulfate testing will be conducted once mass grading is completed.

The use of corrosion preventative measures on metallic pipes or any underground metallic structures should be evaluated by those responsible for the design of those improvements.

### **Asphaltic Concrete**

The minimum structural section for roadways within Washoe County is 4 inches of asphaltic concrete and 6 inches of base material overlying a subgrade soil with a support strength equivalent to an R-Value of 30 or greater. For subgrade soils with R-Values less than 30, base course thickness can be increased or a subbase layer can be utilized to upgrade the subgrade soil support characteristics to an equivalent R-value of 30. Based on our analyses, the minimum structural section overlying subgrade soils with an R-value of at least 30 can be used for the streets within the subdivision. Because final grades are not yet determined, subgrade soils will be evaluated during construction to determine R-Value strength characteristic. If required, recommendations to upgrade subgrade soils to an equivalent R-Value of 30 will be provided.

If clay soils, with a plasticity index greater than 15, are encountered at subgrade they should be over excavated at least 1 foot below subgrade elevation and replaced with structural fill.

All roadway construction shall be in accordance with the approved plans and the Standard Specifications for Public Works Construction. Roadway subgrade shall be prepared in accordance with the requirements of this report. The upper 2-inches of the pavement mat shall use AC-20P oil. The Contractor should submit a pavement mix design to the Owner, for approval, at least 5 working days prior to paving. When pavement is placed directly adjacent to concrete flatwork, the finish compacted grade of the pavement be at least  $\frac{1}{4}$  to  $\frac{3}{8}$  of an inch higher than the edge of adjacent concrete surface or as required by SPPCO. This is to allow adequate compaction of the pavement without damaging the concrete.

## **Asphalt Design Life**

Maintenance is **mandatory** to long-term pavement performance. Maintenance refers to any activity performed on the pavement that is intended to preserve its original service life or load-carrying capacity. Examples of maintenance activities include patching, crack or joint sealing, and seal coats. If these maintenance activities are ignored or deferred, premature failure of the pavement **will occur**.

The cost associated with proper maintenance is generally much less than the cost for reconstruction due to the premature failure of the pavement. Therefore, since pavement quality is an integral consideration in the formulation of our design recommendations, we strongly recommend the owner/project manager implement a pavement management program.

Premature failure of asphaltic concrete frequently occurs adjacent to poorly graded ponding areas and/or landscape areas. Failures may occur due to excessive precipitation, irrigation and landscaping water infiltrating into the subgrade soils causing subgrade failure. As such, in areas where saturation of the subgrade soils beneath asphaltic pavement may occur, we strongly recommend the owner/project manager install a subdrain system to eliminate the potential for saturation of subgrade soils. The subdrain system should discharge into a permanent drainage area that will not impede drainage flow to cause the system to back-up and/or clog. Appropriate maintenance procedures should be implemented to ensure the subdrain system does not plug and allow for proper drainage of surface and subsurface water beneath paved areas. Subdrain location and configuration should be evaluated once final grading and landscaping plans have been prepared. If the ultimate traffic exceeds the anticipated levels, it may be necessary to reevaluate and overlay the pavement at some time in the future.

## **CONSTRUCTION OBSERVATION AND TESTING SERVICES**

Matrix Construction Services is currently under contract to provide testing and observation services during site preparation, grading, over-excavation, fill placement, and paving. These observations would allow us to document that the geotechnical conditions are as anticipated and that the contractor's work meets with the criteria in the approved plans and specifications.

## **STANDARD LIMITATION CLAUSE**

This report has been prepared in accordance with generally accepted local geotechnical practices. The analyses and recommendations submitted are based upon field exploration performed at the locations shown on Plate A-1 – Site Plan of this report. This report does not reflect soils variations that may become evident during the construction period, at which time re-evaluation of the recommendations may be necessary. We recommend our firm be retained to perform construction observation in all phases of the project related to geotechnical factors to document compliance with our recommendations. The owner/project manager is responsible for distribution of this geotechnical report to all designers and contractors whose work is related to geotechnical factors.

All plans and specifications should be reviewed by the design engineer responsible for this geotechnical report, to determine if they have been completed in accordance with the recommendations contained in this report, prior to submitting to the building department for review. It is the owner's/project manager responsibility to provide the plans and specifications to the engineer.

Water level readings were made on the date shown on Plate A-2 – Log of Borings/Test Pits of this report. Fluctuations in the water table may occur due to rainfall, temperature, seasonal runoff or adjacent irrigation practices. Construction planning should be based on assumptions of possible variations.

This report has been prepared to provide information allowing the architect and engineer to design the project. The owner/project manager is responsible for distribution of this report to all designers and contractors whose work is affected by geotechnical aspects. In the event of changes in the design, location, or ownership of the project after presentation of this report, our recommendations should be reviewed and possibly modified by the geotechnical engineer. If the geotechnical engineer is not accorded the privilege of making this recommended review, he can assume no responsibility for misinterpretation or misapplication of his recommendations or their validity in the event changes have been made in the original design concept without his prior review. The engineer makes no other warranties, either expressed or implied, as to the professional advice provided under the terms of this agreement and included in this report.

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# **APPENDIX A**

Scale: 1"=500'  
 Job No.: 1064.01  
 PLATE A-1

EAGLE CANYON IV  
 SITE PLAN

4741 Caughlin Parkway, Suite 1b, Reno, NV  
 Phone (775) 833-4441 Fax (775) 833-4488



**LEGEND**  
 [Symbol] TEST PIT NUMBER AND  
 APPROXIMATE LOCATION



# LOG OF TEST PIT NO. 1

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4520'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CL			B	1	M	0 - 1' Sandy Clay (CL) - stiff, moist, brown		18.4	A, B
2							1 - 4 1/2' Fine Sandy Clay (CL) - stiff, moist, brown			
3	CL					M				
4				B	2				12.6	A, B
5	SC					M	4 1/2 - 6' Clayey Sand (SC) - dense, moist, brown			
6							6 - 8' Silty Fine Sand (SM) - dense, moist, brown			
7	SM					M				
8							8 - 10 1/2' Silty Sand (SM) - very dense, moist, brown, slightly cemented			
9	SM			B		M				
10										

Bottom of Test Pit @ 10 1/2 Feet  
No Free Water Encountered

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE			LABORATORY TESTS	
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits	
∇	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution	
▼				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation	
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density	
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear	



**MATRIX CONSTRUCTION SERVICES**  
 I N C O R P O R A T E D  
 4741 Caughlin Parkway, Suite 1-B  
 Reno, Nevada 89509  
 Phone 775.828.1866 Fax 775.825.4469

Plate  
A-2



## LOG OF TEST PIT NO. 2

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4522'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CL			B		M	0 - 1 1/2' Lean Clay with Sand (CL) - stiff, moist, brown			
2							1 1/2 - 8' Sandy Silt (ML) - stiff, moist, brown			
3				B						
4										
5	ML					M				
6										
7				B						
8							8 - 10' Silty Fine Sand (SM) - dense, moist, brown			
9	SM			B		M				
10							Bottom of Test Pit @ 10 Feet No Free Water Encountered			

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution
☑				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear



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Plate  
  
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## LOG OF TEST PIT NO. 3

PROJECT NAME: Eagle Canyon 4A  
 LOCATION: See Site Plan  
 DATE: 5/6/2004

PROJECT NUMBER: 1064.01  
 SURFACE ELEVATION: 4528'  
 EXPLORATION EQUIPMENT: EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SM	[Pattern]				M	0 - 1 ½' Silty Sand (SM) – dense, moist, brown, heavy root growth to 0.03 feet			
2	SC	[Pattern]		B		M	1 ½ - 3 ½' Clayey Sand (SC) – dense to very dense, moist, brown			
3										
4										
5	SM	[Pattern]				M	3 ½ - 7' Silty Fine Sand (SM) – dense to very dense, moist, brown, with Silt interbeds			
6				B						
7										
8	SM	[Pattern]				M	7 - 10' Silty Sand to fine Sand with Silt (SM) – dense, moist, brown			
9										
10							Bottom of Test Pit @ 10 Feet No Free Water Encountered			

GROUNDWATER & SOIL MOISTURE			SAMPLE TYPE		LABORATORY TESTS
☐	NE	5/6/2004	D - DRY	A - Drill Cuttings	A - Atterberg Limits
☐			M - MOIST	B - Bulk Sample	B - Grain Size Distribution
☐			W - WET	C - CME Sample	C - Consolidation
☐			V-VERY MOIST	R - Rotary Cuttings	MD- Moisture/Density
☐			S- SLIGHTLY MOIST	S- 2" O.D. 1.38" I.D. Tube Sample	DS - Direct Shear
☐				U- 3" O.D. 2.42" I.D. Tube Sample	
☐				T- 3" O.D. Thin-Walled Shelby Tube	



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## LOG OF TEST PIT NO. 4

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4526'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CL			B		M	0 - 2' Sandy Clay to Clay with Sand (CL) - very stiff, moist, brown			
2							2 - 6 1/2' Silty Sand to Sandy Silt with Clay (SM/ML) - dense, moist, brown			
3						M				
4	SM/ML									
5										
6										
7	SP					M	6 1/2 - 7 1/2' Sand with Silt (SP) - dense, moist, brown			
8							7 1/2 - 10 1/2' Clayey Sand (SC) - dense, moist, brown			
9	SC					M				
10										

Bottom of Test Pit @ 10 1/2 Feet  
No Free Water Encountered

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution
☑				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear



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## LOG OF TEST PIT NO. 5

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4532'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SC/CH			B		M	0 - 1 ½' Sandy Clay to Clayey Sand with minor Gravel (SC/CH) - stiff to dense, moist, brown, moderate root growth to 1 foot			
2							1 ½ - 12' Silty Sand with Clay (SM/SC) - dense, moist, brown			
3										
4										
5										
6										
7	SM/SC					M				
8										
9										
10										
11										
12										
Bottom of Test Pit @ 12 Feet No Free Water Encountered										
GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE				LABORATORY TESTS		
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits			
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution			
☒				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation			
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density			
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear			



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## LOG OF TEST PIT NO. 6

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4534'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SC	[Pattern]		B	3	M	0 - 1 ½' Clayey Sand (SC) – dense, moist, brown, root growth to ½'		10.1	A, B
2		[Pattern]		B	4		1 ½ - 10 ½' Sandy Silt (SM) – dense, moist, brown, interbeds of fine sand with silt		6.4	A, B
3		[Pattern]								
4		[Pattern]								
5		[Pattern]								
6	SM	[Pattern]				M				
7		[Pattern]								
8		[Pattern]								
9		[Pattern]								
10		[Pattern]								
Bottom of Test Pit @ 10 ½ Feet No Free Water Encountered										
GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE				LABORATORY TESTS		
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits			
☐	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution			
▼				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation			
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42 " I.D. Tube Sample		MD- Moisture/Density			
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear			



