San Juan County, Colorado

Application for Improvement Permit

Applicant	Name	Lauren Davis, Architect
	Address	564 E. 2nd Ave. Suite 201
		Durango, CO 81301 970-259-7494 Phone
Owner	Name	Cascade Meadows LLC
	Address	665 Glacier Drive, Unit 5
		Durango, CO 81301 704-362-2400 Phone
Contractor	Name	
	Address	
		Phone

Legal Description of Property:

See attached survey and map.
Tract A-1 and Tract B-1to be updated with a new parcel and build out.
S13, T39N, R9W N.M.P.M.
San Juan County Colorado

Township N, Range W, Section

Nature of Improvement Planned:

Proposed updated subdivision

Land Use Zone: PD

Applicant Signature Lauren Davis, RA+A

Date Application Requested		
Date Submitted for Permit		
Date Permit Issued		
Date Permit Denied		

Reason for Denial

Receipt **FEE PAYMENT** Amount Date

	Application		
	Building Permit		
	Subdivision/PUD		
	Hearing Notice		

APPROVAL CHECKLIST	Initial	Date
Land Use Administrator		
Ownership of Surface	LD	
Ownership of Minerals		
Vicinity Map	LD	
Certified Survey Plat	LD	
Monumentation		
Basic Plan Map	LD	
Plans and Drawings	LD	
Road System Relationship	LD	
Zoning Compatibility	LD	
State Mining Permit	NA	
Owner Notification	LD	
Avalanche Hazard	NA	
Geologic Hazard	NA	
Floodplain Hazard	NA	
Wildfire Hazard	NA	
Mineral Resource Impact	NA	
Wildlife Impact	NA	
Historic Site Impact	NA	
Watershed Gearance	NA	
County Building Inspector		
Building Permit	NA	
State Electrical Inspector		
Electrical Permit		
San Juan Basin Health Unit		
Sewage Disposal: Test		
Design		
Central Sewage Collection	LD	
State Division of Water Resources		
Adequate Water Source	LD	
Well Permit		
Central Water Distribution		
U.S. Forest Service/BLM		
Access Approval	NA	
State Division of Highways		
Driveway Permit	LD, IP	
Subdivision Variance		
Subdivision Approval	LD, IP	
PUD Approval		

LAND USE PERMIT

San Juan County, Colorado

Applicant: LAUREN DAVIS, Reynolds Ash + Associates (Agent of Owner)	**Permit No.**
Address: 564 E. 2nd Ave. Suite 201	
City and State: Durango, cO 81301, Suite 201	**Telephone:** 970-259-

****

Description of Use:

The proposed project is a build out of Cascade Meadows, which covers a portion of what was previously Tract A1 and Tract B1 of Cascade Village. The Cascade Village Master Plan originally included 170 units identified for Tract A1/B1. The new owner, would like to update the plats and subdivision so that the developable area is captured in one new parcel. The overall density proposed for this area is 70 dwelling units, which is much less than the original master plan. The team has reviewed all hazard info, topography, wetlands, traffic, emergency access and utility capacity for this project.
The project complies with the original intent and build out of Cascade Village, but given the topography, natural features, the scale of the buildout is less than originally proposed.

****

Dates and Times of Use:

Permanent housing

Location of Use:

Cascade Village

****

Areas of Concern: Applicant should provide attachments for each relevant area
Land Use Administrator will initial approval if appropriate

Property Ownership	X	Permission of Property Owner	X
Vicinity Map	X	Plans and Drawings	X
Natural Hazards	X	Zoning Compatibility	X
Sanitation	X	Environmental Impacts	X
Building Permit		Federal and /or State Permits	IN PROGRESS
Security		Emergency Services	IN PROGRESS
Parking	X	insurance Coverage	
Clean Up	X	County Road Impact	NA
Other		Other	

Date Application Submitted: 07-18-2025	**By (signature):**
Date Permit Issued:	**By (signature):**
Conditions	
Acceptance of Conditions:	**By (signature):**

REYNOLDS ASH + ASSOCIATES

ARCHITECTURE & ENGINEERING

07-20-2025

CASCADE MEADOWS SUBDIVISION
For Application for Improvement Permit

To: Willy Tookey
San Juan County Administrator
970-387-5766
San Juan County, Colorado

Willy,

Reynolds Ash and Associates (RAA) is pleased to submit a subdivision package for your review for the proposed Cascade Meadows Subdivision.

Completed Application (RAA)
Project Narrative (RAA)
Proposed Layout of Residential Units, driveways and overall improvements (RAA)
Proposed Grading Plan and Design (CHC)
Drainage Plan - pending (CHC)
Survey (Moreno)
Preliminary Plat (Moreno)
Geohazards including avalanche map and rock fall and debris flow report (CHC/Trautner)
Soils Report (Trautner)
Ownership Info (Cascade Meadows, LLC)
Statement of Utility Capacity (Dave Marsa, Grizzly Peak Water Sales and Distribution, LLC)
Wetlands Statement (SME)

Project Overview
The proposed subdivision is for the development of a maximum of 72 dwelling units along Meadow View Road. The proposed development is part of the original Master Plan for Cascade Village. The original master plan proposed approximately 170 units for Tract A1/Tract B1 on the southern end of the site.

Original Proposed Buildout

564 E. 2ND AVE. SUITE 201. DURANGO. CO 81301 PHONE 970. 259.7494
262 PAGOSA STREET STE. 200. PAGOSA SPRINGS. CO 81147 (970) 264-6884

The design team and owner have analyzed topography, wetlands, soil conditions, traffic and overall market conditions. The site presents numerous challenges with the soil conditions of the wetlands, the steep slope to the west. The proposed package will reduce overall density with a simpler layout of townhomes. The townhomes will line Meadowview Drive. Most of the units will be built on the west side of the road and into the hillside. The others will line the wetlands where the impact is minimal.

The proposed products will be three story townhomes. The design takes advantage of views across the highway and to the mountains on the east. The scale will be similar to the existing townhomes constructed across from Purgatory Resort. Each townhome is approximately 2,000 square feet with a garage and small driveway in front of the unit. The building envelope will include a mix of metal and wood siding. Overhangs, covered decks and awnings will add interest and protection to the buildings. The rooflines will be broken up to help with snow removal, but also to add interest to the envelope.

The proposed project will line the bottom of the tree line and edge of the wetlands. The colors and materials will be darker and contextual to help the proposed subdivision tie into the rest of Cascade Village. The development will not negatively impact the scenic view corridor and will be similar in scale, color and material palette to the rest of the development in this part of the Highway 550 corridor.

The required utilities for the townhomes has been designed and incorporated into the civil package. Water and sewer service lines will serve each unit and tie into an overall main line that runs along Meadowview Dr. Power to each footprint will be provided by LPEA and also run in the utility easement. Communications and fiber will also run along the street and serve each building. The design team has coordinated with the local utility provider to ensure that sewer and water capacity is adequate.

Landscaping for each dwelling unit will be required and help to soften the edges of the buildings and tie into the existing landscape. Landscaping will also include sidewalks that will connect the development back to the south and other trails in the area.

Due to the analysis of rock fall and debris flow, a rock fence is proposed along the backside of the units. The final design of the rock fence will be a deferred submittal but will protect the new townhomes and be integrated into an attractive landscape design. The rock fall fence will also help in defining defensible space on the back side of the units to further protect them and meet the new Wildfire Resilience Code.

The project will trigger a new turn lane on the highway, which will be part of the improvements. The new turn lane is currently being reviewed by CDOT and being designed by SEH Engineers. The highway work will begin when the build out triggers the threshold of trips. An easement has been established between the owner of Cascade Meadows and the adjacent property owner to the south (Ozone Cubed). This agreement was presented in the previous land use improvement application to begin the extension of Meadowview Drive. This easement and new entry off the highway will serve as the main entry to this proposed development. This will provide a second exit overall for Cascade Village, which is required per IFC and DFPD.

General Notes and Considerations for the proposed development:

1. DFPD has reviewed the plans. Comments - Pending
2. Addressing for the parcels will be approved by DFPD and SJC.
3. All improvements will comply with the design and construction recommendations of DFPD.
4. The project will comply with the Wildfire Resiliency Code, per the State of Colorado.
5. A recent survey has been provided and includes all boundary, easements, etc.
6. A map showing Wetlands has been provided. Full impact of wetlands has been calculated and an application has been submitted to the Army Corps of Engineers for Approval. The developer is proposing to mitigate the impact by land banking with the Animas River Wetlands.

7. All work will be completed within the property lines as shown. No work will occur outside of the property lines.
8. There is not an HOA as part of this development at this time. The developer is working on a Special District. Currently, the public utility will maintain all parts of the development until the Special District is formed.
9. As part of the Building permit application, the applicant shall submit to the County Building Department, a copy of the storm water management plan/permit (SWMP), processed according to the current CDPHE regulations, and shall utilize BMP's specified on the SWMP Plan and or in compliance with CDPHE regulations.
10. A preliminary plat is included in the submittal. A licensed surveyor (Moreno) will file a final as-built plat with San Juan County once construction is complete.
11. The developer and project consultants shall comply with all Conditions of Approval including but not limited to CDPHE, OSHA, UNCC, COOT, San Juan County Land Use Regulations and the Army Corpse of Engineers.
12. The project will coordinate with LPEA for all power to the development.
13. The Applicant shall prepare/submit an agreement for County review regarding the required school fees.
14. Owner agrees to provide fee in lieu for workforce housing

Please review and let us know if you have any questions.
We look forward to working with San Juan County on this project.

Thank you,

Lauren Davis, AIA, AICP

564 E. 2ND AVE., DURANGO, CO 81301 PHONE 970. 259.7494
262 PAGOSA STREET STE. 200, PAGOSA SPRINGS, CO 81147 (970) 264-6884

SITE PLAN

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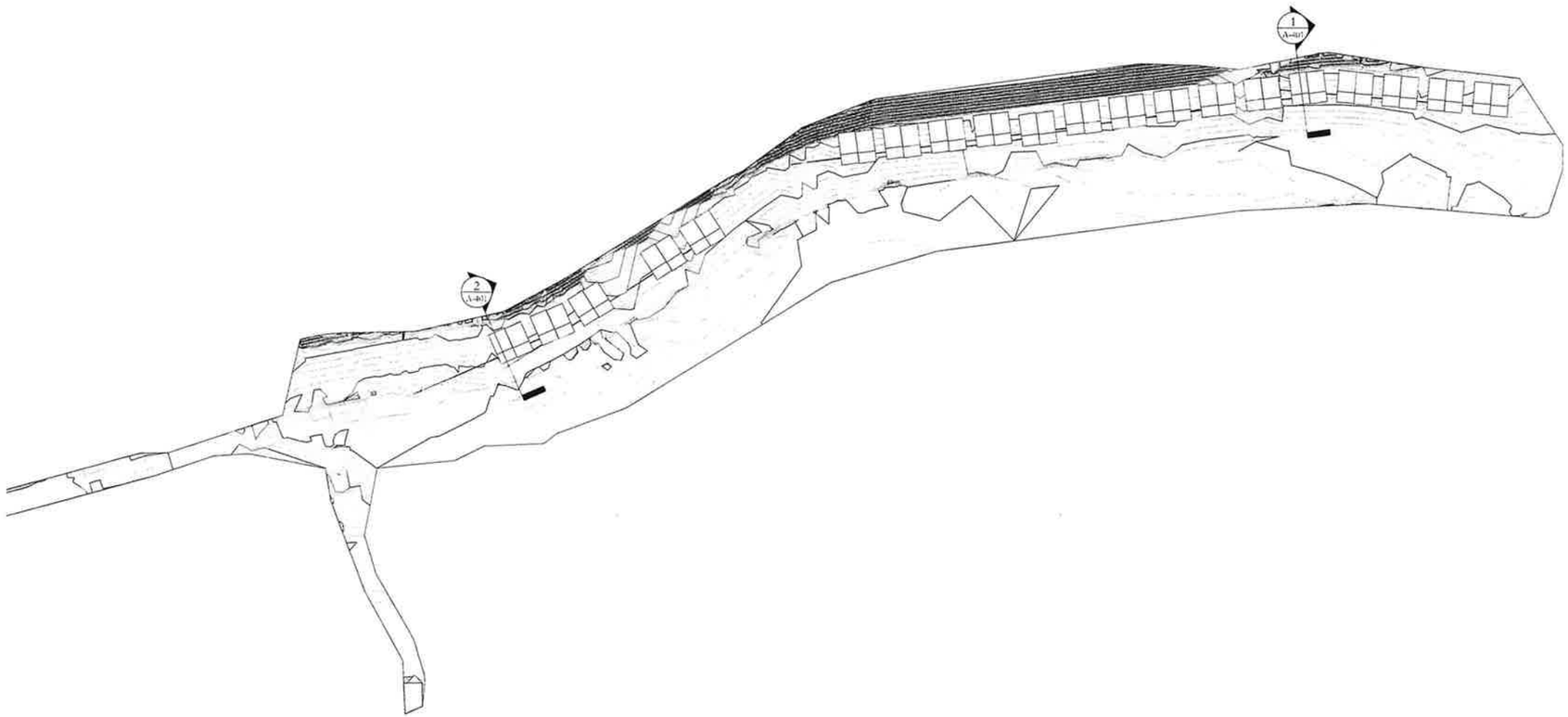


Site Plan
SCALE 1" = 100'-0"

NORTH

NOT FOR CONSTRUCTION

REYNOLDS ASH + ASSOCIATES
ARCHITECTURE ENGINEERING

CASCADE VILLAGE TOWNHOMES

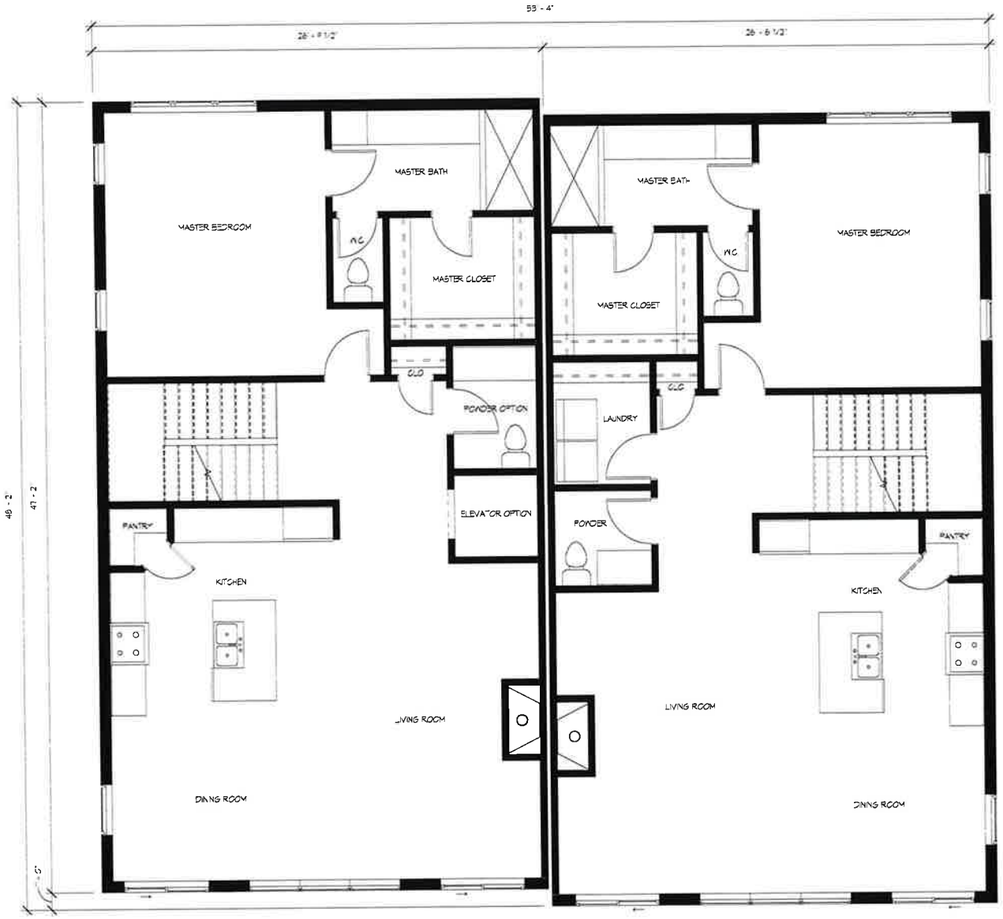
TBD

AS-101

JOB NO. 24029
ISSUE DATE: 7/2/2025

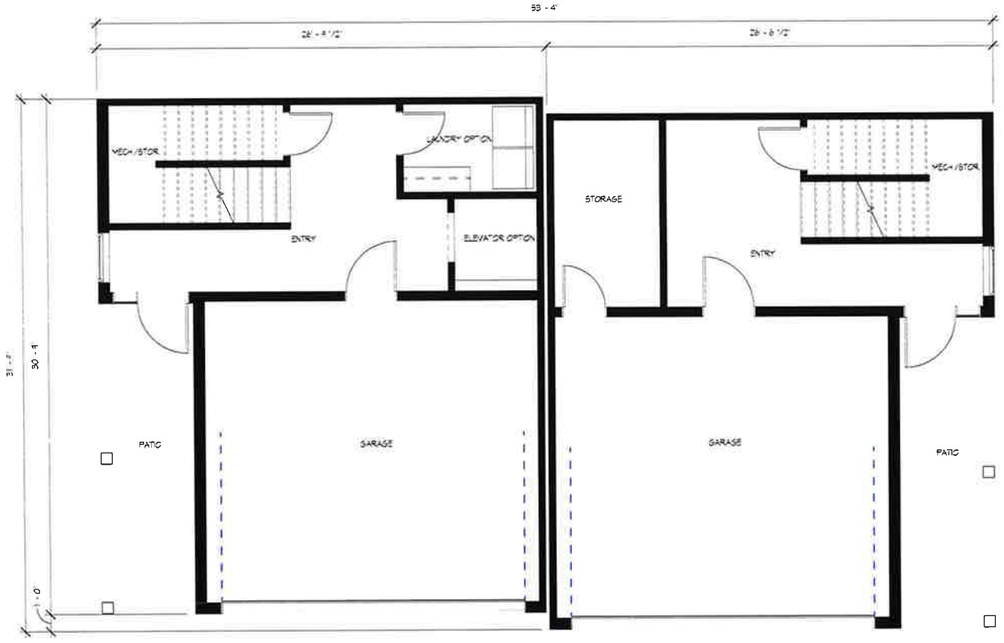
FLOOR PLAN

PRINT ID: ITT - 7/2/2025 9:11:55 AM



2 MAIN LEVEL

SCALE 1/4" 1'-0"



1 LOWER LEVEL

SCALE 1/4" 1'-0"

0 2 4 8

NOT FOR CONSTRUCTION

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ARCHITECTURE ENGINEERING

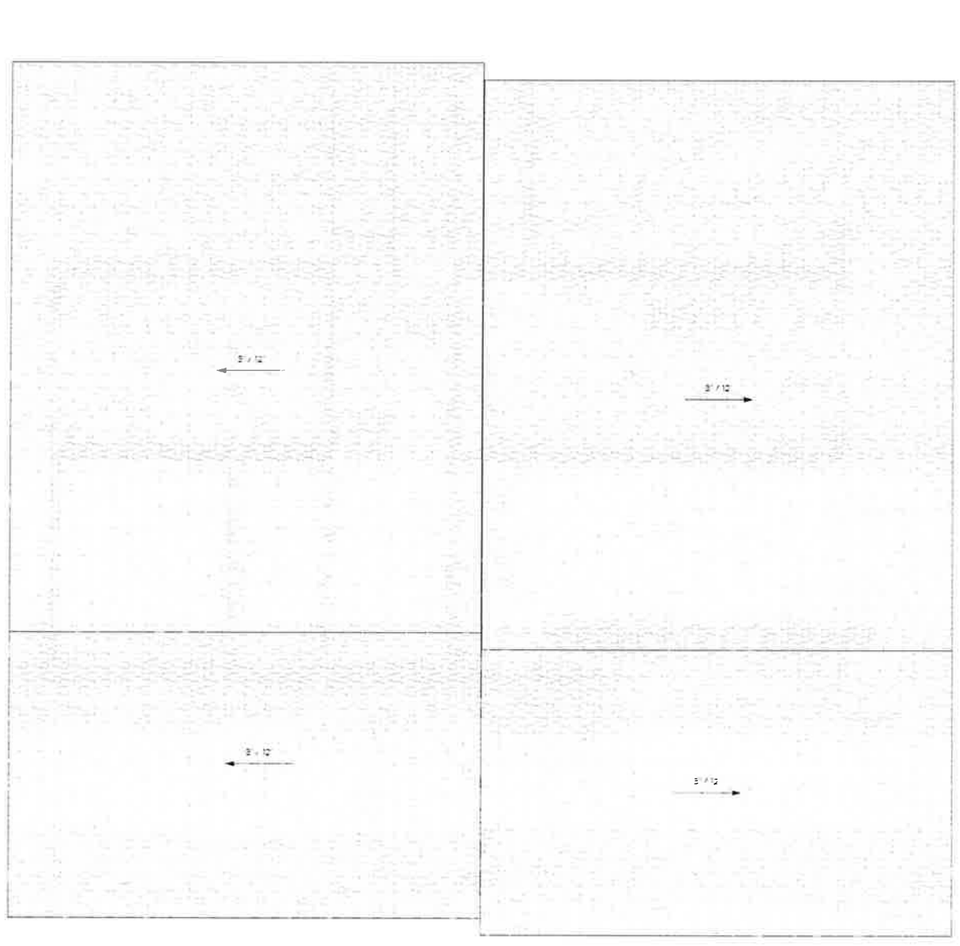
CASCADE VILLAGE TOWNHOMES

TBD

A-101

JOB NO. 24029
ISSUE DATE: 7/2/2025

FLOOR PLAN



ROOF

SCALE 1/4" = 1'-0"

3 UPPER LEVEL

SCALE 1/4" = 1'-0"

NOT FOR CONSTRUCTION

REYNOLDS ASH + ASSOCIATES
ARCHITECTURE ENGINEERING

CASCADE VILLAGE TOWNHOMES

TBD

A-102

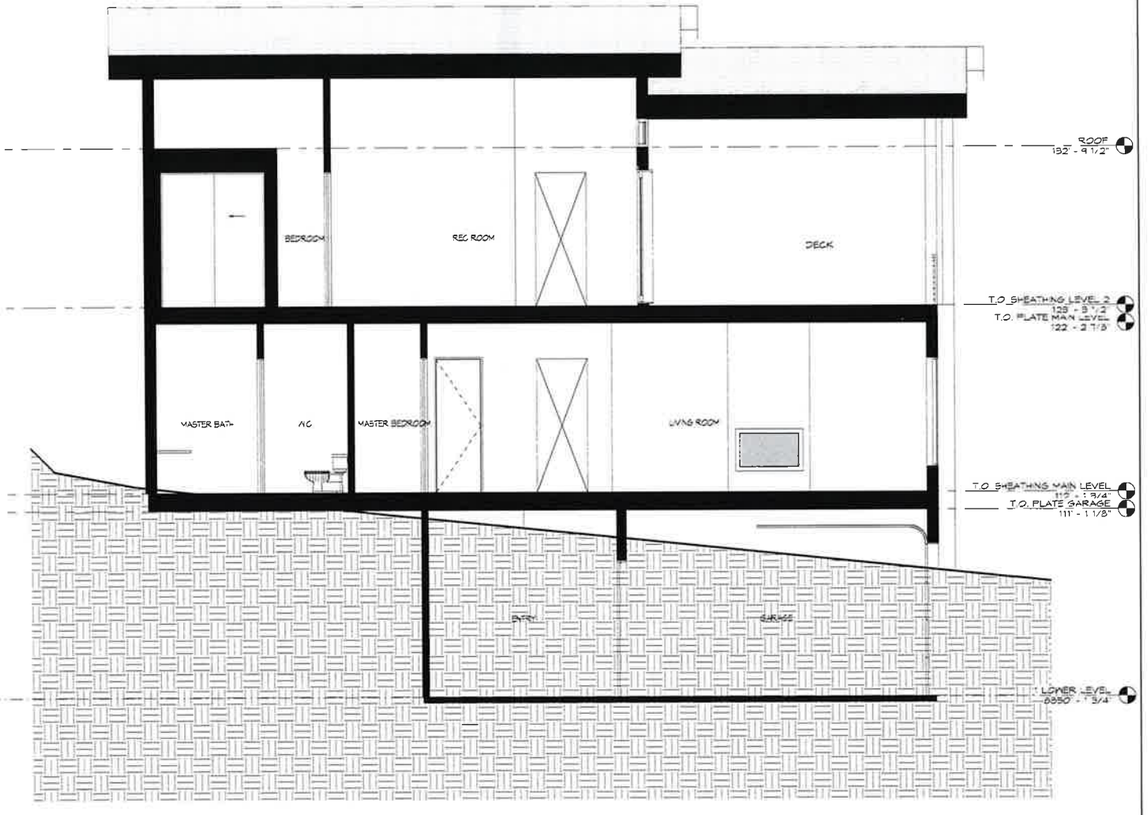
JOB NO. 24029
ISSUE DATE: 7/2/2025

PRINT DATE: 7/2/2025 9:11:56 AM

PRINT DATE: 7/2/2025 9:37:49 AM

EXAMPLE 2

SCALE: 1/4" = 1'-0"



EXAMPLE 1

SCALE: 1/4" = 1'-0"

REYNOLDS ASH + ASSOCIATES
ARCHITECTURE ENGINEERING

CASCADE VILLAGE TOWNHOMES

TBD

A-401

JOB NO. 24029
ISSUE DATE: 7/2/2025

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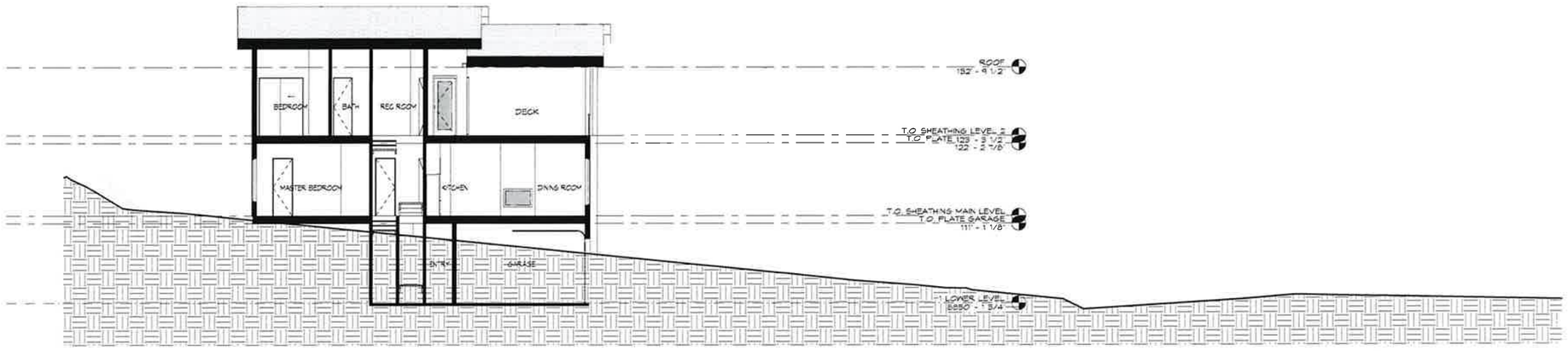
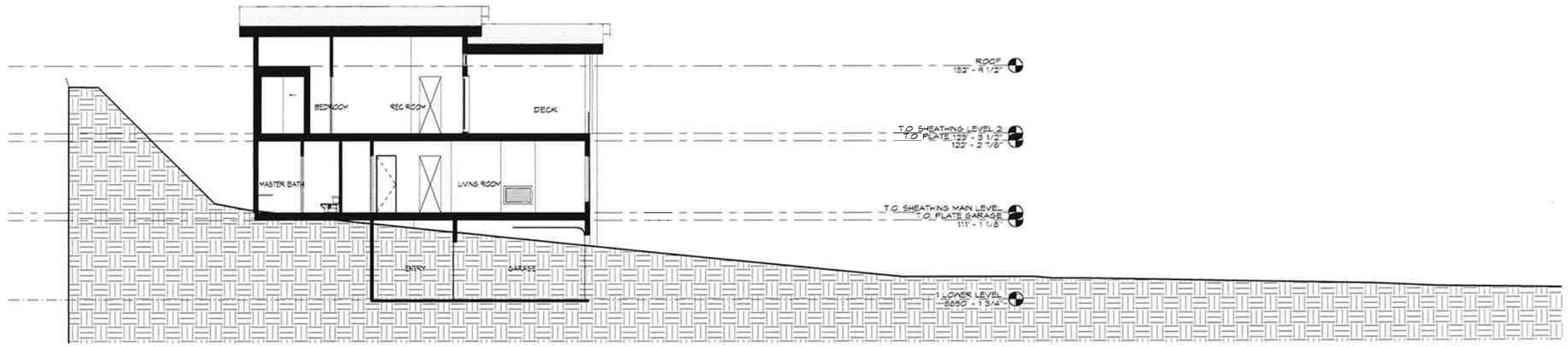


