



Mail

PO Box 5310
Stateline, NV 89449-5310

Location

128 Market Street
Stateline, NV 89449

Contact

Phone: 775-588-4547
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STAFF REPORT

Date: March 31, 2022

To: TRPA Hearings Officer

From: TRPA Staff

Subject O’Grady Revocable Trust Land Capability Challenge; 2220 Lands End Drive,
Douglas County, NV; APN 1418-03-401-010, TRPA File Number LCAP2021-0447

Proposed Action:

Hearings Officer review and approve the proposed Land Capability Challenge.

Staff Recommendation:

Staff recommends the TRPA Hearings Officer approve this land capability challenge, which would decrease land capability Class 1a (CaF) and add Class 2, Class 4 and Class 6. This change is itemized on the table on Page 3 and depicted on a map included in Attachment C.

Background:

The entire parcel is shown as Class 1a on TRPA Land Capability Overlay Maps (aka Bailey Land Capability maps). The Soil Conservation Service Soil Survey of Tahoe Basin Area, California-Nevada (Rogers, 1974) mapped the subject parcel as Cagwin-Rock outcrop complex (CaF, 30 to 50% slopes) mapping unit. The Cagwin soil type is derived from granodiorite parent material that has partially weathered bedrock within 40 inches of the surface and colluvial deposits from soil eroded from upgradient land. The soil texture is typically gravelly loamy coarse sand. The Cagwin soil is considered somewhat excessively drained, with a Hydrologic Soil Group “C” designation due to shallow depth to bedrock. The CaF mapping includes small areas (aka inclusions) of rock outcrops, such as 5 to 25% of the mapping unit, as well as areas of less steep and/or deeper soils. This 7.06-acre hillside parcel has a geomorphic mapping of C-2 for Strongly dissected lands (high hazard lands). The subject parcel has a surveyed size of 307,654 square feet (7.06 acres).

A 1998 land capability verification was issued that found three phases of the Cagwin series, namely CaF / RtF (Class 1a), CaE (Class 2), and CaD (Class 4). The LCV also designated the portion of the property below elevation 6229.1 as Class 1b (presumably Beaches). At the direction of property owner Standish O’Grady, a detailed soil investigation was conducted for this land capability challenge on September 28 and 29, 2021 by consulting soil scientist Roger Poff. TRPA soils consultant, Terra Science/Phil Scoles, conducted a site visit on the same day as the soil consultant’s field investigation. Mr. Scoles examined the same soil pit/auger holes established by Mr. Poff, conducted a walking tour of the property, and review of the consultant’s preliminary field findings. Mr. Scoles also transcribed the consultant’s soil mapping from PDF sheets to AutoCAD, due to backlogged surveyors and engineers.

Mr. Scoles also provided some formatting time to make the soil mapping exhibit consistent with other land capability maps. A land capability challenge (LCAP2021-0447) was filed with TRPA on December 17, 2021.

Findings:

The subject long and narrow property consists of rolling to steep hillsides that mostly slope to the south or southeast. A residence with a detached garage is situated on the lower reach of the hillside adjacent to Lake Tahoe. This lower reach of the hillside has slopes 10 to 30%; except for an escarpment at the shoreline, which has greater than 50%. A shared driveway (aka easement for neighboring residence to the west) and another paved easement dissect the property just upslope of the residence – the land in such easements is included in this land capability challenge; however, the mapping identifies the amount of each land class within each easement. Aside from the residences, the subject parcel has decks, patios, walkways, and landscaping. The remainder of the parcel consists of undisturbed pine forest and shrub land. The vicinity of the shared driveway and paved easement were formerly graded for vehicle access; thus, there are artificially steepened slopes parallel to those access routes. There is also some minor grade modification (subtle terraces) in the lawn area between the residence and escarpment. The shoreline area has a mostly gravelly to boulder land surface below Ordinary High Water of Lake Tahoe (elev. 6229.1 feet) – such area is excluded from land capability challenges.

For the field investigation, the applicant’s consulting soil scientist described three backhoe-dug pits located immediately above and below of the residence, plus several hand-dug auger holes in the center and north parts of the property. All the backhoe pits encountered slightly weathered bedrock, then hard bedrock. Such condition, when occurring 40 inches or less from the surface, affects the land capability class. For example, shallow bedrock on 15 to 30% slopes qualifies as Class 2, while slopes with 5 to 15% slopes are Class 4. In contrast, soils on 5 to 15% slopes with bedrock deeper than 40 inches qualify for Class 6. In addition, an auger hole was utilized to describe a small area of Class 6 soil in the extreme north part of the property where it was unfeasible (and potentially fire-prone) to dig with a backhoe. Other hand auger holes were used to verify deep soils on 15 to 30% slopes. Overall, the center and north part of the parcel has several, small clusters of rock outcrops. Based on the soil pit and auger holes, surface stones and boulders appear to be weathered remnants, hence they are considered “floaters”, not exposed bedrock. There also some placed stones and boulders within landscape areas.

The field investigation found the hillside soils mostly resemble the Cagwin-Rock outcrop complex (as mapped by the 1974 soil survey) across the center and north parts of the parcel. These are somewhat shallow soils, with partially weathered bedrock within 40 inches of the surface. Where the slope is 5 to 15%, that mapping unit qualifies as Class 4. Where the slope is 15 to 30%, those Cagwin-Rock outcrop soils qualify as Class 2. Cagwin-Rock outcrop soils over 30% slope are considered Class 1a. A shallower version of the Cagwin soil is the Toem series, which has weathered bedrock within 20 inches of the surface. All slope phases of the Toem series (TrE) qualify as Class 1a. The escarpment along Lake Tahoe shoreline consists mostly of exposed bedrock, so that mapping unit is Rock outcrop-Rubble land (Rx), which is considered Class 1c.

Near the residence, the soils are deeper and less stony than the Cagwin and Toem soils. Such soils also lack a seasonal high-water table and other root-restricting layer (weathered bedrock) in the upper 40 to 60 inches. As a deeper version of the Cagwin soil (hence an unnamed inclusion), they have similar textures, matrix colors and soil development (albeit minimal). The unnamed soil has two slope phases – 0 to 16% for vicinity of the detached garage (with upstairs apartment), and 16 to 30% for vicinity of the residence and extending north several hundred feet. In accordance with Table 4 of Land-Capability Classification of Lake Tahoe Basin, California-Nevada (Bailey, R.G.,1974), the unnamed soils qualify as Class 4 for slopes 16 to 30% (designated XXX) and Class 6 for slopes 0 to 16% (designated XXX). These unnamed soils are somewhat excessively drained to moderately well drained, and meet Hydrologic Soil group A (HSG-A) due to loamy sand textures. The unnamed soil mapping concluded by this field investigation is consistent with the 2006 soil survey that identifies such land having Cassenai gravelly loamy coarse sand, 15 to 30% slopes and 30 to 50% slopes. While the Cassenai series is a new soil series, the 1974 soil survey indicated the presence of an unnamed granodiorite-derived soil profiles deeper than 40 inches within in the Cagwin map unit. That is, the original soil scientists recognized deeper soils, but those inclusions were too small to differentiate at the 1974 mapping scale. The table below summarizes the changes in land capability and allowable land coverage as concluded by this land capability challenge.

Land Capability District, Slope Range	1998 TRPA Land Capability Verification; Area (sq. ft.)	2021 Land Capability Challenge; Area (sq. ft.)	Net Change (sq. ft.)
Class 1A (Cagwin, CaF), 30-50% sl.	3,176	97,198	+94,022
Class 1A (Cagwin-Toem, CaF-RtF), 30-50% sl.	258,199	63,816	-194,383
Class 1A (Toem, TrE), 9-30% sl.	0	4,765	+4,765
Class 1C (Outcrop-Rubble land, Rx)	0	1,669	+1,669
Class 2 (Cagwin, CaE), 15-30% sl.	41,493	61,022	-19,529
Class 4 (Cagwin, CaD), 5-15% sl.	4,786	0	-4,786
Class 4 (Unnamed, XXX), 16-30% sl.	0	59,954	+59,954
Class 6 (Unnamed, XXX), 0-16% sl.	0	19,230	+19,230
Total Parcel Area	307,654*	307,654*	

* Land area above elevation 6229.1 feet, from Turner and Associates topographic survey (June, 2021). Land area includes two access easements that total 6,649 sf. Submersible land below elevation 6229.1 feet is excluded from land capability challenges.