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## LOG OF TEST PIT NO. 7

PROJECT NAME: Eagle Canyon 4A  
 LOCATION: See Site Plan  
 DATE: 5/6/2004

PROJECT NUMBER: 1064.01  
 SURFACE ELEVATION: 4523'  
 EXPLORATION EQUIPMENT: EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CH					M	0 - 2 ¼' Sandy Clay (CH) - very stiff, moist, brown, light root growth to 1 foot			
2						M	2 ¼ - 4' Silty Fine Sand (SM) - dense, moist, brown			
3	SM					M				
4				B		M	4 - 10' Sandy Silt (ML) - stiff, moist, brown			
5						M				
6						M				
7	ML					M				
8						M				
9						M				
10						M				
Bottom of Test Pit @ 10 Feet No Free Water Encountered										
GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE				LABORATORY TESTS		
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits			
☐	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution			
☐				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation			
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density			
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear			



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## LOG OF TEST PIT NO. 8

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4541'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests	
1				B			0 - 7' Clayey Sand with Silt (SC) - dense, dry brown				
2						M					
3	SC			B							
4						M	7 - 11' Sand (SP) - dense, dry, brown				
5				B							
6											
7						M	Bottom of Test Pit @ 11 Feet No Free Water Encountered				
8	SP			B							
9											
10											
11											

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A - Atterberg Limits
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B - Grain Size Distribution
☑				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C - Consolidation
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear



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## LOG OF TEST PIT NO. 9

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4537'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SM	[Graphical Log: 0-1.5' SM]	B	5	M		0 - 1 ½' Silty Sand with some Gravel (SM) – dense, moist, brown, moderate root growth to 1 foot		6.9	A, B
2		[Graphical Log: 1.5-4' SP]				M	1 ½ - 4 ½' Sand with Gravel (SP) – dense, moist, brown			
3	SP									
4										
5		[Graphical Log: 4.5-11.5' SC]	B				4 ½ - 11 ½' Clayey Sand (SC) – dense, moist, brown			
6										
7										
8	SC					M				
9										
10										
11										
Bottom of Test Pit @ 11 ½ Feet No Free Water Encountered										

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
☐	NE	5/6/2004	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits	
☒			M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution	
☑			W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation	
NE- No Free Water Encountered			V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density	
			S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear	



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## LOG OF TEST PIT NO. 10

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4529'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SC	[Pattern]				M	0 - 1' Clayey Sand with Silt (SC) - dense, dry, brown, light root growth to 1 foot			
2		[Pattern]					1 - 8 1/2' Silty Sand (SM), dense, dry, brown			
3		[Pattern]								
4		[Pattern]								
5	SM	[Pattern]				M				
6		[Pattern]								
7		[Pattern]								
8		[Pattern]								
9		[Pattern]					8 1/2 - 10 1/2' Clayey Sand (SC) - dense, dry, brown			
10	SC	[Pattern]				M				
Bottom of Test Pit @ 10 1/2 Feet No Free Water Encountered										
GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE				LABORATORY TESTS		
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits			
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution			
☑				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation			
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density			
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear			



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# LOG OF TEST PIT NO. 11

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4539'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	SC	[Pattern]		B		M	0 - 1 ½' Clayey Sand (SC) - dense, dry brown, light root growth to 1 foot			
2		[Pattern]					1 ½ - 5' Silty Sand (SP) - dense, moist, brown, with sand interbeds			
3	SP	[Pattern]				M				
4		[Pattern]								
5		[Pattern]		B	6				5.5	A, B
6		[Pattern]					5 - 10 ½' Sand with Silt and Clay (SC/SM) - dense, moist, brown			
7		[Pattern]								
8	SC/SM	[Pattern]				M				
9		[Pattern]								
10		[Pattern]								

Bottom of Test Pit @ 10 ½ Feet  
No Free Water Encountered

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A- Atterberg Limits
∇	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B- Grain Size Distribution
▼				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C- Consolidation
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear



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# LOG OF TEST PIT NO. 12

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4527'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CH			B		M	0 - 1 ½' Sandy Clay (CH) – very stiff, moist, brown, root growth to ½'			
2	SP					M	1 ½ - 2' Sand with Silt (SP) – dense, moist, brown			
3							2 - 7 ½' Clayey Sand (SC) – dense, moist, brown			
4										
5	SC			B		M				
6										
7										
8							7 ½ - 10 ½' Sand (SP) – dense, moist, brown			
9	SP					M				
10										

Bottom of Test Pit @ 10 ½ Feet  
No Free Water Encountered

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A - Atterberg Limits
∇	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B - Grain Size Distribution
▼				W - WET	S- 2" O.D. 1.38" I.D. Tube Sample		C - Consolidation
NE- No Free Water Encountered				V-VERY MOIST	U- 3" O.D. 2.42" I.D. Tube Sample		MD- Moisture/Density
				S- SLIGHTLY MOIST	T- 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear



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## LOG OF TEST PIT NO. 13

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4525'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CH			B		M	0 - 1 1/2' Clay with Sand (CH) - very stiff, dry, brown, root growth to 1'			
2							1 1/2 - 10 1/2' Clayey Sand (SC) - dense, moist, brown, with fine Sand and Silt interbeds			
3				B						
4				B						
5										
6	SC			B		M				
7										
8										
9										
10										
Bottom of Test Pit @ 10 1/2 Feet No Free Water Encountered										
GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE			LABORATORY TESTS			
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A - Atterberg Limits			
☐	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B - Grain Size Distribution			
☐				W - WET	S - 2" O.D. 1.38" I.D. Tube Sample		C - Consolidation			
NE - No Free Water Encountered				V - VERY MOIST	U - 3" O.D. 2.42" I.D. Tube Sample		MD - Moisture/Density			
				S - SLIGHTLY MOIST	T - 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear			



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## LOG OF TEST PIT NO. 14

PROJECT NAME:	Eagle Canyon 4A
LOCATION:	See Site Plan
DATE:	5/6/2004

PROJECT NUMBER:	1064.01
SURFACE ELEVATION:	4514'
EXPLORATION EQUIPMENT:	EL3 Backhoe

Depth in Feet	Unified Soil Classification	Graphical Log	Sample	Sample Type	Sample No.	Moisture	Visual Description	Pocket Penetrometer (tsf)	Moisture Content (% of Dry Weight)	Laboratory Tests
1	CL			B	7	M	0 - 3' Sandy Clay (CL) - very stiff, dry, brown, little vegetation		12.1	A, B
2										
3										
4	SC			B		M	3 - 6' Clayey Sand (SC) - dense, moist, brown			
5										
6	CL					M	6 - 7' Sandy Clay (CL) - very stiff, moist, brown			
7										
8	SP/SM					M	7 - 10' Sand with Silt (SP/SM) - dense, moist, brown			
9										
10							Bottom of Test Pit @ 10 Feet No Free Water Encountered			

GROUNDWATER & SOIL MOISTURE				SAMPLE TYPE		LABORATORY TESTS	
☐	Depth	Hour	Date	D - DRY	A - Drill Cuttings	B - Bulk Sample	A - Atterberg Limits
☒	NE		5/6/2004	M - MOIST	C - CME Sample	R - Rotary Cuttings	B - Grain Size Distribution
☑				W - WET	S - 2" O.D. 1.38" I.D. Tube Sample		C - Consolidation
NE - No Free Water Encountered				V - VERY MOIST	U - 3" O.D. 2.42" I.D. Tube Sample		MD - Moisture/Density
				S - SLIGHTLY MOIST	T - 3" O.D. Thin-Walled Shelby Tube		DS - Direct Shear

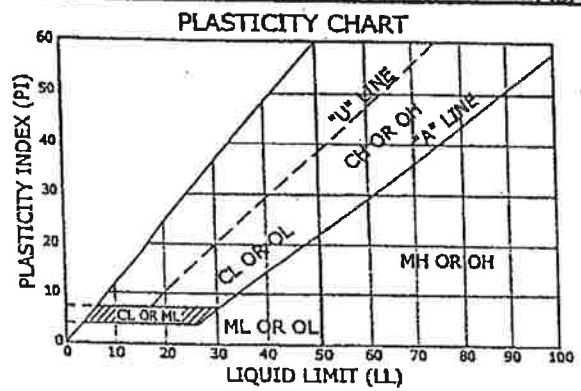


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MAJOR DIVISION					TYPICAL NAMES	
COARSE-GRAINED SOILS MORE THAN HALF IS COARSER THAN NO. 200 SIEVE	GRAVELS	CLEAN GRAVELS WITH LITTLE OR NO FINES		GW	WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
		MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE		GP	POORLY GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES	
	SANDS	GRAVELS WITH OVER 12% FINES		GM	SILTY GRAVELS, SILTY GRAVELS WITH SAND	
		MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE		GC	CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND	
	FINE-GRAINED SANDS MORE THAN HALF IS FINER THAN NO. 200 SIEVE	SILT AND CLAYS LIQUID LIMIT 50% OR LESS	CLEAN SANDS WITH LITTLE OR NO FINES		SW	WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE		SP	POORLY GRADED SAND WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
SILT AND CLAYS LIQUID LIMIT GREATER THAN 50%		SANDS WITH OVER 12% FINES		SM	SILTY SANDS WITH OR WITHOUT GRAVEL	
				SC	CLAYEY SANDS WITH OR WITHOUT GRAVEL	
				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	
				CH	INORGANIC CLAYS OF 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 (SILTS OR CLAYS)	BELOW NO. 200 SIEVE



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Phone (775) 825-4441 Fax (775) 825-4469

**UNIFIED SOIL CLASSIFICATION  
SYSTEM AND KEY TO SOIL  
DESCRIPTION**

Scale:	NTS
Date:	DEC 2003
Sheet No:	A-3

**SUMMARY OF TEST RESULTS**

**Eagle Canyon IV**

Sample	TP-1	TP-1	TP-6	TP-6	TP-9	TP-11	TP-13	TP-14
Depth (ft)	0-1	3-4	1	1-5	0-1.5	4	6	0-2
Sample No.	1	2	3	4	5	6	7	8
Sieve Size	Percent Passing by Weight							
2"								
1 1/2"								
1"								
3/4"					100			
1/2"					99			
3/8"			100	100	99	100	100	
# 4		100	99	99	98	99	100	
# 10	100	98	97	97	93	97	98	100
# 40	99	90	85	81	58	78	88	98
# 100	95	79	63	54	32	50	64	90
# 200	80.3	65.7	38.3	35.5	24.0	31.9	38.0	77.2
% Moisture	18.4	12.6	10.1	6.4	6.9	5.5	9.4	12.1
Liquid Limit	47	34	32	27	27	22	--	38
Plasticity Index	19	8	NP	14	NP	NP	--	16
Classification	ML	ML	SM	SC	SM	SM	SM	CL