EXAMPLE 2 SITE CONTEXT

SCALE 1/8" = 1'-0"



EXAMPLE 1 SITE CONTEXT

SCALE 1/8" = 1'-0"

NOT FOR CONSTRUCTION

REYNOLDS ASH + ASSOCIATES
ARCHITECTURE
ENGINEERING

CASCADE VILLAGE TOWNHOMES

TBD

A-402

JOB NO. 24029
ISSUE DATE: 7/2/2025

SCENIC CORRIDOR VIEWS

PRINTED: 7/22/2025 3:37:35 PM

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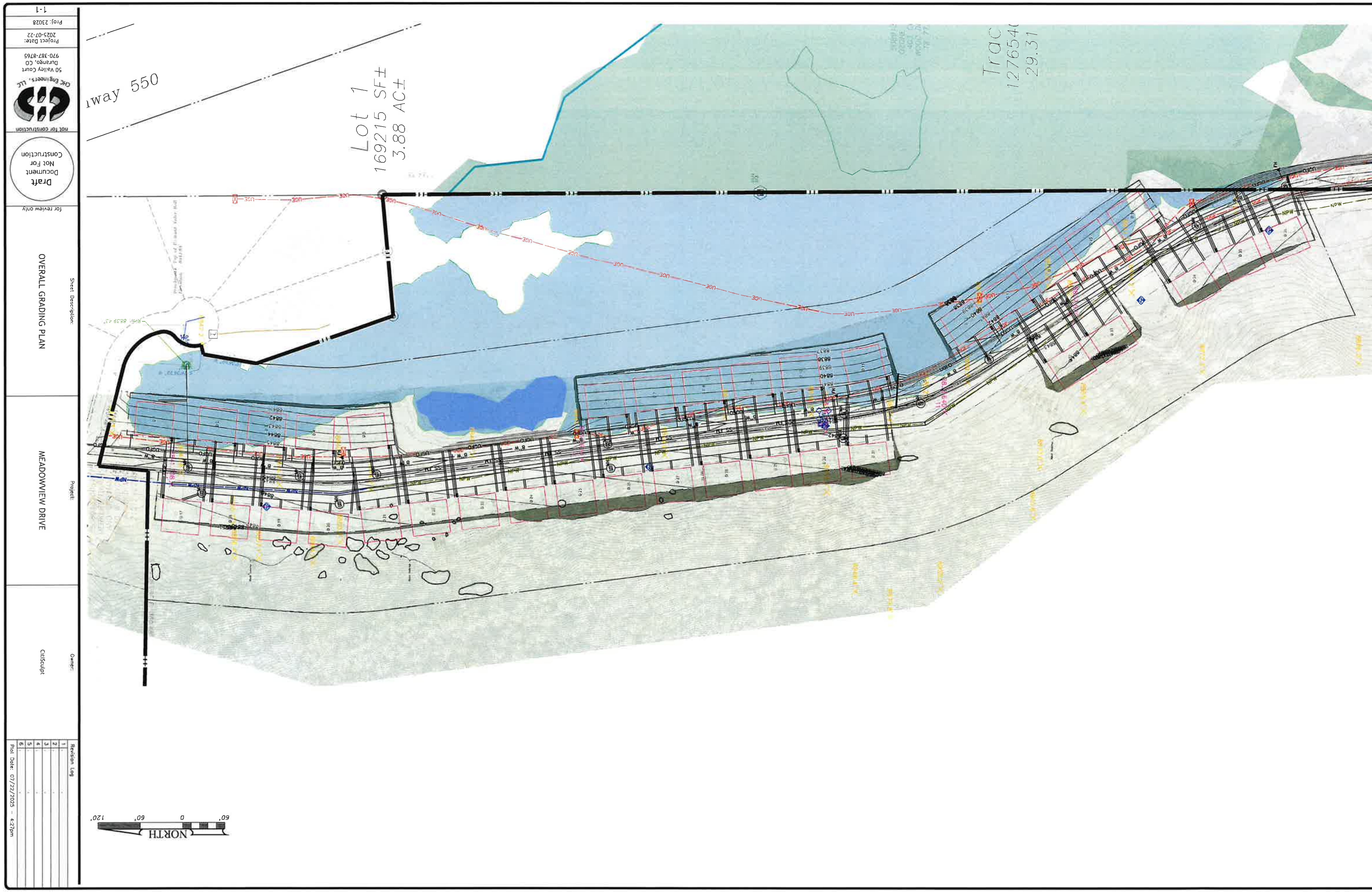
REYNOLDS ASH + ASSOCIATES
ARCHITECTURE ENGINEERING

CASCADE VILLAGE TOWNHOMES

CONCEPTUAL RENDERINGS

SD 100

JOB NO. 24029
ISSUE DATE: 7/21/2025



Lot 1
169215 SF±
3.88 AC±
way 550
Trac
127654
29.31
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Document
Not For
Construction
for review only
not for construction
CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765
Project Date:
2025-07-22
Proj: 23028
1-1
Sheet Description:
OVERALL GRADING PLAN
Project:
MEADOWVIEW DRIVE
Owner:
Revision Log
Plot Date: 07/22/2025 - 4:27pm
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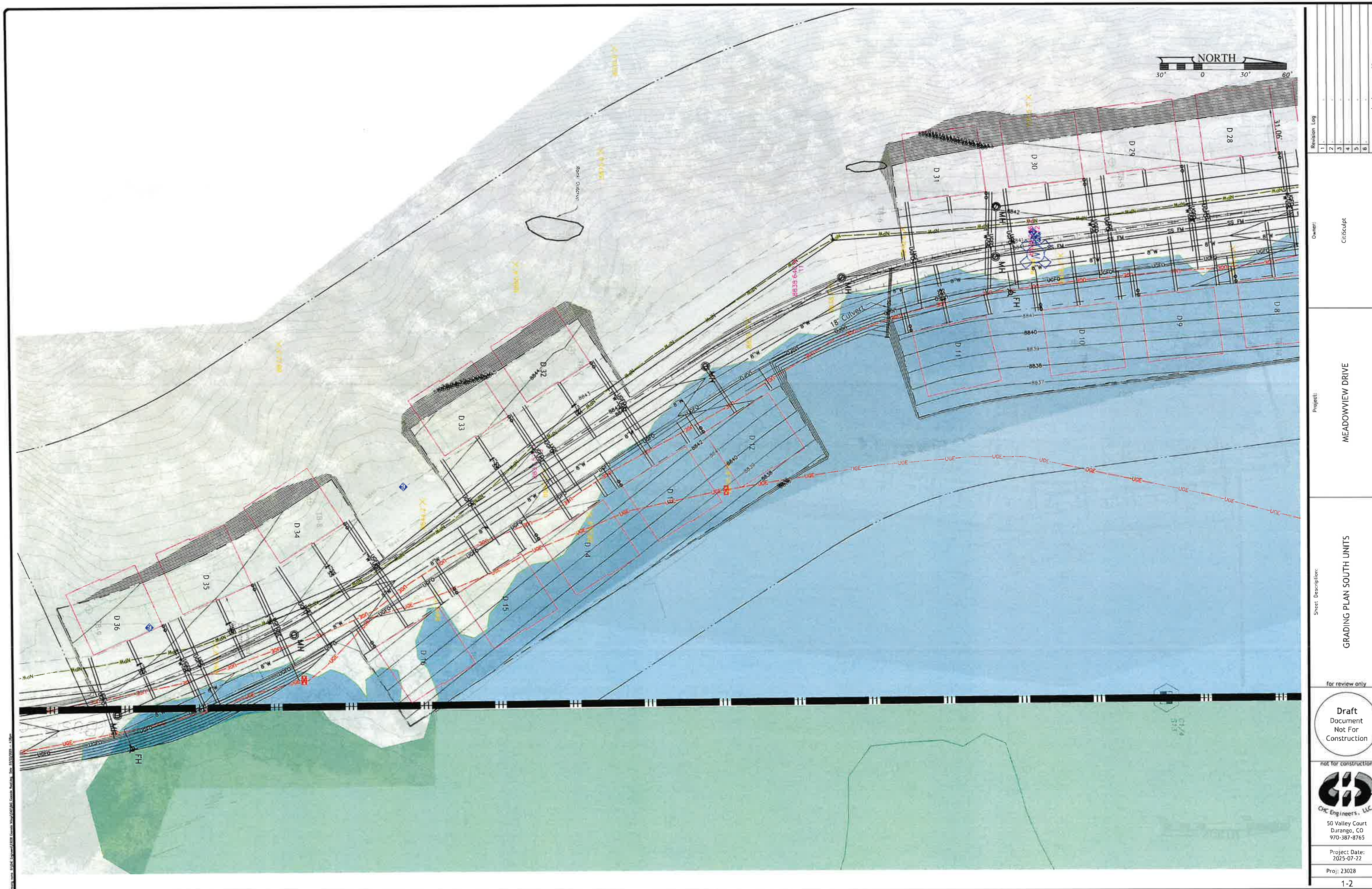
0
60'
120'


NORTH
30' 0 30' 60'
D 28
D 29
D 30
D 31
D 32
D 33
D 34
D 35
D 36
D 8
D 9
D 10
D 11
D 12
D 13
D 14
D 15
D 16
31.06'
Rock Outcrop
18" Culvert
MH
FH
SS FM
8"W
UGE
UGFO
MdN
8842
8841
8840
8839
8838
8837
Revision Log
1
2
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6
Plot Date: 07/22/2025 - 4:28pm
Owner:
CitiSculpt
Project:
MEADOWVIEW DRIVE
Sheet Description:
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for review only
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Document
Not For
Construction
not for construction
CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765
Project Date:
2025-07-22
Proj: 23028
1-2

Lot 1
169215 SF±
3.88 AC±

NORTH
60' 0 60' 120'

1-1

Proj: 23028

Project Date:
2025-07-22

CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765

not for construction

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Document
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Construction

for review only

OVERALL GRADING PLAN

Sheet Description:

MEADOWVIEW DRIVE

Project:

CitiSculpt

Owner:

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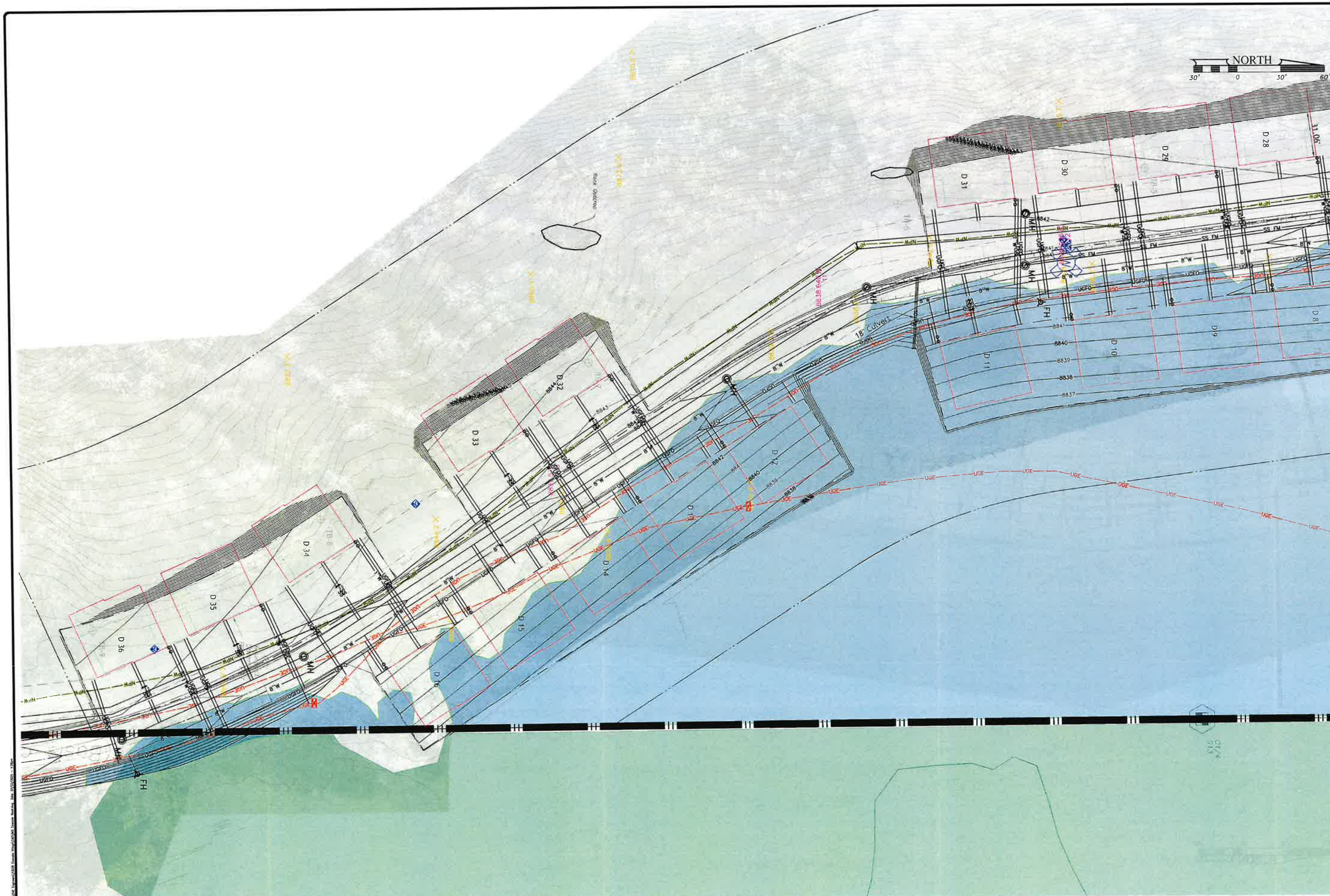

Revision Log
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Plot Date: 07/22/2025 - 4:28pm

Owner:
CitiSculpt

Project:
MEADOWVIEW DRIVE

Sheet Description:
GRADING PLAN SOUTH UNITS

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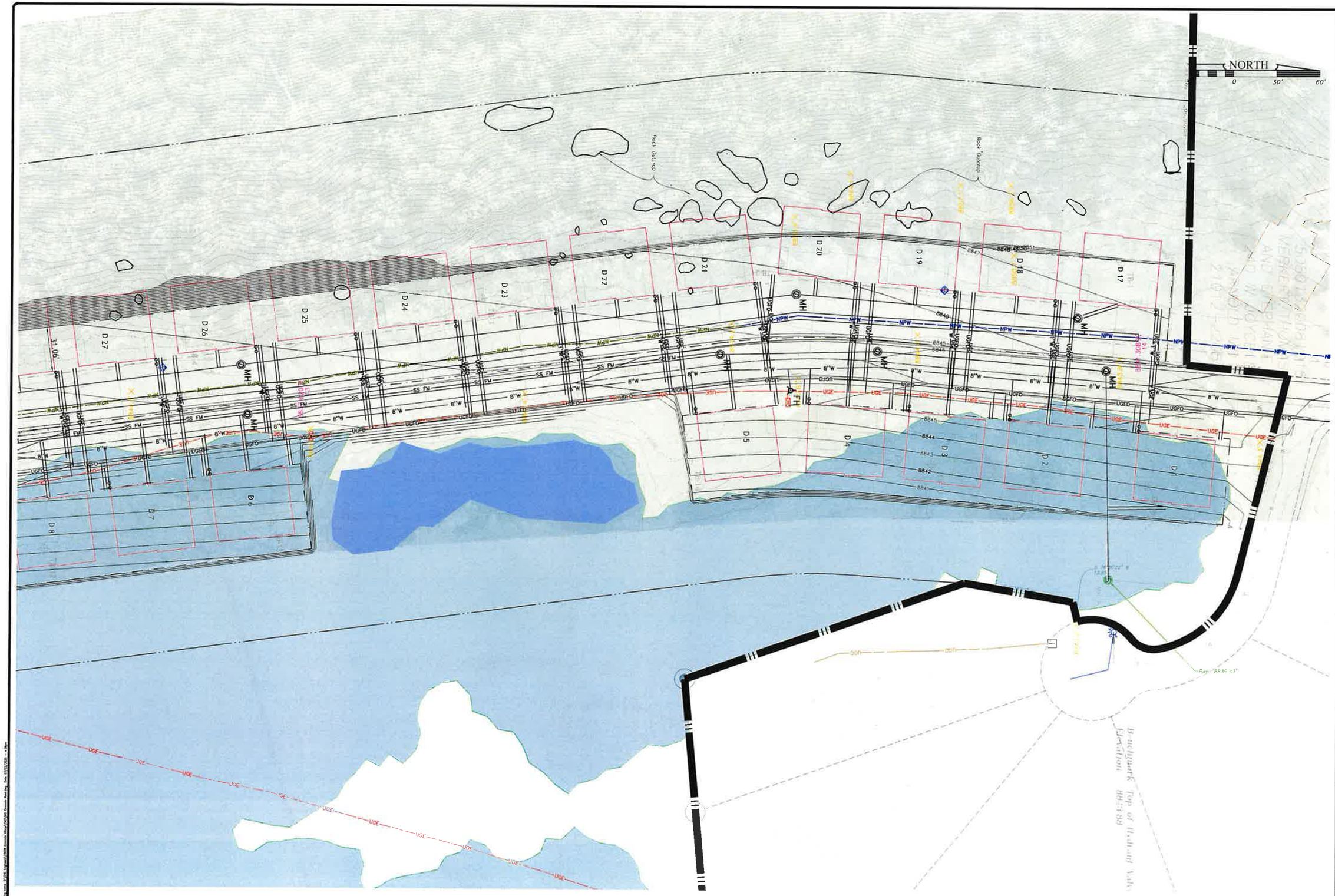
970-387-8765

Project Date:
2025-07-22

Proj: 23028

1-2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30'
60'
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Owner:
CitiSculpt
Project:
MEADOWVIEW DRIVE
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CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765
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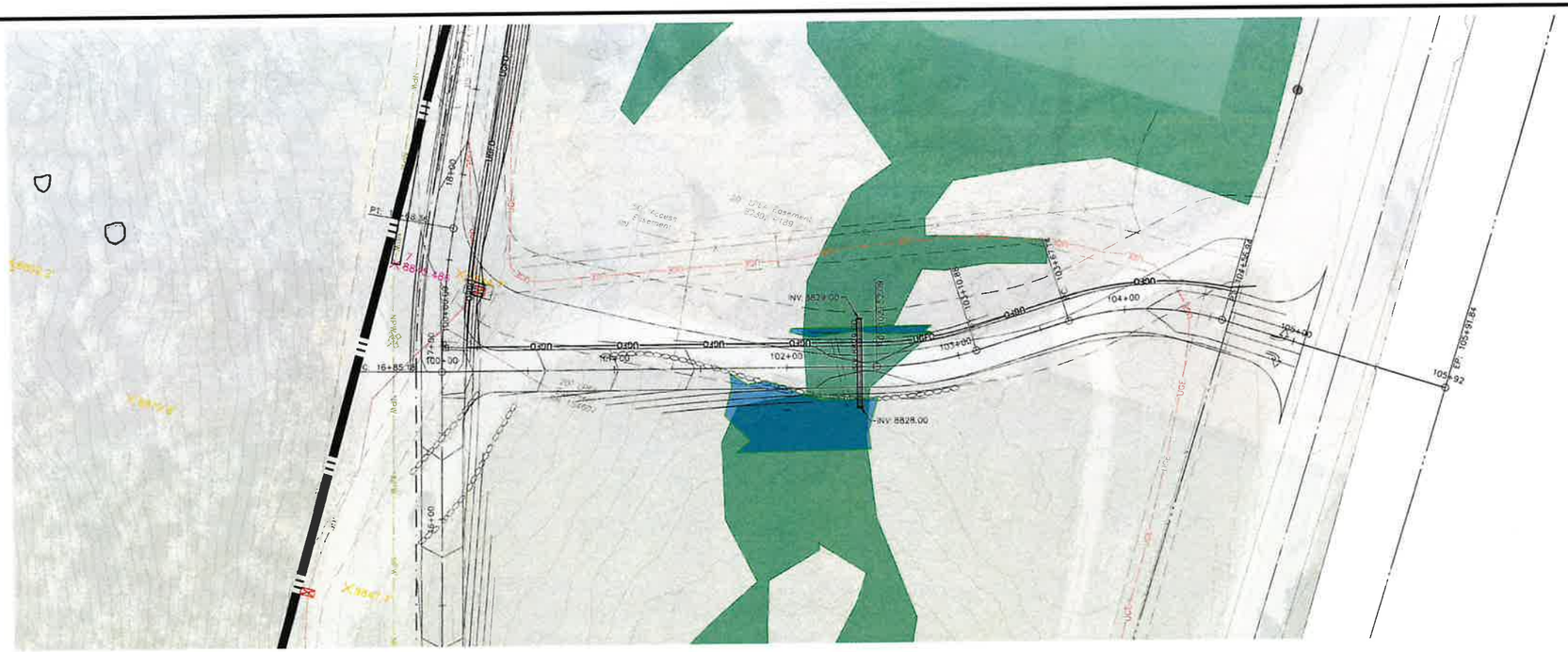
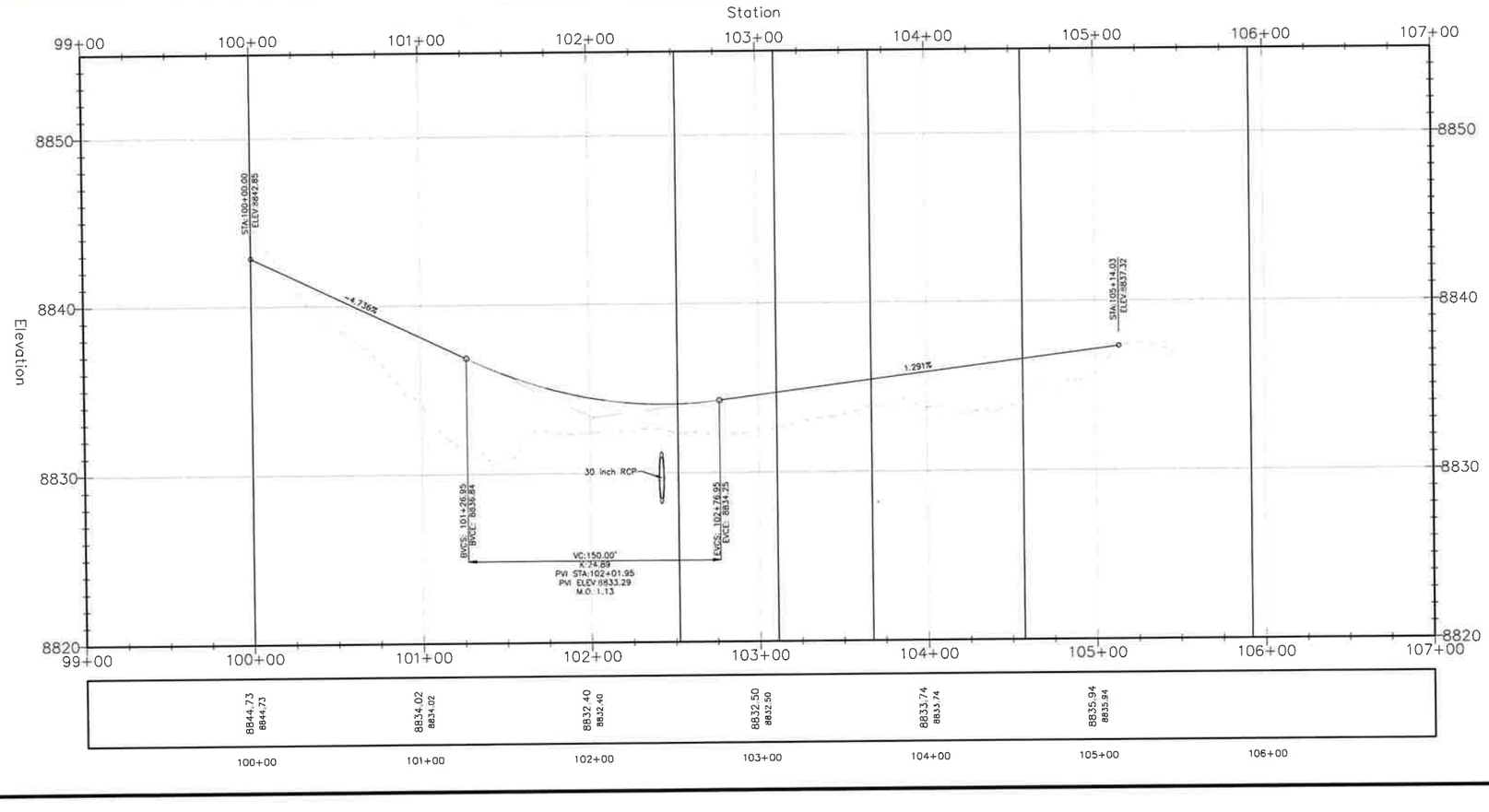
2025-07-22
Proj: 23028
1-2





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Plot Date: 07/22/2025 - 4:28pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

Sheet Description: ACCESS ROAD PLAN AND PROFILE

for review only

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Document
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Construction

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CHC Engineers, LLC
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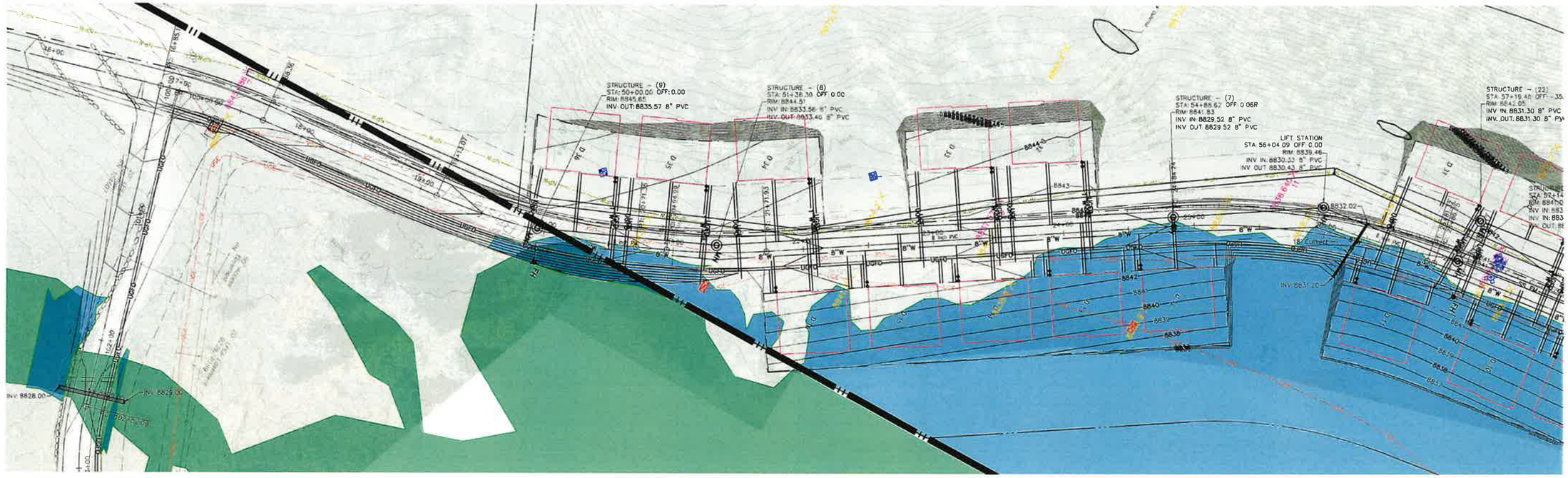
Durango, CO
970-387-8765

Project Date: 2025-07-22

Proj: 23028

2-1



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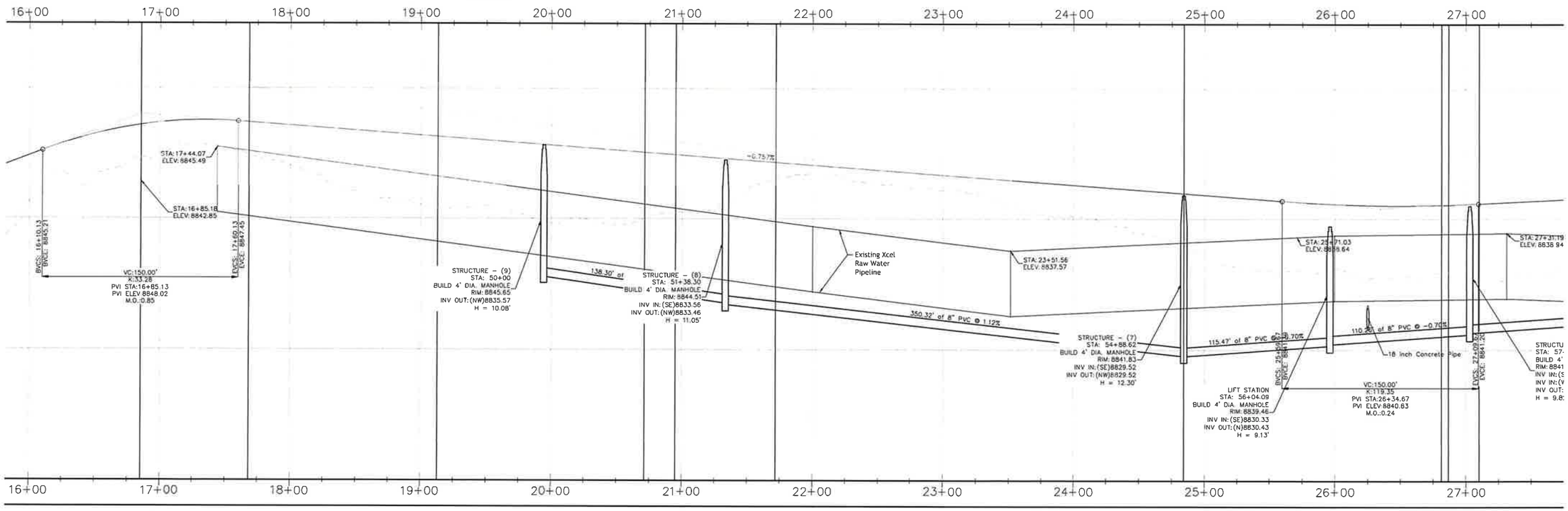