Contact Information:

This staff report was jointly prepared by TRPA contractor Phil Scoles (Terra Science, Inc.) and TRPA Senior Planner, Julie Roll. If you have questions on this Hearings Officer item, please contact Julie Roll at 775-589-5247 or jroll@trpa.gov.

Attachments:

- A. Vicinity map and TRPA land capability map
- B. Site Photographs (September 28, 2021)
- C. April 10, 2001 LCV and March, 2022 land capability challenge recommendation map
- D. Soil consultant’s land capability report (February 2022)

BAILEY LAND CAPABILITY CHALLENGE FINDINGS

Site Information	
Assessor’s Parcel Numbers: (APN)	1418-03-401-010 (7.06 acres)
TRPA File No. / Submittal Date:	LCAP2021-0447 / December 17, 2021
Owner or Applicant:	O’Grady Revocable Trust (Standish O’Grady); Post Office Box 286, Glenbrook, NV 89413.
Address:	2220 Lands End Road, Glenbrook; Douglas County, NV 89413, 39.103164° N, -119.949522° W

Environmental Setting	
Bailey Soil Mapping Unit / Hydrologic Soil Group (HSG) / Land Class / Geomorphic Hazard Unit	CaF (Cagwin-Rock outcrop complex, 30 to 50% slopes, HSG-C) / C-2 Strongly dissected lands (high hazard). A 1998 LCV identified presence of CaE (15 to 30% slopes), and CaD (5 to 15% slopes).
Landform and Soil Parent Material	Colluvium over residuum on hillsides; gravelly to bouldery alluvium in shoreline vicinity.
Slopes and Aspect	10 to >50%. Steeper slopes at far north property edge, while flattest in vicinity of residence (south area).
Elevation and Datum	6229 to 6628 ft. elev. (from Turner and Associates topography survey, June, 2021.
Rock Outcrops and Surface Configuration	Yes. There are numerous small rock outcrops, particularly in center and north part of property. Some surface boulders (“floaters”) in same areas; placed stones and boulders within landscaped areas.
SEZ and Hydrology Source	No – Rocky escarpment immediately above shoreline.
Vegetation	Jeffrey pine, incense cedar (few), greenleaf manzanita, whitethorn, sierra currant, bitterbrush, mulesear, and landscaping (ornamental shrubs).
Ground Cover Condition	Good (vegetation cover 75 to 85%, duff 15 to 25%)
Site Features	Residences with garage, driveway, decks, patios, pine forest, lawn, landscaping and paved easements.

Field Investigation and Procedures	
TRPA Contractor and Address	Roger J. Poff, Soil Scientist; Post Office Box 2073, Nevada City, CA 95959-1942; (530) 273-1709; roger.poff@icloud.com
TRPA Contractor Field Dates	September 28 and 29, 2021
SEZ Mapping / NRCS Hydric Soil	None.
Number of Soil Pits or Auger Holes and Description Depth	3 backhoe-dug pits, plus several hand-augered holes to 40 to 60 inches.
Additional or Repetitive TRPA Sample Locations	TRPA contractor Phil Scoles examined same backhoe pits and hand auger holes documented by applicant's soil consultant. No additional sampling necessary.
Areas Not Examined	Residence, detached garage, driveway, decks, patios, decks, lawn, landscaped areas, and paved easement.

TRPA Findings	
2006 Soil Survey Map Unit¹	Cassenai gravelly loamy coarse sand, 15 to 30% slopes (mapping unit 7422) for the rolling hillsides, and Cagwin-Rock outcrop, 15 to 30% slopes (mapping unit 7412) and 30 to 50% slopes (mapping unit 7413). The Cassenai map unit would qualify as Class 4, while the Cagwin map unit would qualify as Class 2.
Consultant Soil Mapping Determination and Rationale	Hillside soils across most of the site resemble the Cagwin-Rock outcrop complex. These soils have partially weathered bedrock within 40 inches of the surface. Where the slope is 5 to 15%, the Cagwin-Rock outcrop soil qualifies as Class 4. Where the slope is 15 to 30%, they qualify as Class 2. Cagwin-Rock outcrop soils over 30% slope, plus very shallow Toem soils are considered Class 1A. The exposed bedrock along Lake Tahoe shoreline is Rock outcrop-Rubble land (Rx), which is considered Class 1C. The portion of the property surrounding the residence and garage has two phases of an unnamed soil (XXX) that is loamy coarse sand, 0 to 16% slopes, and 16 to 30% slopes (Class 4). This unnamed soil, known as the Cassenai series in the 2006 soil survey update, is somewhat excessively drained and it is a deeper version of the Cagwin soil.
Slope Determination	Varies. Shallow soils occur on all slopes. Deeper soils

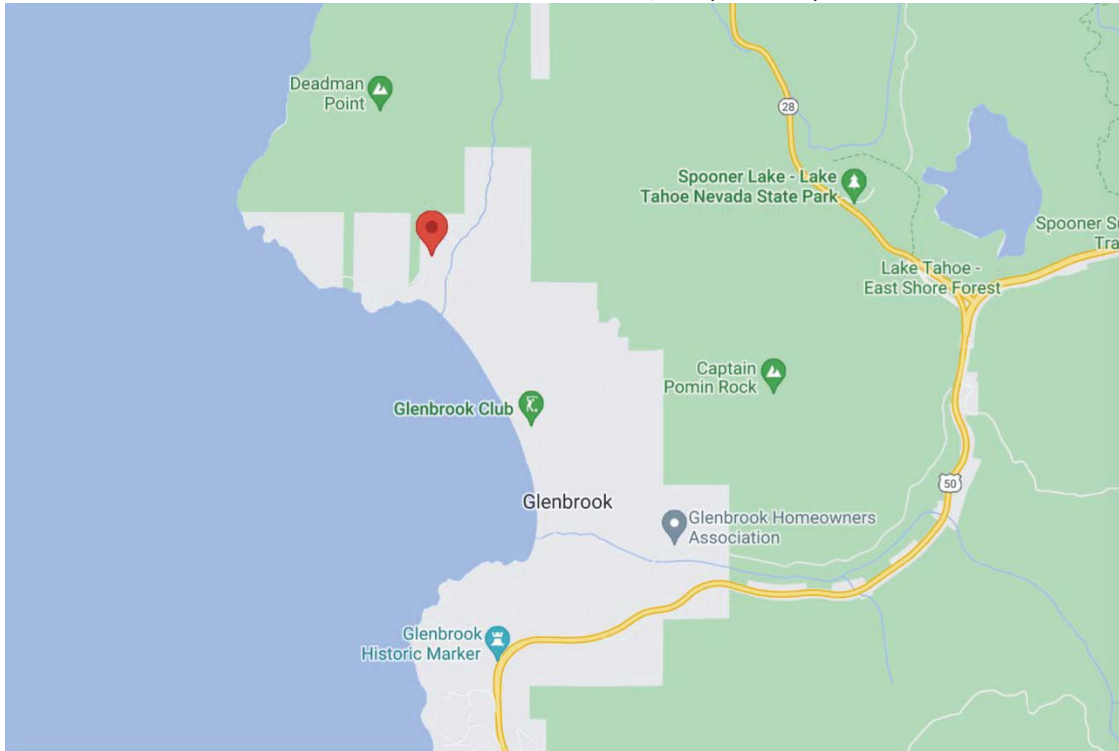
¹ TRPA currently relies upon the Soil Survey of Tahoe Basin, California-Nevada (Rogers and Soil Conservation Service, 1974), which the Bailey Land Capability system is predicated upon. The 2006 soil survey update has not yet been formally adopted by TRPA for use with land capability matters.

	occur predominately on 0 to 16% slopes and 16 to 30% slopes.
TRPA Conclusion(s)	Concur with consultant findings, specifically Cagwin, Toem, Rock outcrop complexes in the center and northern part. And unnamed soil (XXX) on 16-30% slopes (Class 4) and unnamed soil (XXX) on 0 to 16% slopes (Class 6).
Applicable Area	Entire parcel. 7.06 acres – See map (Attachment B, March 2022)