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**LABORATORY  
TEST RESULTS**

Project No.: 1064.01

Date: June 2004

Plate No: A-4

# EAGLE CANYON IV UNIT 4

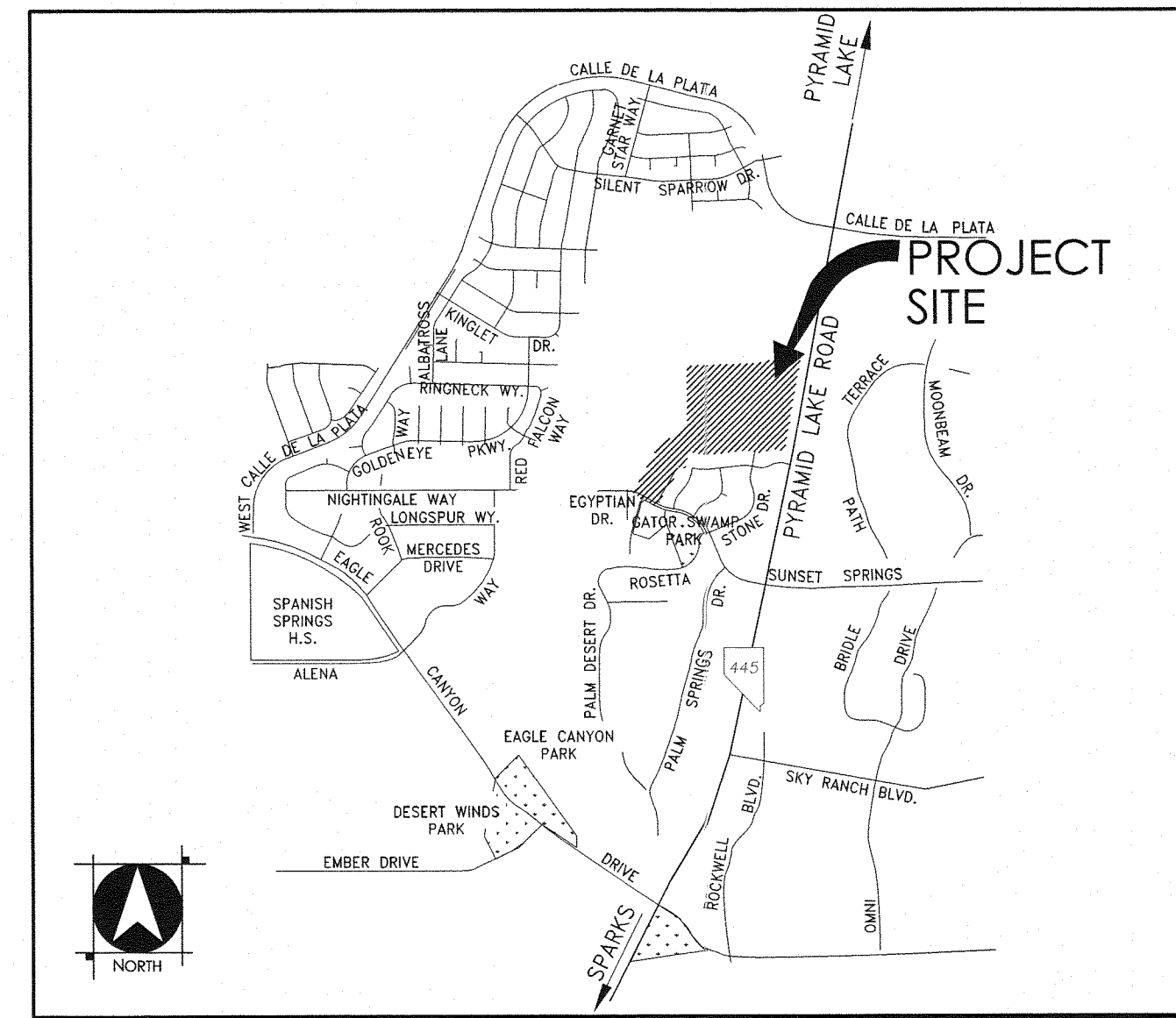
## TENTATIVE MAP

### TITLE SHEET

**OWNER/DEVELOPER:**  
 LENNAR RENO, LLC  
 10345 PROFESSIONAL CIRCLE, SUITE 100  
 RENO, NV 89521  
 (775) 789-3233

**BASIS OF BEARINGS**  
 THE GRID BEARING BETWEEN GPS MONUMENTS "W3028" AND "W3029" TAKEN AS N85°30'56"E, BASED ON THE NORTH AMERICAN DATUM OF 1983/1994, HIGH ACCURACY REFERENCE NETWORK (NAD 83/94-HARN), COMBINED GRID TO GROUND FACTOR=1.00197939.

**BASIS OF ELEVATION**  
 NEVADA DEPARTMENT OF TRANSPORTATION BENCHMARK ALUMINUM CAP ON REBAR, STAMPED 277066, TAKEN AS ELEVATION 4527.81, NGVD 29.



**VICINITY MAP**  
 NOT TO SCALE



**SITE PLAN**  
 NOT TO SCALE

**SITE INFORMATION:**

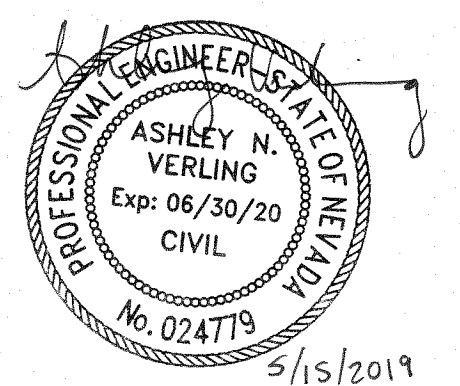
**SITE INFORMATION:**  
 TOTAL NUMBER OF LOTS = 137  
 TOTAL SITE AREA = 63.6 AC  
 RIGHT OF WAY AREA = 9.1 AC  
 LOT AREA = 48.6 AC  
 COMMON AREA = 5.9 AC  
**PROJECT DENSITY:**  
 GROSS DENSITY = 2.2 DU/AC  
**LOT SUMMARY:**  
 MINIMUM LOT SIZE = 12,000 SF  
 MAXIMUM LOT SIZE = 36,001 SF  
 AVERAGE LOT SIZE = 15,469 SF

**ASSESSOR PARCEL NUMBERS:**  
 532-020-09

**ENGINEERS STATEMENT:**

I, ASHLEY N. VERLING, DO HEREBY CERTIFY THAT THIS PLAN HAS BEEN PREPARED BY ME OR UNDER MY SUPERVISION AND WAS COMPLETED ON THE 15th DAY OF MAY, 2019.

*Ashley N. Verling*  
 ASHLEY N. VERLING, P.E. #24779



**SHEET INDEX**

SHT No.	DWG ID	DRAWING DESCRIPTION
1	T-1	TITLE SHEET
2	LB-1	PRELIMINARY LOT AND BLOCK PLAN
3	LB-2	PRELIMINARY LOT AND BLOCK PLAN
4	LB-3	PRELIMINARY LOT AND BLOCK PLAN
5	G-1	PRELIMINARY GRADING PLAN
6	G-2	PRELIMINARY GRADING PLAN
7	G-3	PRELIMINARY GRADING PLAN
8	U-1	PRELIMINARY UTILITY PLAN
9	U-2	PRELIMINARY UTILITY PLAN
10	U-3	PRELIMINARY UTILITY PLAN
11	LS-1	PRELIMINARY LANDSCAPE PLAN
12	LS-2	PRELIMINARY LANDSCAPE PLAN
13	LS-3	PRELIMINARY LANDSCAPE PLAN
14	CS-1	PRELIMINARY CROSS SECTIONS

## EAGLE CANYON IV UNIT 4

### TITLE SHEET



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1660.037

MAY 10, 2019

SHEET T-1 OF 14

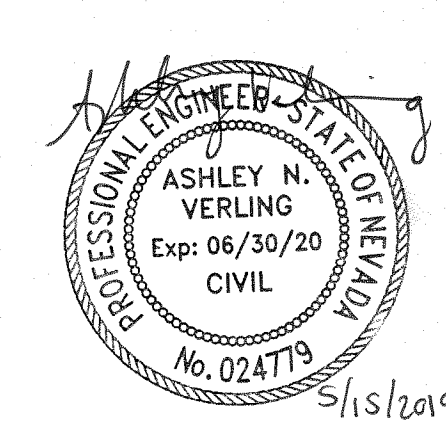
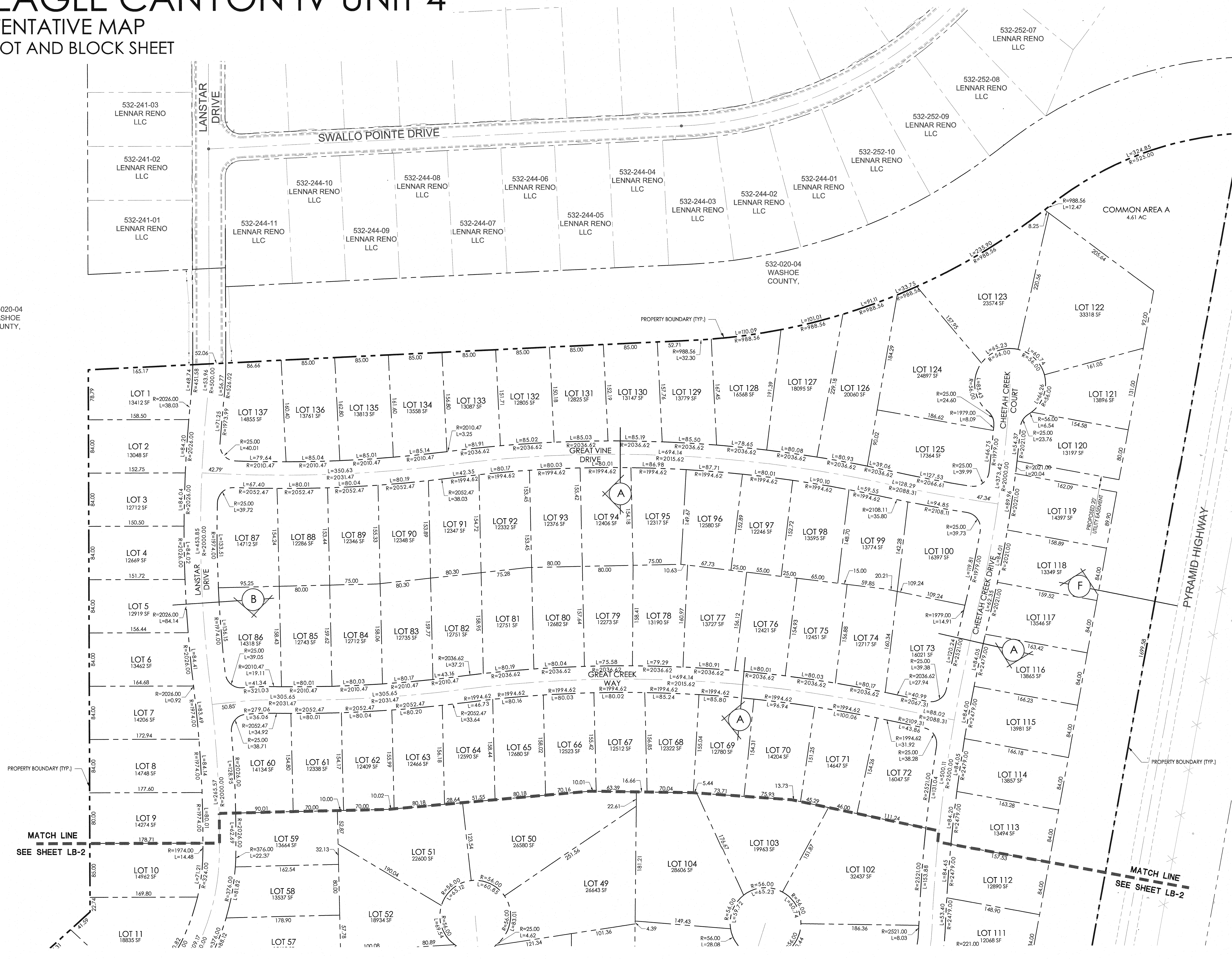


# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

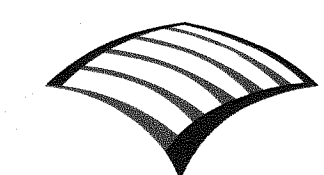
### LOT AND BLOCK SHEET

532-020-04  
WASHOE COUNTY.



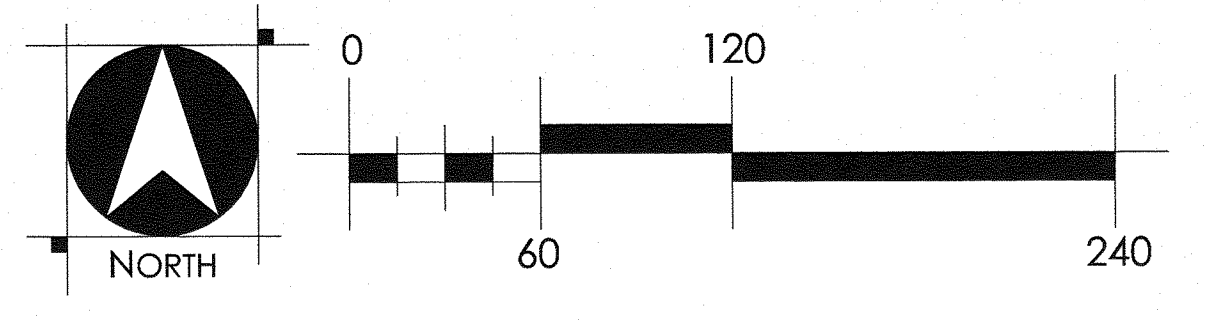
## EAGLE CANYON IV UNIT 4

### LOT AND BLOCK SHEET



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1660.037 MAY 10, 2019  
SHEET LB-1 OF 14



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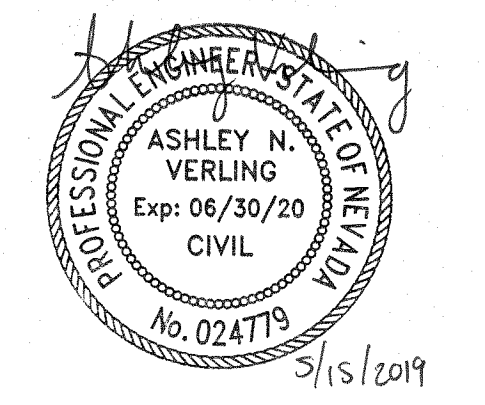
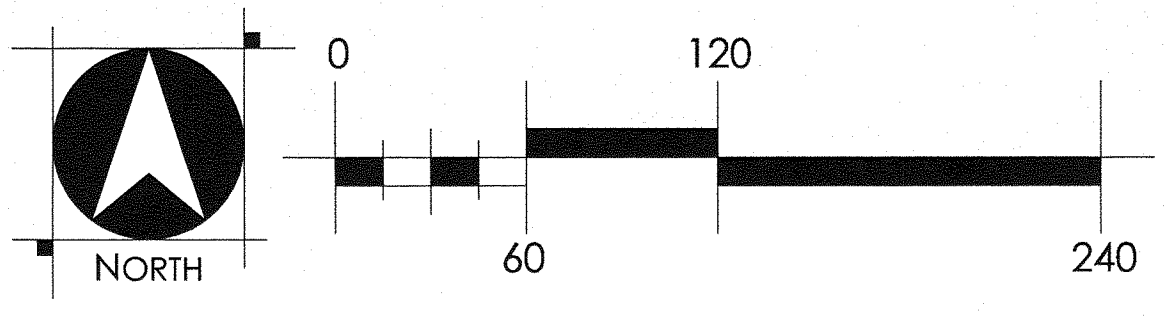


# EAGLE CANYON IV UNIT 4

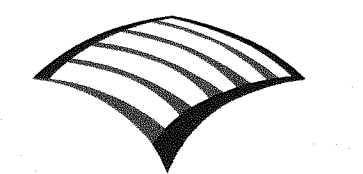
## TENTATIVE MAP

### LOT AND BLOCK SHEET

532-020-04  
WASHOE COUNTY,



EAGLE CANYON IV UNIT 4  
LOT AND BLOCK SHEET



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SHEET LB-2 OF 14

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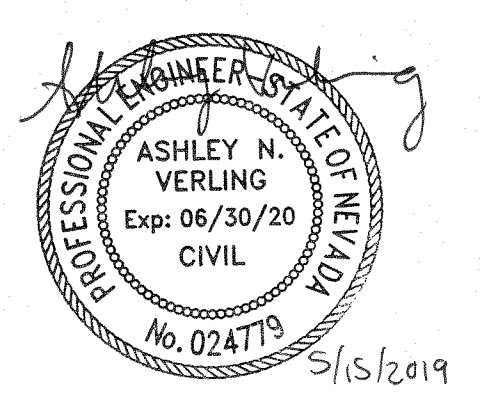
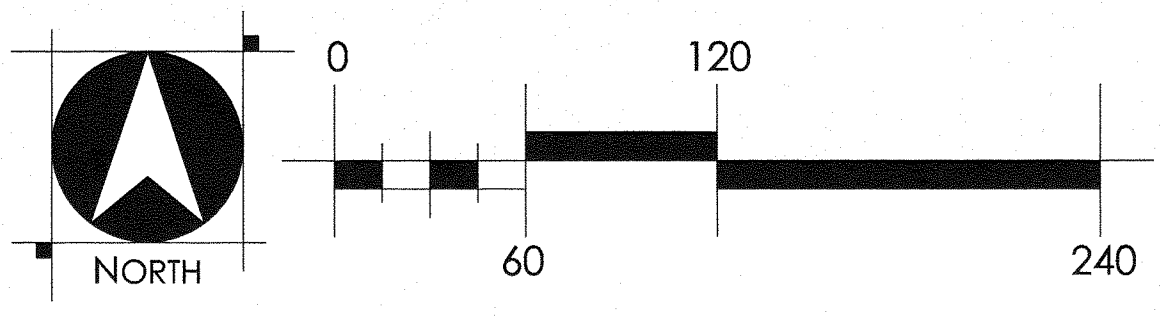
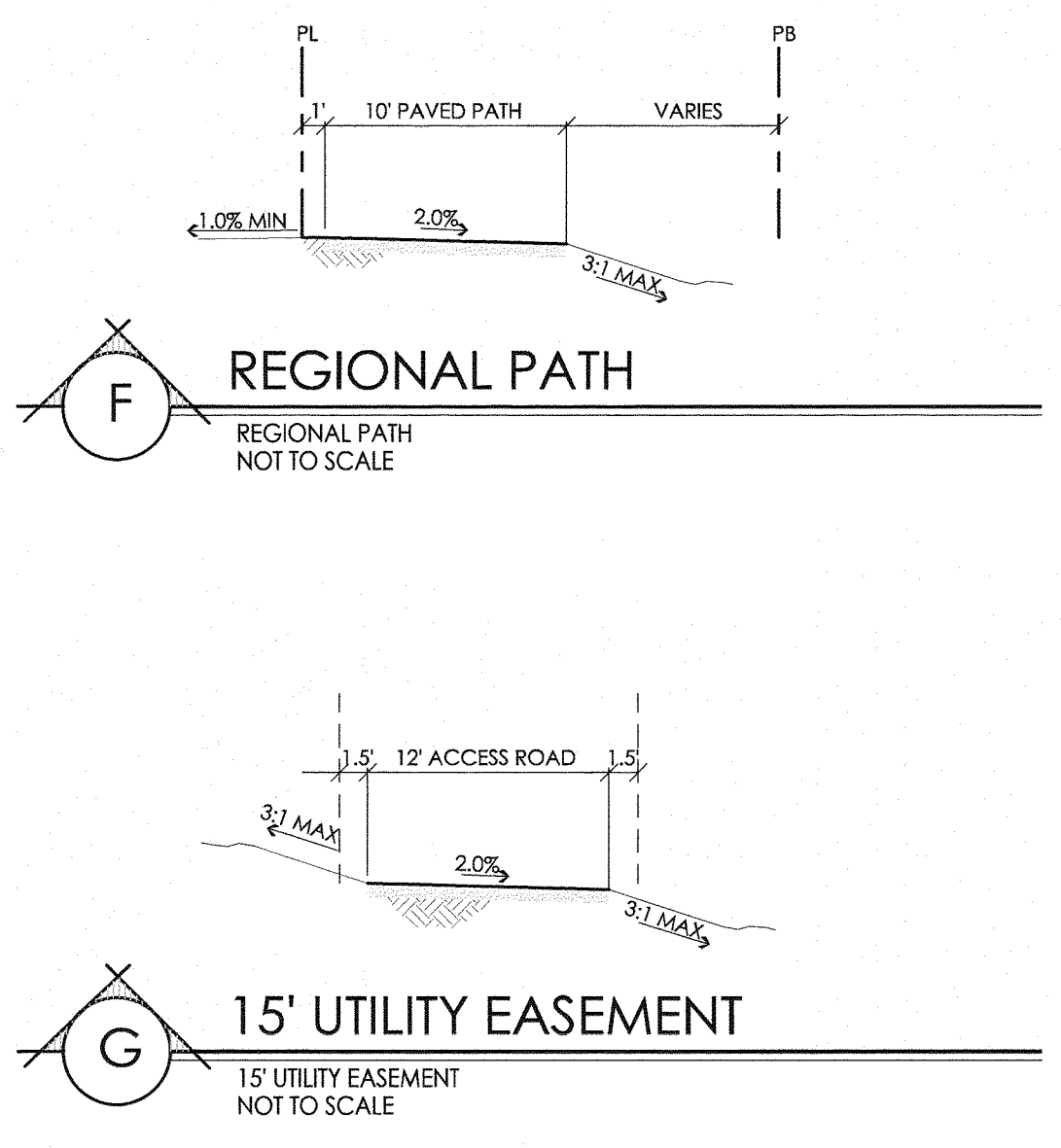
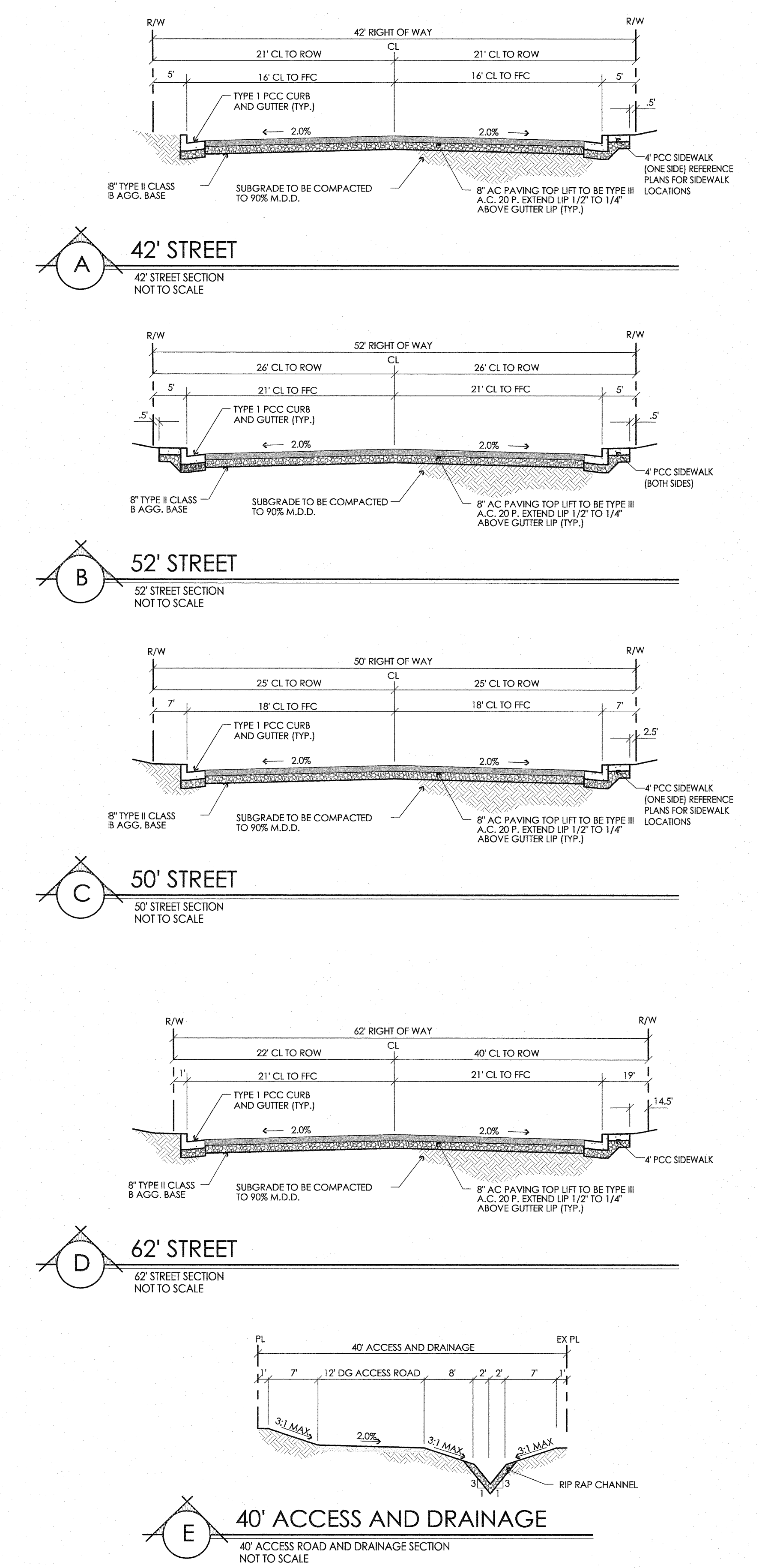


# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LOT AND BLOCK SHEET

532-020-04  
WASHOE COUNTY,



## EAGLE CANYON IV UNIT 4

### LOT AND BLOCK SHEET

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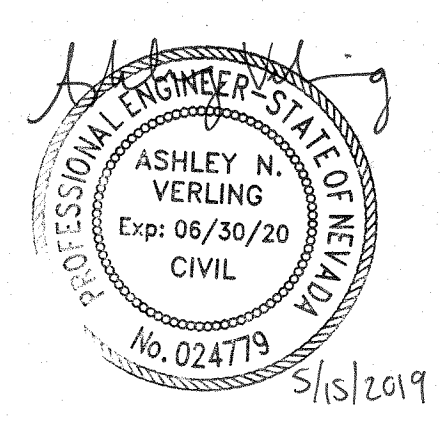
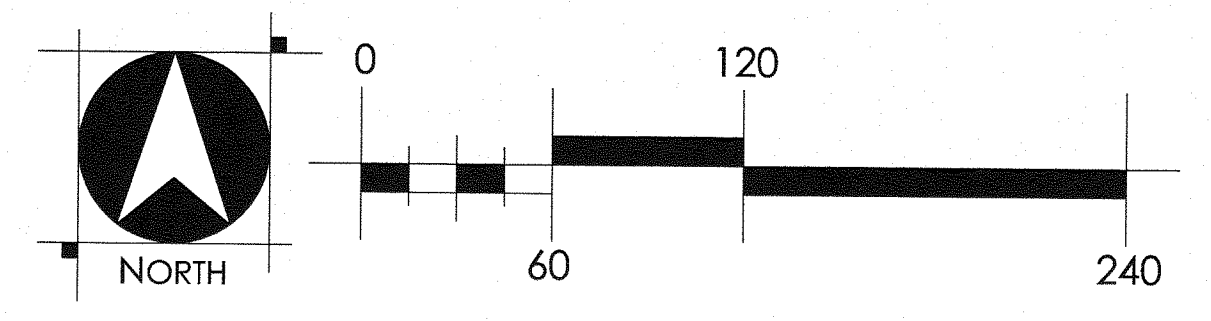
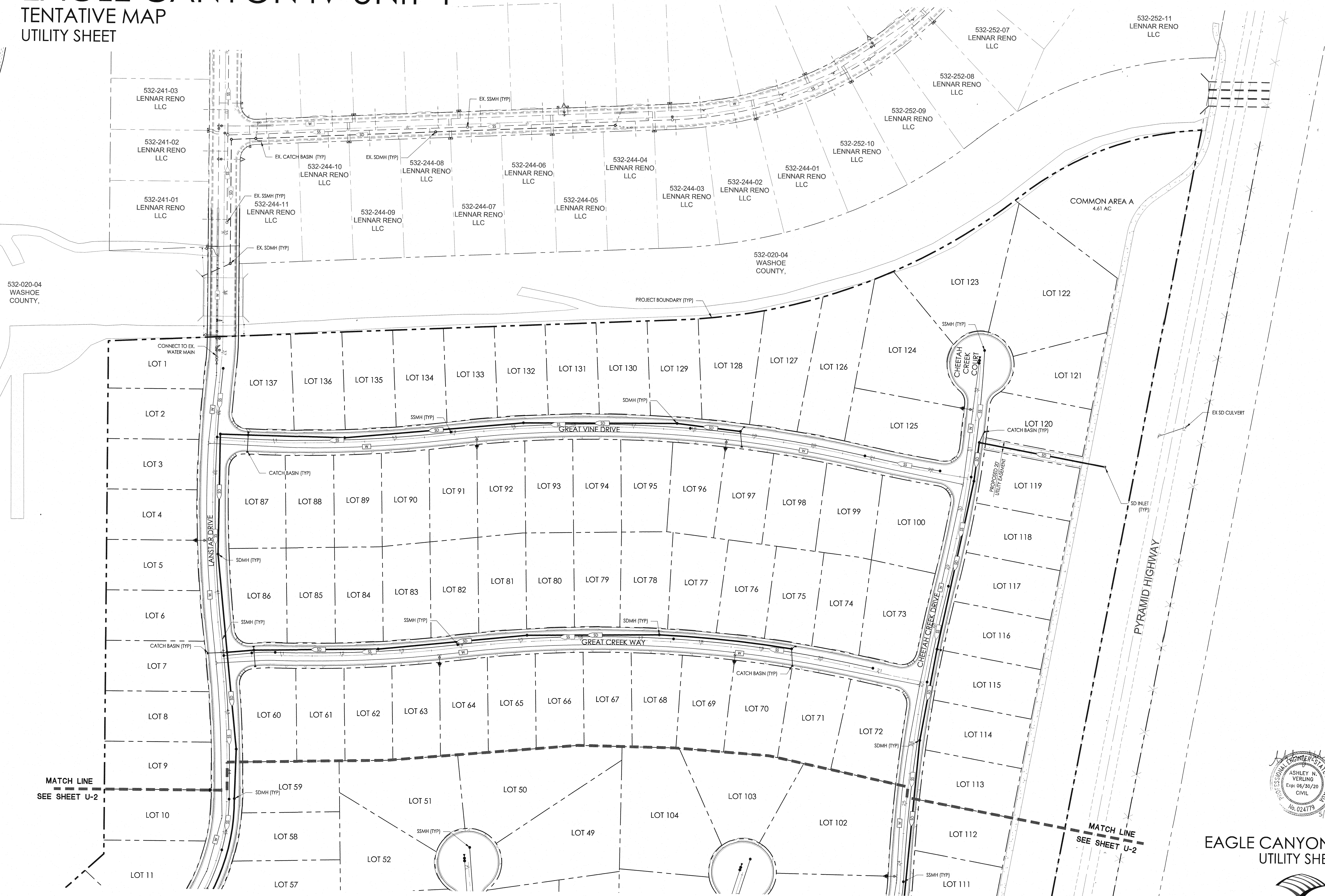
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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET



EAGLE CANYON IV UNIT 4  
UTILITY SHEET

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SHEET U-1 OF 14

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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET

