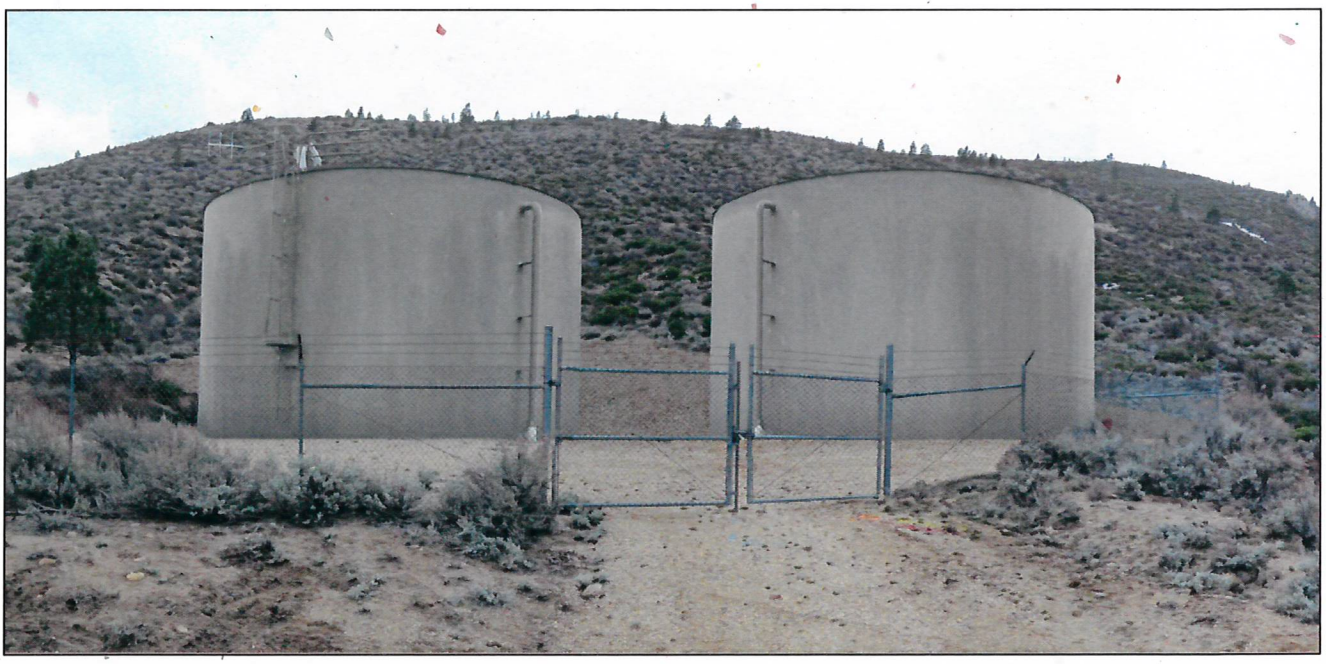
ORIGINAL

TRUCKEE MEADOWS WATER AUTHORITY

TMWA
Lightning W Tank #2
Special Use Permit and
Director's Modification of Standards



Prepared by:

RUBICON Design Group

April 15, 2019

TMWA

Lightning W Tank #2

SPECIAL USE PERMIT AND

DIRECTOR'S MODIFICATION OF STANDARDS

Prepared for:

Truckee Meadows Water Authority

P.O. Box 30013

Reno, NV 89520

Prepared by:

Rubicon Design Group, LLC

1610 Montclair Ave., Suite B

Reno, Nevada 89509

(775) 425-4800

www.rubicondesigngroup.com

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TMWA LIGHTNING W TANK #2
SPECIAL USE PERMIT & DIRECTOR'S MODIFICATION OF STANDARDS

Introduction

This application includes the following requests:

- A **Special Use Permit** to allow the construction of a 250,000-gallon water tank in the General Rural (GR) zoning district, and to vary standards in accordance w/ 110.810.20 (e).
- A **Director's Modification of Standards** to allow for graded 2:1 slopes in lieu of 3:1 slopes, and to allow for a native seed mix without irrigation in lieu of traditional site landscaping.

Project Location

The Lightning W Tank #2 project site (APN 055-210-21) consists of 2.066± acres located approximately 1,800 feet south of the intersection of Franktown Road and Pine Canyon Road in south Washoe Valley. Figure 1 (below) depicts the project location.

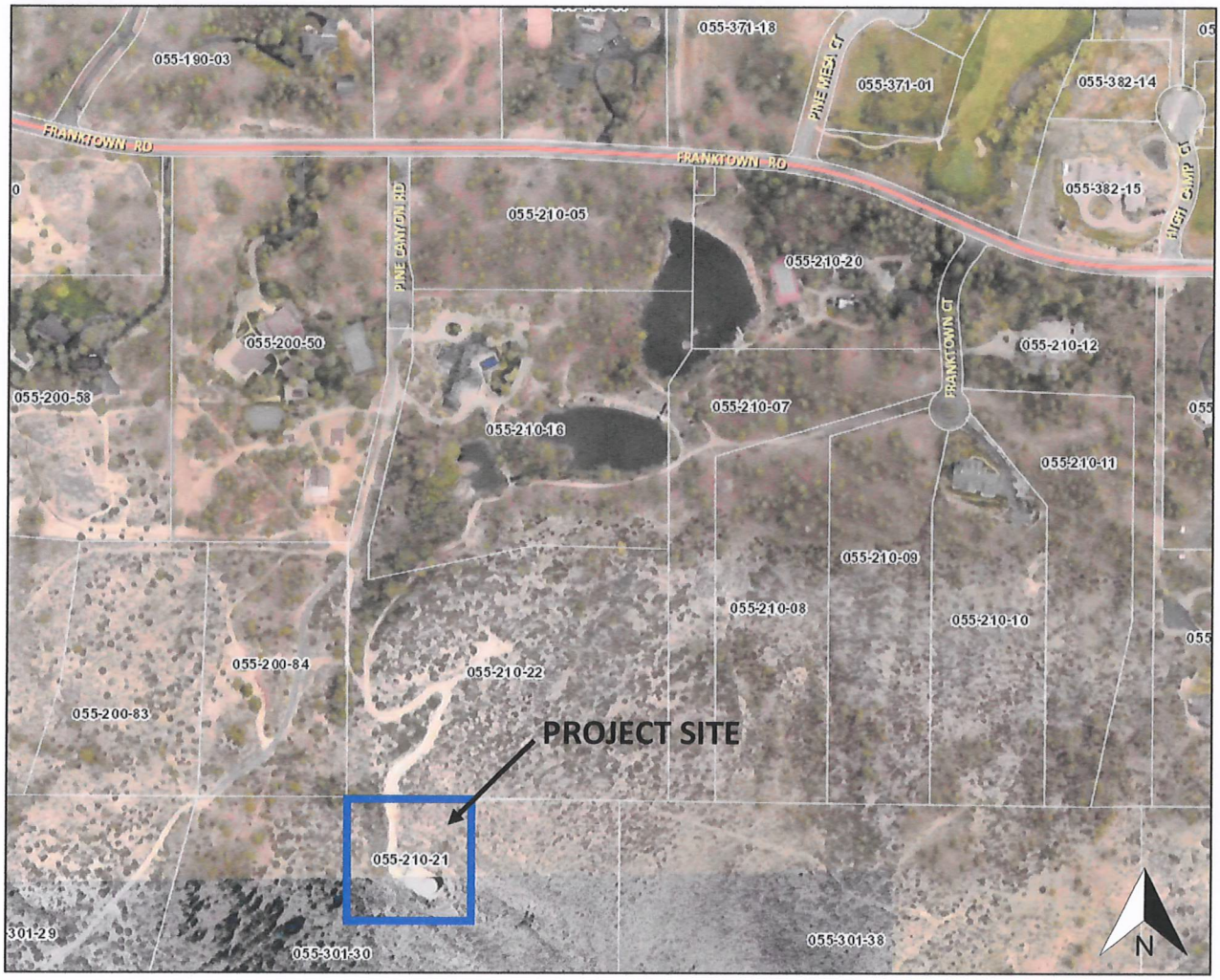


Figure 1 – Vicinity Map

Existing Conditions

The Lightning W #2 Tank site parcel is the site of an existing 250,000-gallon water tank owned and operated by the Truckee Meadows Water Authority (TMWA) that was constructed in 1995. Existing site improvements also include 2:1 graded slopes around the south and west side of the tank, a graded dirt access road and chain link fence topped with barbed wire. Surrounding uses include a vacant rural parcel that surrounds the subject property on the west, south and east sides, and a vacant residential parcel on the north side. Figure 2 (below) depicts the existing onsite conditions.

Figure 2 – Existing Conditions (Site Photo Looking South from Access Road)

The project site is designated as Rural in the Washoe County Master Plan, as is the property that surrounds the site on the west, south and east. The property to the north is designated Rural Residential. Zoning for the project site is General Rural (GR), as is the property on the west, south and east sides. The zoning for the property to the north is Medium Density Rural (MDR).

Project Description

TMWA proposes to construct a 250,000-gallon water tank (Tank #2) on the 2.066± acre site, directly adjacent to the existing 250,000-gallon water tank (Tank #1). The purpose for the additional tank is to allow the original tank to be taken out of service temporarily for much needed rehabilitation. Tank #2 is proposed to be constructed of welded steel 43 feet in diameter with a wall height of 24 feet and a total height of approximately 26 feet at the center of the cone roof. A center-mounted vent will sit on top of the tank adding a maximum of an additional three feet to the total height. This size and shape is the same as existing Tank #1. The new tank will be painted an earthtone color (Sherwin Williams Olivine #4023), which has been used on new TMWA tanks in other parts of Washoe County to blend with the surrounding landscape. Tank #1 will also be painted the Olivine color upon completion of the rehabilitation.

Figure 3 (below) shows the overall site plan for the tanks and Figure 4 (below) is a photo simulation of what both tanks will look like on the site after the project is completed.