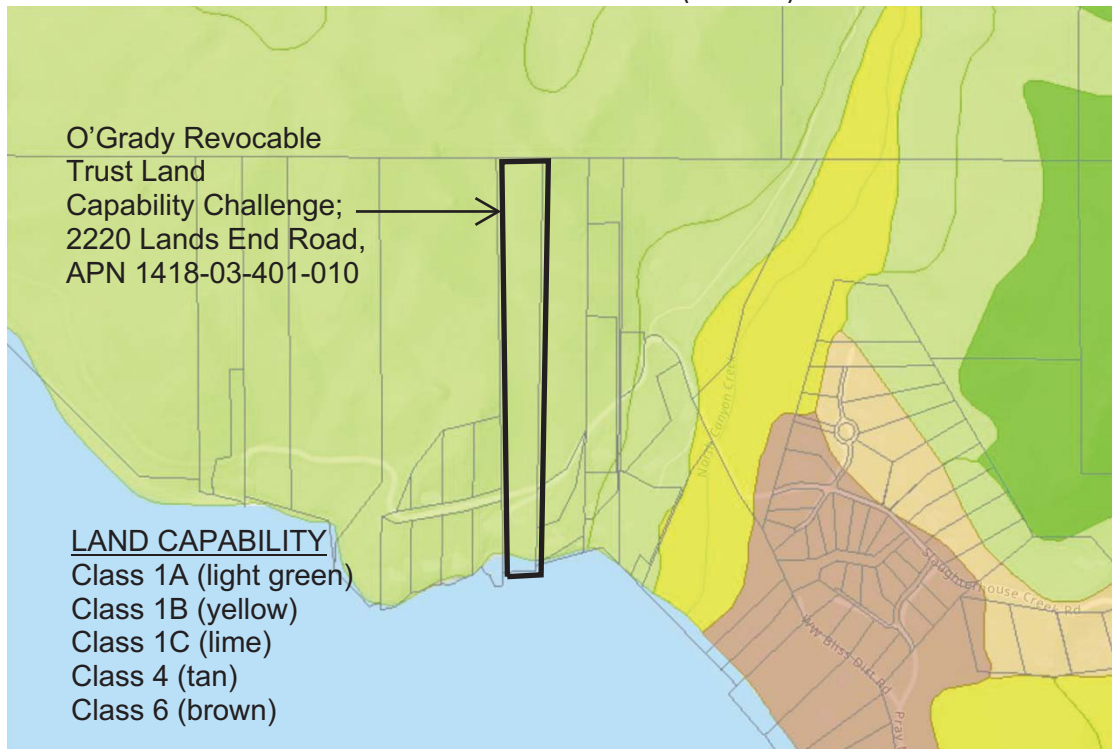
Attachment A

Vicinity map and TRPA land capability map

VICINITY MAP – GLENBROOK, NV (no scale)



TRPA LAND CAPABILITY MAP (no scale)



Attachment B

Site Photographs (September 28, 2021)



Mail

PO Box 5310
Stateline, NV 89449-5310

Location

128 Market Street
Stateline, NV 89449

Contact

Phone: 775-588-4547
Fax: 775-588-4527
www.trpa.gov

O'GRADY REVOCABLE TRUST, 2220 LANDS END RD., GLENBROOK, NV PHOTOS (APN 1418-03-401-010)



Photo 1 – View west (left) to north (right) of south (lower) part of parcel. The land in this vicinity has shallow soils in the lower part, and deeper soils near the residence. The shallow soils qualify as Class 1A and Class 2. The deeper soils qualify as Class 4 (16 to 30% sl.) and Class 6 (0 to 16% sl.)



Photo 2 – View west along easement axis that is situated immediately north of residence. The slopes at far right are natural slopes, while graded slopes in the center and left part of photo. Historic slopes estimated by soil consultant using older trees and non-graded surfaces. A nearby soil pit had deep soils that qualified this vicinity as Class 4 (for slopes 16 to 30%).



Photo 3 – View north (left) to northeast (right) of hillside above Lands End Road, which dissects the south part of the parcel. Lands above the road have a natural condition, albeit forest fuels treatments. This land is often greater than 30% slopes, which results in Class 1A and Class 2 designations.



Photo 4 – View northeast at Lake Tahoe shoreline. Rocky bluff adjacent to the lake is partially vegetated, but also has many bedrock exposures. This bluff qualifies as Rock outcrop-Rubble land (Rx) in the 1974 soil survey (Class 1C). Beach area situated below elevation 6229.1 ft., so not included in land cap. challenge.



Photo 5 – View northwest (left) to north (right) at hillside near center of property. Typical hillside condition is vegetated with Jeffrey pine, Greenleaf manzanita, bitterbrush and scattered grasses. The hillsides have unchanneled hollows that accumulate eroded sediments, but do not generate runoff.



Photo 6 – View northeast (left) to east (right) of small area of Class 6 near the north edge of the subject parcel. The soil auger was able to core to more than 55 inches, and the soil lacks any indication of seasonal high water table. See Photo 10 for profile.



Photo 7 – Close-up view of shallow soil located in south-west part of property (about 125 feet south of residence). Bedrock at approximately 35 inches (Class 1A).



Photo 8 – Close-up view of deep soil with highly weathered bedrock with roots extending deeper than 40 inches.



Photo 9. View southwest at hillside knob with very shallow soils that best resemble the Toem series.



Photo 10. View of soil profile at Pit no. 1 (north part of parcel).

Attachment C

April 10, 2001 LCV and March, 2022 land capability challenge recommendation map



1a
CaF/RtF

2
CaE

CaD

CLASS 4
CLASS 2

2
CaE

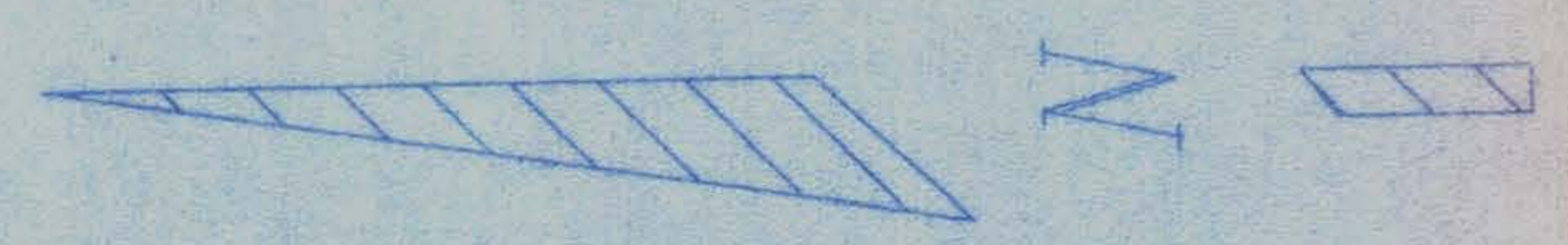
1b
CaF

1b
SEZ
(LAKE
TAHOE)

THE CONCRETE CAP ELEVATION AT THE DAM IN TAHOE CITY, CALIFORNIA IS = 6232.1

TRPA FILE
COPY 2/17/98
[Signature]

CLD SURVEYING
WATER RIGHTS & LAND
P. O. BOX 7316
INCLINE VILLAGE, NEVADA 89452
CONN DAVIS, Surveyor Phone 1-702-831-7539



SCALE: 1" = 20'



SURVEYORS CERTIFICATE
I, CONN DAVIS A REGISTERED LAND SURVEYOR IN THE STATE OF NEVADA DO HEREBY CERTIFY THAT THIS SURVEY WAS MADE BY ME IN THE MONTH OF Sept, 1997, AND IS ACCURATE TO THE BEST OF MY BELIEF.