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Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

Sheet Description: MEADOWVIEW NORTH PLAN AND PROFILE

for review only

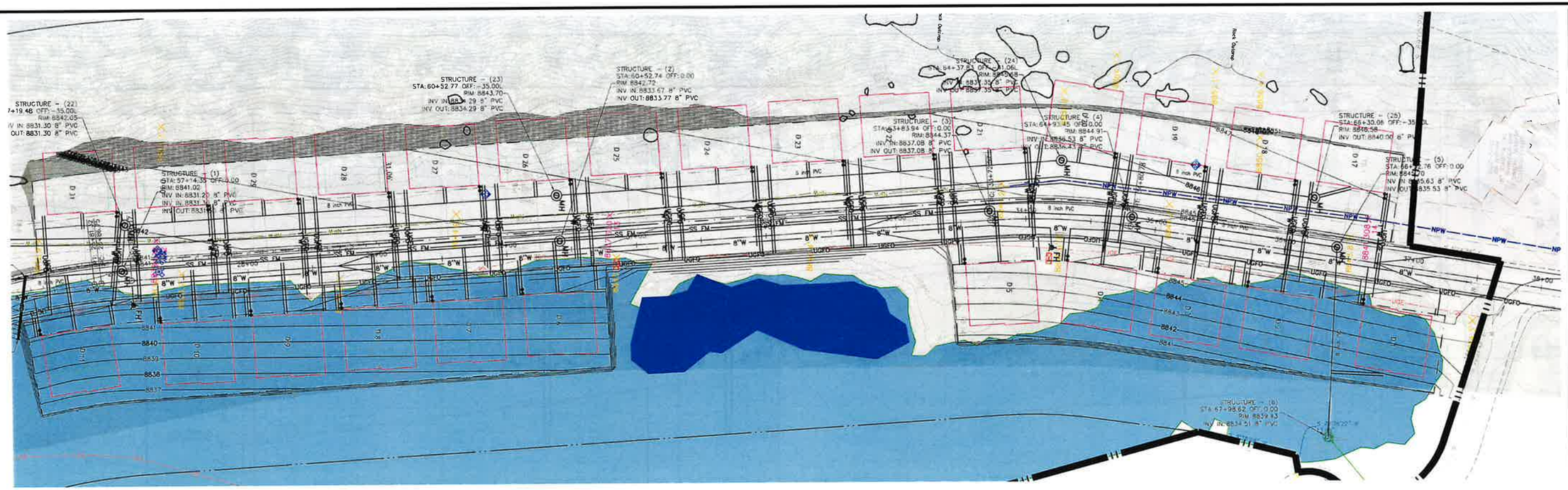
Draft
Document
Not For
Construction

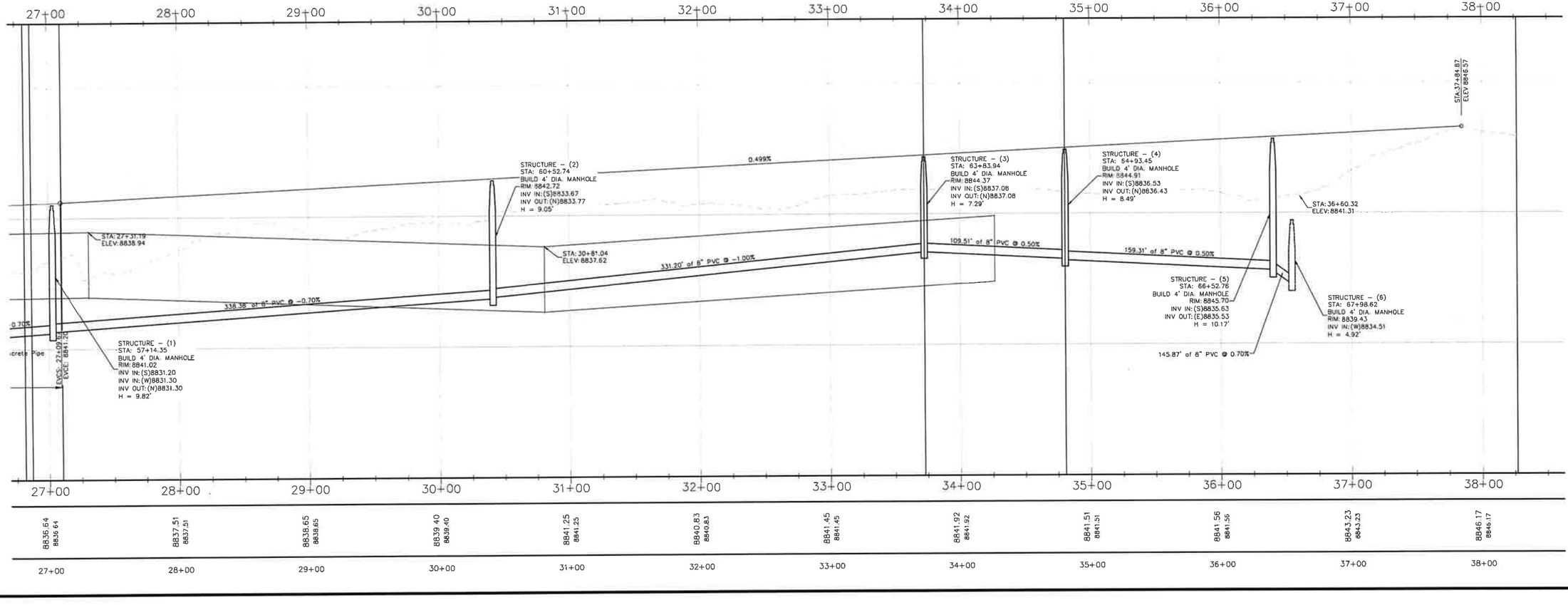
not for construction

CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765

Project Date: 2025-07-22

Proj: 23028





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Plot Date: 07/22/2025 – 4:29pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

Sheet Description: MEADOWVIEW NORTH PLAN AND PROFILE

for review only

Draft
Document
Not For
Construction

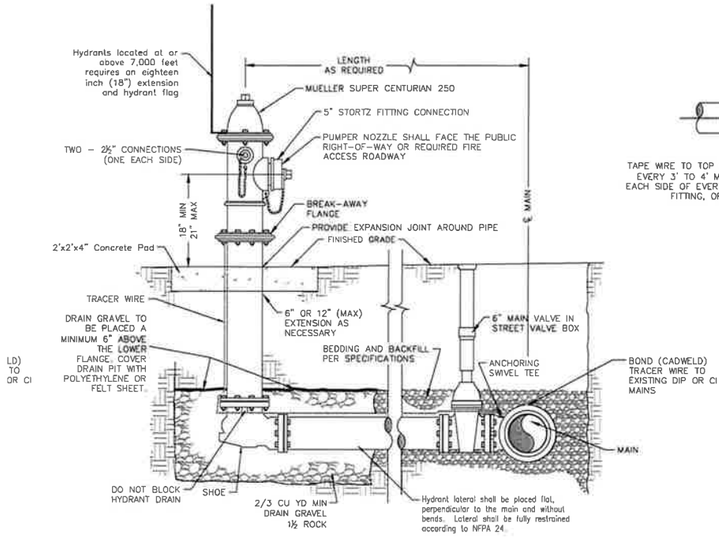
not for construction

CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765

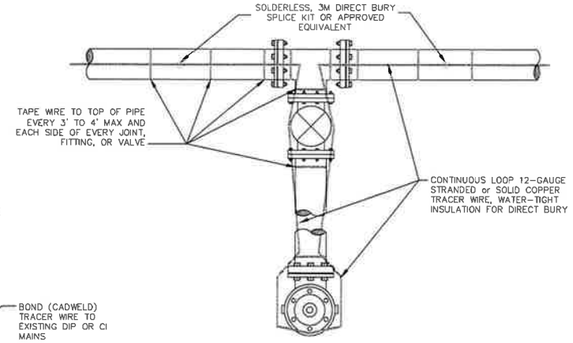
Project Date: 2025-07-22

Proj: 23028

2-3

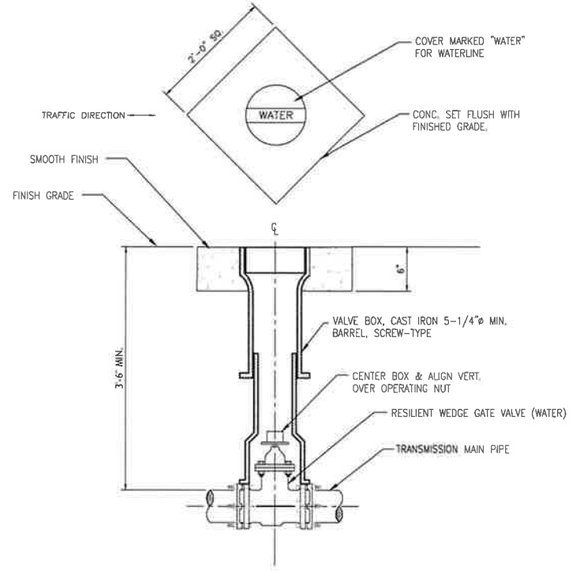


ELEVATION VIEW

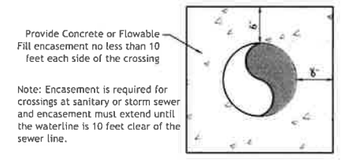


PLAN VIEW

FIRE HYDRANT ASSEMBLY WITH TRACER WIRE INSTALLATION



VALVE AND BOX
NOT TO SCALE



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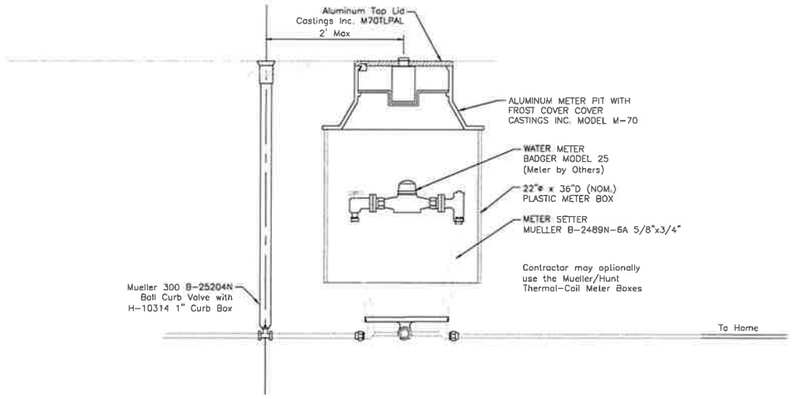

TYPICAL POTABLE WATER SERVICE DETAIL
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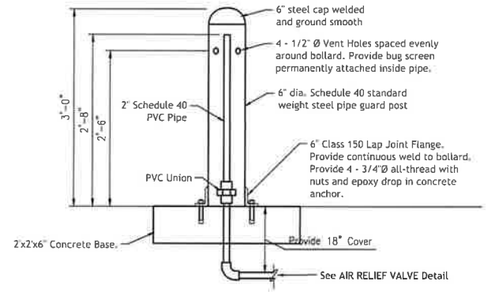
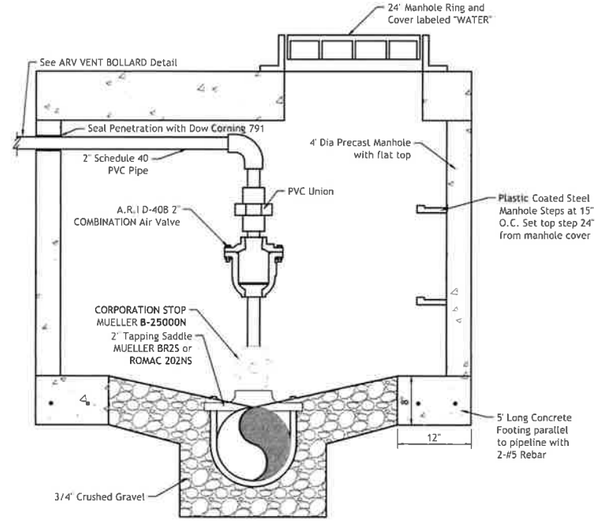


NOTE: PAINT BOLLARD YELLOW IN COLOR.

ARV VENT BOLLARD DETAIL
NOT TO SCALE



AIR RELEASE VALVE
NOT TO SCALE

Revision Log
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Plot Date: 07/22/2025 - 4:09pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

Sheet Description: DETAILS

for review only

Draft
Document
Not For
Construction

not for construction

CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765

Project Date: 2025-07-22

Proj: 23028

3-1

TABLE A

	LENGTH RESTRAINED (L)					
	LARGE					
SMALL	3"	4"	6"	8"	10"	12"
3"	X	20'	40'	50'	70'	80'
4"	X	X	30'	50'	60'	80'
6"	X	X	X	30'	50'	70'
8"	X	X	X	X	30'	50'
10"	X	X	X	X	X	50'

TABLE A NOTES:

1) FLOW FROM LARGE SIZE TO SMALL SIZE PIPE.

TABLE C

	LENGTH RESTRAINED (L)						
	BRANCH (RESTRAINED)						
RUN		3"	4"	6"	8"	10"	12"
	3"	5'	10'	30'	50'	70'	80'
	4"	5'	10'	30'	50'	70'	80'
	6"	5'	10'	20'	40'	60'	70'
	8"	5'	10'	10'	30'	50'	70'
	10"	5'	10'	10'	30'	50'	60'
	12"	5'	5'	5'	20'	40'	60'

TABLE C NOTES:

1) SHORTEST DISTANCE ALLOWABLE BETWEEN TEE END AND FIRST PIPE JOINT ON MAIN RUN IS 5 FEET.
2) FLOW DIRECTION THROUGH TEE DOES NOT AFFECT LENGTH OR JOINT TO BE RESTRAINED.

TABLE B

	LENGTH TO BE RESTRAINED (L)							
	90° HORIZ. ELBOW	45° HORIZ. ELBOW	22½° HORIZ.ELBOW	11¼° HORIZ. ELBOW	45° VERT. OFFSET 3.5' TO 5.0'	22½° VERT. OFFSET 3.5' TO 5.0'	11¼° VERT. OFFSET 3.5' TO 5.0'	DEAD END/ IN-LINE VALVE
3"	10'	5'	5'	5'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	UPPER - 10' LOWER - 5'	30'
4"	20'	10'	5'	5'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	UPPER - 10' LOWER - 5'	40'
6"	20'	10'	5'	5'	UPPER - 30' LOWER - 10'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	50'
8"	30'	10'	10'	5'	UPPER - 40' LOWER - 10'	UPPER - 20' LOWER - 10'	UPPER - 10' LOWER - 5'	70'
10"	30'	20'	10'	5'	UPPER - 50' LOWER - 20'	UPPER - 30' LOWER - 10'	UPPER - 10' LOWER - 5'	80'
12"	30'	20'	10'	5'	UPPER - 50' LOWER - 25'	UPPER - 30' LOWER - 15'	UPPER - 15' LOWER - 10'	90'

TABLE B NOTES:

1) CONTACT ENGINEER FOR RESTRAINT LENGTHS ASSOCIATED WITH OTHER VERTICAL OFFSET DEPTHS.

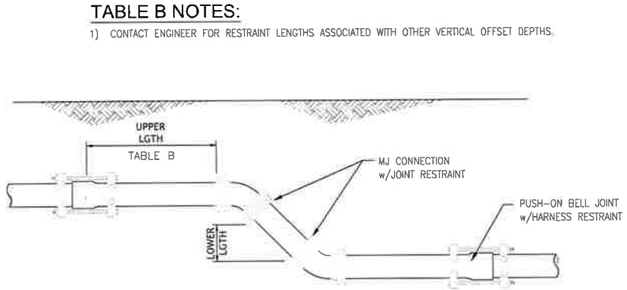
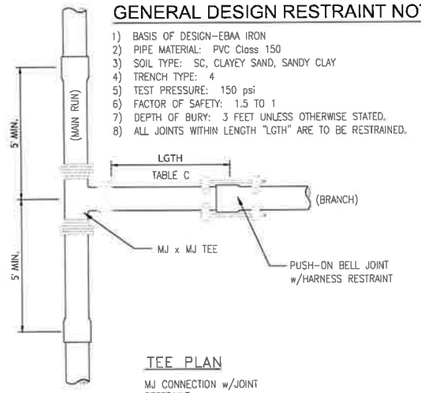


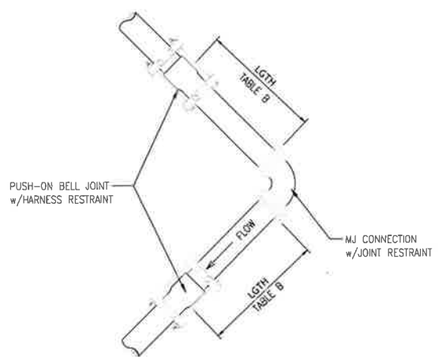
TABLE B

VERTICAL OFFSET PROFILE

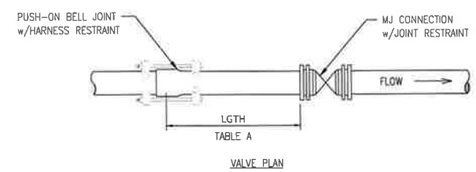


TEE PLAN

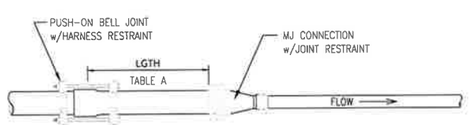
MJ CONNECTION w/JOINT RESTRAINT



ELBOW PLAN



VALVE PLAN



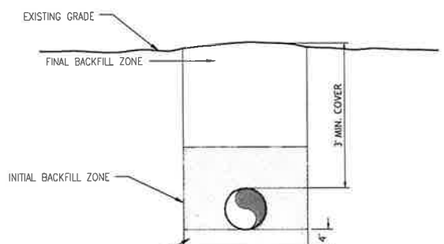
REDUCER PLAN

MECHANICAL JOINT RESTRAINT DETAIL

NOT TO SCALE

GENERAL DESIGN RESTRAINT NOTES:

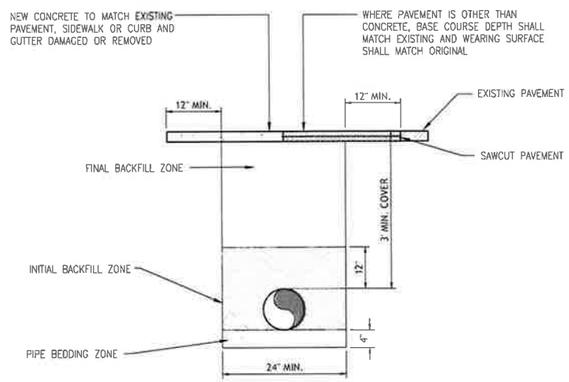
1) BASIS OF DESIGN–EBAA IRON
2) PIPE MATERIAL: PVC Class 150
3) SOIL TYPE: SC, CLAYEY SAND, SANDY CLAY
4) TRENCH TYPE: 4
5) TEST PRESSURE: 150 psi
6) FACTOR OF SAFETY: 1.5 TO 1
7) DEPTH OF BURY: 3 FEET UNLESS OTHERWISE STATED.
8) ALL JOINTS WITHIN LENGTH "LGTH" ARE TO BE RESTRAINED.



NOTE: EXISTING GRADE FOR TOP OF TRENCH IS GROUNDLINE AT TRENCH OR THE ADJACENT ROADWAY WHICH EVER IS LOWER

TYPICAL TRENCH SECTION
UNSURFACED AREAS

NOT TO SCALE



NOTE: EXISTING GRADE FOR TOP OF TRENCH IS GROUNDLINE AT TRENCH OR THE ADJACENT ROADWAY WHICH EVER IS LOWER

TYPICAL TRENCH SECTION
PAVED AREAS

NOT TO SCALE

Revision Log
1 -
2 -
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4 -
5 -
6 -
Plot Date: 01/22/2025 - 4:39pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

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CHC Engineers, LLC
50 Valley Court
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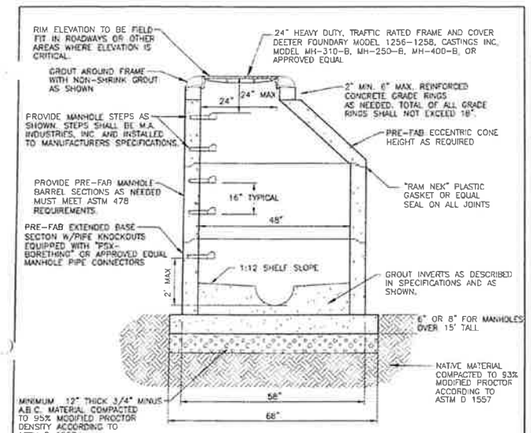
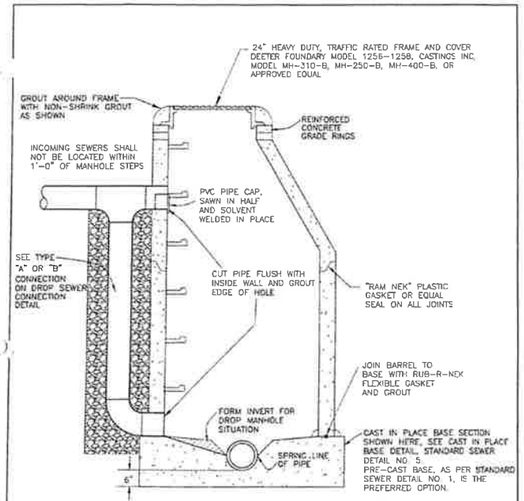


NOTES:

1. 4' MANHOLES SHALL BE USED FOR PIPES UP TO 21" DIAMETER
2. 5' MANHOLES SHALL BE USED FOR PIPES FROM 24"-36" DIAMETER.
3. SPECIAL MANHOLES SHALL BE USED FOR PIPES LARGER THAN 36" DIAMETER.
4. MANHOLES LESS THAN OR EQUAL TO 5' FROM TOP OF CASTING TO INVERT SHALL HAVE FLAT TOPS WITH CONCENTRIC OPENING. ALL ADJUSTING RINGS, CASTINGS, INVERTS, BOTTOMS, ETC., SHALL BE SIMILAR TO SHOWN MANHOLE.
5. IF MANHOLE BASE SECTION IS TO BE PLACED ON NON-SUITABLE SOILS AS DESCRIBED IN THE SPECIFICATIONS, OR IN HIGH GROUNDWATER CONDITIONS, OR AT THE DISCRETION OF THE ENGINEER, OVER EXCAVATION MAY BE REQUIRED AS DESCRIBED IN THE SPECIFICATIONS

STANDARD SEWER DETAIL NO. 1
SEWER MANHOLE DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER01.DWG

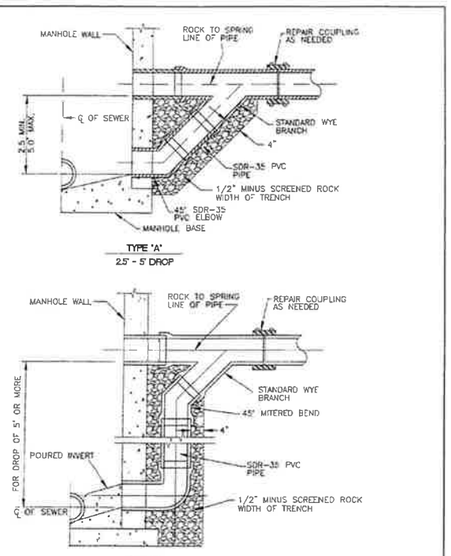


NOTES:

1. DROP MANHOLE SHALL BE PROVIDED WHERE SEWER ENTERS M.H. 18" OR MORE ABOVE LOWEST INVERT OF MANHOLE.
2. SEE NOTES ON STANDARD SEWER MANHOLE DETAIL.

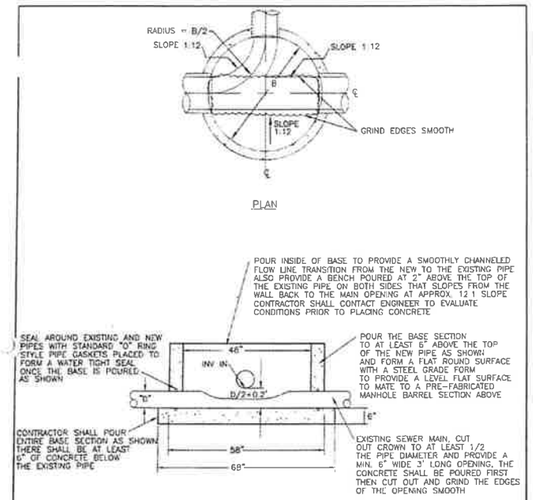
STANDARD SEWER DETAIL NO. 2
DROP SEWER MANHOLE DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER02.DWG



STANDARD SEWER DETAIL NO. 3
DROP SEWER CONNECTION DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER03.DWG

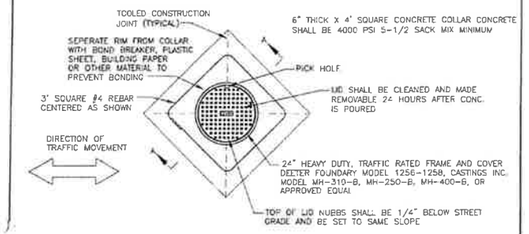


NOTE:

PRE-CAST BASE SECTIONS ARE RECOMENDED FOR ALL NEW CONSTRUCTION. CAST IN PLACE BASE SECTIONS WILL BE ALLOWED AT CONNECTIONS WITH EXISTING MAINS AND IN SPECIAL CONDITIONS WITH THE ENGINEER'S APPROVAL.

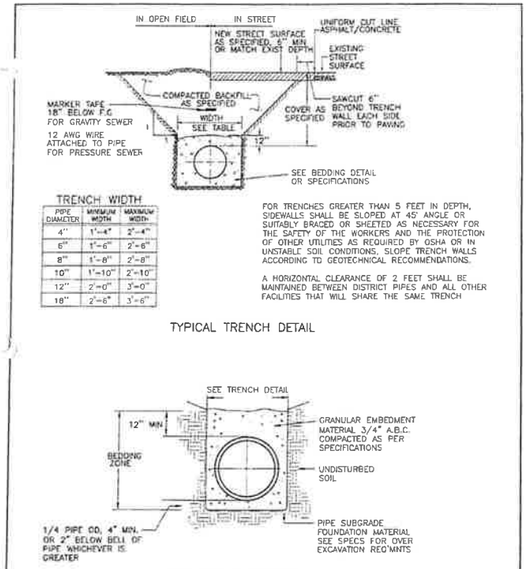
STANDARD SEWER DETAIL NO. 5
CAST IN PLACE MANHOLE BASE DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER05.DWG



STANDARD SEWER DETAIL NO. 7
MANHOLE COLLAR DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER07.DWG



TRENCH WIDTH

PIPE DIAMETER	MINIMUM WIDTH	MAXIMUM WIDTH
4"	1'-4"	2'-4"
6"	1'-6"	2'-6"
8"	1'-8"	2'-8"
10"	1'-10"	2'-10"
12"	2'-0"	3'-0"
18"	2'-6"	3'-6"

FOR TRENCHES GREATER THAN 5 FEET IN DEPTH, SIDEWALLS SHALL BE SLOPED AT 45° ANGLE OR SUITABLY BRACED OR SHEETED AS NECESSARY FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES AS REQUIRED BY OSHA OR IN UNSTABLE SOIL CONDITIONS. SLOPE TRENCH WALLS ACCORDING TO GEOTECHNICAL RECOMMENDATIONS.