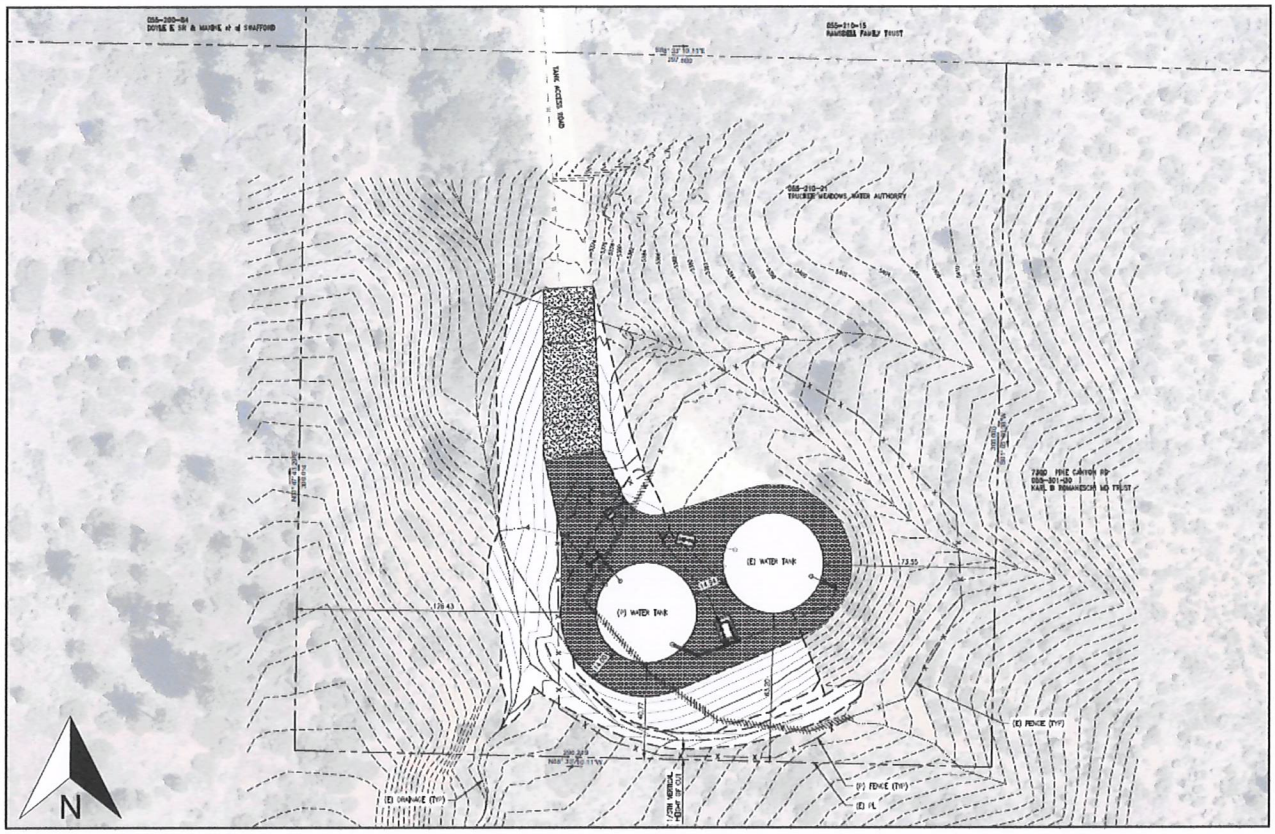


Figure 3 – Overall Site Plan

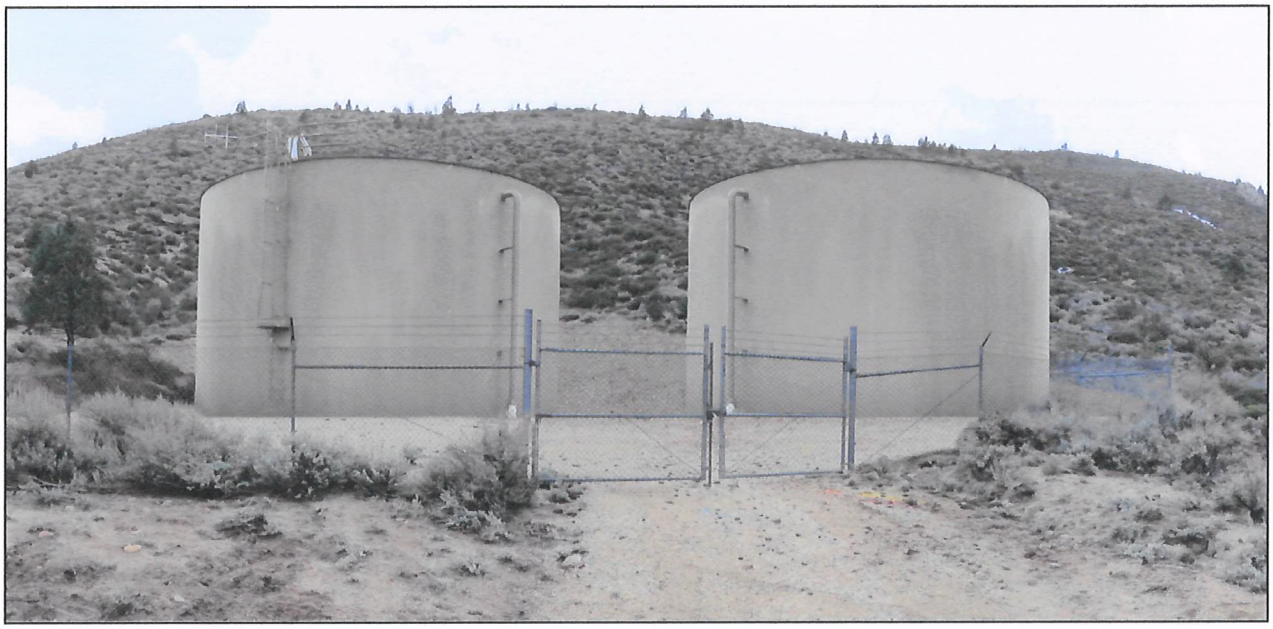


Figure 4 – Photo Simulation of Completed Project with Matching Tanks

Site improvements associated with the construction of Tank #2 consist of grading a building pad including cuts into the existing slope to the south and west, placement of rip rap along drainage channels, new aggregate base placement on approximately 700 feet of the access road leading to the tank site, new piping underground to connect the tank to the existing water line, expansion of the chain link fencing with barbed wire top and placement of hydroseed with a blend of native seed types on the disturbed slopes. Contact with the Washoe Storey Conservation District was attempted prior to this submittal to obtain direction on an appropriate seed mix, but as of the submittal date for this project (April 15, 2019) the applicant's representative had not yet received a return phone call.

During initial discussions with staff, it was noted that the drainage on site is proposed to be slightly modified as a part of the site improvements for Tank #2, and that a drainage study would be required for construction. A drainage study has been initiated but has not yet been completed. The report will be provided as soon as it is available. Approximately 85 linear feet of the existing meandering drainageway on the west side of the tank will be straightened, cleaned up, and channelized. This will protect the proposed tank site from future erosion during heavy runoff events, remove intrusive vegetation that has established in the channel, and improve flow through this section. The proposed cut slopes are 2:1, and the disturbed section of channel will be protected with rounded riprap of varying sizes to closely match the existing landscape.

An estimated timeline of activities has been provided below. When the project is completed, both 250,000-gallon tanks will be put into service, and the addition of the second tank will provide double the water storage capacity that currently exists.

KEY ACTIVITY	TIMEFRAME
• **Permitting and Design**	**March – May 2019**
o SUP, Building, Air Quality, Health, etc.	
o Geotechnical Report	
o Grading Plan	
o Site Piping	
o Tank and Appurtenances	
o Erosion Control/Revegetation	
• **Construction of Tank #2**	**May – November 2019**
o NRS 338 Bidding	
o Grading and Site Drainage	
o Foundation and Piping	
o Steel Erection	
o Interior and Exterior Blast/Coat	
o Disinfect, Fill and Perform Water Quality Analysis	
o Perimeter Road Surfacing	
o Reseeding	
• **Rehabilitation of Tank #1**	**November 2019 – April 2020**
o NRS 338 Bidding	
o Make Any Necessary Steel Repairs	
o Interior and Exterior Blast/Coat	
o Disinfect, Fill and Perform Water Quality Analysis	

In addition to the Special Use Permit required for this project, TMWA is requesting ~~a Director's Modification of Standards~~ to vary and modify standards for two requirements in the Washoe County Development Code. The first is a request to utilize 2:1 slopes for the areas around the site instead of 3:1 slopes. The second is a request to hydroseed the disturbed slope areas with a native seed mix at the end of construction in lieu of traditional landscaping with irrigation. The preliminary grading plan is provided as Figure 5 (below) and shows the proposed slopes and hydroseed areas.

Tank #1 was constructed in 1995 with graded slopes of 2:1. Although the requirements are minimum 3:1 slopes, TMWA believes maintaining the 2:1 slope for this project will better serve the project site and any that may be able to view it. Transitioning from an existing 2:1 slope to a 3:1 slope would be awkward on this relatively small site, would result in potential retaining walls, and more scarring of the hillside because the slope would be laid back farther with the 3:1 slope. Allowing a 2:1 slope would maintain stability while also being less visually obtrusive by minimizing slope cut areas. The geotechnical investigation provided as a part of this application supports the proposal of 2:1 slopes as indicated in Section 4.2.6 (Permanent Slopes) of the investigation. The geotechnical investigation is provided as an appendix to this report.

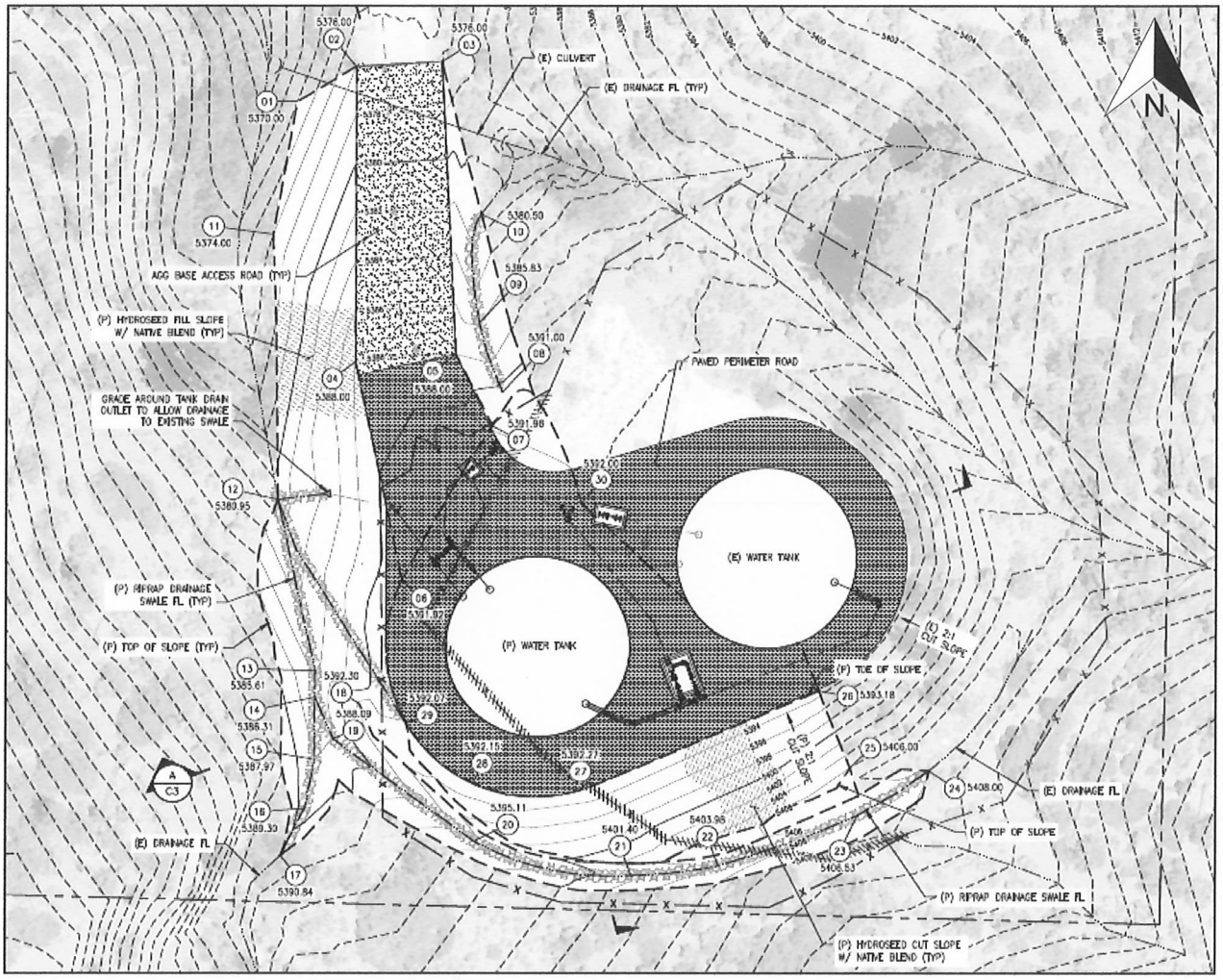


Figure 5 – Preliminary Grading Plan

The TMWA tank is located in a relatively remote area of south Washoe County and although the site has a water tank, it is for storage and service to other properties in the vicinity. As such, no irrigation capability exists onsite. For that reason, TMWA requests to be allowed to hydroseed the disturbed slopes with a native seed mix as shown on the grading plan on Page 5, rather than place traditional landscaping in the form of trees, shrubs and ground cover. Not only would this landscaping not be seen by the general public due to the location of the tank, but it would be impossible to maintain without onsite irrigation.

Potential Impacts

Negative impacts for this site are not expected due to the proposed expansion of an existing public utility use. The site is located in an area surrounded by hills on the east, west and south sides and it behind the tree line in Washoe Valley so is not visible from public roadways. There will be noise during the construction and rehabilitation processes, but this will be temporary only. Light intrusion on surrounding properties is not expected as no lighting is proposed for Tank #1, only a small solar panel to operate the tank systems. Traffic will not increase except during the construction and rehabilitation process as only TMWA staff will access the site on a continual basis, as they do now. To demonstrate lack of visibility of the tank from various locations in south Washoe Valley, a sight line study with photographs is included in this application. Figure 6 (below) depicts the locations from where photos were taken, followed by Figure 7 (Pages 7 and 8) which show three photographs indicating where the tank site is located. These photographs along with referenced exhibits are included in the appendix of this report.

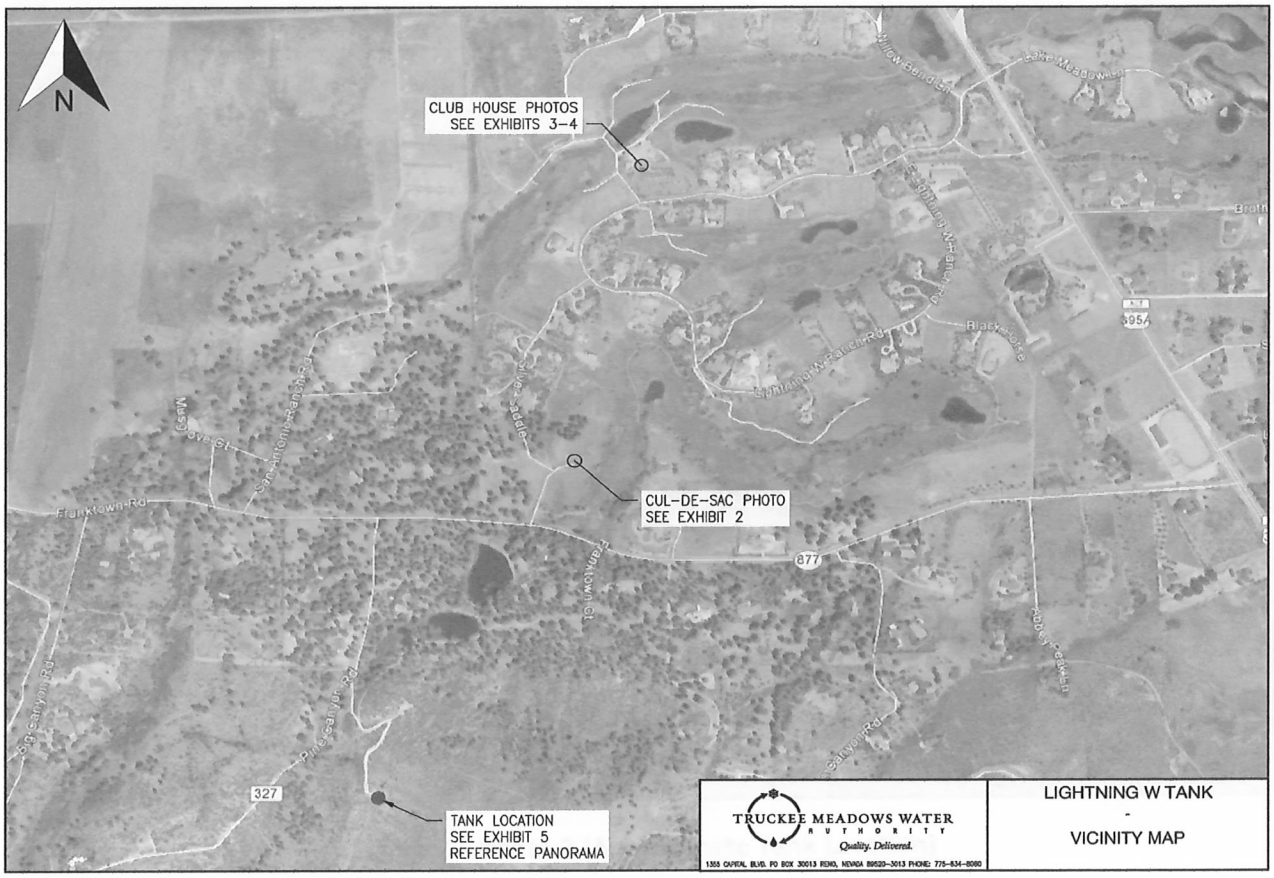


Figure 6 – Sight Line Study Photograph Locations

Figure 7 – Photo 3 (Approximate Tank Location)