DATE _____ CONN DAVIS, PLS 7880

SITE SURVEY OF TOPO, LARGE TREES, BOULDERS, IMPROVEMENTS, & PROPERTY LINE ARE SHOWN WITHOUT EXISTING EASEMENTS FOR
BASIN STRATEGIES
P.O. BOX 11945
ZEPHYR COVE, NEVADA 89448
LOCATED AT 2220 LANDS END, GLENBROOK, NEVADA
KNOWN AS APN# 01-030-14
LEGAL DESCRIPTION - BOOK 1087, PAGE 351,
DOUGLAS COUNTY, NEVADA
DRAWN BY CONN DATE 9-13-97
(GBBS9711.DWG) REV 9-17-97 REV 10-20-97

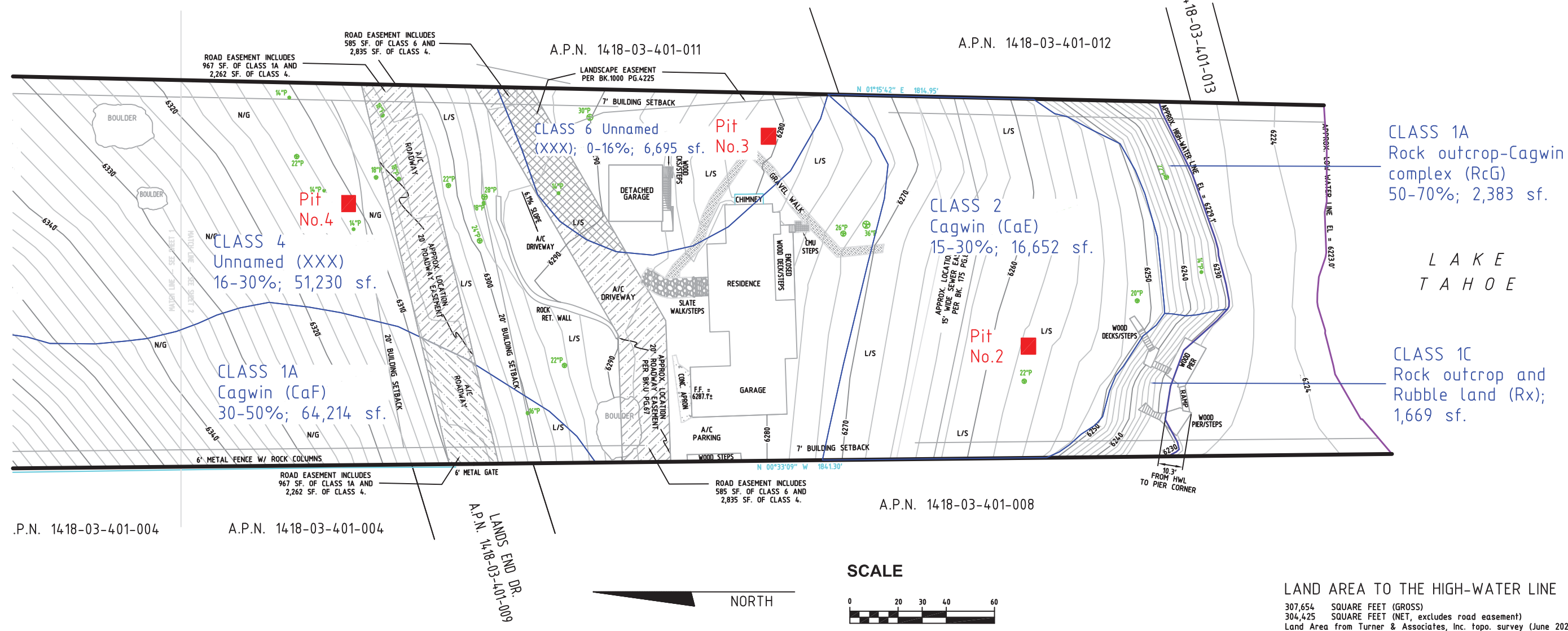
LAND CAPABILITY CHALLENGE SUMMARY

CAPABILITY CLASS	1996 TRPA LCV	2021 LAD. CAP. (R.POFF)
CLASS 1A, Rock outcrop-Cagwin complex (RcG) 50-70%	258,199	63,816 sf.
CLASS 1A, Cagwin (CaF), 30-50%	3,176	97,198 sf.
CLASS 1A Toem (TrE), 9-30%	0	4,765 sf.
CLASS 1C, Rock outcrop and Rubble land (Rx)	0	1,669 sf.
CLASS 2, Cagwin (CaE), 15-30%	41,493	61,022 sf.
CLASS 4, Cagwin (CaD), 5-15%	4,786	0 sf
CLASS 4, Unnamed soil (XXX), 16-30%	0	59,954 sf.
CLASS 6, Unnamed soil (XXX), 0-16%	0	19,230 sf.
TOTAL (includes road easement south of Pit no. 4)	307,654	307,654 sf.

LEGEND

- A/C ASPHALTIC CONCRETE
- EDGE OF PAVEMENT
- F FIR TREE
- HWL HIGH-WATER LINE
- L/S LANDSCAPING/NATURAL GROUND
- P PINE TREE
- PP POWER POLE
- N/G NATURAL GROUND

NOTE: Land Capability Linework Added To Surveyor's Topographic Map; No Changes To Property Boundaries, Structures or Contour Lines. Utility and Infrastructure Layers Turned Off to Simplify Exhibit.



LAND AREA TO THE HIGH-WATER LINE
 307,654 SQUARE FEET (GROSS)
 304,425 SQUARE FEET (NET, excludes road easement)
 Land Area from Turner & Associates, Inc. topo. survey (June 2021)

LAND CAPABILITY CHALLENGE FOR APN 1418-03-401-010
 2220 LANDS END DR., GLENBROOK, DOUGLAS CO., NV
 Owners: Standish & Anne O'Grady (P.O. Box 286, Glenbrook, NV 89413)

SHEET NO. 1

TOPOGRAPHY SURVEY CONDUCTED BY TURNER & ASSOCIATES INC.
 Survey Completed June 2021 (Lake Tahoe Datum)
 Turner & Associates, Inc. not involved in land capability analysis or related mapping (as depicted by color linework).

SOIL MAPPING AND CORRELATION
 BY ROGER J. POFF & ASSOC.
 NEVADA CITY, CALIF.
 530-273-1709 ... roger.poff@icloud.com
 Field Work Completed Nov. 28, 2021
AGENDA ITEM NO. 2

LAND CAPABILITY CHALLENGE SUMMARY

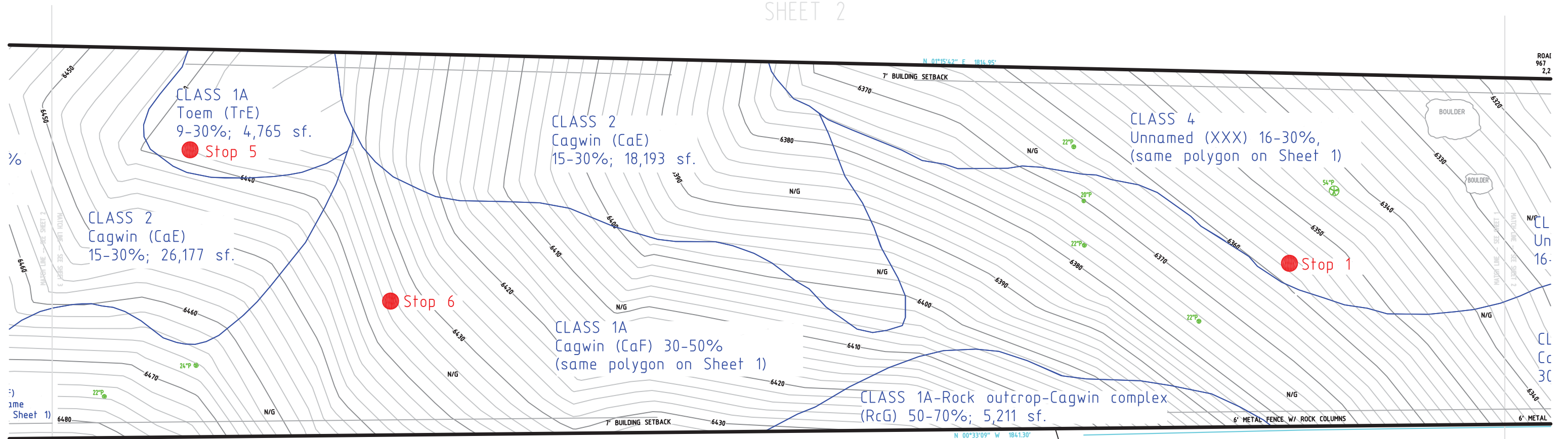
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LEGEND

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- EDGE OF PAVEMENT
- F FIR TREE
- HWL HIGH-WATER LINE
- L/S LANDSCAPING/NATURAL GROUND
- P PINE TREE
- PP POWER POLE
- N/G NATURAL GROUND

NOTE: Land Capability Linework Added To Surveyor's Topographic Map;
No Changes To Property Boundaries, Structures or Contour Lines.
Utility and Infrastructure Layers Turned Off to Simplify Exhibit.