A HORIZONTAL CLEARANCE OF 2 FEET SHALL BE MAINTAINED BETWEEN DISTRICT PIPES AND ALL OTHER FACILITIES THAT WILL SHARE THE SAME TRENCH

TYPICAL TRENCH DETAIL

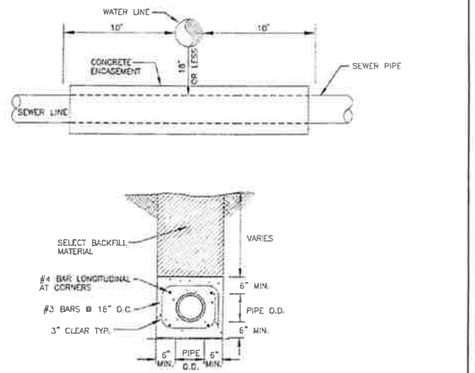
PIPE BEDDING DETAIL

NOTES:

1. MARKER TAPE SHALL BE 6" WIDE, GREEN WITH BLACK LETTERING STATING THE FOLLOWING AS A MINIMUM, "CAUTION SEWER".

STANDARD SEWER DETAIL NO. 8
TYPICAL TRENCH AND BEDDING DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER08.DWG

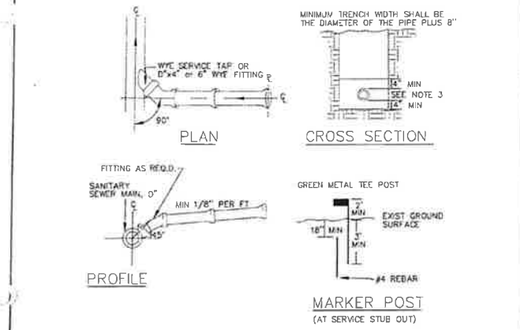


NOTES:

1. THE DISTRICT SHALL REVIEW THIS DETAIL FOR USE ON A CASE BY CASE BASIS. SPECIAL ENCASEMENTS MAY BE REQUIRED AT CREEK CROSSINGS AND CONDUIT CROSSINGS.
2. WHEN SEWER MAIN IS LOCATED ABOVE WATER MAIN, ALWAYS PROVIDE PROTECTION.

STANDARD SEWER DETAIL NO. 9
SEWER CROSSING AND ENCASEMENT DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER09.DWG



NOTES:

1. ALL SERVICE LINES SHALL BE 4" MINIMUM IN DIAMETER.
2. THE MINIMUM SLOPE FOR 4" OR 6" SERVICE LINES SHALL BE 1\6" PER FOOT.
3. BEDDING FOR HOUSE CONNECTION WITHIN DISTRICT R.O.W. SHALL BE THE SAME AS FOR SEWER MAIN, LAID TO A MINIMUM DEPTH OF 4" BELOW THE PIPE INVERT AND 4" ABOVE THE TOP OF THE PIPE.
4. SERVICE LINE WILL BE PLUGGED AT THE PROPERTY LINE WITH APPROPRIATE PLUG FOR TYPE OF LINE INSTALLED UNTIL CONNECTED TO BUILDING. AFTER ABANDONMENT OF A SERVICE LINE IT MUST BE PLUGGED 5' INSIDE THE PROPERTY LINE.
5. CLEANOUT SHALL BE INSTALLED AT PROPERTY LINE IN ACCORDANCE WITH STANDARD SEWER DETAIL NO. 12
6. COMPACTION OF BACKFILL SHALL BE AS STATED IN THE TYPICAL TRENCH DETAIL FOR MAINS.

STANDARD SEWER DETAIL NO. 11
SEWER SERVICE DETAIL

DATE: 6/17/04 | SCALE: N.T.S.
CAD FILE NAME: SEWER11.DWG

Revision Log
1
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Plot Date: 07/21/2025 - 4:28pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

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50 Valley Court
Durango, CO
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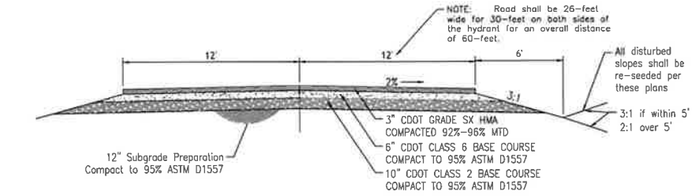
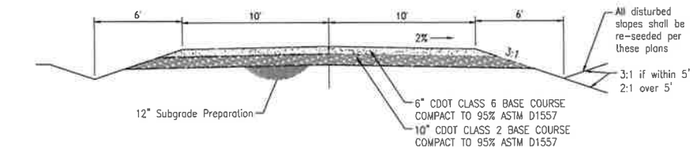
Project Date: 2025-07-22

Proj: 23028



Typical Road Section

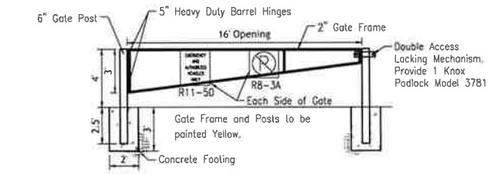
Scale: NTS



Typical Emergency Access Road Section

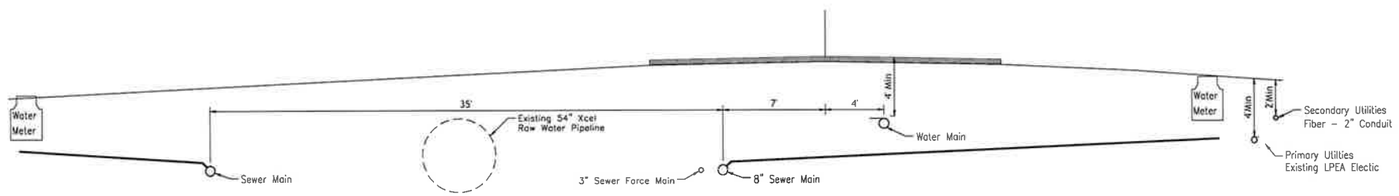
Scale: NTS

Morris Way



Emergency Access Gate

Scale: NTS



Typical Utility Layout

Scale: NTS

Revision Log
1 -
2 -
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4 -
5 -
6 -

Plot Date: 07/22/2025 - 4:29pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

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Document
Not For
Construction

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CHC Engineers, LLC
50 Valley Court
Durango, CO
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Project Date: 2025-07-22

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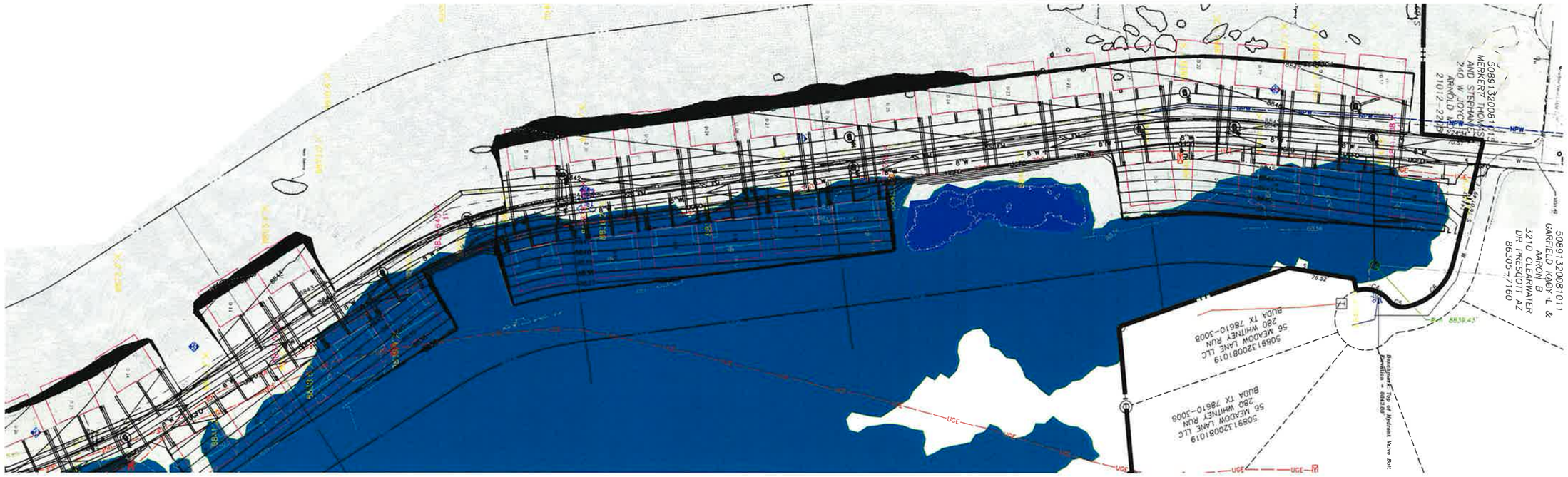
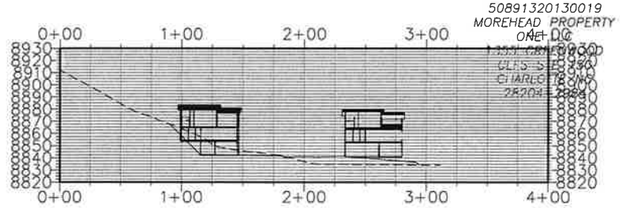
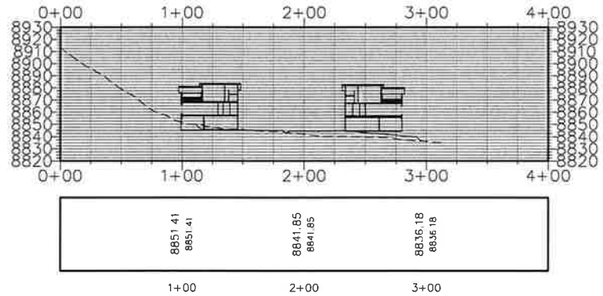


Tract A-1 & Tract B-1
79.3 Acres ± (R)

D10D30 PROFILE



D5 D21 PROFILE



D14D33 PROFILE

D6D26 PROFILE

Tract A-1 & Tract B-1

Revision Log
1
2
3
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6
Plot Date: 07/22/2025 - 4:28pm

Owner: CitiSculpt

Project: MEADOWVIEW DRIVE

Sheet Description: BUILDING SECTIONS

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Construction

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CHC Engineers, LLC
50 Valley Court
Durango, CO
970-387-8765

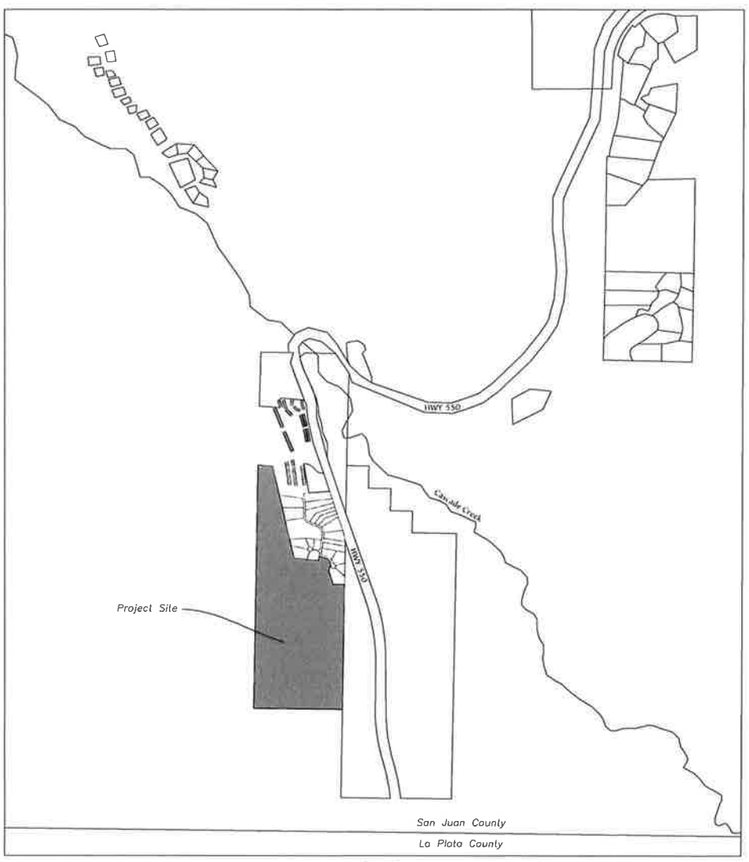
Project Date:
2025-07-22

Proj: 23028

5-1

Cascade Meadows Subdivision
Cascade Village
Tract A-1 & Tract B-1
S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado

Land Use Table		
Lot	Acres (R)	Acres (M)
Tract A-1 & B-1	79.3	79.35
Subdivided	**Acres (M)**	
Lot 1	13.47 Acres	
Lot 2	62.22 Acres	
Lot 3	3.664 Acres	



CERTIFICATE OF OWNERS KNOW BY ALL THESE PRESENTS

That Cascade Meadows, LLC, whose address is 665 Glacier Club Drive #6 Durango, CO 81301, being the legal and record owners of a Tract of land located within S1/2 of Section 12, T39N, R9W, N.M.P.M., in San Juan County, Colorado more particularly described as follows:

That portion of the SE1/4SW1/4 of Section 12, the E1/2NW1/4 and NE1/4SW1/4 Section 13, Township 39 North, Range 9 West, N.M.P.M., San juan County, Colorado, lying and being Westerly of the Westerly right of way of U.S. Highway 550 and Southerly of the following:

Cascade Village Phase 1 Plat recorded May 7, 1981 in Book 222 at Pages 125, 126 and 127.
The Twilight Meadow Subdivision at Cascade Village Plat recorded August 6, 1985 in Book 230 at Page 368.
First Amendment of the Resubdivision of the Twilight Meadow Subdivision at Cascade Village Plat recorded June 10, 1994 in Book 243 at Pages 110 and 111.
The Twilight Meadow Subdivision Phase II at Cascade Village Final Plat recorded July 27, 1999 under Receptiod for record February 12, 1996 as Reception No. 137955.n No. 140023.

NOTE: The above described tract is commonly known as Tracts "A-1" and "B-1" of the Cascade Village Amended Master Plan according to the plat thereof file

Has caused the same to be subdivided and platted under the name and style of Cascade Meadows Subdivision, as shown hereon, consisting of 3 lots named
Lot 1, Lot 2, Lot 3.

THIS PLAT IS HEREBY EXECUTED BY THE FOLLOWING PARTIES:

_____
By Charles Lindsey McAfline, Manager, Cascade Meadows, LLC

STATE OF COLORADO]
SS]
COUNTY OF SAN JUAN]

The foregoing instrument was acknowledged before me by Charles Lindsey McAfline, Manager, Cascade Meadows, LLC on this _____ day, of _____, 2025 for the aforementioned purposes.

_____ _____
My commission Expires Notary Public

CERTIFICATE OF SURVEYOR

I hereby state that this survey and plat was prepared by me or under my direct responsibility, supervision and checking, and that, in my professional opinion, they are true and correct to the best of my knowledge, belief and information based on the applicable standards of practice of Professional Land Surveyors in the State of Colorado. I also state that this survey and plat is not a guaranty or warranty, either expressed or implied.

Joshua J. Casselberry, P.L.S.
Colorado Registration No. 37903

Notice: Title Research - Title, easement and Right-of-Way research was conducted by Colorado Title & Closing Services, LLC, order No. SJ22103593-4 effective December 5, 2021 at 5:00 P.M. and not from research conducted by Moreno Surveying & Geographics, Inc. Any and all parties having interest in subject tracts of land are hereby referred to said title commitments and any title policies issued at a later date.

Notice: According to Colorado law you must commence any legal action based upon any defect in this survey within three (3) years after you first discovered such defect. In no event may any action based upon any defect in this survey be commenced more than ten (10) years from the date of the certification shown hereon.

Notice: Any encroachment of fences across property may indicate that possessory rights are accruing.

CERTIFICATE OF APPROVAL

This plat is hereby approved by the Board of County Commissioners of San Juan County, Colorado, on this _____ day of_____, _____2025 for the aforementioned purposes.

BOARD OF COUNTY COMMISSIONERS
OF SAN JUAN COUNTY, COLORADO

By _____ Attest: _____
Chairman Clerk of Record

STATE OF COLORADO]
SS]
COUNTY OF SAN JUAN]

I hereby state that this instrument was filed for record at _____ O'clock _.M this _____ day of _____ 2025 and duly filed. Reception Number _____ Fee $ _____
By _____
Deputy

Preliminary

Cascade Meadows Subdivision
Cascade Village
Tract A-1 & Tract B-1
S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado

Moreno SURVEYING GEOGRAPHICS
3050 Main Avenue, Durango, CO (970) 385-8535

DATE: 7-30-2025 SCALE: 1 inch = 1000 feet
DRAWN BY: BM CHECKED BY: JC JOB NO.: 2024-020

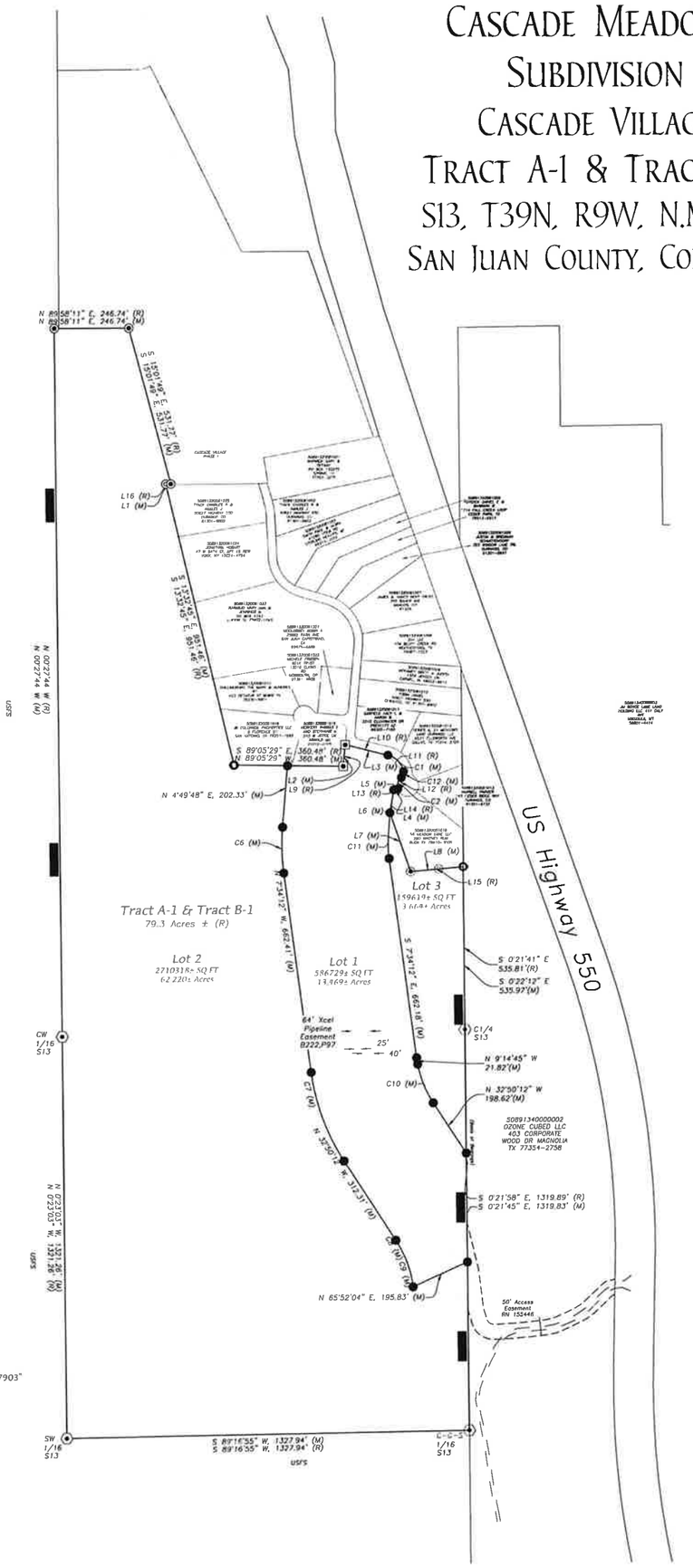
SHEET 1 OF 2

Cascade Meadows Subdivision
Cascade Village
Tract A-1 & Tract B-1
S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado

Scale : 1 inch = 200 feet
Lineal Units are U.S. Survey Feet
Basis of Bearings: Bearings are based on the assumption that the East line of the NE1/4 SW1/4 of Section 13, bears South 00°21'45" East, monumented as shown hereon
Countour Interval: 2 Foot
Datum: NAVD 88

Line Table			Line Table		
L#	Direction	Length	L#	Direction	Length
L1 (M)	N 89°58'53" E	16.73'	L9 (R)	N 5°24'34" E	70.51'
L2 (M)	N 5°24'34" E	70.51'	L10 (R)	S 76°01'49" E	144.57'
L3 (M)	S 76°01'49" E	144.57'	L11 (R)	S 43°34'59" E	74.09'
L4 (M)	N 76°36'22" E	13.85'	L12 (R)	S 17°17'17" W	39.17'
L5 (M)	N 76°36'22" E	13.85'	L13 (R)	S 76°36'22" W	13.85'
L6 (M)	N 9°38'59" E	76.52'	L14 (R)	S 9°38'59" W	76.52'
L7 (M)	N 19°12'22" W	205.27'	L15 (R)	N 84°58'11" E	172.74'
L8 (M)	S 84°56'42" W	172.65'			

Curve Table					
C#	Length	Radius	Delta	Chord	Chord Bearing
C1 (M)	78.20'	69.05'	64°53'27"	74.09'	N 43°34'59" W
C2 (M)	41.57'	35.00'	68°03'08"	39.17'	N 17°17'17" E
C6 (M)	151.49'	700.00'	12°24'00"	151.20'	S 1°22'12" E
C7 (M)	314.02'	721.94'	24°55'17"	311.55'	S 20°01'51" E
C8 (M)	46.16'	300.00'	8°49'00"	46.12'	S 28°25'42" E
C9 (M)	118.65'	321.38'	21°09'11"	117.98'	S 16°45'42" E
C10 (M)	137.95'	350.00'	22°35'00"	137.06'	N 21°32'42" W
C11 (M)	70.08'	350.00'	11°28'22"	69.97'	N 1°50'01" W



Legend

- Found: Bureau of Land Management 3-1/4 inch pipe monument stamped as noted
- Found: 5/8 inch rebar with 1-1/2 inch aluminum cap stamped "PLS 16399"
- Found: 5/8 inch rebar with 1-1/2 inch aluminum cap stamped "PLS 22574"
- Found: 5/8 inch rebar with 1-1/2 inch aluminum cap stamped "PLS 29026"
- Found: 5/8 inch rebar with 1-1/2 inch aluminum cap stamped "PLS 25963"
- Set: 1-1/2 Inch aluminum cap on 5/8 X 24 inch rebar stamped "CASSELBERRY PLS 37903"
- (R) Record Dimension RN 141
- (M) Measured
- Property Line
- Xcel Pipeline Easement
- Access Easment

SURVEYOR STATEMENT:
This topographic survey of a portion of Cascade Village, Tracts A-1 & B-1 as shown on the Cascade Village Results of Survey plat recorded on October 19, 2005 at Reception No. 141 in the San Juan County Surveyor's Land Survey Plats was aerial surveyed by Geospatial Applications, LLC on May 19, 2024 under the direct responsibility, supervision and checking of Joshua J. Casselberry, of Moreno Surveying and Geographics, Inc., being a Colorado Licensed Surveyor. It does not constitute a Land Survey Plat or Improvement Survey Plat as defined by section 38-51-102 C.R.S.

Joshua J. Casselberry, P.L.S.
Colorado Registration No. 37903

PRELIMINARY

1. BENCHMARK: PT# 4376, top of hydrant valve bolt with elevation of 8843.88' as shown hereon.
2. SURVEY CONTROL NOTE: Location of improvements is based upon found survey monuments as shown hereon.
3. UNDERGROUND UTILITIES: Utilities as shown are from individual utility companies field locations and not by Moreno Surveying and Geographics.
4. TITLE RESEARCH: Title, easement and right-of-way research was conducted by Colorado Title and Closing Services, LLC per Order No. SJ22103593-4 (AMENDED), effective date December 5, 2021 at 5:00 PM, and not from research conducted my Moreno Surveying and Geographics, Inc. Any and all parties having interest in the subject tracts of land are hereby referred to said title commitments and any title policies issued at a later date.
5. According to Colorado law you must commence any legal action based upon any defect in the this survey within three (3) years after you first discovered such defect. In no event may any action based upon any defect in this survey be commenced more than ten (10) years from the date of the certification shown hereon.

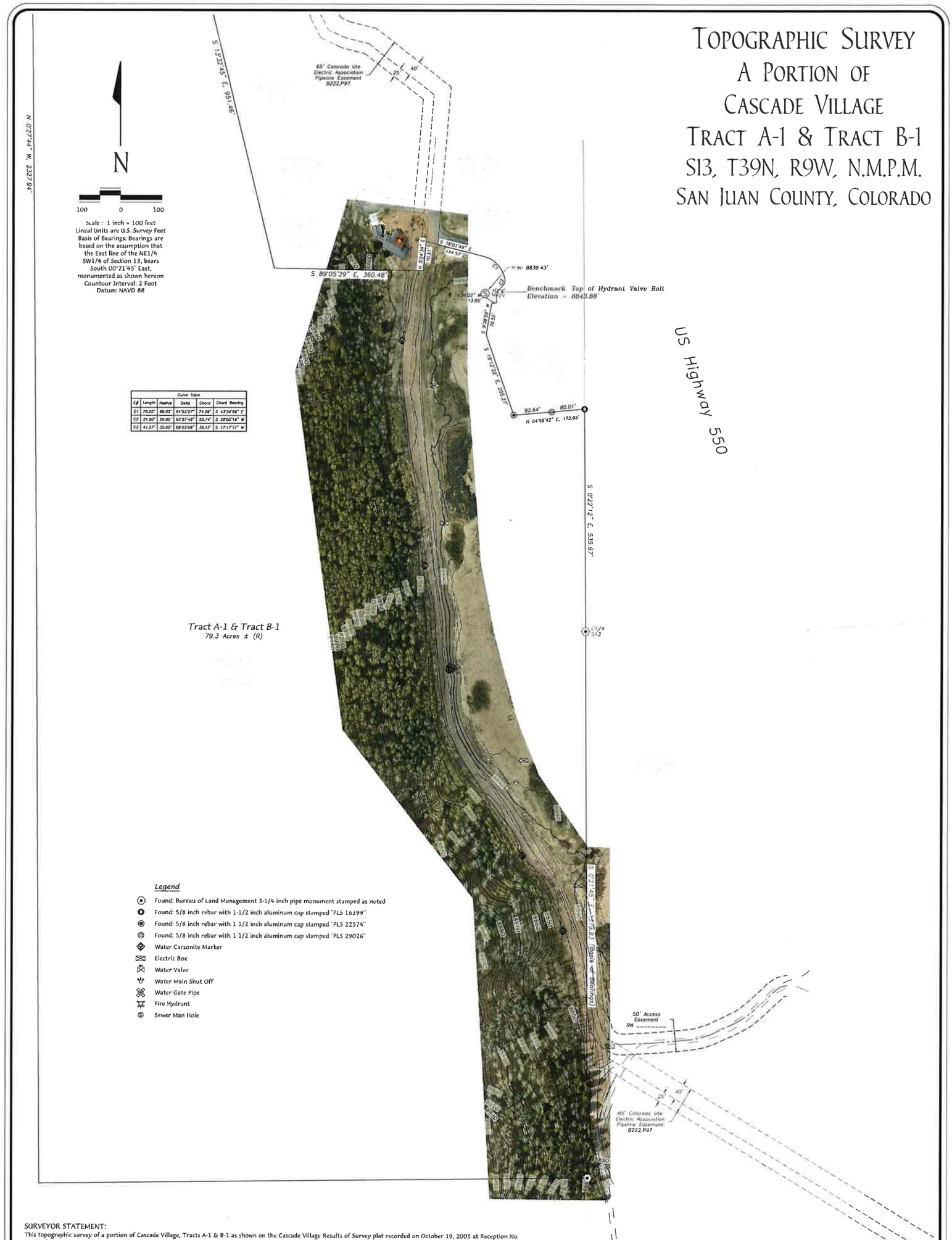
Cascade Meadows Subdivision
Cascade Village
Tract A-1 & Tract B-1
S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado

Moreno SURVEYING & GEOGRAPHICS
3050 Main Avenue, Durango, CO (970) 385-8535

SHEET 2 OF 2

DATE: 7/30/2025 SCALE: 1 INCH = 200 FEET
DRAWN BY: JWJ CHECKED BY: JK JOB NO.: 8124.038

Topographic Survey
A Portion of
Cascade Village
Tract A-1 & Tract B-1
S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado



Curve Table					
Cgl	Length	Radius	Delta	Chord	Chord Bearing
C1	78.20'	80.00'	64°53'27"	74.08'	S 43°34'58" E
C2	21.80'	20.00'	62°27'48"	20.74'	S 20°05'18" W
C3	41.57'	35.00'	68°03'08"	39.17'	S 17°17'37" W

Legend

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- Water Carsonite Marker
- Electric Box
- Water Valve
- Water Main Shut Off
- Water Gate Pipe
- Fire Hydrant
- Sewer Man Hole

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Topographic Survey
A Portion of
Cascade Village
Tract A-1 & Tract B-1