532-020-04  
WASHOE COUNTY,

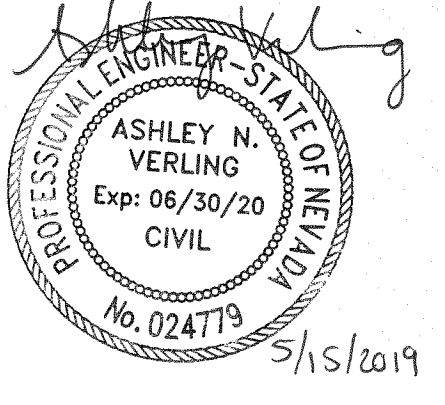
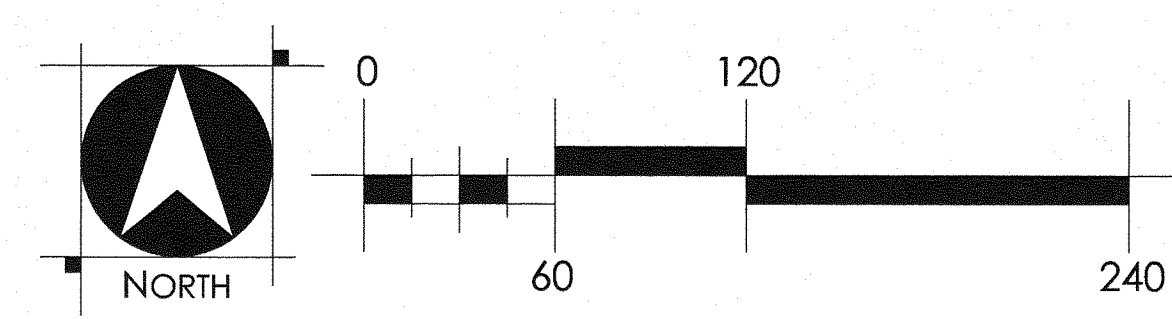


MATCH LINE  
SEE SHEET U-3

SEE SHEET U-1  
MATCH LINE

SEE SHEET U-1  
MATCH LINE

MATCH LINE  
SEE SHEET U-3



EAGLE CANYON IV UNIT 4  
UTILITY SHEET

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SHEET U-2 OF 14

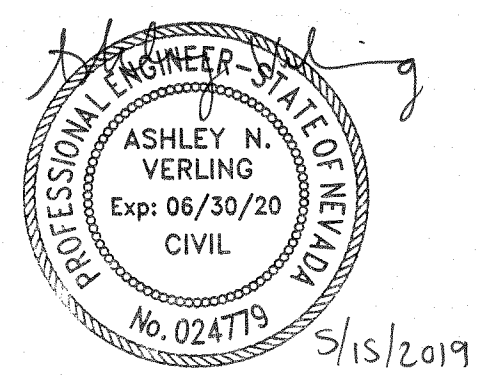
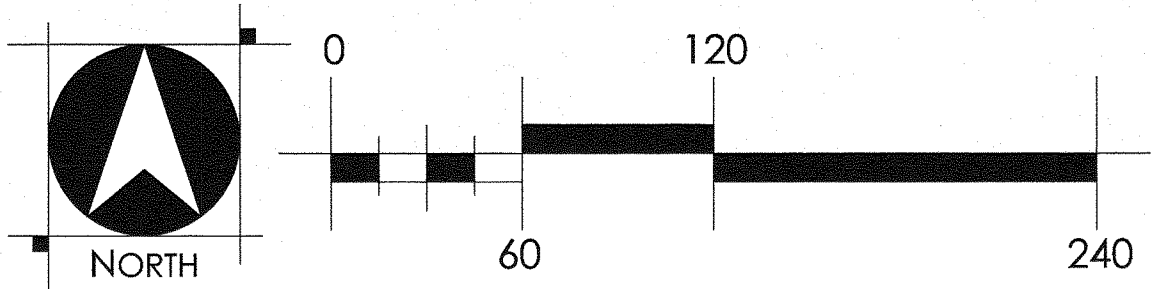
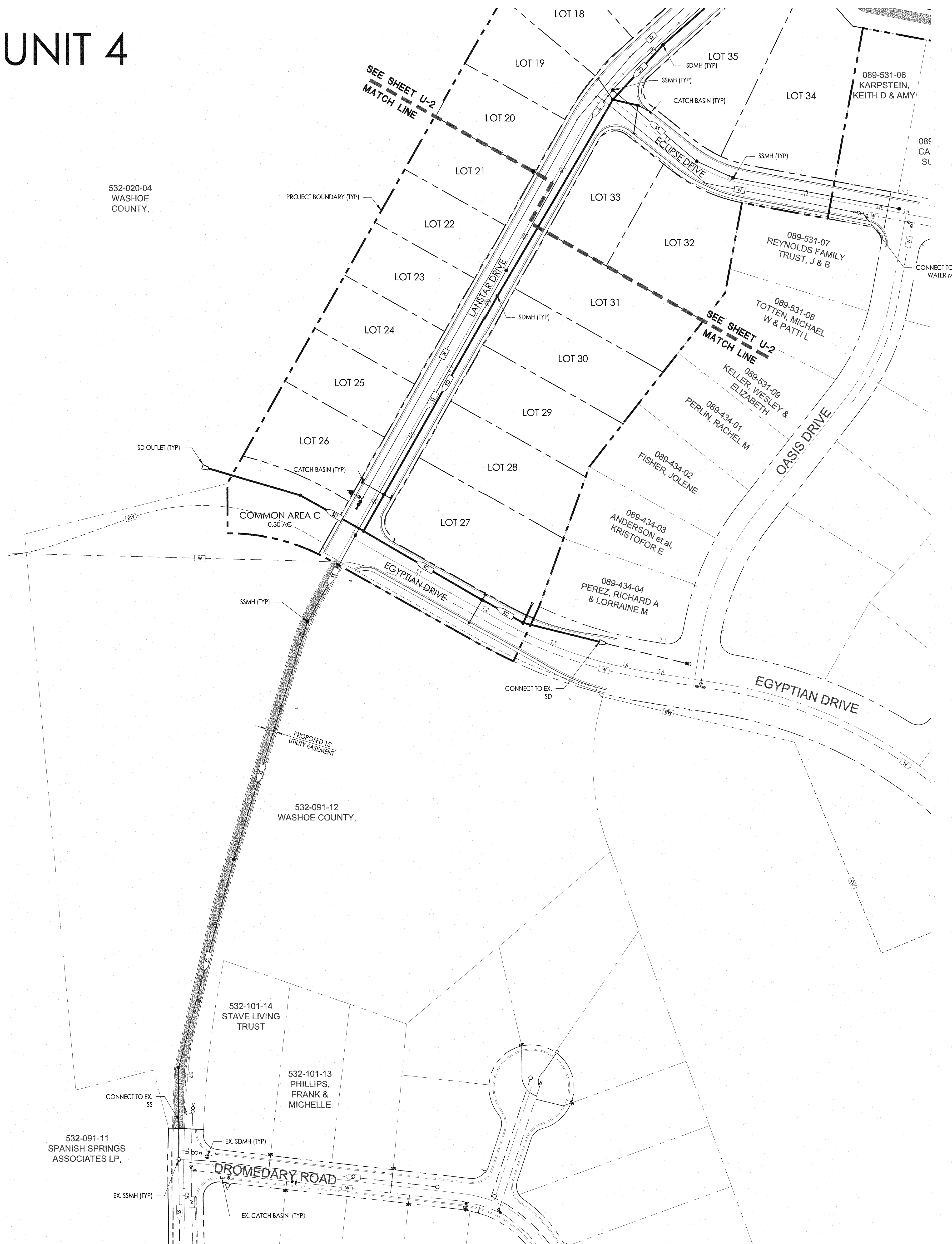
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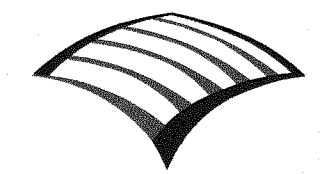
# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### UTILITY SHEET



EAGLE CANYON IV UNIT 4  
UTILITY SHEET



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MAY 10, 2019

SHEET U-3 OF 14

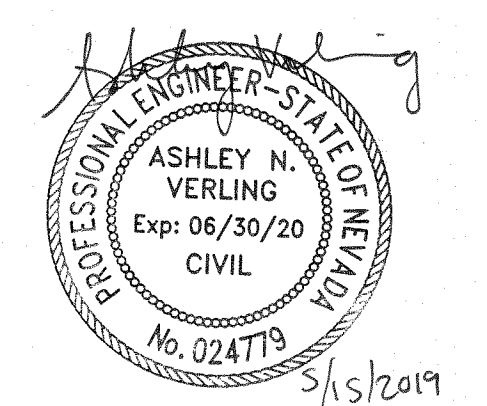
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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### GRADING SHEET



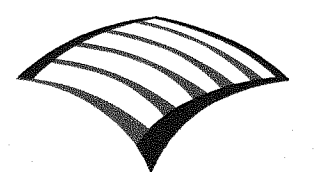
#### GRADING STATISTICS

ESTIMATED CUT	74,000 cu.yd.
ESTIMATED FILL	124,000 cu.yd.
IMPORTED FILL (EC IV US)	50,000 cu.yd.
AREA OF DISTURBANCE	60.8 AC
NET SITE EARTHWORK	0.0 cu.yd.