SHEET 2



A.P.N. 1418-03-301-005

A.P.N. 1418-03-401-004



SCALE



LAND AREA TO THE HIGH-WATER LINE

307,654 SQUARE FEET (GROSS)
304,425 SQUARE FEET (NET, excludes road easement)
Land Area from Turner & Associates, Inc. topo. survey (June 2021)

LAND CAPABILITY CHALLENGE FOR APN 1418-03-401-010
2220 LANDS END DR., GLENBROOK, DOUGLAS CO., NV
Owners: Standish & Anne O'Grady (P.O. Box 286, Glenbrook, NV 89413)

SHEET NO. 2

TOPOGRAPHY SURVEY CONDUCTED BY TURNER & ASSOCIATES INC.
Survey Completed June 2021 (Lake Tahoe Datum)
Turner & Associates, Inc. not involved in land capability
analysis or related mapping (as depicted by color linework).

SOIL MAPPING AND CORRELATION
BY ROGER J. POFF & ASSOC.
NEVADA CITY, CALIF.
530-273-1709 ... roger.poff@icloud.com
Field Work Completed Nov. 28, 2021
AGENDA ITEM NO. 4

LAND CAPABILITY CHALLENGE SUMMARY

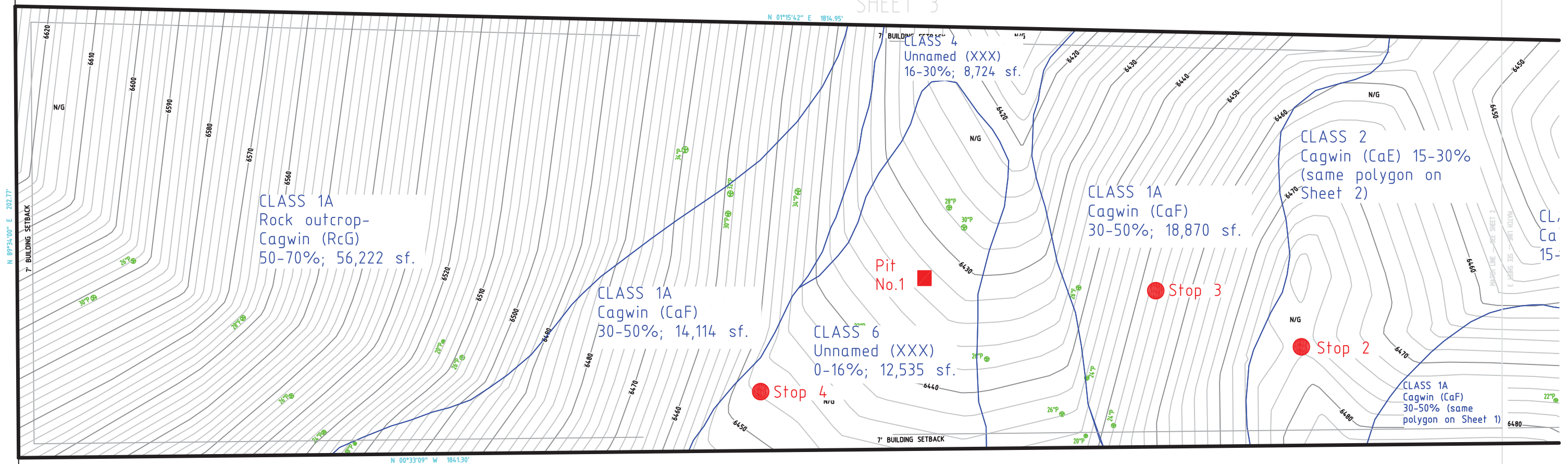
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L/S	LANDSCAPING/NATURAL GROUND
P	PINE TREE
PP	POWER POLE
N/G	NATURAL GROUND

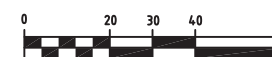
NOTE: Land Capability Linework Added To Surveyor's Topographic Map;
No Changes To Property Boundaries, Structures or Contour Lines.
Utility and Infrastructure Layers Turned Off to Simplify Exhibit.

SHEET 3



A.P.N. 1418-03-301-005

SCALE



LAND AREA TO THE HIGH-WATER LINE

307,654 SQUARE FEET (GROSS)
304,425 SQUARE FEET (NET, excludes road easement)
Land Area from Turner & Associates, Inc. topo. survey (June 2021)

LAND CAPABILITY CHALLENGE FOR APN 1418-03-401-010
2220 LANDS END DR., GLENBROOK, DOUGLAS CO., NV
Owners: Standish & Anne O'Grady (P.O. Box 286, Glenbrook, NV 89413)

SHEET NO. 3

TOPOGRAPHY SURVEY CONDUCTED BY TURNER & ASSOCIATES INC.
Survey Completed June 2021 (Lake Tahoe Datum)
Turner & Associates, Inc. not involved in land capability
analysis or related mapping (as depicted by color linework).

SOIL MAPPING AND CORRELATION
BY ROGER J. POFF & ASSOC.
NEVADA CITY, CALIF.
530-273-1709 ... roger.poff@icloud.com
Field Work Completed Nov. 28, 2021

Attachment D

Soil consultant's land capability report (February 2022)

Soil Capability Report for 2220 Lands End Drive, Glenbrook, NV (APN: 1418-03-401-010), 307,654 Square Ft. Revised 1-31-2022

Introduction

This report provides soil mapping and an analysis of soils in support of a TRPA Land Capability Challenge (LCC). The parcel is owned by the O’Grady Revocable Trust. Mr. Standish O’Grady requested the soil evaluation and subsequent land capability challenge.

This 7-acre parcel is long and narrow (about 605 yards long by 56 yards wide), and oriented north-south, with Lake Tahoe its southern boundary. About 20 percent of the parcel is south of Lands End Drive. This portion of the parcel is fully developed with a residence, detached garage, paved driveway, landscaping, waterfront stairs, and lawn. The 80 percent of the parcel north of Lands End Drive is undisturbed shrubland and Jeffrey Pine forest with a dense understory of manzanita, bitterbrush, and grass. Elevation ranges from 6,230 to 6,628 feet (Lake Tahoe datum). Turner & Associates, Stateline, NV, prepared the topographic base map for the parcel. Report was revised on 1-31-22 to correct small errors in area calculations.

Summary of the Proposed Action

The parcel is currently TRPA-verified as Cagwin-Rock outcrop complex, 5 to 15 percent slope (CaD); Cagwin-Rock outcrop complex, 15 to 30 percent slope (CaE); Cagwin-Rock outcrop complex, 30 to 50 percent slope (CaF); and Rock outcrop-Cagwin complex (RcG). We did not observe the CaD soil, but observed and mapped the other three soils, plus the Toem-rock outcrop complex , 9 to 30 percent slopes (TrE), Rock outcrop-rubble land (Rx), and an unnamed soil (XXX) that does not match any soils identified in the 1974 Soil Survey (Rogers, 1974).

Land Capability Class	Soil Type	Current Area (sq. ft.)	Proposed Area (sq. ft.)	Difference (sq. ft.)
Class 1a	RcG, 50-70%	258,199	63,816	-194,383
Class 1a	CaF, 30-50%	3,176	97,198	+94,022
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Class 2	CaE, 15-30%	41,493	61,022	+19,529
Class 4	CaD, 5-15%	4,786	0	-4,786
Class 4	XXX, 16-30%	0	59,954	+59,954
Class 6	XXX, 0-16%	0	19,230	+19,230
Total		307,654	307,654	0

Table 1. Summary of Proposed Changes to Land Capability Class

Methodology

All soil delineations (except the far north delineation of RcG) were traversed on foot and soils verified by observations of surface soils, vegetation, amount of rock outcrop, and landscape position. Because the steeper slopes north of Lands End Drive are dominantly slope phases of the Cagwin soil, and are all in Class 1a, a detailed slope analysis using the topographic map was used to delineate the soils in this portion of the parcel. Backhoe pits and auger borings were used to verify the soils with higher land capabilities.