S13, T39N, R9W, N.M.P.M.
San Juan County, Colorado

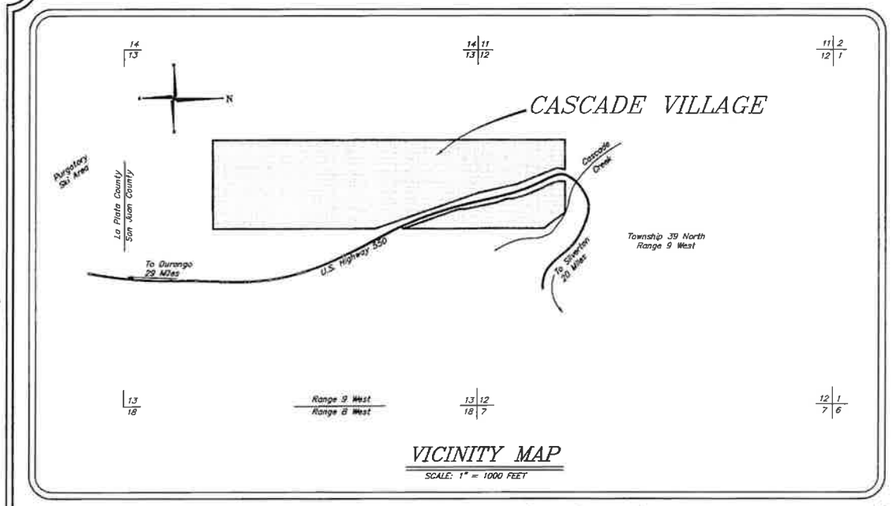
Moreno SURVEYING GEOGRAPHICS
3090 Main Avenue, Durango, CO (970) 385-8535

Sheet 1 of 1

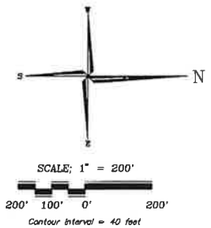
DATE: 6.3.2024 SCALE: 1 inch = 100 feet
DRAWN BY: JM CHECKED BY: JC JOB NO.: 2024-020

CASCADE VILLAGE
AMENDED MASTER PLAN

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO



VICINITY MAP
SCALE: 1" = 1000 FEET

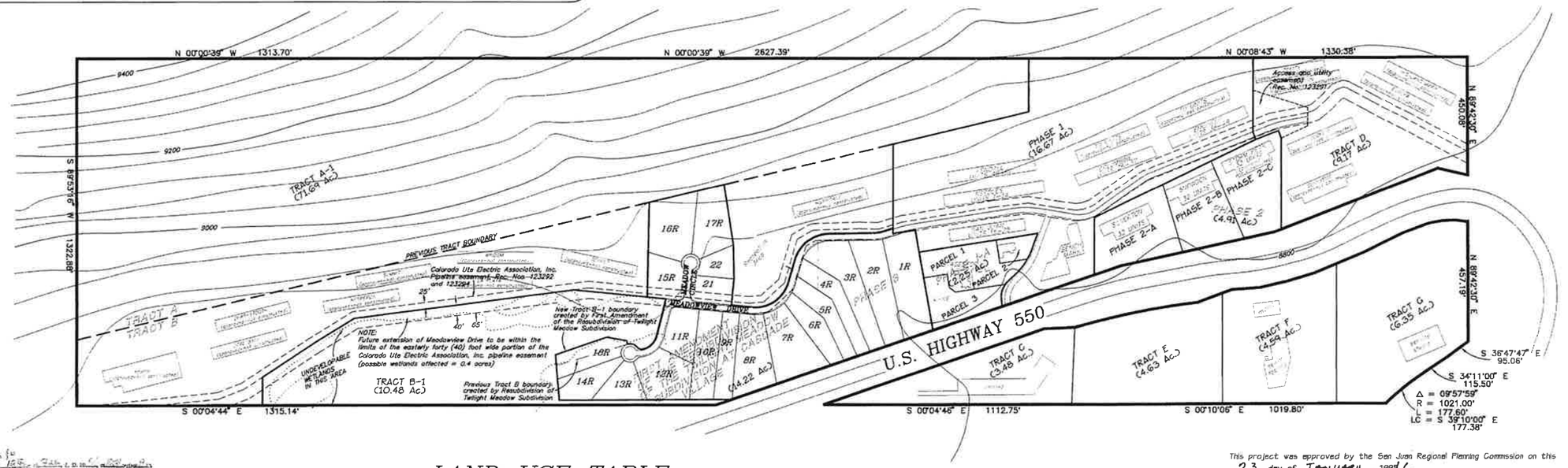


DEVELOPED BY:

CASCADE VILLAGE INVESTMENT VENTURE
50827 U.S. HIGHWAY 550
DURANGO, COLORADO 81301
(970) 259-3500

ENGINEER AND SURVEYOR:

GOFF ENGINEERING AND SURVEYING, INC.
P.O. BOX 97
DURANGO, COLORADO 81302
(970) 247-1705



LAND USE TABLE

ORIGINAL MASTER PLAN

TRACT	UNITS	AREA	DENSITY	DEDICATION
TRACT A	0	52.91 Ac.		OPEN SPACE
TRACT B (AND FUTURE PHASES)	177	29.26 Ac.	6.05 UNITS/Ac.	RESIDENTIAL
TWILIGHT MEADOW	26	14.22 Ac.	1.83 UNITS/Ac.	RESIDENTIAL
PHASE 1	111	16.67 Ac.	6.66 UNITS/Ac.	RESIDENTIAL/COMMERCIAL
PHASE 1-A	0	2.25 Ac.		COMMERCIAL/OPEN SPACE
PHASE 2	96	4.91 Ac.	19.55 UNITS/Ac.	RESIDENTIAL
C	0	3.48 Ac.		LODGE/COMMERCIAL
D	75	9.17 Ac.	8.18 UNITS/Ac.	RESIDENTIAL
E	0	4.63 Ac.		OPEN SPACE
F	0	4.59 Ac.		MAINTENANCE/SEWER
G	0	6.35 Ac.		COMMERCIAL/RECREATION
TOTALS	485	148.44 Ac.	3.27 UNITS/Ac.	

AMENDED MASTER PLAN

TRACT	UNITS	AREA	DENSITY	DEDICATION
TRACT A-1	177	71.69 Ac.	2.47 UNITS/Ac.	RESIDENTIAL
TRACT B-1	0	10.48 Ac.		OPEN SPACE UNDEVELOPABLE WETLANDS
TWILIGHT MEADOW	26	14.22 Ac.	1.83 UNITS/Ac.	RESIDENTIAL
PHASE 1	111	16.67 Ac.	6.66 UNITS/Ac.	RESIDENTIAL/COMMERCIAL
PHASE 1-A	0	2.25 Ac.		COMMERCIAL/OPEN SPACE
PHASE 2	96	4.91 Ac.	19.55 UNITS/Ac.	RESIDENTIAL
C	0	3.48 Ac.		LODGE/COMMERCIAL
D	75	9.17 Ac.	8.18 UNITS/Ac.	RESIDENTIAL
E	0	4.63 Ac.		OPEN SPACE
F	0	4.59 Ac.		MAINTENANCE/SEWER
G	0	6.35 Ac.		COMMERCIAL/RECREATION
TOTALS	485	148.44 Ac.	3.27 UNITS/Ac.	

This project was approved by the San Juan Regional Planning Commission on this 23 day of JANUARY, 1996.

By: Chairman Attest: Secretary

CERTIFICATION OF APPROVAL:
This project was reviewed and approved by the Board of County Commissioners of San Juan County, Colorado, on this 13th day of February, 1996.

BOARD OF COUNTY COMMISSIONERS
OF SAN JUAN COUNTY, COLORADO

By: Chairman Attest: County Clerk

GOFF
ENGINEERING & SURVEYING
555 SOUTH CAMINO DEL RIO
P.O. BOX 97
DURANGO, COLORADO 81302
(303) 247-1705

CASCADE VILLAGE MASTER PLAN
CASCADE VILLAGE INVESTMENT VENTURE
Sections 12 and 13, T 39 N, R 9 W, N.M.P.M.

SHEET 1 OF 1

PREPARED BY: D. COSTER | CHECKED BY: T. WHITE
SCALE: 1" = 200 FEET | DATE: OCTOBER 26, 1995

FILE: CASCADE\MAP
JOB # 304

Traffic Impact Study –Draft Report

Cascade Village

Durango, Colorado

January 20, 2025

SEH

Building a Better World for All of Us®

Engineers | Architects | Planners | Scientists

SEH

Building a Better World for All of Us®

Contents

Contents (continued)

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List of Figures

List of Appendices

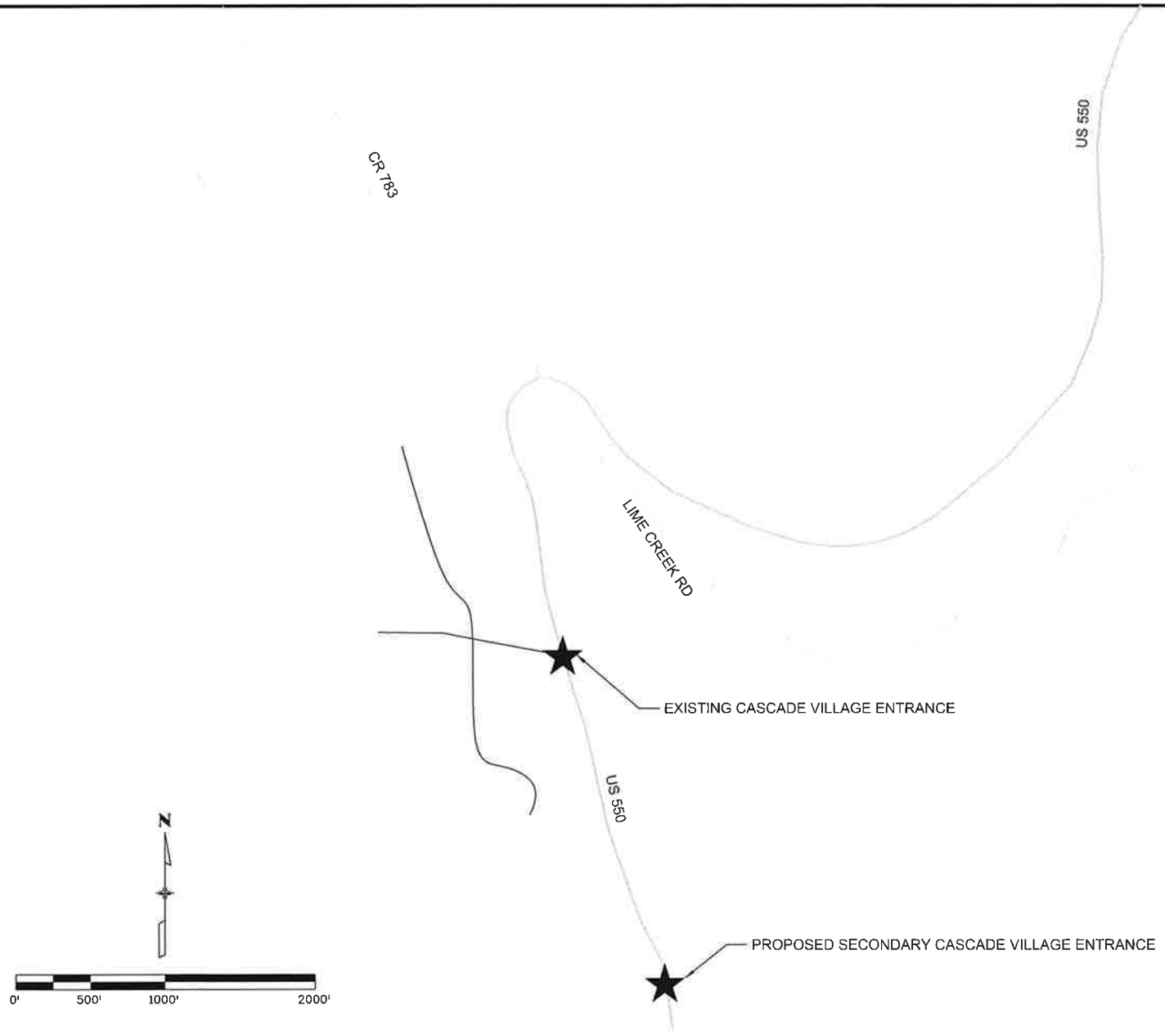
Traffic Impact Study – Draft Report

Prepared for Reynolds Ash & Associates

1 Introduction

Short Elliott Hendrickson Inc. (SEH) is pleased to provide this traffic impact study for the proposed Cascade Village development in Durango, Colorado at 50827 US 550. The development is located adjacent to the existing Cascade Village development approximately a mile north of Purgatory Ski Resort.

The purpose of this study is to identify traffic impacts and recommend mitigation measures associated with the proposed development of the site. This study examines intersection operations for existing, short-term (Year 2026), and long-term (Year 2046) traffic conditions. Typical weekday morning and evening peak periods were analyzed for site-specific impacts. A vicinity map showing the site location in relation to the surrounding roadway network is provided in **Figure 1**.



SEH

Traffic Impact Study - Cascade Village

VICINITY MAP

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	1

2 Project Description

2.1 Proposed Development

The proposed Cascade Village is located on two separate sites. The first site (Site 1) includes Tract C and is located directly across the existing entrance to Cascade Village along US 550. Tract C is proposed to include 24 townhomes. **Figure 2** displays the proposed site plan.

The second site (Site 2) includes Tracts A and B and is displayed in the attached site plan. The site plan calls out 92 townhomes, 9 cabins, 5 single family homes, 10 condos townhomes, and two commercial properties that will include a small deli and retail space. **Figure 3** displays the proposed site plan.

2.2 Site Access

Two site accesses to the Cascade Village development are proposed. The first is a full movement access to US 550 at Site 1. The access will be adding an east leg onto the existing intersection that currently serves the existing Cascade Village property. **Figure 2** displays the proposed access point for Site 1.

The second proposed site access is located at Site 2 that includes Tracts A and B. The proposed access is approximately 3,000 feet south of the existing Cascade Village intersection. **Figure 3** displays the proposed access point for Site 2.

2.3 Study Area and Evaluation Parameters

The project study area includes the two site accesses. Per the direction of the client, the anticipated opening date for the development is 2026. Average weekday morning and evening peak hour operations were evaluated for the existing year, short-term (Year 2026), and long-term (Year 2046) scenarios.

Figure 2 - Site One (Tract C) Site Plan

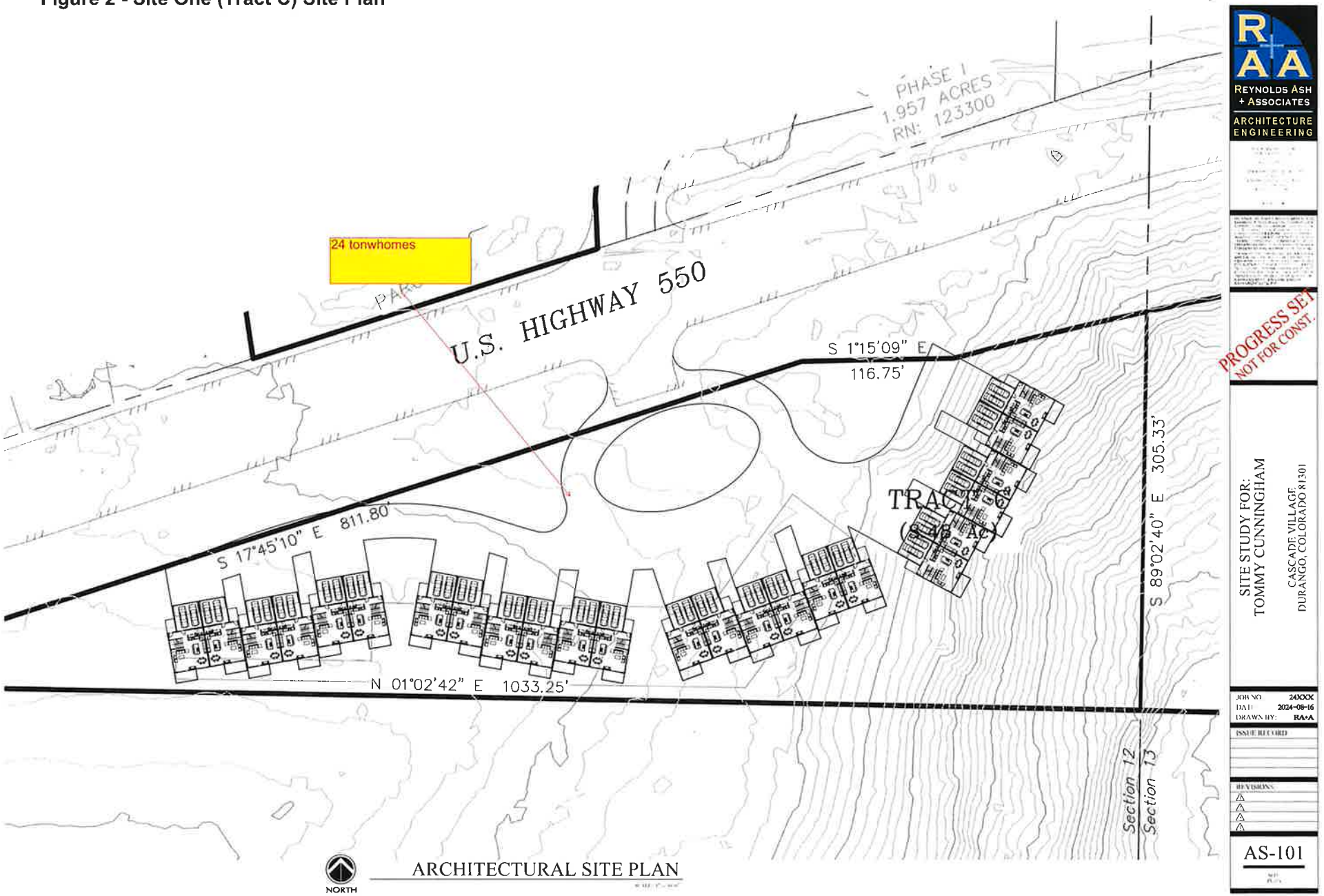
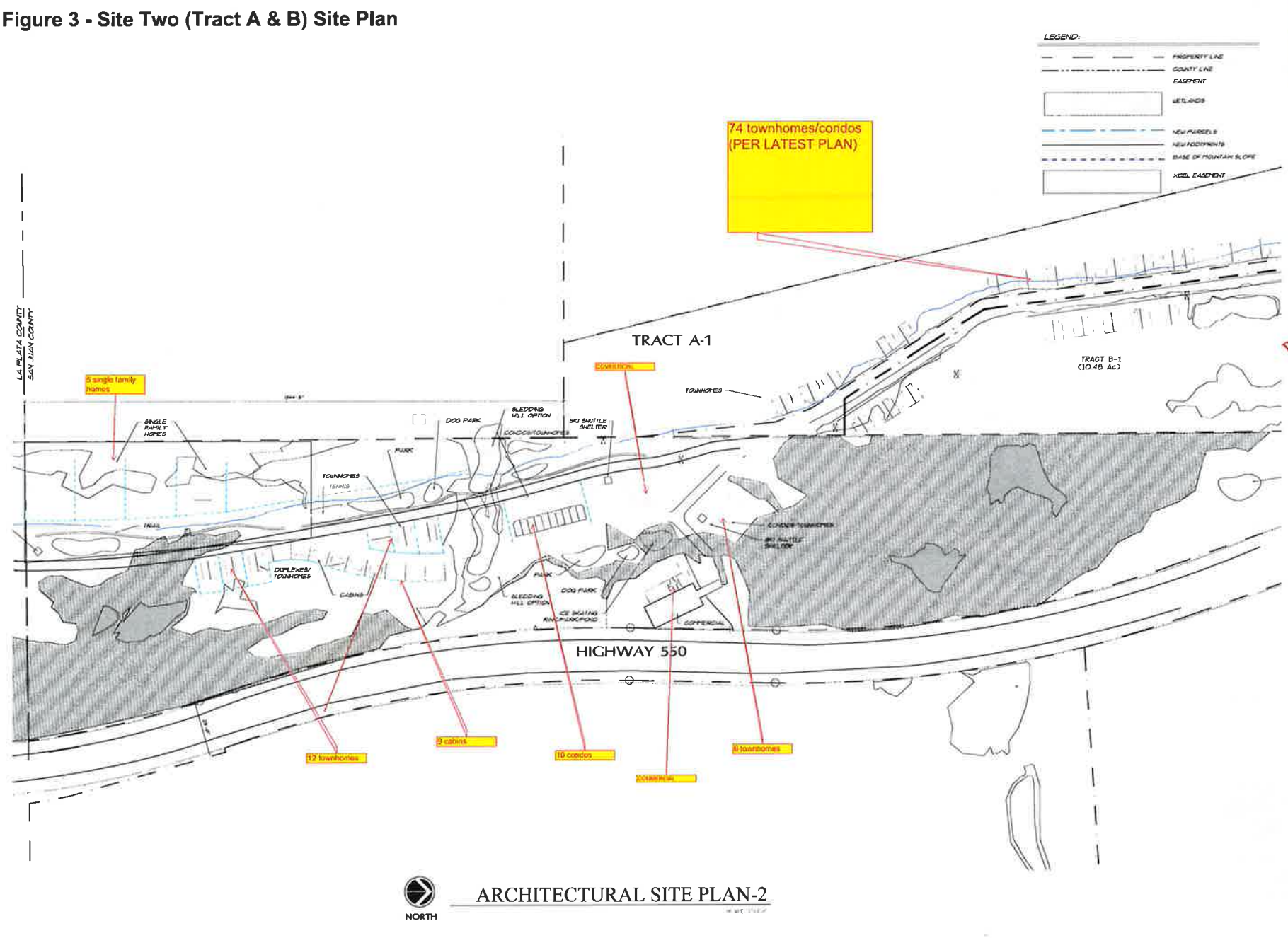


Figure 3 - Site Two (Tract A & B) Site Plan



REYNOLDS ASH + ASSOCIATES
ARCHITECTURE ENGINEERING

PROGRESS SET NOT FOR CONST

CASCADE VILLAGE
JOINT VENTURE
MASTER PLAN
HWY 550
DURANGO, COLORADO 81301

JOB NO: 24029
DATE: 2024-08-02
DRAWN BY: RA+A

ISSUE RECORD

REVISIONS

AS-101

3 Existing Background Conditions

3.1 Roadway Network

US 550

US 550 is a two-lane highway with a posted speed limit of 45 miles per hour (mph) near the existing Cascade Village intersection and 55 mph near the proposed access to Site 2. The CDOT highway classification is R-A: Regional Highway.

3.2 Existing Background Traffic Volumes

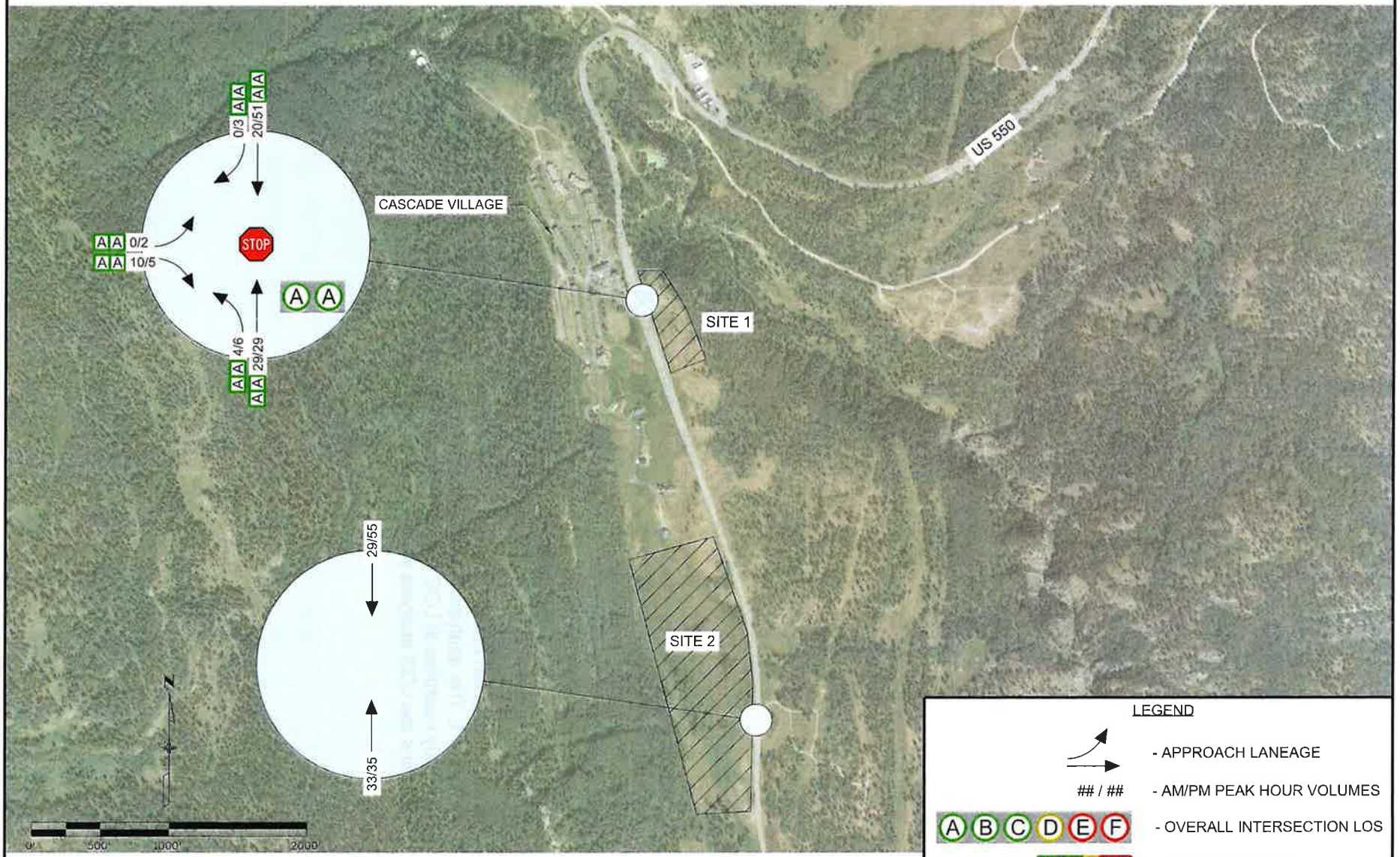
Existing traffic counts were collected by SEH at the existing intersection at US 550 and Cascade Village on Wednesday, December 4, 2024 during the morning and evening peak hours. A seasonal adjustment factor was applied to the traffic volumes to account for the lower traffic observed during time of year traffic volumes were collected. The nearest continuous count station to the site is Station 104809 along US 160 between mile marker 83 and 84 in Durango. A seasonal factor of 1.07 was calculated for the month of December and applied to the collected traffic counts. **Appendix A** contains the turning movement count data and **Figure 4** displays the existing traffic volumes. Average Daily Traffic (ADT) for US 550 near the project site is approximately 2,000 vehicles per day (vpd) displayed in CDOT's Online Transportation Information System (OTIS).

3.3 Existing Background Conditions Level of Service

Level of Service (LOS) was calculated using Synchro 11 software to evaluate the performance of the intersections within the study area. This software package utilizes criteria described in the Highway Capacity Manual[1]. LOS is a measure used to describe operational conditions at an intersection. LOS categories ranging from A to F are assigned based on the predicted delay in seconds per vehicle for the intersection overall, as well as for individual turning movements. LOS A indicates very good operations, while LOS F indicates poor, congested operations. Overall intersection LOS D is considered acceptable by CDOT and most municipalities.

A summarization of the results of the intersection LOS calculations is displayed in **Table 1**. The analysis indicates that the intersection at US 550 / Cascade Village currently operates at LOS A with all movements also operating at LOS A. **Appendix B** contains the LOS analysis worksheets for reference.

1 *HCM 6th: Highway Capacity Manual 6th Edition: A Guide for Multimodal Mobility Analysis* Washington, D.C.: Transportation Research Board, 2016. Print.