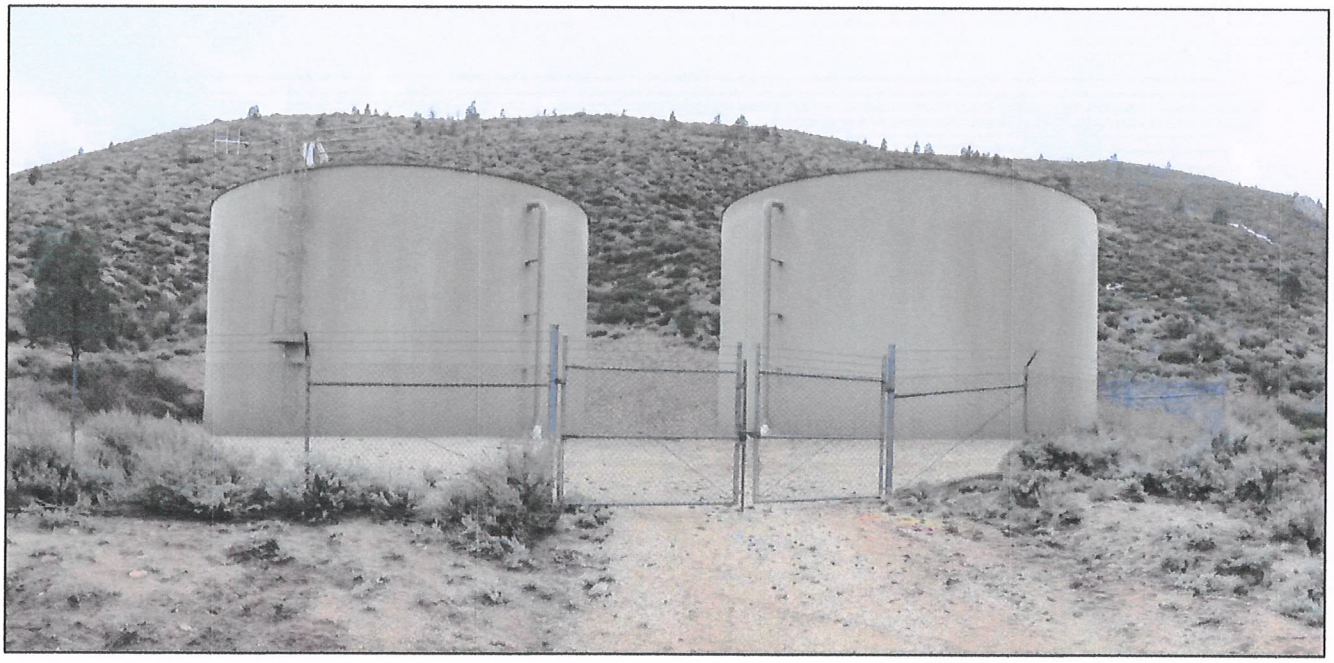
Special Use Permit Findings

The Washoe County Development Code establishes findings that must be made by the Board of Adjustment to approve a Special Use Permit request. These findings are listed below in *italic* type and are addressed in **bold** type.

a. *Consistency. The proposed use is consistent with the action programs, policies, standards and maps of the Master Plan and the applicable area plan;*

The proposed addition of a second water tank at this location is consistent with the action programs, policies, standards and maps of the Master Plan and the South Valleys Area Plan. The project site is located in the Rural land use area, which allows for public and semi-public facilities. A water tank already exists on the site. In addition, the proposed tank is consistent with policies from the Washoe County Master Plan listed on the following page.

Appendices



Washoe County Development Application

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

Project Information	**Staff Assigned Case No.:**

Project Name: **Lightning W Water Tank #2**

Project Description: Construction of a new 250,000 gallon water tank next to the existing 250,000 gallon water tank on the property to allow for additional water storage and rehabilitation of the existing water tank and to allow 2:1 slopes instead of 3:1 slopes.

Project Address: Franktown Road

Project Area (acres or square feet): 2.066 acres

Project Location (with point of reference to major cross streets **AND** area locator):

Approximately 1800 feet south of the Franktown Rd/Pine Canyon Rd intersection in South Washoe Valley

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
055-210-21	2.066 acres		

Indicate any previous Washoe County approvals associated with this application:
Case No.(s). N/A

Applicant Information (attach additional sheets if necessary)

Property Owner:		**Professional Consultant:**	
Name: Truckee Meadows Water Authority		Name: Rubicon Design Group	
Address: P.O. Box 30013		Address: 1610 Montclair Ave., Suite B	
Reno, NV	Zip: 89520	Reno, NV	Zip: 89509
Phone: (775) 834-8047	Fax:	Phone: (775) 425-4800	Fax:
Email: cstruffert@tmwa.com		Email: spansky@rubicondesigngroup.com	
Cell:	Other:	Cell: (775) 250-7981	Other:
Contact Person: Chris Struffert		Contact Person: Susan Pansky, AICP	
Applicant/Developer:		**Other Persons to be Contacted:**	
Name: Same as Property Owner		Name:	
Address:		Address:	
	Zip:		Zip:
Phone:	Fax:	Phone:	Fax:
Email:		Email:	
Cell:	Other:	Cell:	Other:
Contact Person:		Contact Person:	

For Office Use Only

Date Received:	Initial:	Planning Area:
County Commission District:		Master Plan Designation(s):
CAB(s):		Regulatory Zoning(s):

Special Use Permit Application
Supplemental Information

(All required information may be separately attached)

1. What is the project being requested?

Please see the attached application report.

2. Provide a site plan with all existing and proposed structures (e.g. new structures, roadway improvements, utilities, sanitation, water supply, drainage, parking, signs, etc.)

Please see the site plan included with the application report.

3. What is the intended phasing schedule for the construction and completion of the project?

Tank #2 will be constructed in one phase estimated to be completed in November 2019. Once Tank #2 is operational, existing Tank #1 will be taken out of service for rehabilitation, estimated to be completed in April 2020.

4. What physical characteristics of your location and/or premises are especially suited to deal with the impacts and the intensity of your proposed use?

The tank site is located in a remote hillside area in South Washoe Valley and is the site of an existing 250,000 water tank. The size of the parcel is adequate to accommodate two water tanks at the proposed size.

5. What are the anticipated beneficial aspects or affects your project will have on adjacent properties and the community?

The existing water tank is nearly 25 years old and in need of rehabilitation. The proposed project will allow necessary repairs and maintenance to occur on the existing tank, and will provide an additional 250,000 gallon water storage facility once both tanks are operational.

6. What are the anticipated negative impacts or affect your project will have on adjacent properties? How will you mitigate these impacts?

Negative impacts as a result of this project are not anticipated.

7. Provide specific information on landscaping, parking, type of signs and lighting, and all other code requirements pertinent to the type of use being purposed. Show and indicate these requirements on submitted drawings with the application.

421.77 cubic yards

8. Can the disturbed area be seen from off-site? If yes, from which directions and which properties or roadways?

Very few properties can see the disturbed area due to the limited number of homes constructed in this area and the lot sizes. The disturbed site is not visible from nearby roadways.

9. Could neighboring properties also be served by the proposed access/grading requested (i.e. if you are creating a driveway, would it be used for access to additional neighboring properties)?

No. The proposed grading is on the project site only and will not serve any surrounding properties.

10. 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 proposed slope for the project is 2:1 to maintain consistency with the existing 2:1 slope around the existing Tank #1 that was constructed in 1995. _____

11. Are you planning any berms?

Yes	No XX	If yes, how tall is the berm at its highest?

12. If your property slopes and you are leveling a pad for a building, are retaining walls going to be required? If so, how high will the walls be and what is their construction (i.e. rockery, concrete, timber, manufactured block)?

No. As a part of this application we have requested to utilize 2:1 slopes.

13. What are you proposing for visual mitigation of the work?

N/A

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

No

15. 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?

We will work with the Washoe Storey Conservation District to determine an appropriate seed mix for revegetation.

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

Temporary irrigation will be provided with water used for construction.

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

We will work with the Washoe Storey Conservation District to determine an appropriate seed mix for revegetation.

18. Are there any restrictive covenants, recorded conditions, or deed restrictions (CC&Rs) that may prohibit the requested grading?

Yes	No XX	If yes, please attach a copy.

Washoe County Development Application

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Project Information	**Staff Assigned Case No.:**
Project Name: **Lightning W Water Tank #2**	
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Project Address: Franktown Road/Pine Canyon Road in South Washoe Valley	
Project Area (acres or square feet): 2.066 acres	
Project Location (with point of reference to major cross streets **AND** area locator): Approximately 1800 feet south of the Franktown Rd/Pine Canyon Rd intersection in South Washoe Valley	

Assessor's Parcel No.(s):	Parcel Acreage:	Assessor's Parcel No.(s):	Parcel Acreage:
055-210-21	2.066 acres		

Indicate any previous Washoe County approvals associated with this application:
Case No.(s).

Applicant Information (attach additional sheets if necessary)

Property Owner:		**Professional Consultant:**	
Name: Truckee Meadows Water Authority		Name: Rubicon Design Group	
Address: P.O. Box 30013		Address: 1610 Montclair Ave., Suite B	
Reno, NV	Zip: 89520	Reno, NV	Zip: 89509
Phone: (775) 834-8047	Fax:	Phone: (775) 425-4800	Fax:
Email: cstruffert@tmwa.com		Email: spansky@rubicondesigngroup.com	
Cell:	Other:	Cell: (775) 250-7981	Other:
Contact Person: Chris Struffert, PE		Contact Person: Susan Pansky, AICP	
Applicant/Developer:		**Other Persons to be Contacted:**	
Name: Same as Property Owner		Name:	
Address:		Address:	
	Zip:		Zip:
Phone:	Fax:	Phone:	Fax:
Email:		Email:	
Cell:	Other:	Cell:	Other:
Contact Person:		Contact Person:	

For Office Use Only

Date Received:	Initial:	Planning Area:	
County Commission District:		Master Plan Designation(s):	
CAB(s):		Regulatory Zoning(s):	

RTF = Regional Technology Fee. Adopted by the BCC on June 28, 2016 and is effective when the Regional License Platform (A
included as a component of the Health fee.

Director's Modification of Standards
Supplemental Information

(All required information may be separately attached)

1. What modification or deviation are you requesting? **Be specific.**

~~Modification from required 3:1 slopes to allow for 2:1 slopes consistent with existing, previously graded slopes on site;~~ and modification from required landscaping and irrigation to allow instead for post grading re-vegetation with a native seed mix. See report for additional info.

2. Why is the modification or deviation necessary to the success of the project/development? **Be specific.** Are there any extenuating circumstances or physical conditions on the proposed project/development site?

~~Deviation from 3:1 graded slopes is necessary to provide a seamless transition from existing 2:1 graded slopes to new graded slopes.~~ Deviation from the minimum landscape and irrigation standards in favor of revegetation through native seed mix due to remote location of site and lack of on-site irrigation. See report for additional info.

3. Are you proposing to mitigate the effect of the modification or reduction?

~~To help stabilize the proposed 2:1 slopes and in lieu of the minimum landscape requirements,~~ a native seed mix is proposed to be applied following completion of the grading on site. See report for additional info.

In lieu of the minimum landscape requirements

4. What section of code are you requesting to modify or deviate? **Be specific.** List the code section and if there are specific requirements for the modification, provide detailed information. For deviation, provide the percentage of the deviation.

~~Grading: 110.438.45 (Grading of Slopes)~~
Landscaping: 110.412.40 (Civic and Commercial Uses), 110.412.60 (Planting Standards), 110.410.65 (Irrigation Standards)

5. For Minor Deviation request; list what properties/parcels are affected by the deviation? Explain if there will be any impacts to the affected neighboring properties. (At a minimum, affected property owners are those owners of parcels that immediately abut the location of the proposed minor deviation.)

N/A

RTF = Regional Technology Fee. Adopted by the BCC on June 28, 2016 and is effective when the Regional License Platform (/
included as a component of the Health fee.

Property Owner Affidavit

Applicant Name: Truckee Meadows Water Authority

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, DANNY ROTTER,
(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 Building.

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

Assessor Parcel Number(s): 055-210-21

Printed Name DANNY ROTTER - TMWA

Signed

Address 1355 CAPITAL BLVD.

RENO, NV 89502

Subscribed and sworn to before me this 26th day of March, 2019.