Soil profile descriptions were made on September 28, 2021 from four backhoe pits and one hand-dug pit with an auger boring. TRPA land capability contractor Phil Scoles was present and examined the sample sites at this time. The locations of the soil pits are indicated with a red square and number on the parcel map (Appendix 1). The soil profile descriptions are in Appendix 3. Photos of the soil pits and sites are in Appendix 4. Field notes for six additional field stops without formal profile descriptions are also included in Appendix 4. Field Stop locations are indicated by a red circle and number.

Field equipment used included tools normally used to observe and describe soils, such as a shovel, soil auger, trowel, knife, pruning shears, sieves, Munsell soil color charts, pH kit, hand lens, water bottle, measuring tape, compass, camera, and clinometer.

The soil profiles were described following the standards in Schoeneberger et al. (2012). The described soils were compared to the soils listed in the Soil Survey of the Tahoe Basin Area, California and Nevada (Rogers, 1974), and to the soils in the 2006 NRCS soil survey update (Soil Survey Staff, 2006). The comparison with the 2006 soil survey update was for informational purposes only, since TRPA does not use this soil survey to determine land capability class.

The methods used to describe the soil and site are consistent with the detail typical of an Order 1 Soil Survey (Soil Survey Staff, 2018).

Site Characteristics

Geomorphology

The study area is mapped within geomorphic unit C3 (Steep strongly dissected land) as defined in the Land-Capability Classification of the Lake Tahoe Basin, California-Nevada (Bailey, 1974). This is in Group I. High hazard lands, which implies a high potential for erosion, and/or a slow recovery after disturbance. However, the scale of the Bailey geomorphic mapping does not capture site-specific details. The parcel includes some less steep slopes, and colluvial deposits as well as weathered granitic soils—all coarse-grained materials with moderately rapid to rapid permeability.

Vegetation

The portion of the parcel south of Lands End Drive that is not covered by structures or paving is terraced lawn with a few legacy Jeffrey Pine trees and landscaping plants. The escarpment at the edge of the lake has willows and native shrubs.

North of Lands End Drive, the vegetation is shrubland and Jeffrey Pine forest with a dense understory of manzanita, bitterbrush, and grass. On the south-facing slopes the forest canopy is very open, and the brush is dense. On the north-facing slopes and XXX soil areas, the forest canopy is more closed and includes a few white firs, and fewer shrubs.

Ground Cover, Surface Hydrology, and Erosion Hazard

Where not occupied by structures or paved, the area south of Lands End Drive is covered by irrigated turfgrass and a few mulched areas with landscaping plants. Runoff and erosion are moderate to low. The escarpment at the Lake (RcG and Rx) has a few bare spots and has high surface runoff and a very high erosion hazard.

North of Lands End Drive, ground cover is about 95 percent in the open shrub areas. In areas with a forest canopy the ground cover is 100 percent with a thick carpet of needles, cones, and twigs (see Appendix 4, photo 2). In the area mapped as Toem (TrE) ground cover is about 80 percent, and the erosion hazard high (see Appendix 4, Photo 12). The very northern part of the parcel that is mapped RcG also has less ground cover. Erosion hazard is moderate to high on slopes less than 30 percent, and very high on the steeper slopes. The many deer trails on the steep sideslopes have disturbed the duff and litter and exposed bare soil.

Improvements and Modifications

South of Lands End Drive the parcel contains a residence, decks, a detached garage/guest house, and a paved driveway and parking area. Between the residence and the Lake the slope has been slightly terraced and is in irrigated lawn. There are no modifications north of Lands End Drive.

Findings and Analysis

The boundaries of the soils we observed are shown in Appendix 1, Sheets 1, 2, and 3.

Soils

The various slope phases of Cagwin-rock outcrop—and the small area of Toem (TrE)—that we mapped include soils that match their map unit descriptions in the 1974 soil survey. However, the unnamed (XXX) soil we mapped does not match any named soils included in the 1974 soil survey. The Cagwin soil is somewhat excessively drained, moderately deep (20 to 40 inches) over weathered granitic bedrock, and has loamy coarse sand textures. The XXX soil we found is well-drained, deep (40 to 60 inches) over weathered granitic bedrock, and has gravelly loamy coarse sand and gravelly sand textures.

Of the soils mapped the 1974 soil survey, the soil most similar to the XXX soil we mapped is the Gefo series, which is well-drained, and occurs on alluvial fans, outwash terraces, and floodplains. The Gefo soil is very deep (greater than 60 inches) and has more gravelly textures. The Gefo soil is also limited to slope classes 2 to 9 percent, and 9 to 20 percent.

The 2006 survey update (Soil Survey Staff, 2006) has the parcel mapped as 7422 Cassenai gravelly loamy coarse sand, 15 to 30 percent slopes, 7412 Cagwin-Rock outcrop 15 to 30 percent slopes, and 7413 Cagwin-Rock outcrop 30 to 50 percent slopes. The Cassenai soil was

established in the 2006 survey update to capture soils developed in granitic residuum that are deeper than Cagwin soils. The soil boundary delineating the Cassenai soil is quite close to our boundary delineating XXX 16 to 30 percent slopes. This comparison with the 2006 soil survey update is for informational purposes only, since TRPA does not use this soil survey to determine land capability.

The occurrence of deeper soils within areas mapped as Cagwin in the 1974 soil survey is not unexpected. Descriptions of the CaD, CaE, and CaF soils in the 1974 Soil Survey (Rogers, 1974) all mention as an unnamed inclusion a soil similar to Cagwin but deeper than 40 inches over weathered granitic rock.

The CaD, CaE, CaF, and Rx are all complexes of Rock Outcrop and Cagwin soils that are differentiated primarily by steepness of slope. The TrE (Toem-Rock Outcrop) soil is shallower to weathered bedrock than the Cagwin soil.

Determination of Hydrologic Group and Subsurface Hydrology

The unnamed XXX soil observed on this parcel is in Hydrologic Group A because it is a deep, well to somewhat excessively-drained, moderately coarse-textured soil and has moderately rapid permeability, a moderate rate of water transmission, and a moderate rate of infiltration when thoroughly wetted (Rogers, 1974).

The XXX soil lacks restricting layers to a depth of greater than 40 inches, as observed by root penetration in the soil pits, and by the absence of redoximorphic features throughout. (See Appendix 3, pages 1 and 2.)

Determination of Land Capability Class for Soil XXX

The land capability for unnamed soil XXX was determined using the criteria in Table 4 of Land-Capability Classification of the Lake Tahoe Basin, California-Nevada (Bailey 1974). Unnamed soil XXX, 0 to 30 percent slopes, qualifies as Land Capability Class 6 because it occurs on slopes of 0 to 16 percent, has a moderate relative erosion potential, a low to moderately low runoff potential, and a moderate disturbance hazard, and is in Hydrologic Soil Group A.

Unnamed soil XXX, 16 to 30 percent slopes, qualifies as Land Capability Class 4 because it occurs on slopes of 16 to 30 percent.

Conclusions and Recommendations¹

We found that the parcel includes areas of soils that are too deep to be the Cagwin soil, and that do not match any soils mapped in the 1974 soil survey (Rogers, 1974). We mapped these soils as XXX, 0 to 16 percent slopes, and XXX, 16 to 30 percent slopes. In addition—although they are all in Land Capability Class 1a—we mapped in detail several slope phases of Cagwin-Rock outcrop.

¹ A draft of this report was reviewed on November 29, 2021 by TRPA land capability contractor Phil Scoles (Soil Scientist/Terra Science). Where appropriate, his suggestions have been incorporated into this final report.

We recommend the land capability classes for the parcel be changed to those listed in Table 1 and delineated in Appendix 1 of this report.