SEH

Traffic Impact Study - Cascade Village

EXISTING CONDITIONS

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	4

Table 1. LOS Results - Cascade Village TIS

Intersection and Critical Movements	Year 2024 Traffic				Year 2026 Traffic								Year 2046 Traffic							
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
STOP CONTROL	**Existing Background Traffic**				**2026 Background Traffic**				**2026 Background + Site Generated Traffic**				**2046 Background Traffic**				**2046 Background + Site Generated Traffic**			
US 550 / Cascade Village Main Access	**2.8**	**A**	**1.9**	**A**	**2.8**	**A**	**1.9**	**A**	**3.0**	**A**	**2.0**	**A**	**2.8**	**A**	**1.9**	**A**	**3.0**	**A**	**2.0**	**A**
Eastbound Left	8.6	A	9.2	A	8.6	A	9.2	A	8.6	A	9.4	A	8.6	A	9.4	A	8.6	A	9.6	A
Eastbound Through									0.0	A	0.0	A					0.0	A	0.0	A
Eastbound Right	0.0	A	8.7	A	0.0	A	8.7	A	0.0	A	8.8	A	0.0	A	8.8	A	0.0	A	8.8	A
Westbound Left									9.2	A	9.5	A					9.4	A	9.7	A
Westbound Through + Right									8.5	A	8.5	A					8.6	A	8.5	A
Northbound Left	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.5	A	7.4	A	7.6	A
Northbound Through	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
Northbound Right									0.0	A	0.0	A					0.0	A	0.0	A
Southbound Left									7.3	A	7.3	A					7.3	A	7.3	A
Southbound Through	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
Southbound Right	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A
US 550 / Cascade Village Site 2 Access									**4.1**	**A**	**3.5**	**A**					**3.8**	**A**	**3.3**	**A**
Eastbound Left									9.2	A	9.9	A					9.3	A	10.0	A
Eastbound Right									8.7	A	8.8	A					8.7	A	8.8	A
Northbound Left									7.3	A	7.4	A					7.3	A	7.5	A
Northbound Through									0.0	A	0.0	A					0.0	A	0.0	A
Southbound Through + Right									0.0	A	0.0	A					0.0	A	0.0	A

Note: Site 2 Access not analyzed for Background Traffic scenarios due to the traffic being through movements only.

3.4 Trip Generation

To determine the traffic impacts associated with the Cascade Village development, the amount of traffic generated by the proposed development was estimated using trip generation rates contained in the Trip Generation Manual[2]. For Site 1, 24 townhomes are proposed. ITE Code 215-Single-Family Attached determine trip generation rates for Site 1 during the morning and evening peak hour. Site 1 is projected to generate 172 total vpd with 12 vehicles per hour (vph) in the morning peak hour and 14 vph in the evening peak hour.

For Site 2, 5 single family homes, 9 cabins, 92 townhomes, 10 condos, a small deli, and retail store are proposed.

- ITE Code 210-Single-Family Detached Housing was used for the single family homes and cabins
- ITE Code 215-Single-Family Attached Housing was used for the townhomes
- ITE Code 220-Multifamily Housing (Low-Rise) was used for the condos
- ITE Code 932-High-Turnover (Sit-Down) Restaurant was used for the deli
- ITE Code 875-Department Store was used for the retail property.

Site 2 is projected to generate 542 total vpd with 72 vehicles per hour (vph) in the morning peak hour and 89 vph in the evening peak hour.

The estimated weekday, morning peak hour, and evening peak trip generation for the proposed development is contained in **Table 2.**

3.5 Trip Distribution and Assignment

Trip distribution percentages for site generated traffic are based on current traffic patterns in the study area and how traffic will access the site. 90% of the traffic is projected to access the site from the south and 10% from the north. The overall distribution of trips to and from the site are illustrated in **Figure 5**.

---

2 Trip Generation. Institute of Transportation Engineers. 11th Edition. 2021.

Table 2. Weekday Trip Generation Estimate - Cascade Village

Land Use	ITE Code	Size	Unit	Weekday Trips				AM Peak Hour Trips				PM Peak Hour Trips			
				Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out
Townhomes[2]	215	24	Dwelling Units	7.20	172	86	86	0.48	12	3	9	0.57	14	8	6
Site 1 (Tract C) Total Trips					**172**	**86**	**86**		**12**	**3**	**9**		**14**	**8**	**6**
Single Family Homes[1]	210	5	Dwelling Units	9.43	48	24	24	0.70	4	1	3	0.94	5	3	2
Cabins[1]	210	9	Dwelling Units	9.43	85	43	43	0.70	7	2	5	0.94	8	5	3
Townhomes[2]	215	92	Dwelling Units	7.20	662	331	331	0.48	44	11	33	0.57	52	31	21
Condos[3]	220	10	Dwelling Units	6.74	67	34	34	0.40	4	1	4	0.51	5	3	2
Small Restaurant/Deli[4]	932	1	1000 Sq. Ft GFA	107.20	108	54	54	9.57	10	6	4	9.05	9	5	4
Retail Store[5]	875	5	1000 Sq. Ft GFA	22.88	114	57	57	0.58	3	2	1	1.95	10	5	5
Site 2 (Tract A & B) Total Trips					**1,084**	**542**	**542**		**72**	**23**	**50**		**89**	**52**	**37**
Total Trips					**1,256**	**628**	**628**		**84**	**26**	**59**		**103**	**60**	**43**

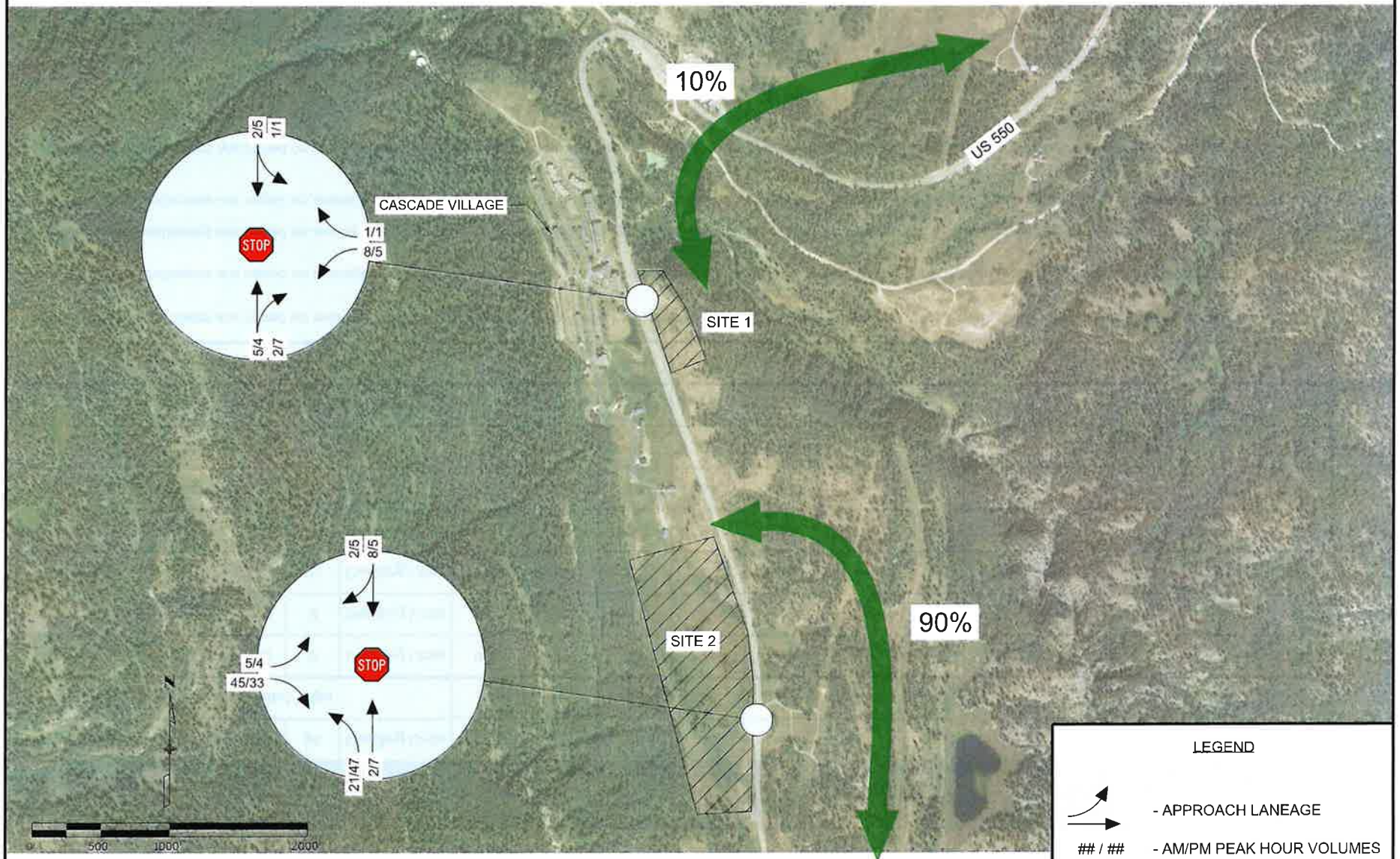
[1] Trip Generation estimates are based on average rates for 210 -Single-Family Detached Housing contained in *Trip Generation, 11th Edition (Institute of Transportation Engineers, 2021).*

[2] Trip Generation estimates are based on average rates for 215 - Single-Family Attached Housing contained in *Trip Generation, 11th Edition (Institute of Transportation Engineers, 2021).*

[3] Trip Generation estimates are based on average rates for 220 - Multifamily Housing (Low-Rise) contained in *Trip Generation, 11th Edition (Institute of Transportation Engineers, 2021).*

[4] Trip Generation estimates are based on average rates for 932 - High-Turnover (Sit-Down) Restaurant contained in *Trip Generation, 11th Edition (Institute of Transportation Engineers, 2021).*

[5] Trip Generation estimates are based on average rates for 875 - Department Store contained in *Trip Generation, 11th Edition (Institute of Transportation Engineers, 2021).*



SEH

Traffic Impact Study - Cascade Village

TRIP GENERATION AND DISTRIBUTION

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	5

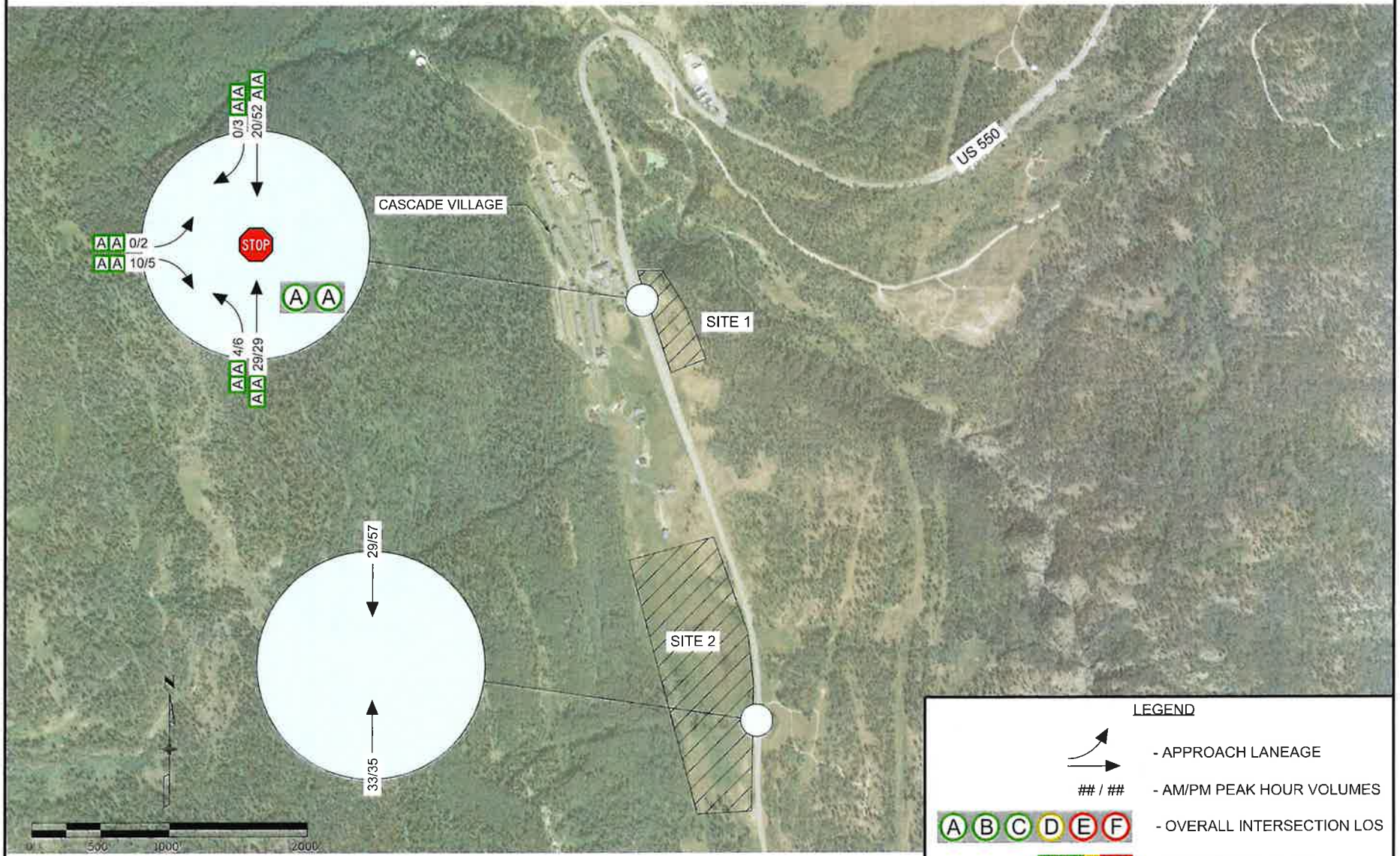
4 Short-Term (Year 2026) Background Analysis

4.1 Short-Term Background Traffic Volumes

Year 2026 is identified as the "open year" for the Cascade Village development and is used as the short-term scenario. OTIS reports a 20-factor of 1.16 near the project site corresponding to 0.8% growth per year. Existing volumes were grown by 1.6 to grow to year 2026 background volumes. The projected short-term background traffic volumes are contained in **Figure 6**.

4.2 Short-Term Background Level of Service

Year 2026 background traffic volumes were analyzed to determine future operations and capacity constraints. A summarization of the results of the intersection LOS calculations is displayed in **Table 1**. The analysis indicates that the intersection at US 550 / Cascade Village currently operates at LOS A with all movements also operating at LOS A. **Appendix B** contains the LOS analysis worksheets for reference.



SEH

Traffic Impact Study - Cascade Village

SHORT-TERM (YEAR 2026) BACKGROUND CONDITIONS

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	6

5 Short-Term (Year 2026) Background plus Site Generated Traffic Analysis

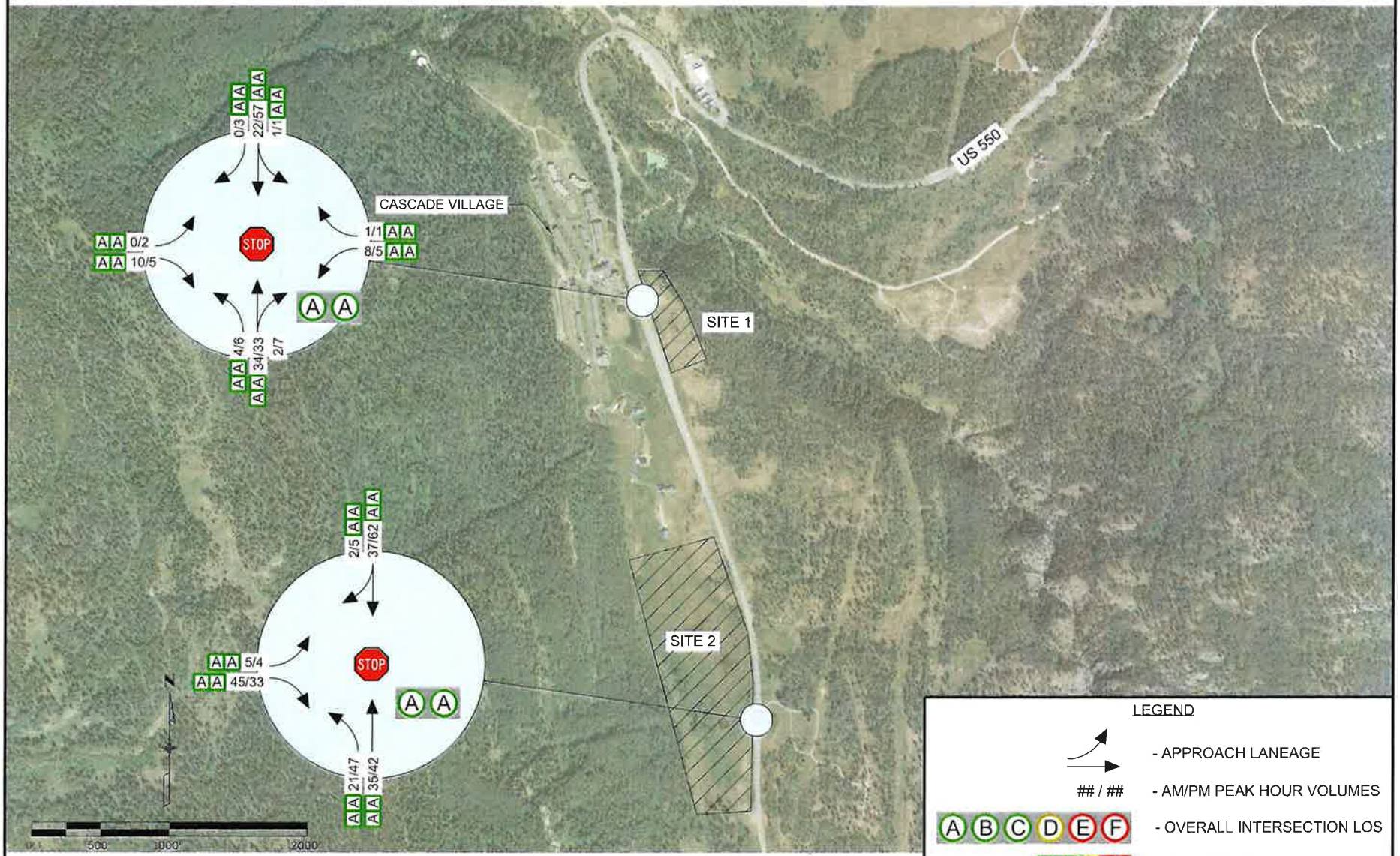
5.1 Short-Term Background plus Site Generated Traffic Volumes

The Cascade Village site generated traffic volumes (**Table 2**) were combined with the short-term background volumes to produce the total short-term traffic volumes. The resulting total traffic volumes are presented in **Figure 7**.

5.2 Short-Term Background plus Site Generated Traffic Level of Service

The Year 2026 background plus site generated traffic volumes were analyzed to determine short-term operations and potential capacity constraints caused by the addition of site traffic from the Cascade Village development.

The analysis of the intersections US 550 / Cascade Village and US 550 / Cascade Village Site 2 Access indicates that the addition of the site generated traffic is projected to have a minimal impact on overall intersection operations and travel time delay with no impact to either overall intersection LOS or LOS by movement. A summarization of the results of the intersection LOS calculations is displayed in **Table 1**. The analysis indicates that the intersection at US 550 / Cascade Village and US 550 / Cascade Village Site 2 Access is projected to continue operating at LOS A with all movements also operating at LOS A. **Appendix B** contains the LOS analysis worksheets for reference.



Traffic Impact Study - Cascade Village

SHORT-TERM (YEAR 2026) BACKGROUND + SITE GENERATED TRAFFIC CONDITIONS

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	7

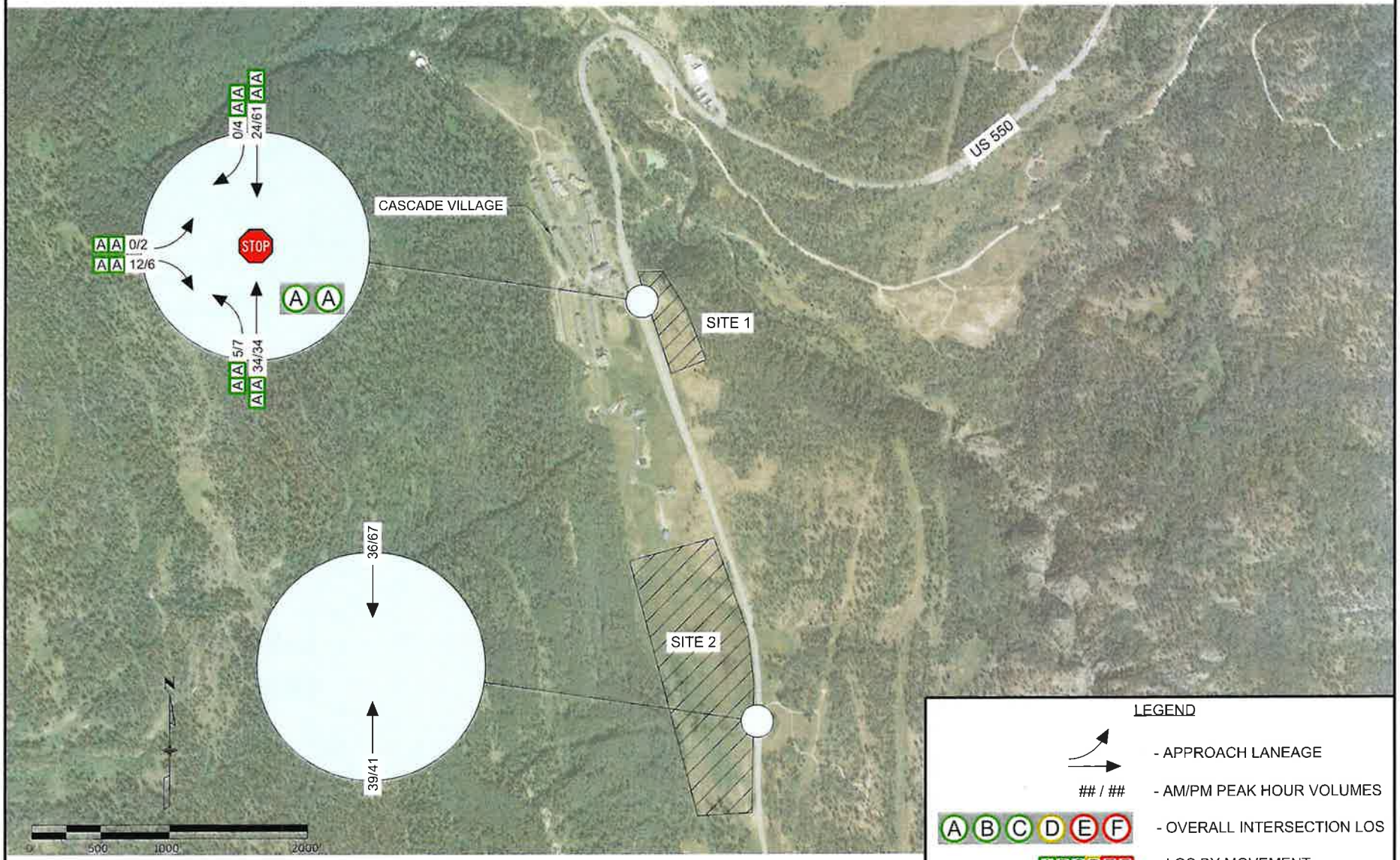
6 Long-Term (Year 2046) Background Analysis

6.1 Long-Term Background Traffic Volumes

Year 2046 is identified as the long-term horizon year for this study and is 20 years post "open year". Similar to the short-term, background traffic volumes were grown using a 20-factor of 1.16 (0.8% per year growth) outlined in OTIS for the station nearest the site. The projected long-term background traffic volumes are contained in **Figure 8**.

6.2 Long-Term Background Level of Service

Year 2046 background traffic volumes were analyzed to determine future operations and capacity constraints. A summarization of the results of the intersection LOS calculations is displayed in **Table 1**. The analysis indicates that the intersection at US 550 / Cascade Village currently operates at LOS A with all movements also operating at LOS A. **Appendix B** contains the LOS analysis worksheets for reference.



SEH

Traffic Impact Study - Cascade Village

LONG-TERM (YEAR 2046) BACKGROUND CONDITIONS

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	8

7 Long-Term (Year 2046) Background plus Site Generated Traffic Analysis

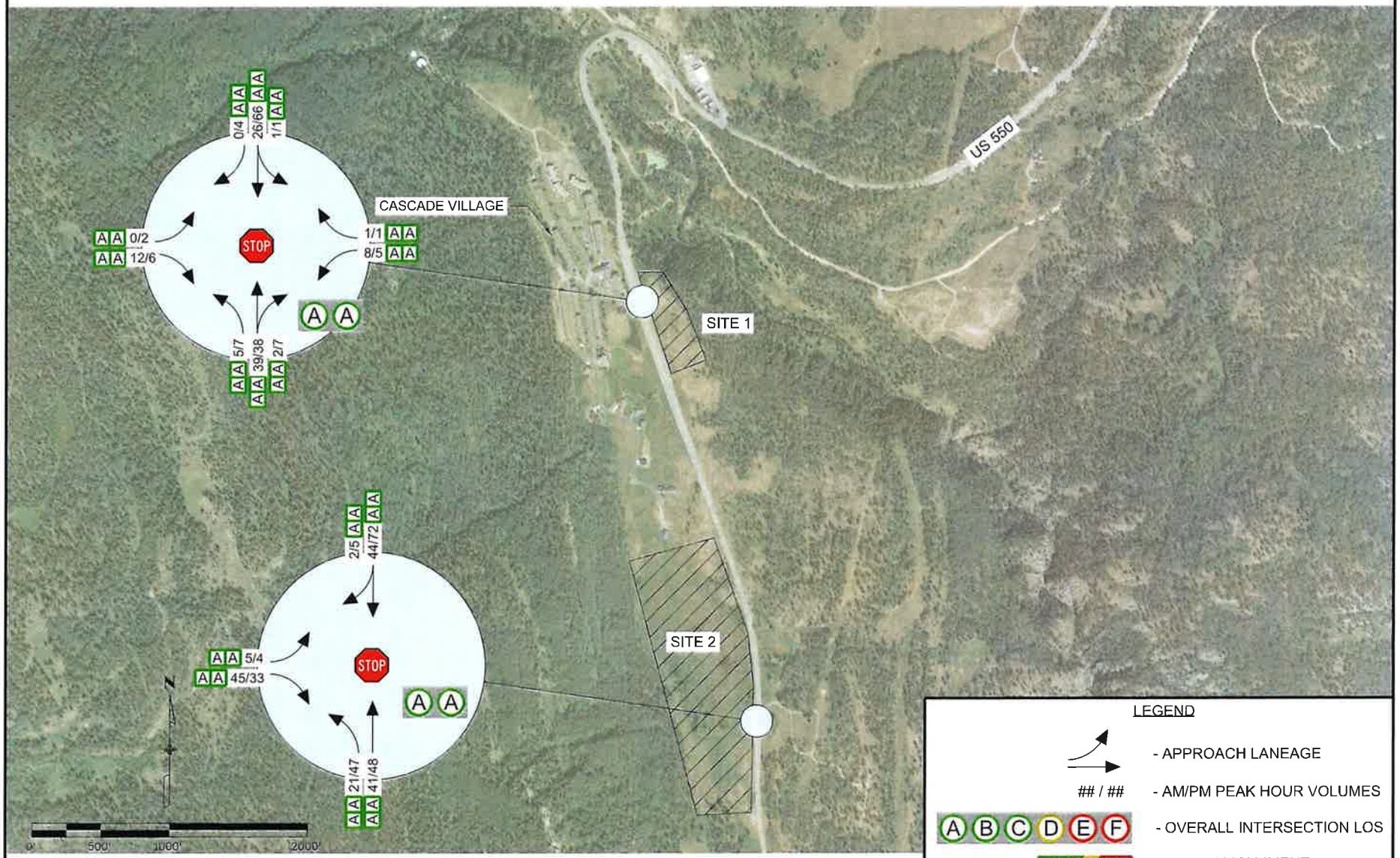
7.1 Long-Term Background plus Site Generated Traffic Volumes

The Cascade Village site generated traffic volumes (**Table 2**) were combined with the long-term background volumes to produce the total long-term traffic volumes. The resulting total traffic volumes are presented in **Figure 9**.

7.2 Long-Term Background plus Site Generated Traffic Level of Service

The Year 2046 background plus site generated traffic volumes were analyzed to determine long-term operations and potential capacity constraints caused by the addition of site traffic from the Cascade Village development.

The analysis of the intersections US 550 / Cascade Village and US 550 / Cascade Village Site 2 Access indicates that the addition of the site generated traffic is projected to have a minimal impact on overall intersection operations and travel time delay with no impact to either overall intersection LOS or LOS by movement. A summarization of the results of the intersection LOS calculations is displayed in **Table 1**. The analysis indicates that the intersection at US 550 / Cascade Village and US 550 / Cascade Village Site 2 Access is projected to continue operating at LOS A with all movements also operating at LOS A. **Appendix B** contains the LOS analysis worksheets for reference.



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Traffic Impact Study - Cascade Village

LONG-TERM (YEAR 2046) BACKGROUND + SITE GENERATED TRAFFIC CONDITIONS

Scale	1" = 1000'	Date	01/02/2025	Drawn By	MJW	Job #	REYAS-181787	Figure	9

8 Additional Roadway Analysis

8.1 Auxiliary Lane Analysis

US 550 is classified as R-A: Regional Highway and has a speed limit of 45 mph posted near the existing US 550 / Cascade Village Access / Site 1 Access intersection and 55 mph near the intersection US 550 / Site 2 Access. According to section 3.8 of the State of Colorado State Highway Access Code, (Volume 2, March 2002), the following criteria require the construction of auxiliary lanes:

- Left turn deceleration lane: 10 vph
- Right turn deceleration lane: 25 vph
- Right turn acceleration lane: 50 vph

An auxiliary lane analysis was conducted for both proposed accesses to the Cascade Village development. The evening peak hour represents the largest amount of site generated traffic with 14 vph at Site 1 (8 vph entering and 6 mph out) and 89 vph at Site 2 (52 vph entering and 37 vph exiting). The proposed development includes a full movement access to/from US 550 at both Site 1 and Site 2. **Figure 5** displays the trip generation.