Notary Public in and for said county and state

My commission expires: 9-23-2021

(Notary Stamp)

DAVID NELSON
Notary Public - State of Nevada
Appointment Recorded in Washoe County
No: 13-11710-2 - Expires September 23, 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

Washoe County Treasurer
Tammi Davis

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

Bill Detail

Back to Account Detail | Change of Address | Print this Page

Washoe County Parcel Information

Parcel ID	Status	Last Update
05521021	Active	4/8/2019 2:07:14 AM

Current Owner:
TRUCKEE MEADOWS WATER AUTHORITY
PO BOX 30013
RENO, NV 89520

SITUS:
0 FRANKTOWN RD
WASHOE COUNTY NV

Taxing District
4000

Geo CD:

Legal Description

Township 16 Section 27 Lot 1 Block Range 19 SubdivisionName LIGHTNING "W" RANCH PINES SUB

Installments

Period	Due Date	Tax Year	Tax	Penalty/Fee	Interest	Total Due
INST 1	8/20/2018	2018	$0.00	$0.00	$0.00	$0.00
		Total Due:	**$0.00**	**$0.00**	**$0.00**	**$0.00**

Tax Detail

	Gross Tax	Credit	Net Tax
State of Nevada	$141.90	($141.90)	$0.00
Truckee Meadows Fire Dist	$450.75	($450.75)	$0.00
Washoe County	$1,161.69	($1,161.69)	$0.00
Washoe County Sc	$950.33	($950.33)	$0.00
Total Tax	**$2,704.67**	**($2,704.67)**	**$0.00**

Payment History

No Payment Records Found

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

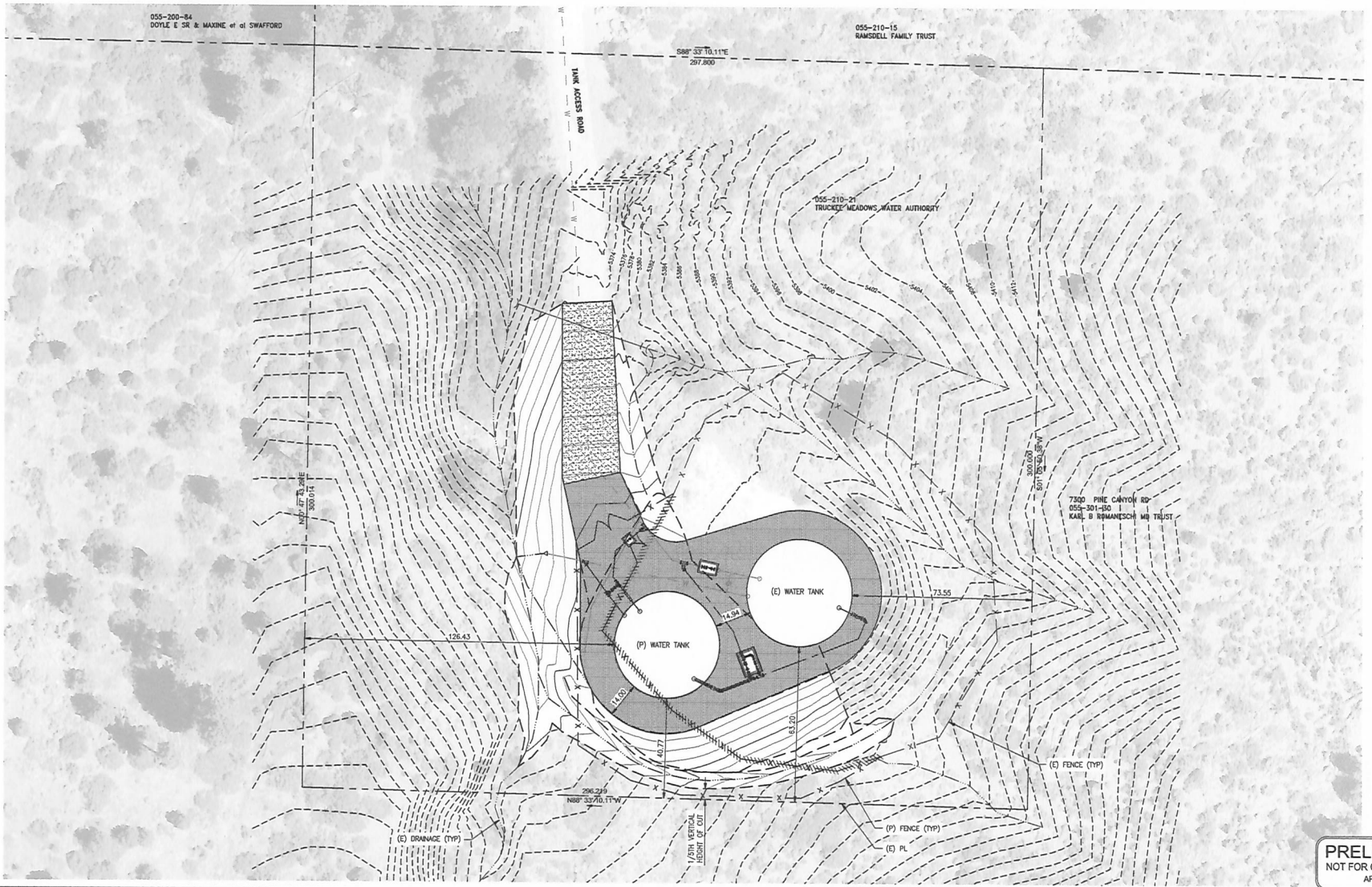
Change of Address

All requests for a mailing address change must be submitted in writing, including a signature (unless using the online form).

To submit your address change online click here

Address change requests may also be faxed to:
(775) 328-2500

Address change requests may also be mailed to:
Washoe County Treasurer
P O Box 30039
Reno, NV 89520-3039



PRELIMINARY
NOT FOR CONSTRUCTION
APRIL 2019

REVISION	DESCRIPTION	BY	APP	DATE

WORK ORDER NO. 14-0019
DESIGNED HCS
DRAWN JRH
DATE JAN, 2019
CHECKED
SUBMITTED
RECOMMENDED
APPROVED

TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK 2
WASHOE COUNTY, NEVADA

OVERALL SITE PLAN

SHEET NUMBER
C1
3 OF XX

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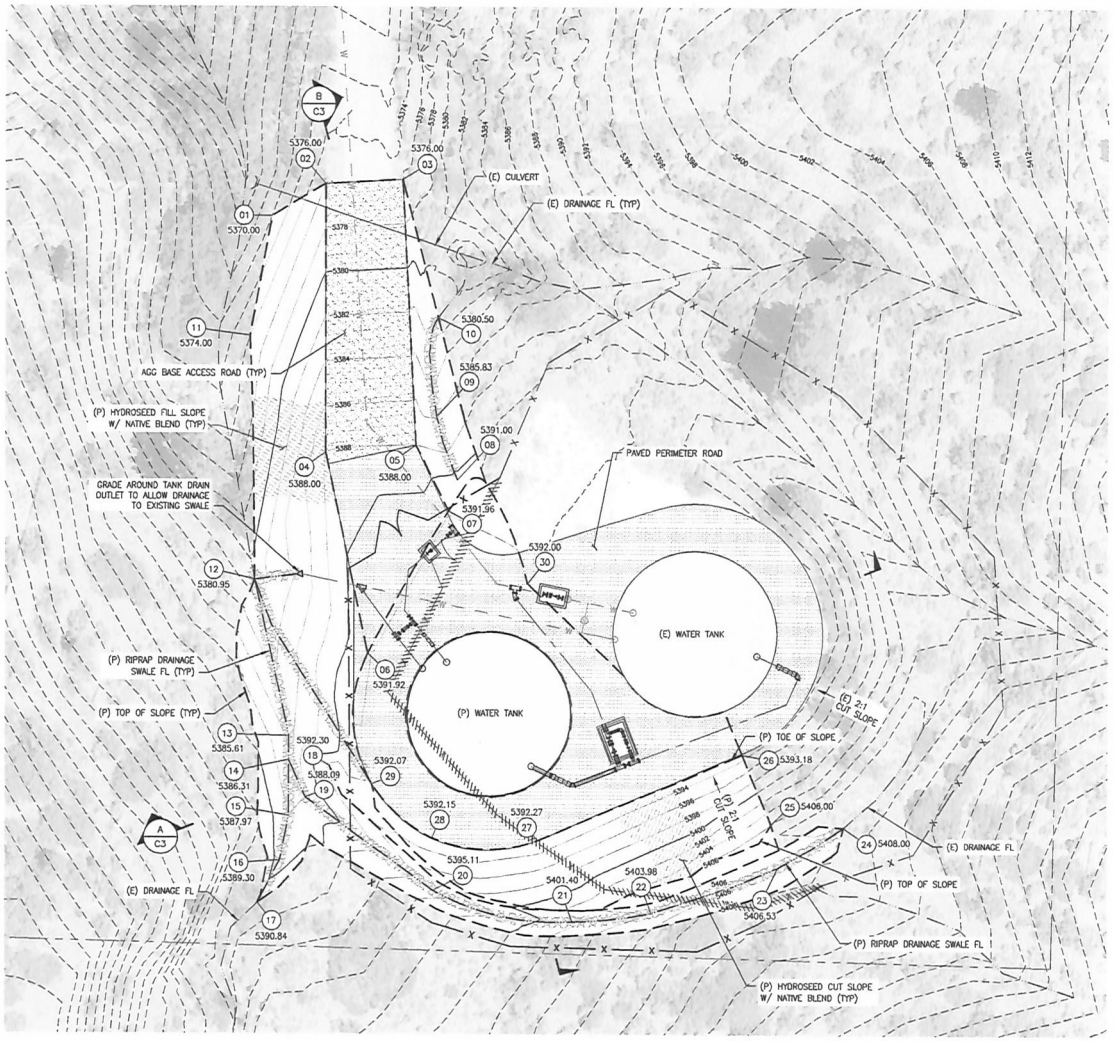
Apr 11, 2019 - 4:47pm



GRADING TAG TABLE

TAG	EASTING	NORTHING	ELEVATION
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03	2270403.1214	14759508.7948	5376.00
04	2270383.0041	14759437.3765	5388.00
05	2270406.7170	14759439.2123	5388.00
06	2270394.1777	14759385.4855	5391.92
07	2270415.2895	14759422.1846	5391.96
08	2270417.6132	14759430.2110	5391.00
09	2270412.1513	14759446.6653	5385.83
10	2270412.5166	14759472.5288	5380.50
11	2270363.1137	14759467.7011	5374.00
12	2270364.4811	14759404.6093	5380.95
13	2270373.5462	14759363.9428	5385.61
14	2270373.5316	14759357.6419	5386.31
15	2270373.4971	14759342.8353	5387.97
16	2270371.1344	14759331.1545	5389.30
17	2270365.3174	14759320.0071	5390.84
18	2270384.1384	14759356.1625	5392.30
19	2270377.8361	14759347.7579	5388.09
20	2270411.2880	14759323.3632	5395.11
21	2270447.8643	14759315.2167	5401.40
22	2270468.5514	14759317.5369	5403.98
23	2270501.6706	14759329.4750	5406.53
24	2270518.8955	14759340.1888	5408.00
25	2270499.9772	14759340.8750	5406.00
26	2270492.3920	14759359.2400	5393.18
27	2270438.8621	14759336.5816	5392.27
28	2270411.1346	14759337.2158	5392.15
29	2270395.2572	14759351.4675	5392.07
30	2270436.0088	14759403.6967	5392.00

GRADING VOLUME REPORT

Volume Summary

Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
volume compare	full	0.850	1.000	15431.53	421.77*	453.20	31.43*

Totals

	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	15431.53	421.77*	453.20	31.43*

* Value adjusted by cut or fill factor other than 1.0

PRELIMINARY
NOT FOR CONSTRUCTION
APRIL 2019

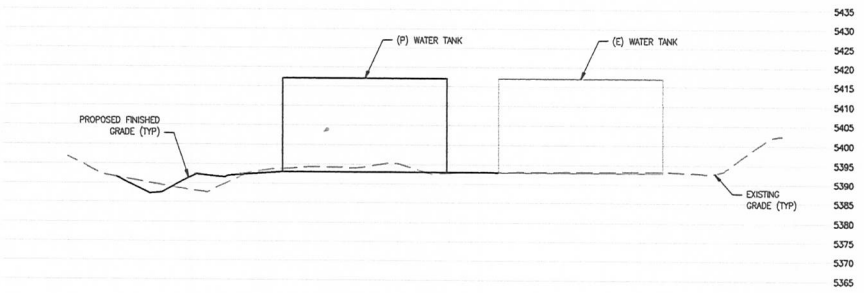
REVISION	DESCRIPTION	BY	APP	DATE

WORK ORDER NO. 14-0019
DESIGNED HCS
DRAWN JRH
DATE JAN, 2019
CHECKED
SUBMITTED
RECOMMENDED
APPROVED

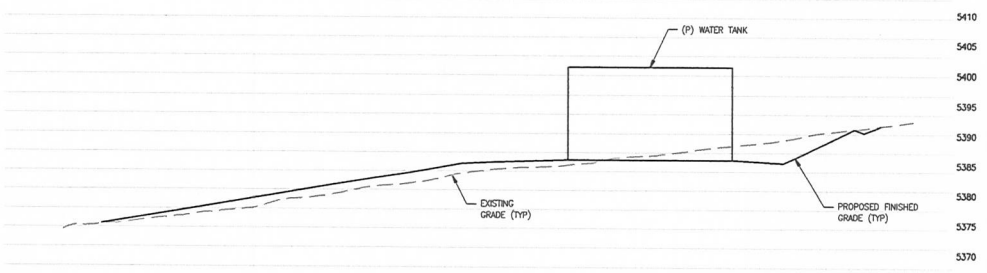
TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK 2
WASHOE COUNTY, NEVADA
GRADING PLAN

SHEET NUMBER
C2
4 OF XX



GRADING SECTION A / C3
SCALE: 1/16" = 1'-0"



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PRELIMINARY
NOT FOR CONSTRUCTION
APRIL 2019

REVISION	DESCRIPTION	BY	APP	DATE

WORK ORDER NO. 14-0019
DESIGNED HCS
DRAWN JRH
DATE JAN. 2019
CHECKED
SUBMITTED
RECOMMENDED
APPROVED

TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK 2
WASHOE COUNTY, NEVADA

GRADING SECTIONS AND DETAILS

SHEET NUMBER
C3
5 OF XX

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Apr 11, 2019 - 4:47pm

TRUCKEE MEADOWS WATER AUTHORITY
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LIGHTNING W TANK
-
VICINITY MAP

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
1

FILE SPEC: K:\2018-19 Capital Projects\14-0019 Lightning W Tank\Design\ACAD_PRESENTATION.dwg
PLOT DATE: Apr 09, 2019 - 2:54pm

TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK
-
VIEW FROM CUL-DE-SAC
OFF FRANKTOWN RD

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
2

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Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK
-
VIEW FROM CLUBHOUSE PARKING LOT

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
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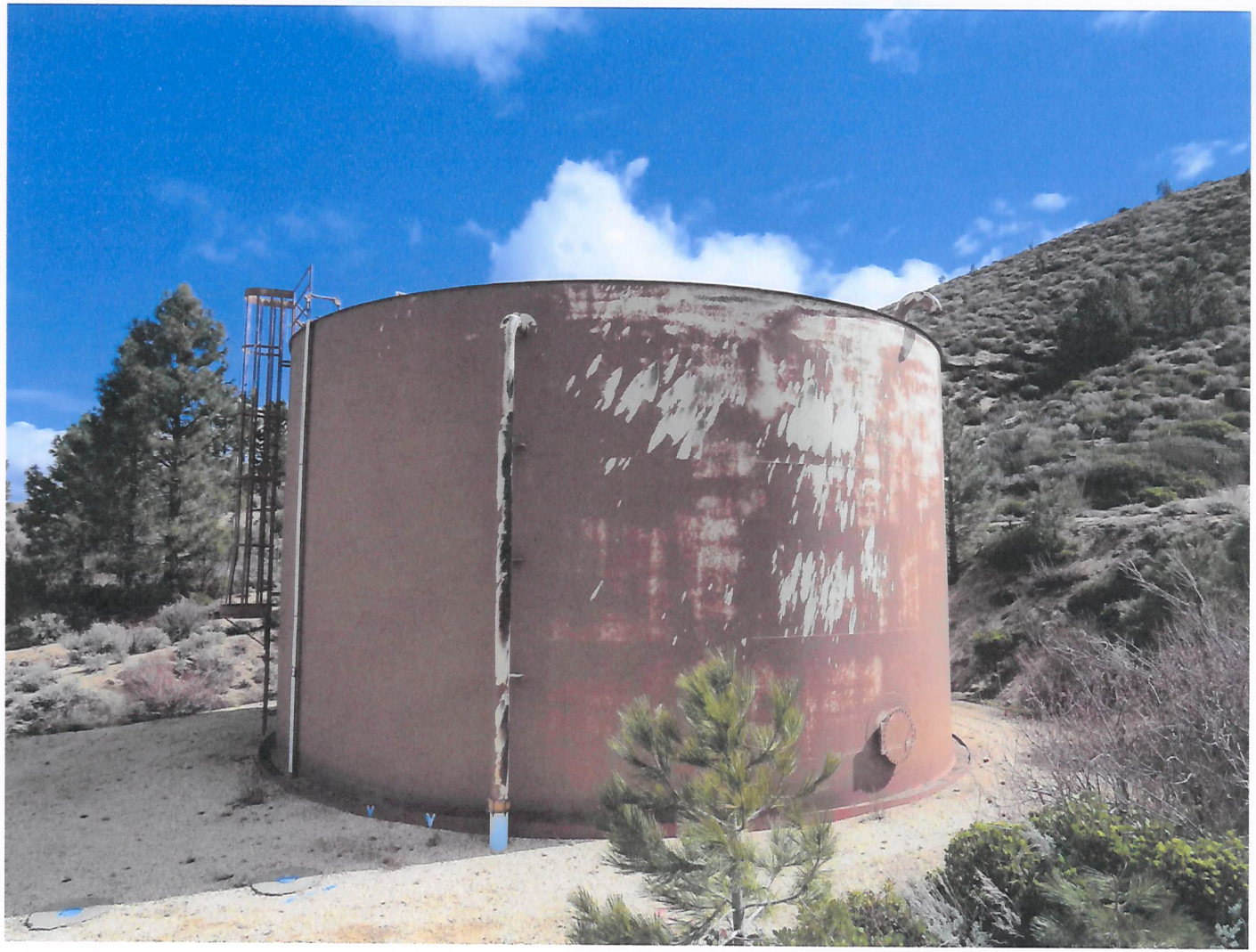

TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.
1355 CAPITAL BLVD. PO BOX 30013 RENO, NEVADA 89520-3013 PHONE: 775-834-8080

LIGHTNING W TANK
-
TANK CONDITION PHOTO

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
5

FILE SPEC: K:\2018-19 Capital Projects\14-0019 Lightning W Tank\Design\MCAD_PRESENTATION.dwg
PLOT DATE: Apr 09, 2019 - 2:54pm

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LIGHTNING W TANK
-
TANK COLOR EXAMPLE

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
6

FILE SPEC: K:\2018-19 Capital Projects\14-0019 Lightning W Tank\Design\ACAD_PRESENTATION.dwg
PLOT DATE: Apr 09, 2019 - 2:54pm

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LIGHTNING W TANK
-
TANK 2 SIMULATION
FROM ACCESS ROAD

DATE:	APRIL 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
8

FILE SPEC: K:\2018-19 Capital Projects\14-0019 Lightning W Tank\Design\ACAD_PRESENTATION.dwg
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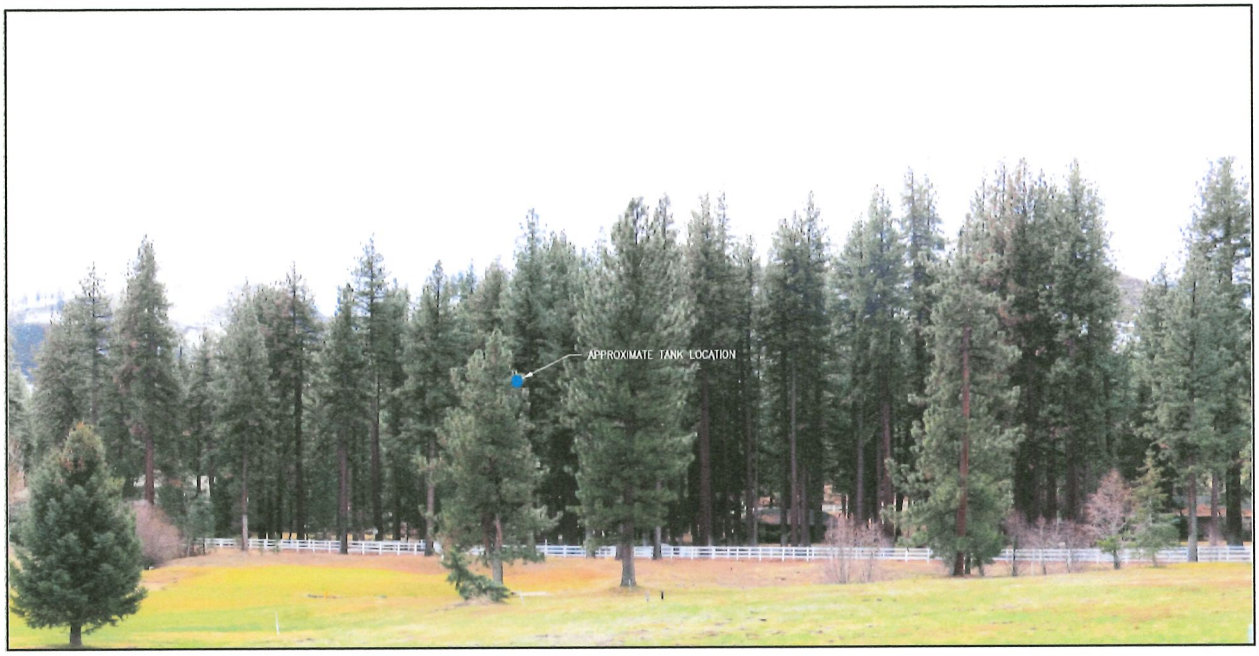

Figure 7 – Photo 1 (Approximate Tank Location)

Figure 7 – Photo 2 (Approximate Tank Location)

PSF.1.13 – Ensure that a safe and dependable water supply is provided.

PSF.1.20 – Ensure water quality standards are maintained consistent with the Safe Drinking Water Act and in Compliance with the Nevada Water Pollution Control Law and underground injection control regulations.

The addition of Tank #2 will allow the existing Tank #1 to be taken out of service for rehabilitation. This will ensure that a safe, dependable and quality water supply is maintained during rehabilitation, and perpetuated through additional storage capabilities that will exist once both tanks are operating side by side.

b. *Improvements. Adequate utilities, roadway improvements, sanitation, water supply, drainage, and other necessary facilities have been provided, the proposed improvements are properly related to existing and proposed roadways, and an adequate public facilities determination has been made in accordance with Division Seven;*

The proposed water tank will be an addition to the public facilities already located in the project site area. It will allow for the rehabilitation of the existing water tank and provide additional water storage. Adequate utilities, roadway improvements, sanitation, water supply and other necessary facilities are not applicable to the type of development contemplated with this application. Drainage improvements include minimal channel realignment on site to improve drainage flows, and the addition of rip rap in drainage areas where necessary.

c. *Site Suitability. The site is physically suitable for the type of development and for the intensity of development;*

The project site is the location of an existing 250,000-gallon water tank and has proven to be suitable for this type of development. The site is large enough to accommodate an additional 250,000 gallon water tank with little to no impact to the surrounding area.

d. *Issuance Not Detrimental. Issuance of the permit will not be significantly detrimental to the public health, safety or welfare; injurious to the property or improvements of adjacent properties; or detrimental to the character of the surrounding area; and*

The issuance of a Special Use Permit for a water tank at this location will not be detrimental to the public health, etc., injurious to property or improvements of adjacent properties, or detrimental to the area's character. The project site is located on a relatively remote parcel that is surrounding by vacant land, is screened from view from nearly all existing development in the vicinity and will serve to ensure that water quality and quantity in the area is maintained. The proposal of 2:1 graded slopes instead of 3:1 slopes will allow a smaller area of land to be disturbed and is supported by the soil types on site.

e. *Effect on a Military Installation. Issuance of the permit will not have a detrimental effect on the location, purpose or mission of the military installation.*

The project site is not located near a military installation.

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LIGHTNING W TANK
-
VIEW FROM CLUBHOUSE PARKING LOT - MAGNIFIED

DATE:	MARCH 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
4

TRUCKEE MEADOWS WATER AUTHORITY
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LIGHTNING W TANK
-
EXISTING TANK
FROM ACCESS ROAD

DATE:	APRIL 2019
DRAWN BY:	JRH
WORK ORDER #:	14-0019
SCALE:	NTS

EXHIBIT
7

FILE SPEC: K:\2018-19 Capital Projects\14-0019 Lightning W Tank\Design\ACAD_PRESENTATION.dwg
PLOT DATE: Apr 09, 2019 - 3:16pm

GEOTECHNICAL INVESTIGATION

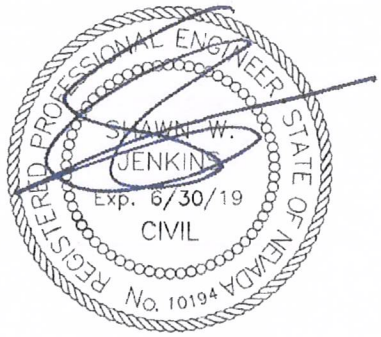
Lighting W Tank 2
Washoe County, Nevada

April 4, 2019

Prepared for:

TRUCKEE MEADOWS WATER AUTHORITY
Quality. Delivered.

1355 Capital Boulevard
Reno, Nevada 89502



4-10-19

ESE Project No. 19114

Prepared by:

EASTERN SIERRA ENGINEERING

4515 Towne Drive ❖ Reno ❖ NV ❖ 89521 ❖ 775-828-7220

Table of Contents

EASTERN SIERRA ENGINEERING

1.0 INTRODUCTION AND SCOPE

This Report presents the results of Eastern Sierra Engineering's (ESE's) geotechnical investigation for the proposed Lighting W Tank 2 project in Washoe County, Nevada. The project location is approximately 2,800 feet southwest of the intersection of Franktown Road and Franktown Court. We understand that the site of the proposed tank is southwest of the existing tank and that the finish grade for new tank will be the same as the existing tank. Maximum cuts and fills will be 12 feet and 8 feet respectively. The limits of the project are shown on Figure 1.

The following scope of services was provided:

- Located and marked two (2) test pits and contacted Underground Service Alert (USA) to notify them of our intent to excavate at the site;
- Excavated, logged, and sampled two (2) test pits ranging in depth from 9 feet to 13 feet;
- Performed laboratory testing that included particle size analysis, Atterberg limits, moisture content, and corrosivity (pH, sulfate, chloride, resistivity, sulfides and redox potential) testing;
- Prepared conclusions and recommendations addressing foundation design criteria, site grading, temporary and permanent slopes, and 1997 UBC seismic soil coefficients;
- Prepared this report that summarizes field activities, subsurface soil conditions and laboratory testing. Also included is a site plan with approximate boring locations, boring logs, particle size distribution charts, plasticity charts, and construction recommendations.

This report was prepared for the sole use of the Truckee Meadows Water Authority (TMWA), the only intended beneficiary of ESE's work. No other party should rely on the information contained herein without prior written consent of TMWA and ESE.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

ESE explored subsurface conditions by excavating two (2) test pits (TP-1 and TP-2) on March 19, 2019. Test pits were excavated to depths ranging from 9 to 13 feet below the existing grade using a Komatsu PC 158 excavator. The approximate locations of test pits are presented on Figure 1. During excavating activities, ESE's geologist logged the test pits and obtained representative loose bulk samples at various depths. At the completion of logging and sampling, the test pits were backfilled in lifts and compacted using the excavator bucket. Groundwater, if encountered, was measured prior to backfilling test pits. Summary logs of test pits TP-1 and 2 are presented on Figures 2 through 4.

Soil samples were classified in accordance with the Unified Soil Classification System (ASTM D2487-00) presented on Figure 5.