Respectfully submitted,

R. J. POFF & ASSOCIATES

Roger J. Poff, Principal Soil Scientist

CPSS, RPF, CPESC

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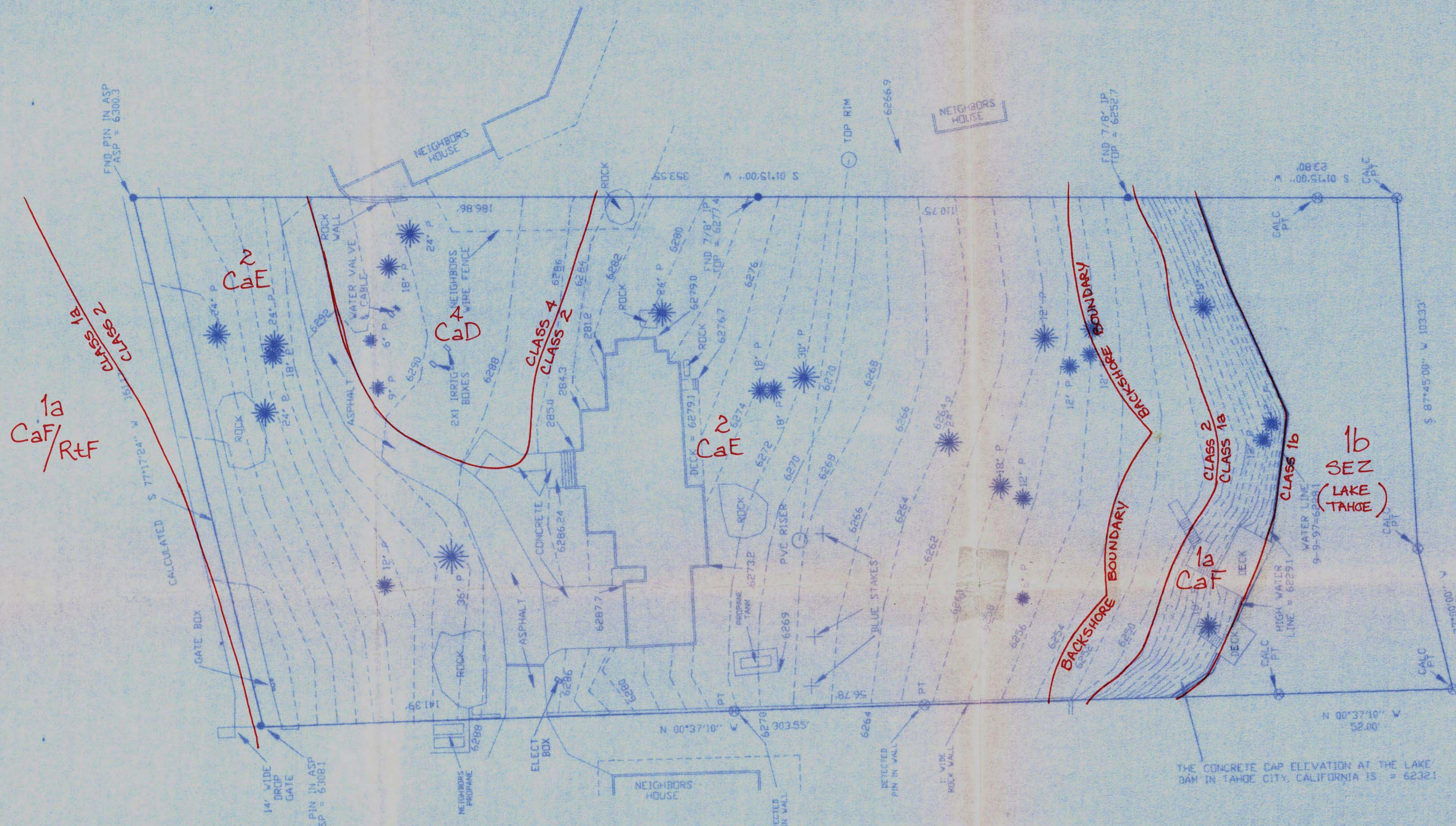
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List of Appendices

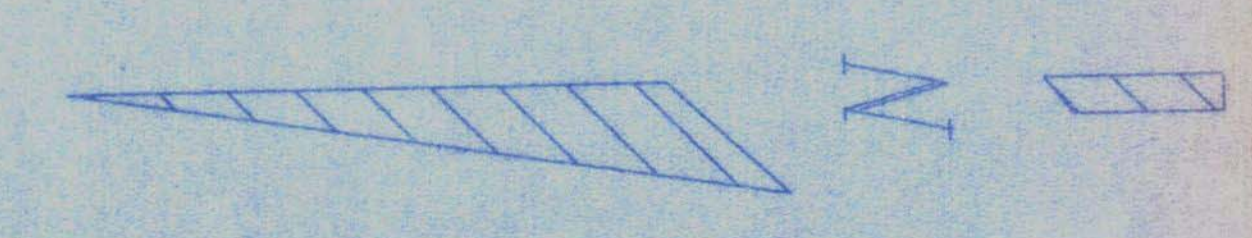
- Appendix 1 Proposed Land Capability Map, Sheets 1, 2, and 3*
- Appendix 2 Current TRPA Land Capability (Existing LCV Map)*
- Appendix 3 Soil Profile Descriptions and Field Stops*
- Appendix 4 Photos*



THE CONCRETE CAP ELEVATION AT THE LAKE DAM IN TAHOE CITY, CALIFORNIA IS = 6232.1

TRPA FILE
COPY 2/17/98
[Signature]

CLD SURVEYING
WATER RIGHTS & LAND
P. O. BOX 7316
INCLINE VILLAGE, NEVADA 89452
CONN DAVIS, Surveyor Phone 1-702-831-7539



SCALE: 1" = 20'



SURVEYORS CERTIFICATE
I, CONN DAVIS A REGISTERED LAND SURVEYOR IN THE STATE OF NEVADA DO HEREBY CERTIFY THAT THIS SURVEY WAS MADE BY ME IN THE MONTH OF Sept, 1997, AND IS ACCURATE TO THE BEST OF MY BELIEF.

DATE _____ CONN DAVIS, PLS 7880

SITE SURVEY OF TOPO, LARGE TREES, BOULDERS, IMPROVEMENTS, & PROPERTY LINE ARE SHOWN WITHOUT EXISTING EASEMENTS FOR
BASIN STRATEGIES
P.O. BOX 11945
ZEPHYR COVE, NEVADA 89448
LOCATED AT 2220 LANDS END, GLENBROOK, NEVADA
KNOWN AS APN# 01-030-14
LEGAL DESCRIPTION - BOOK 1087, PAGE 351,
DOUGLAS COUNTY, NEVADA
DRAWN BY CONN DATE 9-13-97
(GBBS9711.DWG) REV 9-17-97 REV 10-20-97

Appendix 3 –Soil Profile Descriptions and Stop Notes

Locations of backhoe pits and stops are shown on Appendix 1.

Soil Pit 1: XXX 0 to 16 percent slopes

Described by Roger Poff and Phil Scoles on September 28, 2021 from a hand-dug pit and soil auger boring. On a plane-plane, 14 percent, southeast facing slope (145°) at 39°6'16"N, 119°56'58"W. Somewhat excessively drained. Developed in a small valley filled with granitic colluvium. Vegetation is an open overstory of medium-sized Jeffrey Pine, with scattered cedar, pine, and white fir saplings, and <1% bitterbrush and grasses. When described the soil was dry throughout. This soil does not match any of the soil series described in the 1974 soil survey. It is deeper than the Cagwin soil, and differs from the Gefo soil in pedogenesis and gravel content. (See report, pages 3-4.) Photos of the auger borings and site are in Appendix 4, page 1.

Oi—0 to 1 inches; littler of needles, twigs, and a few small limbs; abrupt smooth boundary

A—1 to 13 inches; dark grayish brown (10YR 4/2) **gravelly coarse sand**, very dark brown (10YR 2/2) moist; weak, medium and fine granular structure; loose, friable, non-sticky, non-plastic; many fine and common medium roots; common, very fine interstitial pores; 15% fine gravels; gradual smooth boundary.

AB—13 to 34 inches; dark grayish brown (10YR 4/2) **gravelly coarse sand**, very dark brown (10YR 2/2) moist; very weak fine granular structure; loose, friable, non-sticky; non-plastic; very many medium and fine, and common coarse roots; common, very fine interstitial pores; 20% fine gravels; gradual smooth boundary.

Bw—34 to 47 inches; brown (10YR 4/3) **gravelly coarse sand**, very dark grayish brown (10YR 3/2) moist; very weak fine and very fine granular structure; loose, very friable, non-sticky, non-plastic; 22% fine gravels; diffuse smooth boundary.