NOTE:  
ADD 4500 TO ALL FG ELEVATIONS

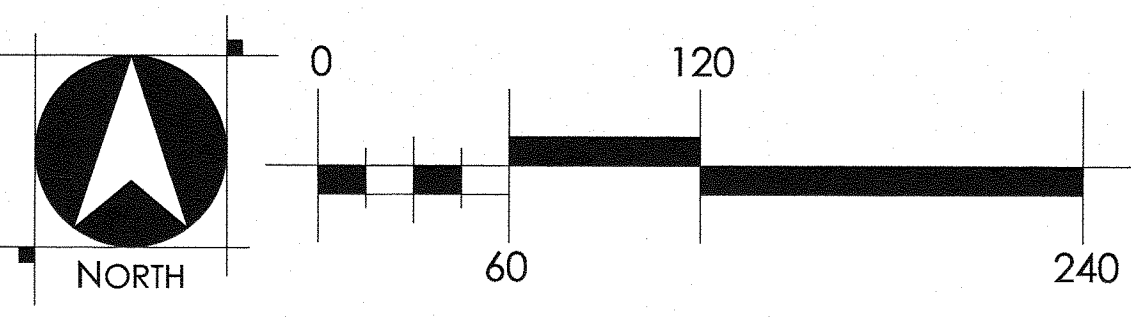
## EAGLE CANYON IV UNIT 4

### GRADING SHEET



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1660.037 MAY 10, 2019



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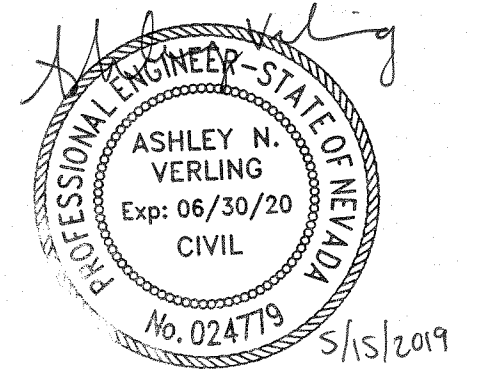


# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### GRADING SHEET

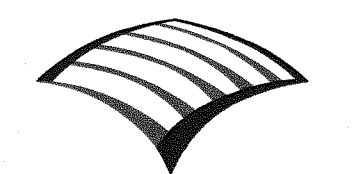
532-020-04  
WASHOE COUNTY,



NOTE:  
ADD 4500 TO ALL FG ELEVATIONS

## EAGLE CANYON IV UNIT 4

### GRADING SHEET



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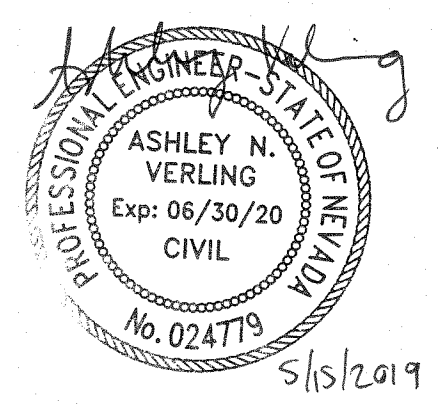
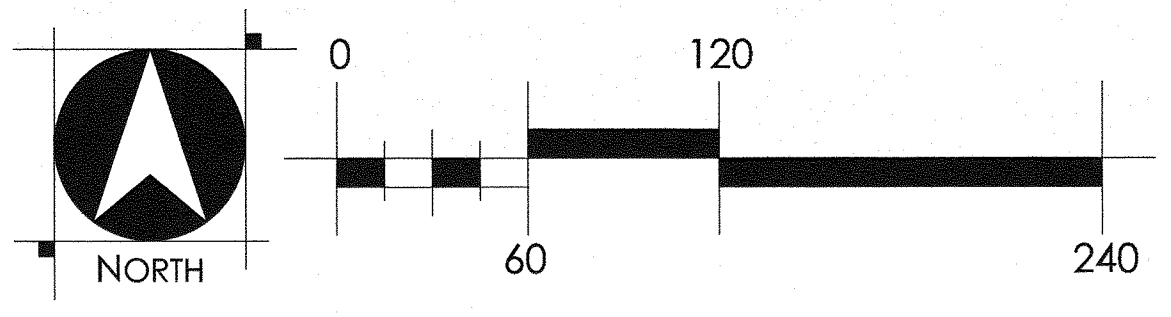
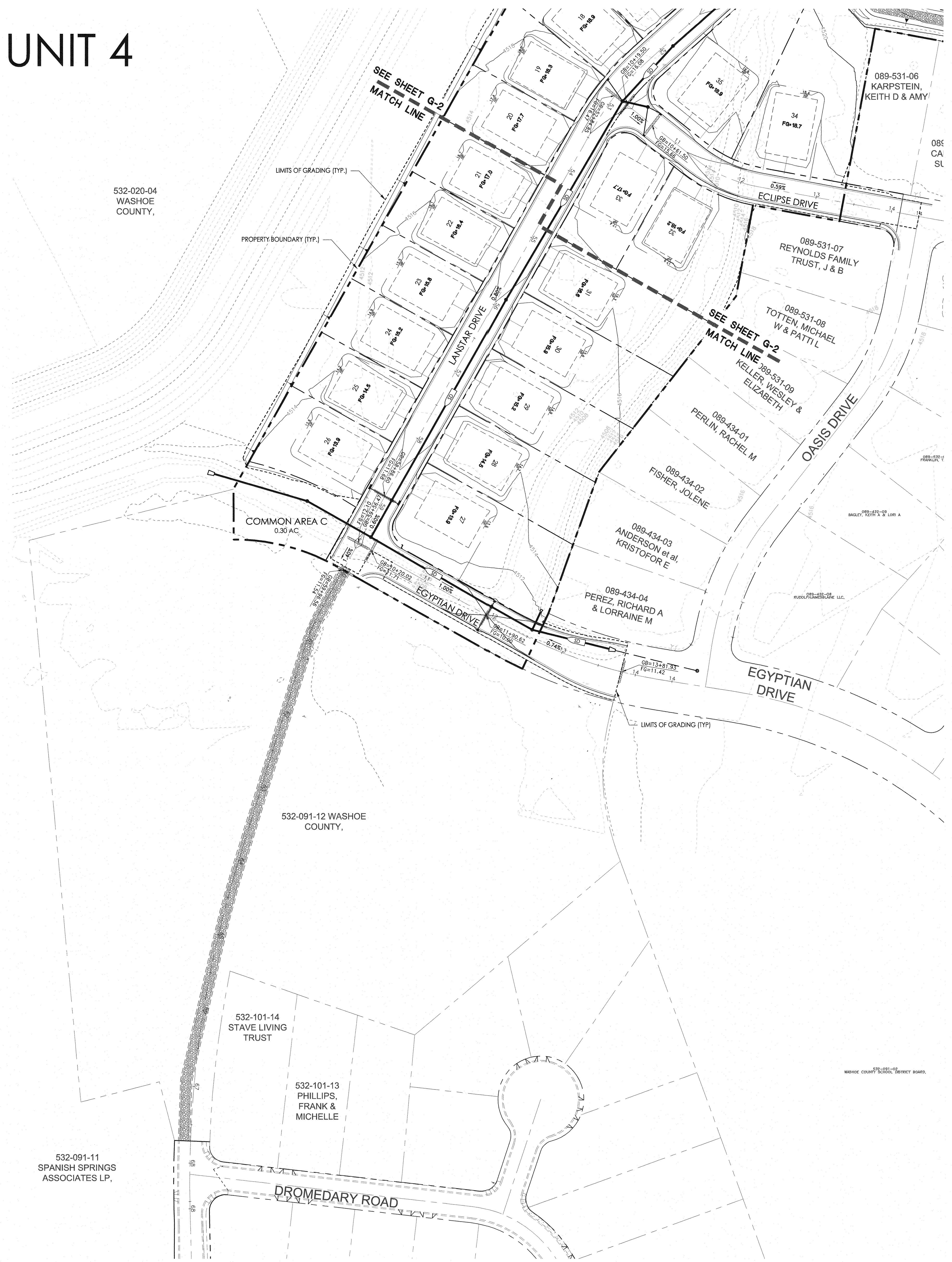
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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

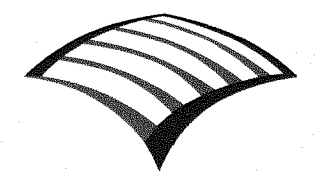
### GRADING SHEET



NOTE:  
ADD 4500 TO ALL FG ELEVATIONS

## EAGLE CANYON IV UNIT 4

### GRADING SHEET



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**SHEET G-3 OF 14**

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# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LANDSCAPE SHEET



#### LEGEND:

- PAVED AREA
- COMMON AREA
- LOT AREA
- PAD
- SIDEWALK
- TREES

#### LANDSCAPING GENERAL NOTES

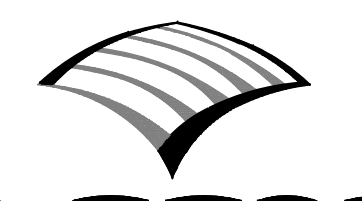
- 1) ALL PLANTING AND IRRIGATION SHALL BE INSTALLED PER LOCAL GOVERNING CODES.
- 2) FINAL PLANT SELECTION AND LAYOUT WILL BE BASED ON SOUND HORTICULTURE PRACTICES RELATING TO MICRO-CLIMATE, SOIL, AND WATER REGIMES. ALL TREES WILL BE STAKED SO AS TO REMAIN UPRIGHT AND PLUMBS FOLLOWING INSTALLATION. PLANT SIZE AND QUALITY AT TIME OF PLANTING WILL BE PER THE AMERICAN STANDARD FOR NURSERY STOCK.
- 3) ALL PLANTER BEDS WILL RECEIVE 3" TOP-DRESSING OF MULCH WITH WEED CONTROL.
- 4) ALL LANDSCAPING WILL BE AUTOMATICALLY IRRIGATED. TURF GRASS WILL BE IRRIGATED USING LOW ANGLE SPRAY, ROTARY, AND/OR IMPACT HEADS TO REDUCE WIND DRIFT. CONTAINER PLANTINGS WILL BE DRIP IRRIGATED BASED ON THE SPECIFIC HORTICULTURE REQUIREMENTS OF EACH SPECIES. THE IRRIGATION SYSTEM WILL BE DESIGNED TO ALLOW FULL IRRIGATION OF THE SITE BASED ON A THREE-DAY WEEKLY WATERING SCHEDULE. A REDUCED-PRESSURE-TYPE BACKFLOW PREVENTER (RFB) WILL BE PROVIDED ON THE IRRIGATION SYSTEM AS REQUIRED PER CODE.
- 5) LANDSCAPE REQUIREMENTS PER WASHOE COUNTY DEVELOPMENT CODE ZONING: MEDIUM RESIDENTIAL.
- 6) SUBDIVISION PERIMETERS - NEW RESIDENTIAL SUBDIVISION, REGARDLESS OF NUMBER OF DWELLING UNITS PER PARCEL, SHALL PROVIDE AT LEAST ONE (1) TREE EVERY FIFTY (50) LINEAR FEET OF PERIMETER FRONTAGE ADJOINING AN ARTERIAL OR COLLECTOR IDENTIFIED IN THE WASHOE COUNTY COMPREHENSIVE PLAN SHEETS AND HIGHWAYS SYSTEM PLAN MAP.