According to the criteria outlined in the Access Code, a left turn deceleration lane is warranted for the intersection at US 550 / Site 2. According to section 4.8 of the Access Code, a deceleration length of 600' is required for a 55 mph roadway and a storage length of 50' is required for the turn lane resulting in an effective length of 650'. No other auxiliary lanes are warranted along US 550 at either of the sites.

8.2 Sight Distance Analysis

According to section 4.3 of the Access Code entering sight distance for a two-lane 45 mph roadway is 450 feet and 550 feet for a 55 mph roadway. SEH conducted a site visit to confirm the sight distance at the proposed Site 1 and Site 2 access. Approximate sight distances measured were:

- US 550 / Site 1 Access (Southbound, looking right): 1,100'
- US 550 / Site 1 Access (Northbound, looking left): 1,320'
- US 550 / Site 2 Access (Southbound, looking left): 840'
- US 550 / Site 2 Access (Northbound, looking right): 1,110'

Sight distance is sufficient for both proposed accesses, exceeding the criteria outlined in section 4.3 of the Access Code.

9 Conclusions and Mitigation Considerations

Based on the analysis described in the sections above, the following conclusions have been drawn regarding the traffic impacts resulting from the Cascade Village development:

- The anticipated traffic volume generated by the Cascade Village development is not expected to significantly impact the surrounding roadway network.
- Traffic analysis results for the Short-Term and Long-Term scenarios are projected to be similar to the Existing Conditions with very minor changes in travel time delay. Both study intersections are projected to operate at overall LOS A all movements projected to operate at LOS A.
- A left-turn deceleration lane is warranted for the US 550 / Site 2 Access intersection. No auxiliary lanes are required US 550 to accommodate the site generated traffic.
- Sight distance is sufficient in all directions at both Site 1 and Site 2 accesses.
- Due to the minimal projected impact of site generated traffic to the study intersections, no additional mitigation measures for the site or surrounding area are proposed at this time.

Tables

Table 1 – LOS Results – Cascade Village TIS (In Report)

Table 2 – Trip Generation Estimate – Cascade Village TIS (In Report)

Figures

Appendix A

Traffic Count Data

US 550 & Meadowview Dr. Durango, CO near Purgatory Ski Resort

0 0

Wednesday, December 4, 2024

Time	Southbound 0						Westbound 0						Northbound 0						Eastbound 0						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
12:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
12:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
12:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
12:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
1:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
1:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
1:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
1:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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2:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
2:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
2:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
3:00 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
3:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
3:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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4:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
4:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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5:15 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
5:30 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
5:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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6:45 AM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0
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7:15 AM	0	0	3	0	0	*3*	0	0	0	0	0	*0*	0	1	8	0	0	*9*	0	0	0	0	0	*0*	12
7:30 AM	0	0	2	0	0	*2*	0	0	0	0	0	*0*	0	0	3	0	0	*3*	0	0	0	1	0	*1*	6
7:45 AM	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	0	5	0	0	*5*	0	0	0	2	0	*2*	12
Hourly Total	0	0	14	0	0	*14*	0	0	0	0	0	*0*	0	3	19	0	0	*22*	0	0	0	3	0	*3*	39

US 550 & Meadowview Dr. Durango, CO near Purgatory Ski Resort

0 0

Wednesday, December 4, 2024

Time	Southbound 0						Westbound 0						Northbound 0						Eastbound 0						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
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Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
3:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**

US 550 & Meadowview Dr. Durango, CO near Purgatory Ski Resort

0 0

Wednesday, December 4, 2024

Time	Southbound 0						Westbound 0						Northbound 0						Eastbound 0						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	13	1	0	*14*	0	0	0	0	0	*0*	0	1	7	0	0	*8*	0	0	0	2	0	*2*	**24**
4:15 PM	0	0	11	0	0	*11*	0	0	0	0	0	*0*	0	1	6	0	0	*7*	0	1	0	1	0	*2*	**20**
4:30 PM	0	0	16	1	0	*17*	0	0	0	0	0	*0*	0	3	7	0	0	*10*	0	0	0	1	0	*1*	**28**
4:45 PM	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	**14**
Hourly Total	0	0	47	2	0	*49*	0	0	0	0	0	*0*	0	5	27	0	0	*32*	0	1	0	4	0	*5*	**86**
5:00 PM	0	0	3	1	0	*4*	0	0	0	0	0	*0*	0	1	4	0	0	*5*	0	0	0	1	0	*1*	**10**
5:15 PM	0	0	9	0	0	*9*	0	0	0	0	0	*0*	0	0	6	0	0	*6*	0	0	0	2	0	*2*	**17**
5:30 PM	0	0	6	0	0	*6*	0	0	0	0	0	*0*	0	1	6	0	0	*7*	0	0	0	1	0	*1*	**14**
5:45 PM	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	1	4	0	0	*5*	0	0	0	2	0	*2*	**12**
Hourly Total	0	0	23	1	0	*24*	0	0	0	0	0	*0*	0	3	20	0	0	*23*	0	0	0	6	0	*6*	**53**
6:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
6:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
7:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
8:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
9:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
10:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:00 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:15 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:30 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
11:45 PM	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
Hourly Total	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	0	0	0	0	0	*0*	**0**
DAILY TOTAL	**0**	**0**	**103**	**3**	**0**	*106*	**0**	**0**	**0**	**0**	**0**	*0*	**0**	**14**	**90**	**0**	**0**	*104*	**0**	**1**	**0**	**22**	**0**	*23*	**233**
Cars	0	0	95	3	0	*98*	0	0	0	0	0	*0*	0	12	84	0	0	*96*	0	1	0	20	0	*21*	**215**
Heavy Vehicles	0	0	8	0	0	*8*	0	0	0	0	0	*0*	0	2	6	0	0	*8*	0	0	0	2	0	*2*	**18**
Heavy Vehicle %	0.00%	0.00%	7.77%	0.00%	0.00%	*7.55%*	0.00%	0.00%	0.00%	0.00%	0.00%	*0.00%*	0.00%	14.29%	6.67%	0.00%	0.00%	*7.69%*	0.00%	0.00%	0.00%	9.09%	0.00%	*8.70%*	**7.73%**

US 550 & Meadowview Dr. Durango, CO near Purgatory Ski Resort

0 0

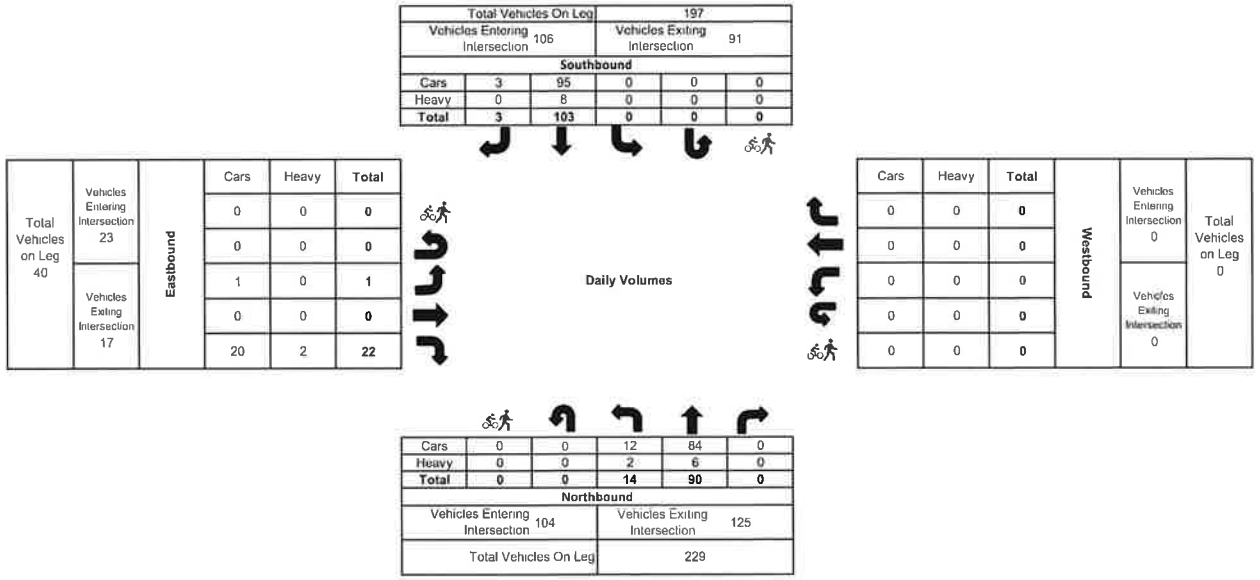
Wednesday, December 4, 2024

AM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
7:45 AM	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	0	5	0	0	*5*	0	0	0	2	0	*2*	**12**
8:00 AM	0	0	5	0	0	*5*	0	0	0	0	0	*0*	0	2	8	0	0	*10*	0	0	0	5	0	*5*	**20**
8:15 AM	0	0	4	0	0	*4*	0	0	0	0	0	*0*	0	1	10	0	0	*11*	0	0	0	1	0	*1*	**16**
8:30 AM	0	0	4	0	0	*4*	0	0	0	0	0	*0*	0	0	4	0	0	*4*	0	0	0	1	0	*1*	**9**
Peak Hour Total	0	0	18	0	0	*18*	0	0	0	0	0	*0*	0	3	27	0	0	*30*	0	0	0	9	0	*9*	**57**
PHF	0.000	0.000	0.900	0.000	0.000	*0.900*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.375	0.675	0.000	0.000	*0.682*	0.000	0.000	0.000	0.450	0.000	*0.450*	**0.713**

PM Peak Hour

Time	Southbound						Westbound						Northbound						Eastbound						VEHICLE TOTAL
	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	U Turns	Left Turns	Straight Through	Right Turns	Crosswalk Crossings	*Vehicle Approach Total*	
4:00 PM	0	0	13	1	0	*14*	0	0	0	0	0	*0*	0	1	7	0	0	*8*	0	0	0	2	0	*2*	**24**
4:15 PM	0	0	11	0	0	*11*	0	0	0	0	0	*0*	0	1	6	0	0	*7*	0	1	0	1	0	*2*	**20**
4:30 PM	0	0	16	1	0	*17*	0	0	0	0	0	*0*	0	3	7	0	0	*10*	0	0	0	1	0	*1*	**28**
4:45 PM	0	0	7	0	0	*7*	0	0	0	0	0	*0*	0	0	7	0	0	*7*	0	0	0	0	0	*0*	**14**
Peak Hour Total	0	0	47	2	0	*49*	0	0	0	0	0	*0*	0	5	27	0	0	*32*	0	1	0	4	0	*5*	**86**
PHF	0.000	0.000	0.734	0.500	0.000	*0.721*	0.000	0.000	0.000	0.000	0.000	*0.000*	0.000	0.417	0.964	0.000	0.000	*0.800*	0.000	0.250	0.000	0.500	0.000	*0.625*	**0.768**



Appendix B

LOS Calculation Worksheets

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	10	4	29	20	0
Future Vol, veh/h	0	10	4	29	20	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	45	38	68	90	92
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	0	22	11	43	22	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	87	22	22	0	-	0
Stage 1	22	-	-	-	-	-
Stage 2	65	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	919	1035	1519	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	963	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	913	1035	1519	-	-	-
Mov Cap-2 Maneuver	913	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	963	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1519	-	-	1035	-	-
HCM Lane V/C Ratio	0.007	-	-	0.021	-	-
HCM Control Delay (s)	7.4	-	0	8.6	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	5	6	29	51	3
Future Vol, veh/h	2	5	6	29	51	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	50	42	96	73	50
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	8	10	14	30	70	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	128	70	76	0	-	0
Stage 1	70	-	-	-	-	-
Stage 2	58	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	871	974	1450	-	-	-
Stage 1	958	-	-	-	-	-
Stage 2	970	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	862	974	1450	-	-	-
Mov Cap-2 Maneuver	862	-	-	-	-	-
Stage 1	948	-	-	-	-	-
Stage 2	970	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1450	-	862	974	-	-
HCM Lane V/C Ratio	0.01	-	0.009	0.01	-	-
HCM Control Delay (s)	7.5	-	9.2	8.7	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	↰	↱	↰	↑	↑	↱
Traffic Vol, veh/h	0	10	4	29	20	0
Future Vol, veh/h	0	10	4	29	20	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	45	38	68	90	92
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	0	22	11	43	22	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	87	22	22	0	-	0
Stage 1	22	-	-	-	-	-
Stage 2	65	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	919	1035	1519	-	-	-
Stage 1	1006	-	-	-	-	-
Stage 2	963	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	913	1035	1519	-	-	-
Mov Cap-2 Maneuver	913	-	-	-	-	-
Stage 1	999	-	-	-	-	-
Stage 2	963	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1519	-	-	1035	-	-
HCM Lane V/C Ratio	0.007	-	-	0.021	-	-
HCM Control Delay (s)	7.4	-	0	8.6	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	5	6	29	52	3
Future Vol, veh/h	2	5	6	29	52	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	50	42	96	73	50
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	8	10	14	30	71	6

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	129	71	77	0	-	0
Stage 1	71	-	-	-	-	-
Stage 2	58	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	870	972	1449	-	-	-
Stage 1	957	-	-	-	-	-
Stage 2	970	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	861	972	1449	-	-	-
Mov Cap-2 Maneuver	861	-	-	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	970	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1449	-	861	972	-	-
HCM Lane V/C Ratio	0.01	-	0.009	0.01	-	-
HCM Control Delay (s)	7.5	-	9.2	8.7	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	10	8	0	1	4	34	2	1	22	0
Future Vol, veh/h	0	0	10	8	0	1	4	34	2	1	22	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	25	-	0	0	-	0	420	-	-	-	-	280
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	45	92	92	92	38	68	92	92	90	92
Heavy Vehicles, %	0	2	9	2	2	2	14	7	2	2	8	2
Mvmt Flow	0	0	22	9	0	1	11	50	2	1	24	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	100	-	24	99	-	51	24	0	0	52	0	0
Stage 1	26	-	-	73	-	-	-	-	-	-	-	-
Stage 2	74	-	-	26	-	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.29	7.12	-	6.22	4.24	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.381	3.518	-	3.318	2.326	-	-	2.218	-	-
Pot Cap-1 Maneuver	886	0	1033	883	0	1017	1516	-	-	1554	-	-
Stage 1	997	0	-	937	0	-	-	-	-	-	-	-
Stage 2	940	0	-	992	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	880	-	1033	858	-	1017	1516	-	-	1554	-	-
Mov Cap-2 Maneuver	880	-	-	858	-	-	-	-	-	-	-	-
Stage 1	990	-	-	930	-	-	-	-	-	-	-	-
Stage 2	932	-	-	970	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.6	9.1	1.2	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1516	-	-	-	1033	858	1017	1554	-	-
HCM Lane V/C Ratio	0.007	-	-	-	0.022	0.01	0.001	0.001	-	-
HCM Control Delay (s)	7.4	-	-	0	8.6	9.2	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	0	0	-	-

Intersection	
Int Delay, s/veh	4.1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	45	21	35	37	2
Future Vol, veh/h	5	45	21	35	37	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	49	23	38	40	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	125	41	42	0	-	0
Stage 1	41	-	-	-	-	-
Stage 2	84	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	870	1030	1567	-	-	-
Stage 1	981	-	-	-	-	-
Stage 2	939	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	857	1030	1567	-	-	-
Mov Cap-2 Maneuver	857	-	-	-	-	-
Stage 1	966	-	-	-	-	-
Stage 2	939	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	2.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1567	-	857	1030	-	-
HCM Lane V/C Ratio	0.015	-	0.006	0.047	-	-
HCM Control Delay (s)	7.3	-	9.2	8.7	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	0	5	5	0	1	6	33	7	1	57	3
Future Vol, veh/h	2	0	5	5	0	1	6	33	7	1	57	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	25	-	0	0	-	0	420	-	-	-	-	280
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	92	50	92	92	92	42	96	92	92	73	50
Heavy Vehicles, %	0	2	9	2	2	2	14	7	2	2	8	2
Mvmt Flow	8	0	10	5	0	1	14	34	8	1	78	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	147	-	78	149	-	38	84	0	0	42	0	0
Stage 1	80	-	-	66	-	-	-	-	-	-	-	-
Stage 2	67	-	-	83	-	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.29	7.12	-	6.22	4.24	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.381	3.518	-	3.318	2.326	-	-	2.218	-	-
Pot Cap-1 Maneuver	826	0	964	819	0	1034	1440	-	-	1567	-	-
Stage 1	934	0	-	945	0	-	-	-	-	-	-	-
Stage 2	948	0	-	925	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	819	-	964	804	-	1034	1440	-	-	1567	-	-
Mov Cap-2 Maneuver	819	-	-	804	-	-	-	-	-	-	-	-
Stage 1	925	-	-	936	-	-	-	-	-	-	-	-
Stage 2	938	-	-	914	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	9.3	1.9	0.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1440	-	-	819	964	804	1034	1567	-	-
HCM Lane V/C Ratio	0.01	-	-	0.01	0.01	0.007	0.001	0.001	-	-
HCM Control Delay (s)	7.5	-	-	9.4	8.8	9.5	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	0	0	-	-

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	12	5	34	24	0
Future Vol, veh/h	0	12	5	34	24	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	45	38	68	90	92
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	0	27	13	50	27	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	103	27	27	0	-	0
Stage 1	27	-	-	-	-	-
Stage 2	76	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	900	1029	1512	-	-	-
Stage 1	1001	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	892	1029	1512	-	-	-
Mov Cap-2 Maneuver	892	-	-	-	-	-
Stage 1	992	-	-	-	-	-
Stage 2	952	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.6	1.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1512	-	-	1029	-	-
HCM Lane V/C Ratio	0.009	-	-	0.026	-	-
HCM Control Delay (s)	7.4	-	0	8.6	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	-	-

Intersection	
Int Delay, s/veh	1.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	2	6	7	34	61	4
Future Vol, veh/h	2	6	7	34	61	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	25	0	420	-	-	280
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	50	42	96	73	50
Heavy Vehicles, %	0	9	14	7	8	2
Mvmt Flow	8	12	17	35	84	8

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	153	84	92	0	-	0
Stage 1	84	-	-	-	-	-
Stage 2	69	-	-	-	-	-
Critical Hdwy	6.4	6.29	4.24	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.381	2.326	-	-	-
Pot Cap-1 Maneuver	843	956	1430	-	-	-
Stage 1	944	-	-	-	-	-
Stage 2	959	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	833	956	1430	-	-	-
Mov Cap-2 Maneuver	833	-	-	-	-	-
Stage 1	933	-	-	-	-	-
Stage 2	959	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9	2.4	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1430	-	833	956	-	-
HCM Lane V/C Ratio	0.012	-	0.01	0.013	-	-
HCM Control Delay (s)	7.5	-	9.4	8.8	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0	-	-

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	12	8	0	1	5	39	2	1	26	0
Future Vol, veh/h	0	0	12	8	0	1	5	39	2	1	26	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	25	-	0	0	-	0	420	-	-	-	-	280
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	45	92	92	92	38	68	92	92	90	92
Heavy Vehicles, %	0	2	9	2	2	2	14	7	2	2	8	2
Mvmt Flow	0	0	27	9	0	1	13	57	2	1	29	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	116	-	29	115	-	58	29	0	0	59	0	0
Stage 1	31	-	-	84	-	-	-	-	-	-	-	-
Stage 2	85	-	-	31	-	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.29	7.12	-	6.22	4.24	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.381	3.518	-	3.318	2.326	-	-	2.218	-	-
Pot Cap-1 Maneuver	865	0	1026	862	0	1008	1510	-	-	1545	-	-
Stage 1	991	0	-	924	0	-	-	-	-	-	-	-
Stage 2	928	0	-	986	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	858	-	1026	834	-	1008	1510	-	-	1545	-	-
Mov Cap-2 Maneuver	858	-	-	834	-	-	-	-	-	-	-	-
Stage 1	982	-	-	916	-	-	-	-	-	-	-	-
Stage 2	919	-	-	959	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	8.6	9.3	1.3	0.3
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1510	-	-	-	1026	834	1008	1545	-	-
HCM Lane V/C Ratio	0.009	-	-	-	0.026	0.01	0.001	0.001	-	-
HCM Control Delay (s)	7.4	-	-	0	8.6	9.4	8.6	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0.1	0	0	0	-	-

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	45	21	41	44	2
Future Vol, veh/h	5	45	21	41	44	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	5	49	23	45	48	2

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	140	49	50	0	-	0
Stage 1	49	-	-	-	-	-
Stage 2	91	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	853	1020	1557	-	-	-
Stage 1	973	-	-	-	-	-
Stage 2	933	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	840	1020	1557	-	-	-
Mov Cap-2 Maneuver	840	-	-	-	-	-
Stage 1	958	-	-	-	-	-
Stage 2	933	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.8	2.5	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1557	-	840	1020	-	-
HCM Lane V/C Ratio	0.015	-	0.006	0.048	-	-
HCM Control Delay (s)	7.3	-	9.3	8.7	-	-
HCM Lane LOS	A	-	A	A	-	-
HCM 95th %tile Q(veh)	0	-	0	0.2	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	2	0	6	5	0	1	7	38	7	1	66	4
Future Vol, veh/h	2	0	6	5	0	1	7	38	7	1	66	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Stop	-	-	None	-	-	None	-	-	None
Storage Length	25	-	0	0	-	0	420	-	-	-	-	280
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	92	50	92	92	92	42	96	92	92	73	50
Heavy Vehicles, %	0	2	9	2	2	2	14	7	2	2	8	2
Mvmt Flow	8	0	12	5	0	1	17	40	8	1	90	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	171	-	90	174	-	44	98	0	0	48	0	0
Stage 1	92	-	-	78	-	-	-	-	-	-	-	-
Stage 2	79	-	-	96	-	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	6.29	7.12	-	6.22	4.24	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.12	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	3.381	3.518	-	3.318	2.326	-	-	2.218	-	-
Pot Cap-1 Maneuver	797	0	949	789	0	1026	1423	-	-	1559	-	-
Stage 1	920	0	-	931	0	-	-	-	-	-	-	-
Stage 2	935	0	-	911	0	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	788	-	949	772	-	1026	1423	-	-	1559	-	-
Mov Cap-2 Maneuver	788	-	-	772	-	-	-	-	-	-	-	-
Stage 1	909	-	-	920	-	-	-	-	-	-	-	-
Stage 2	923	-	-	899	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.1	9.5	2	0.1
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1423	-	-	788	949	772	1026	1559	-	-
HCM Lane V/C Ratio	0.012	-	-	0.01	0.013	0.007	0.001	0.001	-	-
HCM Control Delay (s)	7.6	-	-	9.6	8.8	9.7	8.5	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	0	0	-	-

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	4	33	47	48	72	5
Future Vol, veh/h	4	33	47	48	72	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	0	0	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	36	51	52	78	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	235	81	83	0	-	0
Stage 1	81	-	-	-	-	-
Stage 2	154	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	753	979	1514	-	-	-
Stage 1	942	-	-	-	-	-
Stage 2	874	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	727	979	1514	-	-	-
Mov Cap-2 Maneuver	727	-	-	-	-	-
Stage 1	910	-	-	-	-	-
Stage 2	874	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	3.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1514	-	727	979	-	-
HCM Lane V/C Ratio	0.034	-	0.006	0.037	-	-
HCM Control Delay (s)	7.5	-	10	8.8	-	-
HCM Lane LOS	A	-	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0	0.1	-	-

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Sustainable buildings, sound infrastructure, safe transportation systems, clean water, renewable energy and a balanced environment. Building a Better World for All of Us communicates a company-wide commitment to act in the best interests of our clients and the world around us.

We're confident in our ability to balance these requirements.

Join Our Social Communities

COLORADO DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ACCESS PERMIT APPLICATION

Issuing authority application acceptance date:

Instructions:
- Contact the Colorado Department of Transportation (CDOT) or your local government to determine your issuing authority.
- Contact the issuing authority to determine what plans and other documents are required to be submitted with your application.
- Complete this form (some questions may not apply to you) and attach all necessary documents and Submit it to the issuing authority.
- Submit an application for each access affected.
- If you have any questions, contact the issuing authority.
- For additional information, see CDOT's Access Management website at http://www.codot.gov/business/permits/accesspermits.

Please print or type

**Indicates required field*

1) Property Owner (Permittee)*		2) Applicant or Agent for Permittee (if different from property owner)	
Cascade Hospitality		SEH Inc. - Paul O'Neil	
Street Address*		Mailing Address	
PO Box 34781		934 Main Ave, Unit C	
City, State & Zip*	Phone #	City, State & Zip	Phone #
Charlotte, NC 28234		Durango, CO 81301	970.459.4259
E-mail Address*		E-mail Address (if available)	
		poneil@sehinc.com	

3) Address of property to be served by permit*
50221 Highway 550, Durango CO

4) Legal description of property: (If within jurisdictional limits of Municipality, City and/or County, which one?

county	subdivision	block	lot	section	township	range
San Juan	3			13	39N	9W

5) What State Highway are you requesting access from?*	6) What side of the highway?*
US 550	☐ N ☐ S ☐ E ☒ W

7) How many feet is the proposed access from the nearest milepost (or cross street if mile post unknown)?*
970 feet (☒ N ☐ S ☐ E ☐ W) from: MP 50

8) What is the approximate date you intend to begin construction?
08/01/2025

9) Check here if you are requesting a:*
- ☒ New Access
- ☐ Temporary Access (duration anticipated: _____)
- ☐ Improvement to Existing Access
- ☐ Change in Access Use
- ☐ Removal of Access
- ☐ Relocation of an Existing Access (provide detail)

10) Provide existing property use
Vacant

11) Do you have knowledge of any State Highway access permits serving this property, or adjacent properties in which you have a property interest?*
☒ No ☐ Yes, if yes – what are the permit number(s) and provide copies: and/or, permit date:

12) Does the property owner own or have any interests in any adjacent property?*
☐ No ☒ Yes, if yes – please describe: Property is part of Cascade Village overall development

13) Are there other existing or dedicated public streets, roads, highways or access easements bordering or within the property?*
☐ No ☒ Yes, if yes – list them on your plans and indicate the proposed and existing access points.

14) If you are requesting agriculture field access – how many acres will the access serve?

15) If you are requesting commercial or industrial access, please indicate the types and number of businesses and provide the floor area square footage of each.

Business/Land Use	Square Footage	Business/Land Use	Square Footage

16) If you are requesting residential development access, what is the type (single family, apartment, townhouse) and number of units?

Type	Number of Units	Type	Number of Units
Townhomes/Condos	102	Restaraunt	1000
Single Family/Cabins	14	Retail	5000

17) Provide the following vehicle count estimates for vehicles that will use the access. Leaving the property then returning is two counts.*

Indicate if your counts are ☒ peak hour volumes or ☐ average daily volumes.	# of passenger cars and light trucks at peak hour volumes	# of multi-unit trucks at peak hour volumes
	89	
# of single unit vehicles in excess of 30 ft.	**# of farm vehicles (field equipment)**	**Total count of all vehicles**
		89

18) Check with the issuing authority to determine which of the following documents are required to complete the review of your application.

a) Property map indicating other access, bordering roads and streets.
b) Highway and driveway plan profile.
c) Drainage plan showing impact to the highway right-of-way.
d) Map and letters detailing utility locations before and after development in and along the right-of-way.
e) Subdivision, zoning, or development plan.
f) Proposed access design.
g) Parcel and ownership maps including easements.
h) Traffic studies.
i) Proof of ownership.

1- It is the applicant's responsibility to contact appropriate agencies and obtain all environmental clearances that apply to their activities. Such clearances may include Corps of Engineers 404 Permits or Colorado Discharge Permit System permits, or ecological, archeological, historical or cultural resource clearances. The COOT Environmental Clearances Information Summary presents contact information for agencies administering certain clearances, information about prohibited discharges, and may be obtained from Regional COOT Utility/Special Use Permit offices or accessed via the COOT Planning/Construction-Environmental-Guidance webpage: https://www.codot.gov/programs/environmental/resources/guidance-standards/environmental-clearances-info-summary-august-2017/view.

2- All workers within within the State Highway right of way shall comply with their employer's safety and health policies/ procedures, and all applicable U.S. Occupational Safety and Health Administration (OSHA) regulations -including, but not limited to the applicable sections of 29 CFR Part 1910 -Occupational Safety and Health Standards and 29 CFR Part 1926

- Safety and Health Regulations for Construction.

Personal protective equipment (e.g. head protection, footwear, high visibility apparel, safety glasses, hearing protection, respirators, gloves, etc.) shall be worn as appropriate for the work being performed, and as specified in regulation. At a minimum, all workers in the State Highway right of way, except when in their vehicles, shall wear the following personal protective equipment: High visibility apparel as specified in the Traffic Control provisions of the documentation accompanying the Notice to Proceed related to this permit (at a minimum, ANSI/ISEA 107-1999, class 2); head protection that complies with the ANSI 289.1-1997 standard; and at all construction sites or whenever there is danger of injury to feet, workers shall comply with OSHA's PPE requirements for foot protection per 29 CFR 1910.136, 1926.95, and 1926.96. If required, such footwear shall meet the requirements of ANSI 241-1999.