C—47 to 58 inches; brown (10YR 4/3) **gravelly coarse sand**, dark brown (10YR 3/3) moist; single grain structure; loose, very friable, non-sticky, non-plastic; 15% fine gravels.

Soil Pit 2: Cagwin-Rock Outcrop, 15 to 30 percent slope (CaE)

Described by Roger Poff on September 29, 2021 from a backhoe pit on aN 18 percent, south-southwest facing slope (196°) at 39°6'3"N, 119°56'58"W. Slope has been landscaped. Somewhat excessively drained. Developed in colluvium weathered from granodiorite. Depth to firm bedrock without root penetration varies from 30 to 38 inches across the site. Profile contains about 25 percent stones 8 to 12 inch in diameter. Vegetation is lawn and landscaping plants with scattered legacy Jeffrey Pine. When described, soil was moist throughout from lawn irrigation. Photos of the soil pit and site are in Appendix 4, page 2.

Ap—0 to 2 inches; dark grayish brown (10YR 4/2) **sandy loam**, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; soft, very friable, slightly-sticky; non-plastic; many fine and very fine, and common medium roots; few fine interstitial pores; 10% fine gravels; pH 7.0; abrupt smooth boundary.

A—2 to 10 inches; brown (10YR 5/3) **loamy sand**, dark brown (10YR 3/3) moist; moderate medium and fine granular structure; soft, very friable, non-sticky, non-plastic; common medium and few fine roots; few fine interstitial pores; 15% fine gravels; pH 6.5; gradual smooth boundary.

Bw—10 to 25 inches; yellowish brown (10YR 5/4) **light loamy sand**, dark yellowish brown (10YR 4/4) moist; moderate medium and fine granular structure; soft, very friable, non-sticky; non-plastic; common medium and few fine and very fine roots; 15% fine gravels; pH 6.5; clear irregular boundary.

C—25 to 32 inches; pale brown (10YR 6/3) **gravelly sand**, dark yellowish brown (10YR 4/4) moist; single grain structure; loose, loose, non-sticky, non-plastic; common medium and very few fine roots; 25% fine gravels; pH 6.0; clear wavy boundary.

R—32 to 42 inches; weathered granodiorite; no roots.

Soil Pit 3: XXX 0 to 16 percent slope

Described by Roger Poff on September 29, 2021 from a backhoe pit on a 12 percent, south-facing slope (202°). 39°6'4"N, 119°56'57"W. Slope has been terraced and landscaped. Well-drained. Developed in shoreline colluvium weathered from granodiorite. Vegetation is lawn and landscaping plants. When described the soil was moist throughout from irrigation. The Ap is a mixture of native and 15 percent imported soil and contains one 8-inch imported stone. This

soil does not match any of the soil series described in the 1974 soil survey. It is deeper than the Cagwin soil, and differs from the Gefo soil in pedogenesis and gravel content. (See report, pages 3-4.) Photos of the soil pit and site are in Appendix 4, page 3.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) **sandy loam**, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, slightly sticky; non-plastic; very many fine and very fine roots; many fine interstitial pores; 15% fine gravels; pH 7.0; clear smooth boundary.

Bw1—7 to 19 inches; brown (10YR 5/3) **gravelly loamy coarse sand**, dark brown (10YR 3/3) moist; moderate very fine granular structure; soft, very friable, slightly sticky, non-plastic; common medium and fine roots; common, very fine interstitial pores; 25% fine gravels; slightly hydrophobic; pH 6.0; gradual smooth boundary.

Bw2—19 to 38 inches; pale brown (10YR 6/3) **gravelly loamy coarse sand**, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, non-sticky; non-plastic; common medium and fine roots; 30% fine gravels; pH 5.5; clear wavy boundary.

Cr—38 to 52 inches; brown (10YR 5/3) **gravelly loamy coarse sand**, dark brown (10YR 4/3) moist; single grain structure; loose, loose, non-sticky, non-plastic; few fine and very fine roots throughout; 30% fine gravels; pH 5.5; gradual irregular boundary.

R—52 to 54 inches; weathered granodiorite; no roots.

Soil Pit 4: XXX 16 to 30 percent slope

Described by Roger Poff on September 29, 2021 from a backhoe pit on a 24 percent, south-southeast facing, plane-plane slope (153°). 39°6'6"N, 119°56'57"W. Well to somewhat excessively drained. Developed in stratified granitic colluvium and slope wash over granodiorite. Vegetation consists of an overstory of pole-sized Jeffrey Pine with a dense understory of bitterbrush and manzanita, with 1% grasses and scattered pine seedlings. About 20% large boulders in the vicinity of the pit, but fewer boulders in delineated soil overall. When described, the soil was dry. This soil does not match any of the soil series described in the 1974 soil survey. It is deeper than the Cagwin soil, and differs from the Gefo soil in pedogenesis, gravel content, and slope steepness. (See report, pages 3-4.) Photos of the soil pit and site are in Appendix 4, pages 4 and 5.

Oi—0 to 4 inches; thick duff of pine needles, twigs, cones and branches; abrupt smooth boundary.

A—4 to 20 inches; brown (10YR 5/3) **loamy sand**, dark brown (10YR 3/3) moist; very weak fine granular structure; soft, very friable, slightly sticky, non-plastic; common fine and medium, and few coarse roots; horizon is in highly stratified colluvium; 15% fine gravels; pH 7.5; gradual smooth boundary.

Bw—20 to 29 inches; very pale brown (10YR 7/4) **gravelly loamy coarse sand**, brown (10YR 5/3) moist; very weak, very fine granular structure; firm, very friable, slightly sticky, non-plastic; common fine and medium, and few large roots; 20% fine gravels; pH 6.5; gradual wavy boundary.

Cr—29 to 43 inches; pale brown (10YR 6/3) **gravelly coarse sand**, dark brown (10YR 4/3) moist; single grain structure; loose, loose, non-sticky, non-plastic; very few medium and fine roots; 25% fine gravels; pH 6.5; abrupt wavy boundary.

R—43 to 45 inches; weathered granodiorite; no roots. Within the soil pit the depth to weathered granodiorite varies from 38 to 45 inches.

Additional Notes at Field Stops

- Stop 1 (10-30-20) Slope near break, 28-30%; toeslope to SE could be XXX 16-30; granitics and slopewash; need backhoe pit to verify depth; heavy bitterbrush and manzanita; scattered granitic boulders to SW
- Stop 2 (9-28-21) Area of Cagwin 5 -15% too small to delineate; most adjacent slopes 15-20%; 20 to 40 inch deep; bitterbrush and manzanitia
- Stop 3 (9-28-21) Almost closed canopy of mid-sized Jeff Pine on N-facing slope; forest floor of duff and litter with no brush in understory; slopes 40-45%; N and NE aspects less brush more trees; S and SW aspects more brush
- Stop 4 (9-28-21) Visual observation from bottom of steep slope to N open stand of Jeff Pine, sparse shrub understory; may include more Toem at N end, probably within range of inclusions for R/Cagwin on steep slopes; photos 0792-0793
- Stop 5 (9-28-21) Toem soil 16-18 inches deep; very dense manzanita and bitterbrush, with scattered saplings and stunted old dwarf white fir and Jeff Pine; 15-20% bare soil in places; Photos 0796-0800; rock outcrop knob to E just outside parcel boundary
- Stop 6 (9-28-21) 30-40% slope; Cagwin; grus exposed by very heavy deer use; dense manzanita/bitterbrush w/scattered Jeff Pine; less granitic outcrop than typical for R/Cagwin map units, probably within range of inclusions



Photo 1. Soil Pit 1, Profile (Depth to bedrock >60 inches)



Photo 2. Soil Pit 1, Landscape



Photo 3. Soil Pit 2, Landscape



Photo 4. Soil Pit 2, Profile (Weathered bedrock at 32 inches)



Photo 5. Soil Pit 3, Landscape



Photo 6. Soil Pit 3, Profile (Depth to weathered bedrock 52 inches)



Photo 7. Soil Pit 4, Landscape



Photo 8. Soil Pit 4, Profile (Depth to weathered bedrock 43 inches)



Photo 9. Soil Pit 4, Profile showing stratification in upper horizons



Photo 10. Stop 4, Steep slope not traversed; view to NE



Photo 11. Stop 5, Profile (Toem soil; depth to bedrock 16-18 inches)



Photo 12. Stop 5, Landscape