2.2 Laboratory Testing

Soil samples were taken to ESE's American Association of State Highway and Transportation Officials (AASHTO) certified materials testing laboratory for further examination and selected laboratory testing. Laboratory testing included particle size analysis, Atterberg limits (plasticity), moisture content; additionally select samples were sent to WETLAB for corrosivity (pH, sulfate, sulfides chloride, resistivity and redox potential) testing. Results of laboratory testing are presented in Figures 7 through 10. Results are also summarized in Table 1 and on the logs of the borings, Figures 2 through 4.

TABLE 1 - Laboratory Test Results

Test Pit No.	Sample Depth (ft.)	Moisture Content (%)	Percent Passing No. 200 Sieve Size (%)	Atterberg Limits (%)	Soil Type
TP-1	0.5 – 4.0	9.6	13.3	LL = -- PI = NP	Silty Sand WITH Gravel (SM)

TABLE 1 - Laboratory Test Results (cont.)

Test Pit No.	Sample Depth (in.)	Moisture Content (%)	Percent Passing No. 200 Sieve Size %	Atterberg Limits (%)	Soil Type
TP-1	4.0 – 8.0	9.8	12.9	LL =-- PI = NP	Silty Sand with Gravel (SM)
TP-2	0.5 – 4.5	7.9	9.3	LL = -- PI = NP	Poorly Graded Sand with Silt and Gravel (SP-SM)

3.0 SURFACE AND SUBSURFACE CONDITIONS

3.1 Surface Conditions

The ground surface is moderately to densely covered with sage brush and other shrubs. Surface soils generally consisted of loose to medium dense silty, clayey sand with cobbles and boulders spread across the site. A natural drainage channel runs down to the northwest of the proposed tank. The existing water tank is located to the northeast of proposed tank. The ground surface slopes down to the northwest with an elevation drop of approximately twenty (20) feet in the area of the proposed water tank.

3.2 Subsurface Conditions

The tank site is located within an area mapped by the Nevada Bureau of Mines and Geology (NBMG) in the Carson City Folio Geologic Map, Carson City Area, Nevada (Dennis T. Trexler, 1977) as: **"Kdg" – Hornblende-biotite granodiorite** – "Grayish white to gray and greenish gray, medium to coarse-grained, equigranular to porphyritic, and locally foliated and lineated. Locally grades into quartz monzonite or quartz diorite". **"Tlt" – Lenihan Canyon Tuff** – "Pale-lavender to purplish-tan, moderately to densely welded, devitrified, fine-grained hornblende quartz latite crystal-vitric tuff. 0-300 m thick". **"QTg" – Pediment gravel** – "Yellowish-gray to light-brown boulder sandy cobble gravel. Most clasts subrounded and consist of all bedrock lithologies".

Based on ESE's field investigation and laboratory testing, subsurface soils underlying the clayey sand (0-.5') surface soils generally consist of medium dense to dense, silty sand with gravel, cobble and boulders, poorly graded sand with silt, gravel, cobble and boulders to a depth of 8.5 feet in TP-1 and 5.5' in TP-2. Underlying the soils is a

granodiorite bedrock that is massive, little to occasionally fractured, low hardness to moderately hard, weak to moderately strong, moderately to deeply weathered. The excavator met refusal at 13.0 feet in TP-1 and at 9.0' in TP-2. Physical Properties Criteria For Rock Descriptions is presented on Figure 6.

Groundwater was encountered in both test pits at the top of bedrock, 8.5 feet in TP-1 and 5.5 feet in TP-2. Groundwater elevations should be expected to seasonally fluctuate due to precipitation and snowmelt.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based on ESE's field investigation, laboratory testing, and engineering analysis there are no geotechnical engineering constraints to prevent the construction of the proposed tank. ESE understands the proposed new water tank finish grade elevation will match the grade of the existing tank of approximately 5392 feet with cuts on the order of 12 feet and fills on the order of 8 feet.

Based on the field exploration, native silty sand with gravel, cobble and boulders were encountered to depths of 8.5 feet in TP-1 and to a depth of 5.5 feet in TP-2 below existing grade. Beneath the silty sand was granodiorite bedrock. The Komatsu PC 158 excavator was able to advance the excavations through bedrock to 13.0 feet in TP-1 and to 9.0 feet in TP-2 which was below the proposed site grading elevation for the tank. Groundwater was observed flowing through soil, on top of the bedrock in both test pits.

4.2 Site Grading

4.2.1 Site Preparation

Proposed structural areas shall be stripped of any surface vegetation and underlying roots and organics. Clearing and stripping limits should extend 5 feet laterally beyond structural areas. The estimated stripping depth is on the order of 12 inches. The stripped material is unsuitable for use as engineered select fill, may be used as growth medium to reclaim areas disturbed beyond the structural areas.

ESE recommends that existing soil beneath the proposed water tank be removed 2 feet below bottom of footings and replaced with compacted engineered select fill.

4.2.2 Engineered Select Fill Criteria

Import or onsite soils used as engineered select fill shall be non-expansive, reasonably well-graded soil and be free of organics, other perishable material and construction debris. In addition, they shall meet the following criteria:

Sieve Size	Percent Passing (by dry weight
3"	100
No. 4	70-100
No. 200	0-25
Liquid Limit	35
Plasticity Index	12

4.2.3 Engineered Select Fill Placement

Before engineered select fill or aggregate base (AB) is placed, exposed soil surfaces shall be proofrolled until nonyielding as determined by ESE. Engineered select fill and AB shall be placed in lifts not exceeding 8 inches (loose thickness), moisture conditioned to near optimum moisture content, and compacted to at least 95 percent relative compaction below foundations and minimum 90 percent relative compaction below proposed access road.

During fill placement, the work surface shall be graded to direct runoff away from engineered select fill areas to prevent saturation of the exposed surface of fill material during a precipitation event. The Contractor shall also provide positive drainage away from all excavations. No frozen fill shall be placed and no fill shall be placed on frozen ground, upon standing water, or on yielding soil.

The compaction of engineered select fill shall be accomplished under continuous engineering inspection and testing.

4.2.4 Unstable Subgrade

If areas of soft, wet, unstable subgrade are encountered or created, it may require the Contractor to overexcavate and stabilize the subgrade by placing Engineer approved 8-inch to 12-inch diameter, clean, crushed, angular rock, and/or combine the crushed rock with Mirafi HP570 woven geofabric (or acceptable equivalent) to create a working platform. **NOTE:** A test area is recommended to determine the most suitable method of creating a working platform. Relatively light, nonvibratory compaction equipment shall be used during this operation to minimize further softening and pumping of the exposed subgrade.

4.2.5 Temporary Excavations

The Contractor is responsible for the selection, design, construction and maintenance of the shoring method and temporary slopes. Safety requirements established by OSHA or other regulatory agencies shall be followed during excavation and construction by the Contractor. Heavy construction equipment, construction materials, or soil stockpiles shall not be located near the top of any excavation. Sloughing of excavation sidewalls should be anticipated during construction excavation due to cohesionless granular soils.

4.2.6 Permanent Slopes

TMWA's conceptual plan indicates 2 to 1 Horizontal to Vertical cut and fill slopes for the new tank which would match the existing cut slopes adjacent to the existing tank. The existing slopes were observed to be stable by ESE with no evidence of excessive erosion. These slopes had mature vegetation on them preventing excessive erosion. Therefore it is ESE's opinion that 2 to 1 cut slopes are acceptable provided that the slope construction include an import growth medium and seed and then place a mulch/heavy-duty tackifier application to minimize erosion while the new vegetation is established, and 2 to 1 fill slopes are acceptable provided the slope is protected with an angular fractured stone 8-12" in diameter.

4.3 Foundations

ESE recommends that the base of the steel water tank bear on a minimum of 12 inches of Type 2, Class B aggregate base (AB) compacted to at least 95 percent relative compaction. The steel water tank ring footing should bear entirely on a minimum of 24 inches of engineered select fill compacted to at least 95 percent relative compaction. The water tank bottom founded on a minimum of 12 inches of AB may be designed for a maximum allowable soil bearing pressure of 2,500 pounds per square foot for dead plus live loads. This value may be increased one-third for total loads including wind and seismic loads.

Foundations shall be founded at least 2 feet below the lowest adjacent finished ground surface for confinement and frost protection. The maximum estimated total settlement for the water tank foundation designed as presented above is on the order of 1-inch. Maximum differential settlement is estimated to be on the order of 1/2 inch from center to edge of tank.

Resistance to lateral loads for footings can be obtained from a combination of passive earth pressures acting against the sides of footings and soil friction at the base of the footings. For computing base friction, ESE recommends using an allowable friction coefficient of 0.40. The coefficient of friction shall be applied to vertical dead loads only. ESE recommends a passive pressure of 400 psf/foot of depth. Passive resistance shall be neglected in the upper foot unless confined by slab or pavement.

4.4 Seismic Design

For seismic loadings evaluated using 2015 International Building Code (IBC) method, ESE recommends the following design criteria:

Soil Profile Type = Site Class C
$S_s = 2.227$ g
$S_1 = 0.819$ g
$S_{MS} = 2.227$ g
$S_{M1} = 1.065$ g
$S_{DS} = 1.485$ g
$S_{D1} = 0.71$ g

No faults are mapped crossing the project site. Based on a review of the Carson City Quadrangle Earthquake Hazards Map, (Dennis T. Trexler and John W. Bell, 1979) shows one fault south and west of the site trending north to south and east to west, and one north east of the site trending east to west and north to south. These faults have been identified as indeterminate; predominantly bedrock faults with last probable movement of pre-pleistocene age. Additionally Holocene faults have been identified approximately 2 miles west of the site trending north to south, and 1.5 miles to the east trending north and south. A Pleistocene age fault (11,000 to 2 Million years old) is considered "potentially active". A Holocene age or "active" fault is considered to be any movement in the last 11,000 years.

Based on the above referenced Hazards Map potential for ground shaking at site during a seismic event is variable severity of shaking, includes older fan deposits, granodiorite which ranges in degree and depth of weathering, and Tertiary ash-flow tuffs, which exhibit various degrees of alteration, welding and fracture spacing.

4.5 Corrosion Potential

The results of the corrosion testing on boring soil samples are presented in Table 2.

TABLE - 2
Corrosivity Test Results

Boring No.	Sample Depth (ft.)	Chloride (mg/kg)	Sulfate (mg/kg)	Resistivity (ohm-cm)	pH	Sulfides	Redox potential (mV)
TP-1	0.5 – 4.0	ND	ND	77000	6.6	ND	380
TP-1	4.0 – 8.0	ND	ND	61000	6.7	ND	380
TP-2	0.5 – 4.5'	ND	ND	120000	6.7	ND	380

Based on the results of analytical testing there is negligible potential for sulfate exposure/attack to concrete, therefore a Type II cement is acceptable for use. Also, based on the results of laboratory testing the degree of corrosive potential for metals is also negligible. Corrosion protection of metal pipelines shall be based upon the recommendations found in AWWA C105, Appendix A and the Design Engineers judgment.

5.0 ADDITIONAL SOILS ENGINEERING SERVICES

Prior to and during construction, the following should be performed under ESE observations to ensure conformance with the intent of ESE's recommendations.

- Excavation;
- Suitability of onsite and imported fill materials;
- Bedding and backfill placement and compaction;

Observation of these operations will allow ESE to check that soil conditions are consistent with this geotechnical investigation and to evaluate variations in soils conditions, which may require special consideration or modification of the recommendations.

6.0 LIMITATIONS

Recommendations contained in this report are based on our field explorations, laboratory tests, and our understanding of the proposed construction. The study was a cost-effective method to evaluate some of the potential geotechnical concerns.

The soils data used in the preparation of this report were obtained from test pits located for this investigation. It is possible that variations in soils exist between the points explored. The nature and extent of soil variations may not be evident until construction occurs. If any soil conditions are encountered at this site, which are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to our recommendations.

This report may be used only by TMWA and only for the purposes stated within a reasonable time from issuance, but in no event later than three years from the date of the report. Land or facility use, on and off-site conditions, regulations, or other factors may change over time, and additional work may be required with the passage of time.

7.0 REFERENCES

- *Geologic Map of the Reno Folio, Washoe County, Nevada*. H.F. Bonham Jr. and E.C. Bingler, Nevada Bureau of Mines and Geology, U.S. Geological Survey, 1973.

- *Carson City Quadrangle Earthquake Hazards Map.* Dennis T. Trexler and John W. Bell, Nevada Bureau of Mines and Geology, U.S. Geological Survey, 1979.