#### TREE CALCULATIONS

RESIDENTIAL STREET TREES REQUIRED: 4311  
1 PER 50 LF OF STREET FRONTAGE

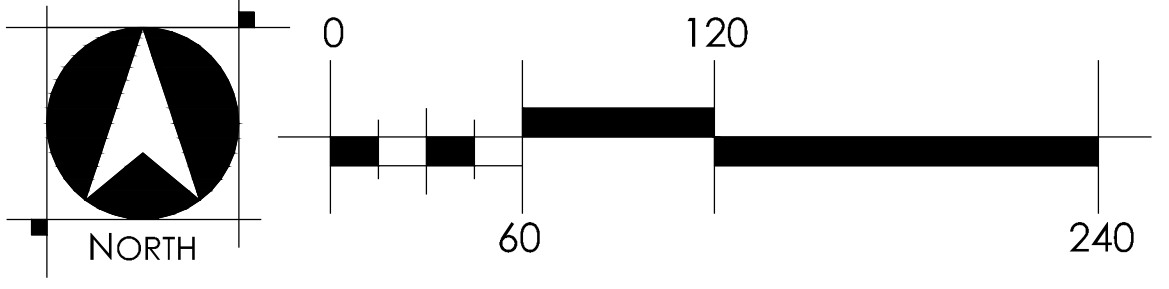
### EAGLE CANYON IV UNIT 4

### LANDSCAPE SHEET



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1660.037 MAY 10, 2019  
SHEET LS-1 OF 14



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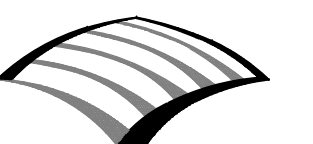
# EAGLE CANYON IV UNIT 4

## TENTATIVE MAP

### LANDSCAPE SHEET

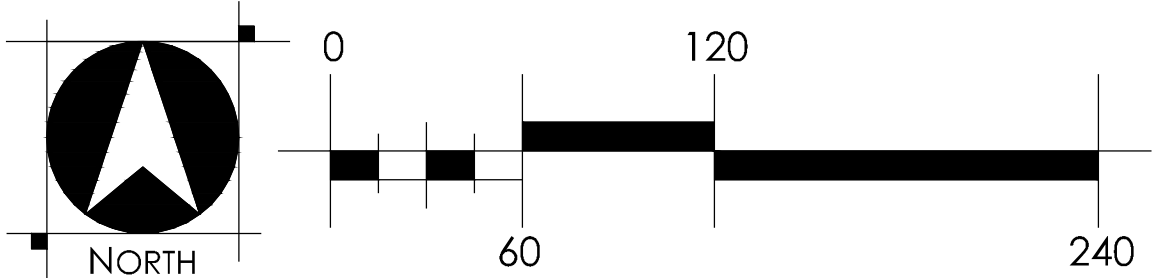


EAGLE CANYON IV UNIT 4  
LANDSCAPE SHEET



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1660.037 MAY 10, 2019  
SHEET LS-2 OF 14



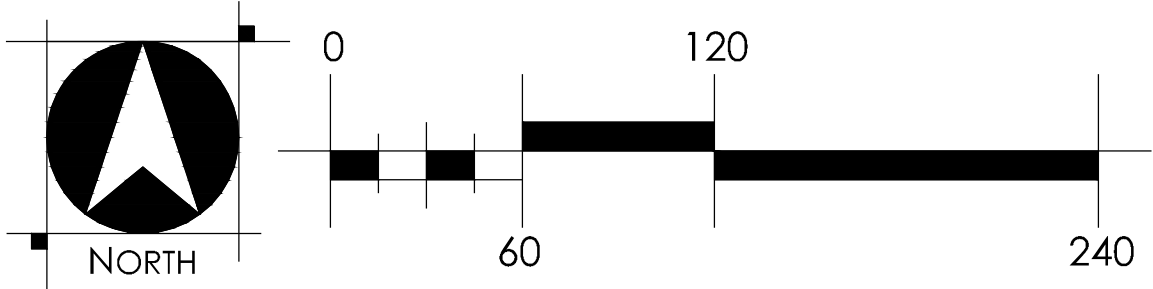
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# EAGLE CANYON IV UNIT 4

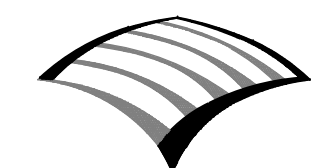
## TENTATIVE MAP

### LANDSCAPE SHEET



## EAGLE CANYON IV UNIT 4

### LANDSCAPE SHEET



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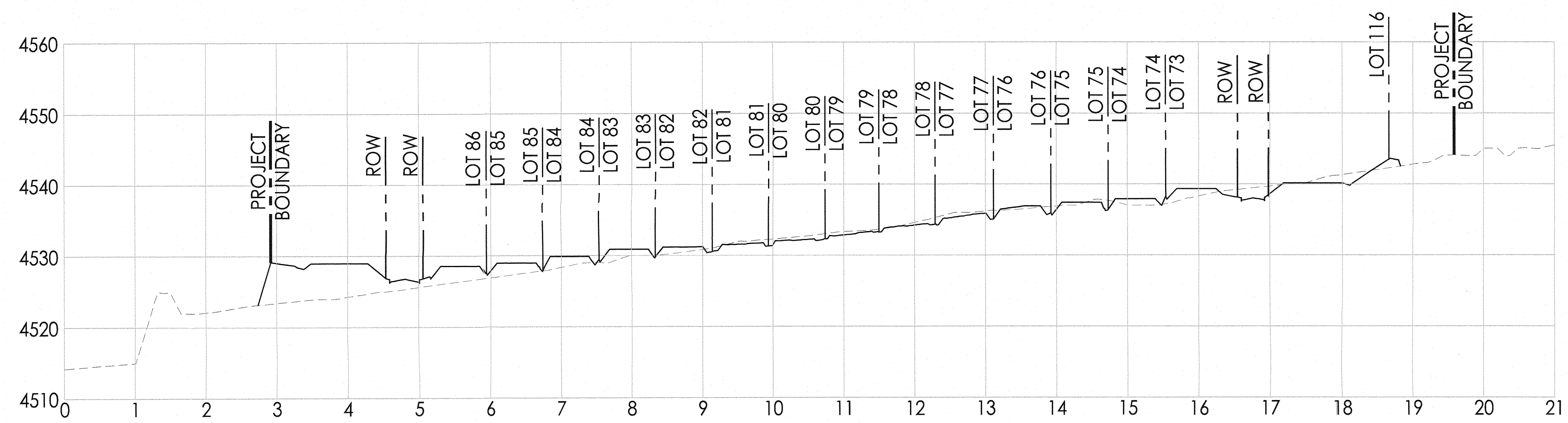
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# EAGLE CANYON IV UNIT 4

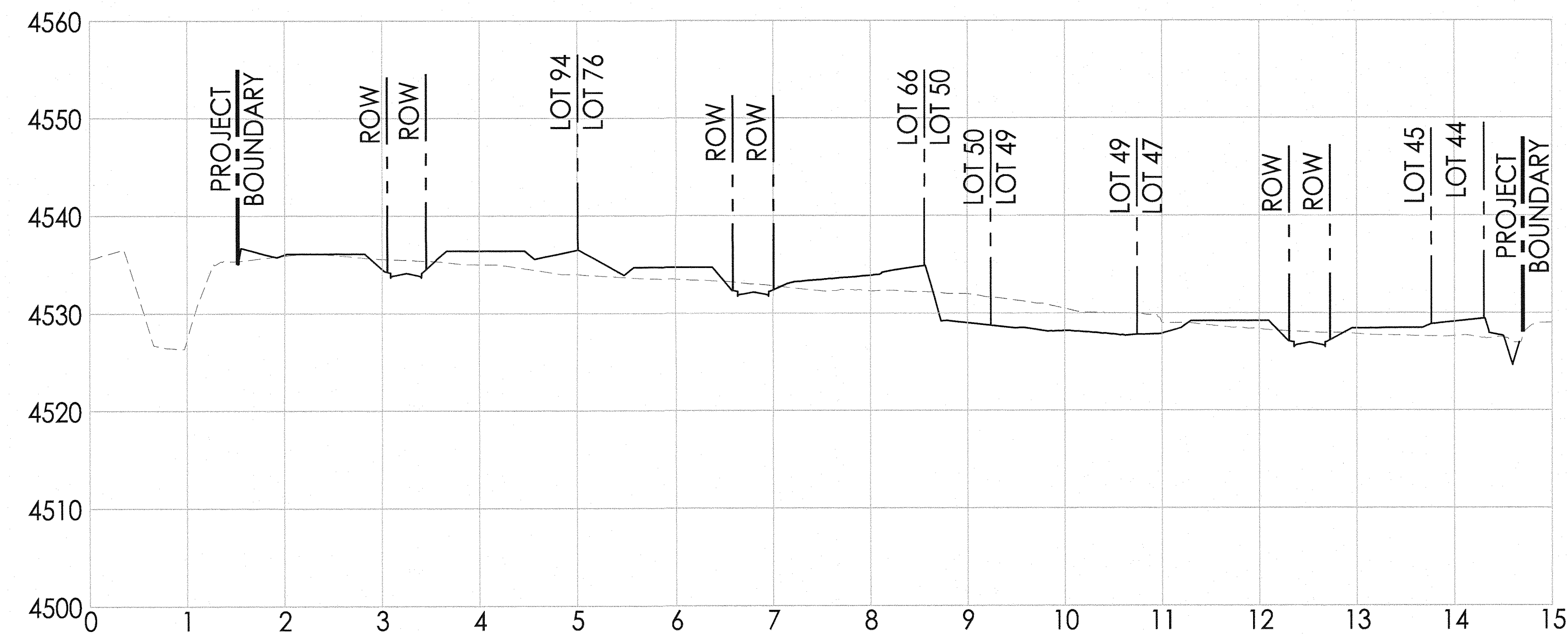
## TENTATIVE MAP

### CROSS SECTIONS



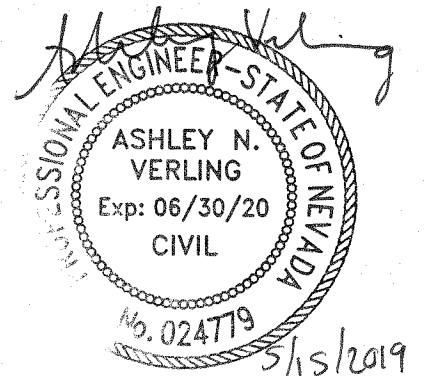
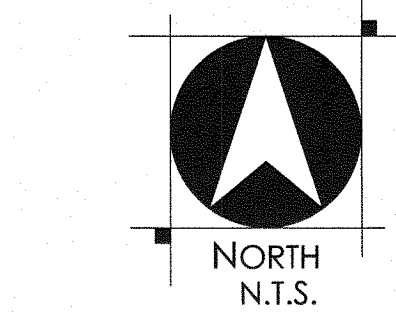
**CROSS SECTION B**

SCALE: 1"=100' HORIZ.  
1"=10' VERT.

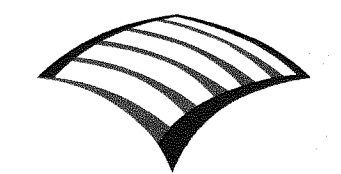


**CROSS SECTION A**

SCALE: 1"=100' HORIZ.  
1"=10' VERT.



**EAGLE CANYON IV UNIT 4**  
**CROSS SECTIONS**



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