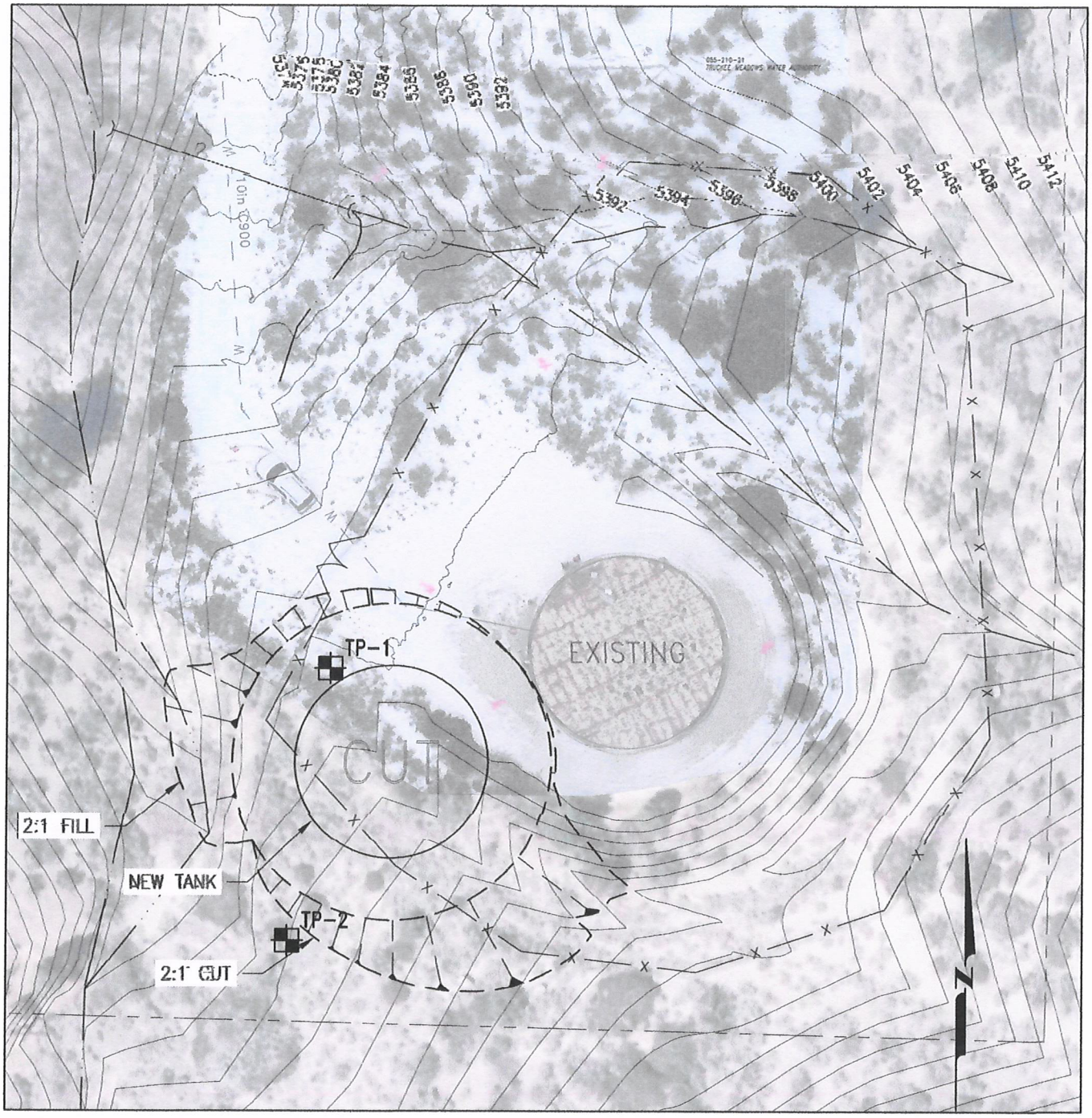
- *International Building Code 2015,* International Code Council, 2015.

- USGS, Earthquake Hazards Program, http:// earthquake.usgs.gov/research/hazmaps/design, March 25, 2019

- *Standard Specifications for Public Works Construction*. RTC of Washoe County, Washoe County, City of Sparks, City of Reno, Carson City, and City of Yerington, Revision No. 9, December 21, 2016

- *Construction and Design Standards,* Truckee Meadows Water Authority https://tmwa.com/new-construction/standards/

APPENDIX A - FIGURES



N.T.S.

EASTERN SIERRA ENGINEERING

LIGHTING W TANK 2
SITE PLAN AND TEST PIT LOCATIONS
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
JSC	19114	SWJ	3/26/2019		

TEST PIT LOG

TEST PIT NO:	TP-1	DATE:	3/19/2019
EQUIPMENT:	KOMATSU PC 158 EXCAVATOR	DEPTH TO GROUND WATER (ft):	N/A
LOGGED BY:	M. PHELPS	GROUND ELEVATION (ft):	N/A

LIQUID LIMIT (%)	PLASTICITY INDEX	MOISTURE (%)	% PASSING #200 SIEVE	BLOWS/FT.	SAMPLE	DEPTH (FT)	USCS SYMBOL	LITHOLOGY	
						0	SC-SM		BROWN SILTY, CLAYEY SAND WITH GRAVELS, COBBLES AND BOULDERS (SC-SM); loose, wet
--	NP	9.6	13.3			2			BROWN SILTY SAND WITH GRAVEL, COBBLE AND BOULDERS (SM): medium dense to dense, moist to wet
						3			Encountered a 5 feet boulder at 3.0'.
						4	SM		
--	NP	9.8	12.9			6			Encountering large cobbles and small boulders.
						8			
						10	GD		GRAY-WHITE GRANODIORITE (GD); little to occasionally fractured, low hardness, weak to moderately strong, moderately to deeply weathered.
						12			Bedrock becoming more difficult to excavate, getting stronger, harder and less weathered.

EASTERN SIERRA ENGINEERING

TEST PIT LOG: TP-1
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE 2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/26/2019		

TEST PIT LOG

BORING NO:	TP-1 cont	DATE:	3/19/2019
EQUIPMENT:	KOMATSU PC 158 EXCAVATOR	DEPTH TO GROUND WATER (ft):	N/A
LOGGED BY:	M. PHELPS	GROUND ELEVATION (ft):	N/A

LIQUID LIMIT (%)	PLASTICITY INDEX	MOISTURE (%)	% PASSING #200 SIEVE	BLOWS/FT.	SAMPLE	DEPTH (FT)	USCS SYMBOL	LITHOLOGY	
						12	GD		GRAY-WHITE GRANODIORITE (GD); little to occasionally fractured, low to moderately hard, moderately strong, moderately weathered
									Refusal at 13 feet. Groundwater was encountered at 8.5 feet.
						14			
						16			
						18			
						20			
						22			
						24			

EASTERN SIERRA ENGINEERING

TEST PIT LOG: TP-1 Cont.
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE 3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/26/2019		

TEST PIT LOG

TEST PIT NO:	TP-2	DATE:	3/19/2019
EQUIPMENT:	KOMATSU PC 158 EXCAVATOR	DEPTH TO GROUND WATER (ft):	N/A
LOGGED BY:	M. PHELPS	GROUND ELEVATION (ft):	N/A

LIQUID LIMIT (%)	PLASTICITY INDEX	MOISTURE (%)	% PASSING #200 SIEVE	BLOWS/FT.	SAMPLE	DEPTH (FT)	USCS SYMBOL	LITHOLOGY	
							SC-SM		BROWN SILTY, CLAYEY SAND WITH GRAVELS, COBBLES AND BOULDERS (SC-SM); loose, wet
--	NP	7.9	9.3			2	SP-SM		BROWN POORLY GRADED SAND WITH SILT, GRAVEL, COBBLE AND BOULDERS (SP-SM): medium dense to dense, moist to wet Difficult excavating due to large volume of cobble size rock.
						4			
						6	GD		GRAY-WHITE GRANODIORITE (GD); little to occasionally fractured, low hardness, weak to moderately strong, moderately to deeply weathered Bedrock becoming more difficult to excavate, getting stronger, harder and less weathered.
						8			
						10			Refusal at 9.0 feet. Groundwater was encountered at 5.5 feet.
						12			

EASTERN SIERRA ENGINEERING

TEST PIT LOG: TP-2
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/26/2019		

UNIFIED SOIL CLASSIFICATION–ASTM D2487–00

MAJOR DIVISIONS					TYPICAL NAMES
COARSE–GRAINED SOILS MORE THAN HALF IS COARSER THAN No. 200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No. 4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW		WELL GRADED GRAVELS WITH OR WITHOUT SAND, LITTLE OR NO FINES
			GP		POORLY GRADED GRAVEL WITH OR WITHOUT SAND, LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM		SILTY GRAVELS, SILTY GRAVELS WITH SAND
			GC		CLAYEY GRAVELS, CLAYEY GRAVELS WITH SAND
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN No. 4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW		WELL GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS WITH OR WITHOUT GRAVEL, LITTLE OR NO FINES
		SANDS WITH OVER 12% 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	SILTS AND CLAYS 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
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%		MH		INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS, FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH		ORGANIC SILTS OR CLAYS OF MEDIUM TO HIGH PLASTICITY
	HIGHLY ORGANIC SOILS		Pt		PEAT AND OTHER HIGHLY ORGANIC SOILS

M(80)	–	Moisture Content (%)
DD(105)	–	Dry Density (pcf)
Perm	–	Permeability
Consol	–	Consolidation
LL	–	Liquid Limit (%)
PI	–	Plasticity Index (%)
G_s	–	Specific Gravity
MA	–	Particle Size Analysis
OC	–	Organic Content
R–Value	–	Resistance Value
CBR	–	California Bearing Ratio
■	–	"Undisturbed" Sample
☒	–	Bulk or Classification Sample

Shear Strength (psf) / Confining Pressure

TxUU 3200 (2600)	– Unconsolidated Undrained Triaxial Shear
(FM) or (S)	– (field moisture or saturated)
TxCU 3200 (2600)	– Consolidated Undrained Triaxial Shear
(P)	– (with or without pore pressure measurement)
TxCD 3200 (2600)	– Consolidated Drained Triaxial Shear
SSCU 3200 (2600)	– Simple Shear Consolidated Undrained
(P)	– (with or without pore pressure measurement)
SSCD 3200 (2600)	– Simple Shear Consolidated Drained
DSCD 2700 (2000)	– Consolidated Drained Direct Shear
UC 470	– Unconfined Compression
LVS 700	– Laboratory Vane Shear
DSUU	– Unconsolidated Undrained Direct Shear

EASTERN SIERRA ENGINEERING

LIGHTING W TANK 2
UNIFIED SOIL CLASSIFICATION
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE 5

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/26/2019		

I CONSOLIDATION OF SEDIMENTARY ROCKS; usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated
P = poorly consolidated
M = moderately consolidated
W = well consolidated

II BEDDING OF SEDIMENTARY ROCKS

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 ft.	very thick bedded
Blocky	2.0 to 4.0 ft.	thick-bedded
Slabby	0.2 to 2.0 ft.	thin-bedded
Flaggy	0.05 to 0.2 ft.	very thin-bedded
Shaly or platy	0.01 to 0.05 ft.	laminated
Papery	less than 0.01 ft.	thinly laminated

III FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0 ft.
Occasionally fractured	2.0 to 4.0 ft.
Moderately fractured	0.2 to 2.0 ft.
Closely fractured	0.05 to 0.2 ft.
Intensely fractured	0.01 to 0.05 ft.
Crushed	less than 0.01 ft.

IV HARDNESS

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

V STRENGTH

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

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

D. Deep – Moderate to complete mineral decomposition; deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay silt.

M. Moderate – Slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.

L. Little – No megascopic decomposition of minerals; little or no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.

F. Fresh – Unaffected by weathering agents. No disintegration or discoloration. Fractures usually less numerous than joints.

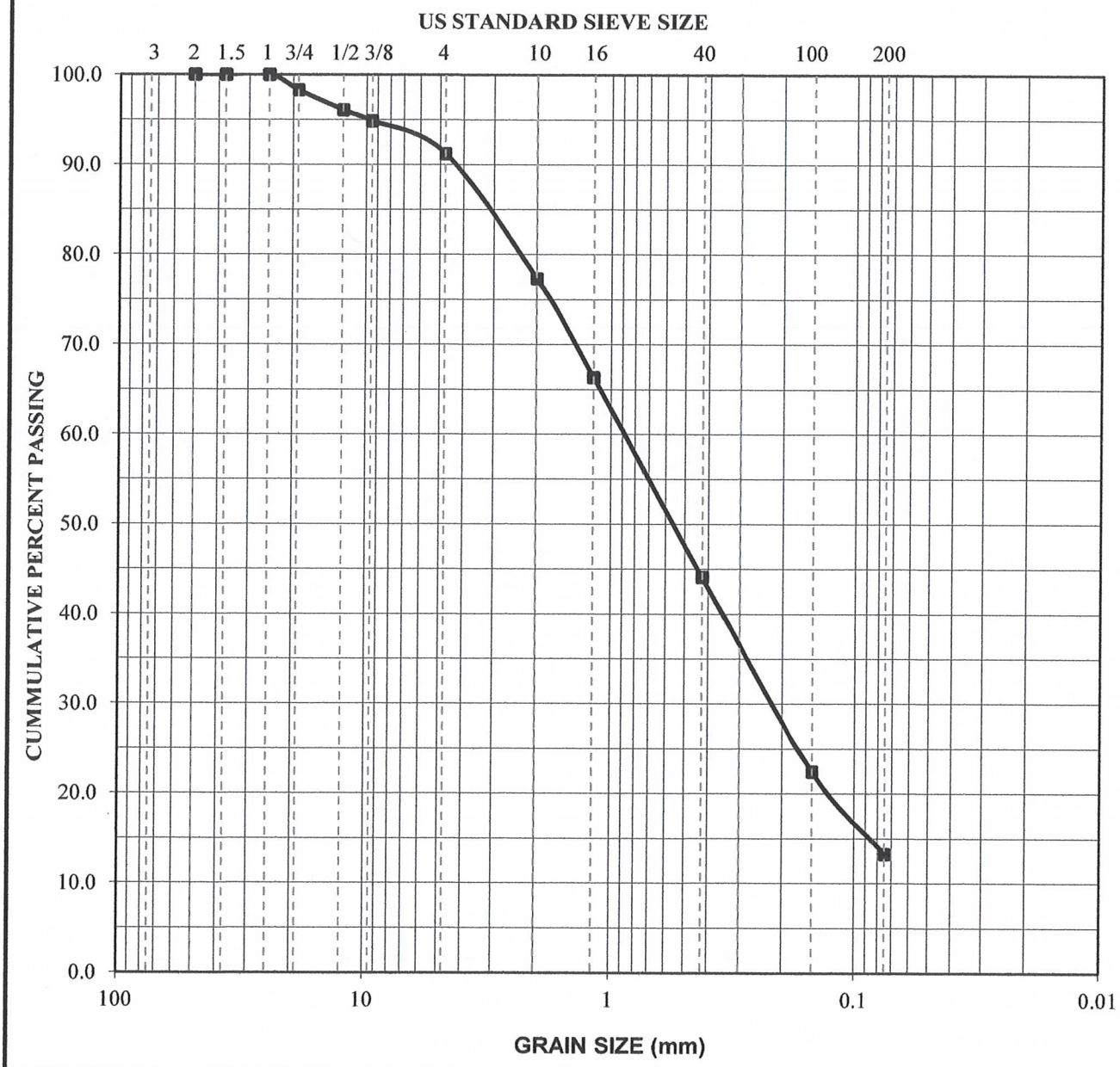
EASTERN SIERRA ENGINEERING

LIGHTING W TANK 2
PHYSICAL PROPERTIES CRITERIA FOR ROCK DESCRIPTIONS
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/26/2019		

APPENDIX B - LABORATORY RESULTS



COBBLES	GRAVEL	SAND	SILT OR CLAY

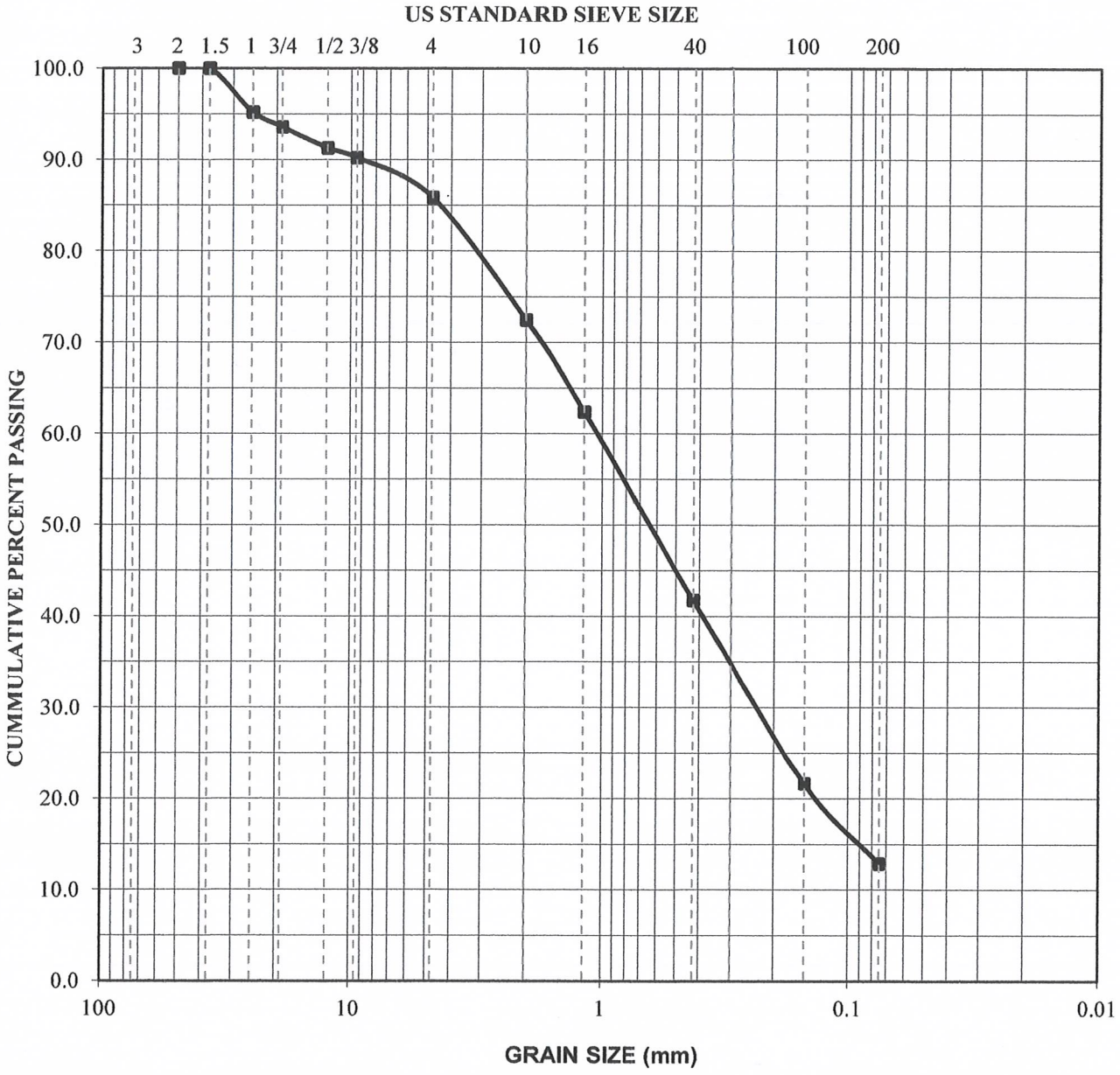
Symbol	Sample Source	Classification
■	TP-1 @ 0.5' - 4.0'	SILTY SAND WITH GRAVEL (SM)

EASTERN SIERRA ENGINEERING

PARTICLE SIZE ANALYSIS
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/21/2019		



COBBLES	GRAVEL	SAND	SILT OR CLAY

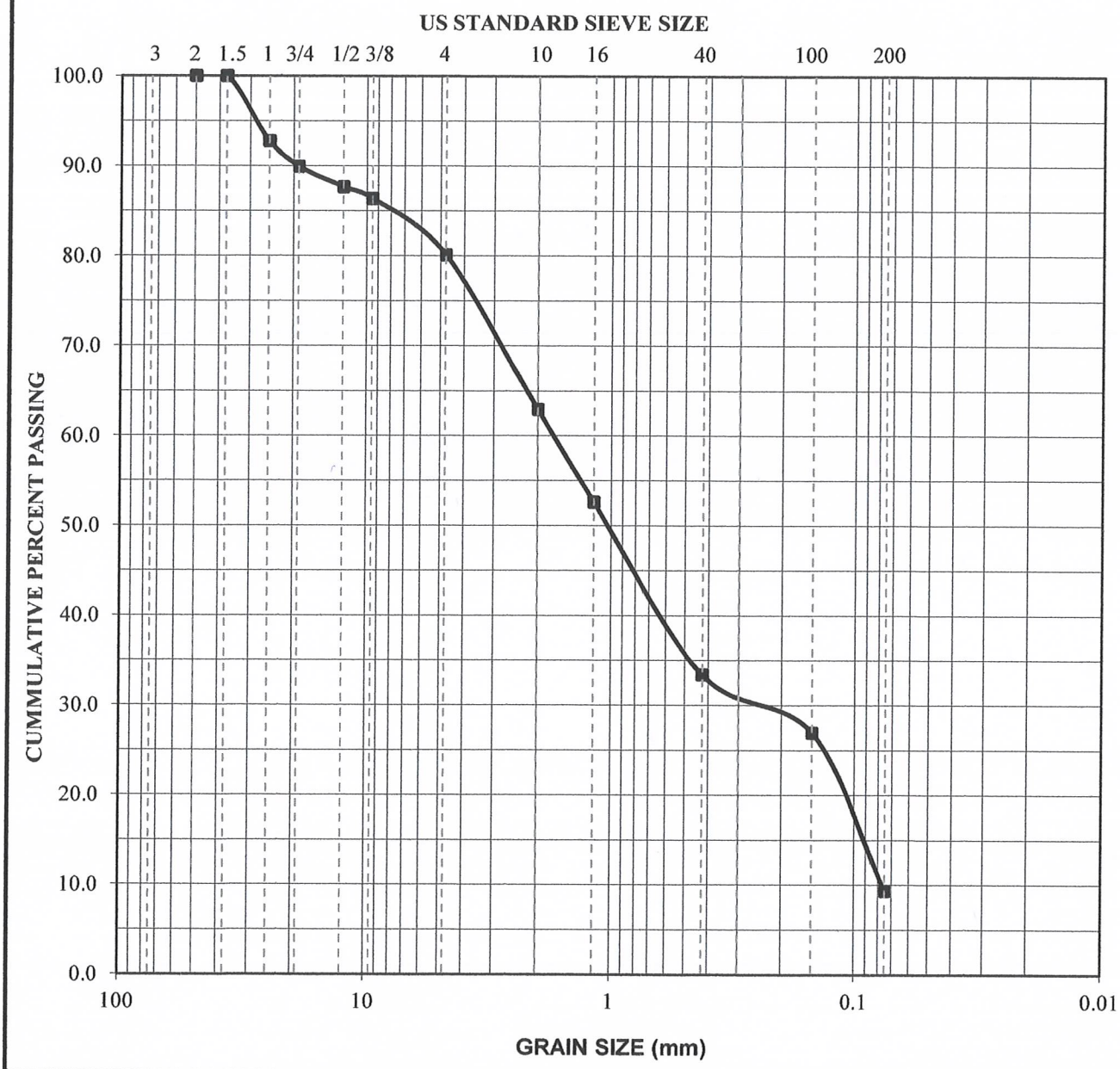
Symbol	Sample Source	Classification
■	TP-1 @ 4.0' - 8.0'	SILTY SAND WITH GRAVEL (SM)

EASTERN SIERRA ENGINEERING

PARTICLE SIZE ANALYSIS
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
8

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/21/2019		



COBBLES	GRAVEL	SAND	SILT OR CLAY

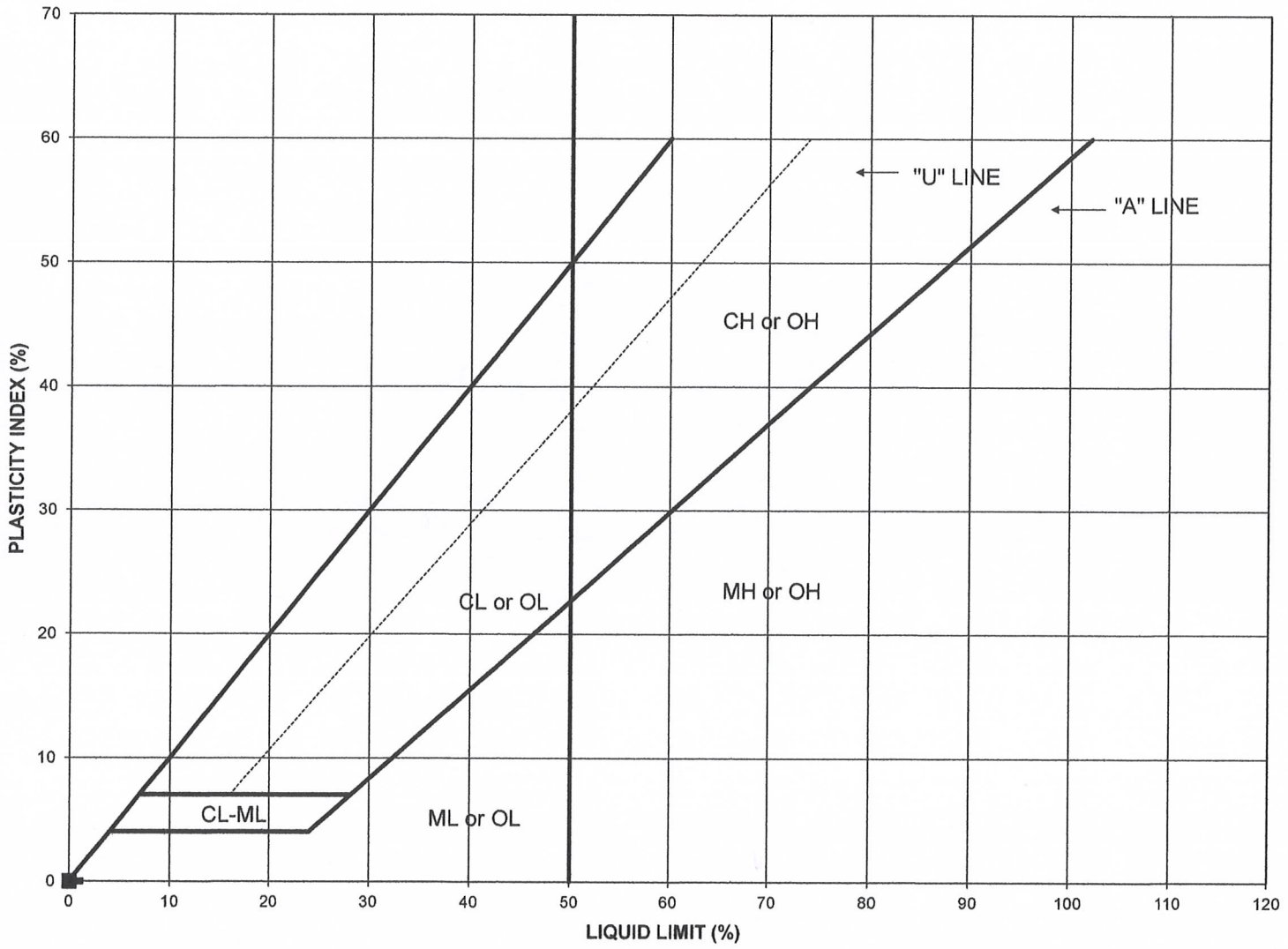
Symbol	Sample Source	Classification
■	TP-2 @ 0.5' - 4.5'	POORLY GRADED SAND W/ SILT & GRAVEL (SP-SM)

EASTERN SIERRA ENGINEERING

PARTICLE SIZE ANALYSIS
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
9

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/21/2019		



Symbol D 4318-10	Sample Source	Classification	Natural M.C. (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
■	TP-1 @ 0.5' - 4.0'	SILTY SAND WITH GRAVEL (SM)	9.6			NP	13.3
◆	TP-1 @ 4.0' - 8.0'	SILTY SAND WITH GRAVEL (SM)	9.8			NP	12.9
▲	TP-2 @ 0.5' - 4.5'	POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)	7.9			NP	9.3
●							
▬							

EASTERN SIERRA ENGINEERING

PLASTICITY CHART
LIGHTING W TANK 2
TRUCKEE MEADOWS WATER AUTHORITY

FIGURE
10

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MPP	19114	SWJ	3/21/2019		