Where any of the above-referenced ANSI standards have been revised, the most recent version of the standard shall apply.

3- The Permittee is responsible for complying with the Revised Guidelines that have been adopted by the Access Board under the American Disabilities Act (ADA). These guidelines define traversable slope requirements and prescribe the use of a defined pattern of truncated domes as detectable warnings at street crossings. The new Standards Plans and can be found on the Design and Construction Project Support web page at: https://www.codot.gov/business/civilrights/ada/resources-engineers.

If an access permit is issued to you, it will state the terms and conditions for its use. Any changes in the use of the permitted access not consistent with the terms and conditions listed on the permit may be considered a violation of the permit.

The applicant declares under penalty of perjury in the second degree, and any other applicable state or federal laws, that all information provided on this form and submitted attachments are to the best of their knowledge true and complete.

I understand receipt of an access permit does not constitute permission to start access construction work.

Applicant or Agent for Permittee Signature	Print Name	Date
Paul F. O'Neil	Paul O'Neil	04/15/2025

If the applicant is not the owner of the property, we require this application also to be signed by the property owner or their legally authorized representative (or other acceptable written evidence). This signature shall constitute agreement with this application by all owners-of-interest unless stated in writing. If a permit is issued, the property owner, in most cases, will be listed as the permittee.

Property Owner Signature	Print Name	Date

INSTRUCTIONS FOR COMPLETING APPLICATION FOR ACCESS PERMIT
(CDOT FORM NO. 137)
December 2018

To construct, relocate, close, or modify access(es) to a State Highway or when there are changes in use of such access point(s), an application for access permit must be submitted to the Colorado Department of Transportation (CDOT) or the local jurisdiction serving as the issuing authority for State Highway Access Permits. Contact the CDOT Regional Access Unit in which the subject property is located to determine where the application must be submitted. The following link will help you determine which CDOT Region office to contact:

https://www.codot.gov/business/permits/accesspermits/regional-offices.html

All applications are processed and access permits are issued in accordance to the requirements and procedures found in the most current version of the State Highway Access Code (Access Code). Code and the application form are also available from CDOT's web site at:

https://www.codot.gov/business/permits/accesspermits

Please complete all information requested accurately. Access permits granted based on applications found to contain false information may be revoked. An incomplete application will not be accepted. If additional information, plans and documents are required, attach them to the application. Keep a copy of your submittal for your records. Please note that only the original signed copy of the application will be accepted. Do not send or enclose any permit fee at this time. A permit fee will be collected if an access permit is issued. The following is a brief description of the information to be provided on each enumerated space on the application form (CDOT Form 137, 2010).

1. **Property Owner (Permittee):** Please provide the full name, mailing address and telephone number and the E-mail address (if available) of the legal property owner (owner of the surface rights). Please provide a telephone number where the Permittee can be reached during business hours (8:00 a.m. to 5:00 p.m.). Having a contract on the property is not a sufficient legal right to that property for purposes of this application. If the access is to be on or across an access easement, then a copy of the easement MUST accompany this application. If federal land is involved, provide the name of the relevant federal agency AND attach copy of federal authorization for property use.

2. **Agent for permittee:** If the applicant (person completing this application) is different than the property owner (Permittee), provide entity name (if applicable), the full name of the person serving as the Agent, mailing address, telephone number, and the E-mail address (if available). Please provide a telephone number where the Agent can be reached during business hours (8:00 a.m. to 5:00 p.m.). Joint applications such as owner/lessee may be submitted. Corporations must be licensed to do business in Colorado: All corporations serving as, or providing, an Agent as the applicant must be licensed to do business in Colorado.

3. Address of Property to be Served: Provide if property to be served has an official street address. If the access is a public road, note the name (or future name) of the road.

4. Legal Description of Property: Fill in this item to the extent it applies. This information is available at your local County Courthouse, or on your ownership deed(s). A copy of the deed may be required as part of this application in some situations. To determine applicability, check with the CDOT's Regional Access Manager or issuing authority staff.

5. State Highway: Provide the State Highway number from which the access is requested.

6. Highway Side: Mark the appropriate box to indicate what side of the highway the requested access is located.

7. Access Mile Point: Without complete information, we may not be able to locate the proposed access. To obtain the distance in feet, drive the length between the mile point and the proposed access, rounding the distance on the odometer to the nearest tenth of a mile; multiply the distance by 5,280 feet to obtain the number of feet from the mile point. Then enter the direction (i.e. north, south, east, west) from the mile point to the proposed access. Finally, enter the mile point number. It is helpful in rural or undeveloped areas if some flagging is tied to the right-of-way fence at the desired location of the access. If the mile post is unknown, note the distance in feet (using the same procedures noted above) from that cross street or road closest to the proposed access.

8. Access Construction Date: Fill in the date on which construction of the access is planned to begin.

9. Access Request: Mark items that apply. More than one item may be checked.

10. Existing property use: Describe how the property is currently being used. For example, common uses are Single Family Residential, Commercial or Agricultural.

11. Existing Access: Does the property have ***any other legal alternatives to reach a public road*** other than the access requested in this application? Note the access permit number(s) for any existing state highway access point(s) along with their issue date(s). If there are no existing access point(s), mark the "no" box.

12. Adjacent Property: Please mark the appropriate box. If the "yes" box is marked, provide a brief description of the property (location of the property in relation to the property for which this access application is being made).

13. Abutting Streets: If there are any other existing or proposed public roads or easements abutting the property, they should be shown on a map or plan attached to this application.

14. Agricultural Acres: Provide number of acres **to be served.**

15. Access Use: List the land uses and square footage of the site as it will be when it is fully developed. The planned land uses as they will be when the site is fully developed are used to project the amount of traffic that the site will generate, peak hour traffic levels and the type of vehicles that can be expected as a result of the planned land uses. There may be exceptional circumstances that would allow phased installation of access requirements. This is at the discretion of the CDOT Regional Access Unit or issuing authority staff.

16. Estimated Traffic Count: Provide a reasonable estimate of the traffic volume expected to use the access. Note the type of vehicles that will use the access along with the volume (number of vehicles in and out at either the peak hour or average daily rates) for each type of vehicle. A vehicle leaving the property and then returning counts as two trips. If 40 customers are expected to visit the business daily, there would be 80 trips in addition to the trips made by all employees and other visitors (such as delivery and trash removal vehicles). If the PDF on-line version of this application is being used, the fields for each type of vehicle will automatically be added together to populate the last field on the page.

17. Documents and Plans: The CDOT Regional Access Manager or issuing authority staff will determine which of these items must be provided to make the application complete. Incomplete applications will not be accepted. If an incomplete application is received via U.S. mail or through means other than in the hand of the Access Manager or issuing authority staff, it will not be processed. ***It is the responsibility of the applicant to verify with the CDOT Regional Access Manager or issuing authority staff whether the application is complete at the time of submission.***

Signature: Generally, if the applicant is not the property owner, then the property owner or a legally authorized representative must sign the application. With narrow exceptions, proof of the property owner's consent is required to be submitted with the application (proof may be a power of attorney or a similar consent instrument). The CDOT Regional Access Manager or issuing authority staff will determine if the exception provided in the Access Code (2.3 (3) (b)) is applicable.

If CDOT is the issuing authority for this application, direct your questions to the CDOT Regional Access Manager or the issuing authority staff serving the subject property.

https://www.codot.gov/business/permits/accesspermits/regional-offices.html

If the application is accepted, it will be reviewed by the CDOT Regional Access Manager or the issuing authority staff. If an Access Permit is issued, be sure to read all of the attached Terms and Conditions before signing and returning the Access Permit. The Terms and Conditions may require that additional information be provided prior to issuance of the Notice to Proceed.

The CDOT Regional Access Manager (or issuing authority staff) MUST be contacted prior to commencing work on any Access Permit project. ***A Notice to Proceed that authorizes the Permittee to begin access related construction MUST be issued prior to working on the access in the State Highway right-of-way.*** The Notice to Proceed may also have Terms and Conditions that must be fulfilled before work may begin on the permitted access.

ENVIRONMENTAL CONSULTANTS

Memo

To: William Tookey, San Juan County Administrator

From: Sean Moore (SME Environmental, Inc.)

Date: July 18, 2025

Re: Status of 404 permitting for the Cascade Village Tracts A1-B1 project

Introduction

The purpose of this memorandum is to summarize the status of Clean Water Act Section 404 Permitting for the Cascade Village Tracts A1-B1 project which is located west of US Highway 550 just north of the San Juan/La Plata County boundary. As summarized in the attached letter from Reynolds Ash + Associates (Attachment A), for a couple of reasons, the project proponent plans to phase the construction of the development. Phase I will entail the construction of the access road from the southern end of the existing Cascade Village development to a shred access point on US 550 with the landowner due south of the subject property. Subsequent phases of the Cascade Village Tracts A1-B1 project will entail the build out of residential units served by the access road constructed in Phase I.

Phased 404 Permitting

Since the construction of Phase I will incur an impact of 0.18 acre of wetland impact, SME has prepared a Pre-construction Notification for Nationwide Permit (NWP) #14 (Linear Transportation Crossings) that will be submitted to the US Army Corps of Engineers (USACE) in the coming weeks. If necessary, subsequent phases of the development would be permitted under either NWP #39 (Commercial and Institutional Developments) of an Individual 404 Permit, per confirmation from the USACE.

Pending Revision to Jurisdictional Limits of Waters of the US

In March of 2025 the US Environmental Protection Agency released a memo summarizing forthcoming new guidance on adjacent (currently jurisdictional) wetlands (Attachment C). Implementation of the new guidance is expected sometime in the next 18 months. Should the details on implementation include the second bullet in the attached memo: **wetlands separated from local perennial or intermittent streams by "berms, dikes, uplands or indirect hydrologic features (ditches, swales, pipes, etc.) no longer qualify as adjacent".** The wetland complex in the Cascade Village Tracts A1-B1 project area is such a wetland as it is connected to Cascade Creek/the Animas River through culverts under US 550 on the Durango Mountain Resort/Purgatory property. Should these culverts serve as a disconnect of USACE jurisdiction when the new guidance becomes official, impacts to the wetland complex

resulting from Phase II (and beyond) of the Cascade Village Tracts A1-B1 project would not require a 404 Permit. This is another reason the project proponent feels it is important to phase implementation of the project as completion of the residential component of the project without the need for 4094 Permitting and required mitigation will realize a significant cost savings.

ATTACHMNENT A
Project Phasing Letter (from RA+A)

REYNOLDS ASH + ASSOCIATES

ARCHITECTURE & ENGINEERING

06-21-2025

CASCADE MEADOWVIEW DRIVE
Application for a 404 Permit

To: The Army Corps of Engineers
SME Environmental, Inc.

To Whom it May Concern,

Reynolds Ash and Associates (RA+A) has been working diligently with the owner and San Juan County on building out the southern portion of the master plan for Cascade Village in Durango, Colorado. The south side of the original master plan includes about 79 acres of land including what is referred to as Tract A-1/Tract B-1. The Cascade Village master plan is approved for additional residential and multi-family units that extend from the current edge of development to the southern boundary. The long term build out is anticipating about 50-60 residential units that will be part of the full build out. The master plan requires an extension of Meadowview Road, which will connect the existing road to a south entry off of Highway 550. However, the residential units will take more time to get fully approved, entitled and permitted through San Juan County.

Recently, Xcel impacted the site in question, to install a new pipeline that follows the proposed path of Meadowview Drive. The installation of the pipeline disturbed the soil and presumably touched the existing wetlands.

The design team, working with the Owner, has designed the completion of the road to include full grading, specs for paved driving surface, rough in for utilities to serve future build out. The design meets best practices, follows the easement established by the Xcel pipeline and to the best of our abilities, has minimal impact to the wetlands. Our civil engineer has kept all grading as tight as possible.

However, due to the short building season and the potential for the Corps to modify how wetlands are defined, the owner wishes only to build out the road in the first phase of construction. Following the road installation, the Owner will submit additional land use applications to San Juan County for the building pads and residential improvements. Since the road has a small impact to the wetlands, and since there could be a shift in jurisdictional wetlands, we believe that phasing the permits for this project are best.

Once the Corps comes out with new guidance on jurisdiction, the design team can better plan for and adjust as necessary the plan for build out.

Thank you,

Lauren Davis, AIA, AICP

564 E. 2ND AVE, SUITE 201, DURANGO, CO 81301 PHONE 970. 259.7494
262 PAGOSA STREET STE. 200, PAGOSA SPRINGS, CO 81147 (970) 264-6884

APPENDIX B
Pre-Construction Notification for NWP 14 for Phase I

U.S. Army Corps of Engineers (USACE)

NATIONWIDE PERMIT PRE-CONSTRUCTION NOTIFICATION (PCN)

33 CFR 330. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 02-28-2022

DATA REQUIRED BY THE PRIVACY ACT OF 1974

Authority	Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Regulatory Program of the Corps of Engineers (Corps); Final Rule 33 CFR 320-332.
Principal Purpose	Information provided on this form will be used in evaluating the nationwide permit pre-construction notification.
Routine Uses	This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of the agency coordination process.
Disclosure	Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued.

The public reporting burden for this collection of information, 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR RESPONSE TO THE ABOVE EMAIL.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (*see sample drawings and/or instructions*) and be submitted to the district engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (*agent is not required*)
First - Charles Middle - Lindsey Last - McAlpine	First - Sean Middle - Last - Moore
Company - CitiSculpt	Company - SME Environmental, Inc. (SME)
Company Title -	E-mail Address - smoore@sme-env.com
E-mail Address - Lmcalpine@citisculpt.com	
6. APPLICANT'S ADDRESS	**9. AGENT'S ADDRESS**
Address- 1355 Greenwood Cliff #150	Address- 679 East 2nd Avenue Unit 8
City - Charlotte State - NC Zip - 28204 Country - USA	City - Durango State - CO Zip - 81301 Country - USA
7. APPLICANT'S PHONE NOs. with AREA CODE	**10. AGENT'S PHONE NOs. with AREA CODE**
a. Residence b. Business c. Fax d. Mobile	a. Residence b. Business c. Fax d. Mobile
704-361-3758	(970) 259-9595 (970) 259-0050

STATEMENT OF AUTHORIZATION

11. I hereby authorize, SME Environmental, Inc. to act in my behalf as my agent in the processing of this nationwide permit pre-construction notification and to furnish, upon request, supplemental information in support of this nationwide permit pre-construction notification.

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME or TITLE (*see instructions*)

Cascade Village Tracts A1-B1

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

13. NAME OF WATERBODY, IF KNOWN (*if applicable*)

14. PROPOSED ACTIVITY STREET ADDRESS (*if applicable*)
South of and adjacent to 56 Meadowview Dr

15. LOCATION OF PROPOSED ACTIVITY (*see instructions*)

Latitude	°N	Longitude	°W
37.647453		-107.810142	

City: Durango

State: CO

Zip: 81301

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (*see instructions*)

State Tax Parcel ID

Municipality
Durango

Section	Township	Range
13	39N	9W

17. DIRECTIONS TO THE SITE
The project site is located west of U.S. Highway 550, north of Purgatory Resort by about .8 mile, and just south of the Cascade Village development in San Juan County, Colorado. Exit west off U.S. Highway 550 on Meadowview Drive and proceed left (south) on Meadowview Drive. Continue south on Meadowview Drive until the road ends at a cul-de-sac. The project site is located south and west of the end of the cul-de-sac. A road map is provided as Figure '1' and a topographic map is provided as Figure'2' in the Aquatic Resources Delineation Report (Appendix 'A' of Attachment '2').

18. IDENTIFY THE SPECIFIC NATIONWIDE PERMIT(S) YOU PROPOSE TO USE
Nationwide Permit 14 - Linear Transportation Projects

19. DESCRIPTION OF PROPOSED NATIONWIDE PERMIT ACTIVITY (*see instructions*)
The proposed project involves the installation of the extension of Meadowview Road, which will connect the existing road to a south entry off of Highway 550. The design of the road includes full grading, specs for paved driving surface, and rough in for utilities to serve future build out. The road is the first phase of this project and the subject of this PCN. The second phase includes the development and building of additional residential and multi family units and will be permitted under a future 404 Permit action if necessary.

20. DESCRIPTION OF PROPOSED MITIGATION MEASURES (*see instructions*)
Mitigation will occur through the Animas River Wetlands Bank. Additionally, standard construction practices would be implemented on-site (as applicable) to minimize impacts to aquatic resources to the maximum extent practicable during construction. BMPs would be used to prevent erosion and sediment runoff prior to, during and after construction (as necessary and applicable) to minimize impacts to important natural resources. Any exposed slopes or areas of disturbed soil would be stabilized and revegetated as soon as possible upon completion of construction. All temporary impact areas will be restored to pre-construction conditions.

21. PURPOSE OF NATIONWIDE PERMIT ACTIVITY (*Describe the reason or purpose of the project, see instructions*)
The purpose of the Nation Wide permit is to construct an access road to that eventually provide access to the Cascade Village Tracts A1 - B1 development.

22. QUANTITY OF WETLANDS, STREAMS, OR OTHER TYPES OF WATERS DIRECTLY AFFECTED BY PROPOSED NATIONWIDE PERMIT ACTIVITY (*see instructions*)

Acres	Linear Feet	Cubic Yards Dredged or Discharged
0.184 (8,021 sq ft) see Figure 1	N/A	N/A

Each PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site.

23. List any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. (*see instructions*)

24. If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and requires pre-construction notification, explain how the compensatory mitigation requirement in paragraph (c) of general condition 23 will be satisfied, or explain why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required for the proposed activity.
The proposed project would result in the loss of greater than 1/10 acre of wetlands. Total impacts equal to 0.181 acres of PEM wetland.

Control measures/BMPs will be used to prevent erosion and sediment runoff prior to, during and after construction. These BMPs would be installed before construction begins and would remain in place until construction is completed, with removal as appropriate. Following completion of construction activities, temporary impact areas wold be restored to pre-construction conditions and revegetated, as appropriate.

25. Is any portion of the nationwide permit activity already complete? ☐ Yes ☒ No If Yes, describe the completed work:

26. List the name(s) of any species listed as endangered or threatened under the Endangered Species Act that might be affected by the proposed NWP activity or utilize the designated critical habitat that might be affected by the proposed NWP activity. (*see instructions*)

27. List any historic properties that have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic property or properties. (*see instructions*)

The following information is provided in accordance with General Condition 20 Historic Properties. SME contacted the Colorado Office of Archaeology and Historic Preservation (OAHP) to request a database search for the proposed project area on June 30, 2025. The Colorado OAHP usually provides results within 20 business days from the request. SME will provide cultural results when they are received.

28. For a proposed NWP activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, identify the Wild and Scenic River or the "study river":

N/A

29. If the proposed NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, have you submitted a written request for section 408 permission from the Corps district having jurisdiction over that project? ☐ Yes ☒ No

If "yes", please provide the date your request was submitted to the Corps district: N/A

30. If the terms of the NWP(s) you want to use require additional information to be included in the PCN, please include that information in this space or provide it on an additional sheet of paper marked Block 30. (*see instructions*)

N/A

31. Pre-construction notification is hereby made for one or more nationwide permit(s) to authorize the work described in this notification. I certify that the information in this pre-construction notification is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

SIGNATURE OF APPLICANT	DATE	SIGNATURE OF AGENT	DATE

The pre-construction notification must be signed by the person who desires to undertake the proposed activity (applicant) and, if the statement in Block 11 has been filled out and signed, the authorized agent.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

ATTACHMENT 1
Impacts Figures

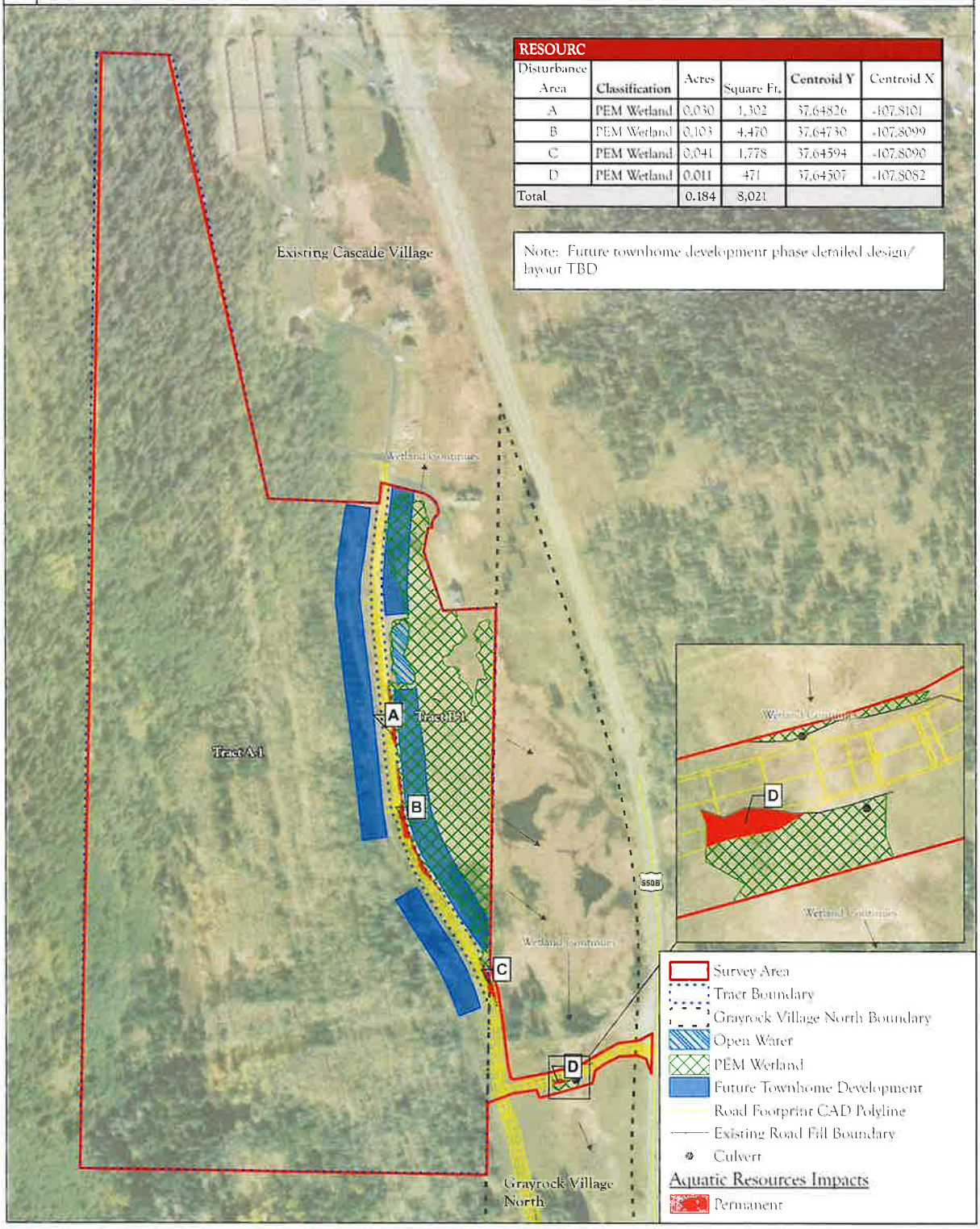
GENERAL NOTES

1. Survey area boundary created by SME based on CAD data provided CHC Engineering.
2. SME Environmental, Inc. (SME) staff visited the site on June 19, 2025 to assess and delineate the boundaries of wetlands and other Waters of the U.S. (WOUS) in the area of interest using the methodology defined in the Routine Determination procedure set forth in the U.S. Army Corps of Engineers Wetlands Delineation Manual (USACE 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Region (USACE 2010), A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States (USACE 2014), which is the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008) and the Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (USACE 2008).
3. Wetland boundaries were defined based on presence of hydrophytic vegetation, hydric soils, and hydrologic indicators that under normal conditions would indicate wetland conditions. Where wetland conditions did not occur adjacent to surface water, the jurisdictional boundary was identified based on evidence of the OHWM.
4. The boundaries of WOUS were surveyed using a Trimble R1 GNSS Receiver (real-time sub-meter accuracy).
5. Acres which likely satisfy the USACE criteria as WOUS are labeled. Note that WOUS continue beyond the survey area boundary.
6. All WOUS boundaries, depicted hereon, are subject to modification until jurisdictional verification has been completed by the USACE.
7. Please be aware that impacts to WOUS may require authorization from Local, State and/or Federal regulatory agencies.
8. Aquatic resources delineation table represents acreage, linear feet/ac, square footage and centroid locations.

RESOURC

Disturbance Area	Classification	Acres	Square Ft.	Centroid Y	Centroid X
A	PEM Wetland	0.030	1,302	37.64826	-107.8101
B	PEM Wetland	0.103	4,470	37.64730	-107.8099
C	PEM Wetland	0.041	1,778	37.64594	-107.8090
D	PEM Wetland	0.011	471	37.64507	-107.8082
Total		0.184	8,021		

Note: Future townhome development phase detailed design/ layout TBD



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Drawn By:	Rvwd. By:	Proj. No.:
SB	SM	240008
Date:	Rvsd. Date:	Scale:
7/2/2025	NA	1 in = 317 ft

N

0 240 480

Feet

AQUATIC RESOURCES IMPACTS MAP

AQUATIC RESOURCES DELINEATION
CASCADE VILLAGE TRACTS A1-B1
SAN JUAN COUNTY, CO

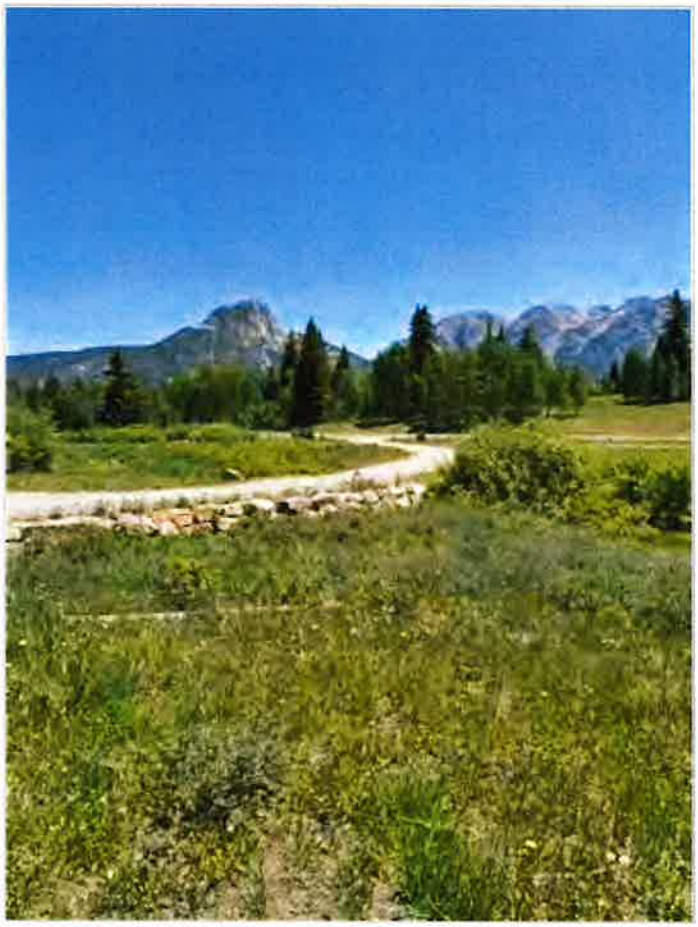
FIGURE
1

ATTACHMENT 2
Aquatic Resources Delineation Report

Aquatic Resources Delineation Report

Cascade Village Tracts A1-B1

San Juan County, CO



Prepared for:

CitiSculpt
1355 Greenwood Cliff, #150
Charlotte, North Carolina, 28204

Prepared by:

ENVIRONMENTAL CONSULTANTS
679 East 2nd Avenue, Unit E2
Durango, Colorado 81301

July 2025

EXECUTIVE SUMMARY

Wetlands and other Waters of the U.S. (WOUS) in Cascade Village Tracts A1-B1 survey area were identified by SME Environmental, Inc. (SME) on June 16th, 2025 using the methodology defined in the Routine Determination procedure set forth in the *U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and *the Regional Supplement: Western Mountains, Valleys, and Coast Region (Version 2.0)*. Aquatic resources boundaries were surveyed based on presence of hydrophytic vegetation, hydric soils, and hydrologic indicators that under normal conditions would indicate wetland conditions. Additionally, SME surveyed for the presence of an ordinary high-water mark (OHWM) in accordance with the *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams: Final Version* (USACE 2025).

The Cascade Village Tracts A1-B1 Project survey area is 79.50 acres. Based on the site investigation, approximately 7.36 acre (320,679 sq. feet) of aquatic resources exist in the survey area. The survey area is located west of U.S. Highway 550, north of Purgatory resort about 0.8 mile, and just south of Cascade Village Condos in Durango, CO within San Juan County. SME prepared this report for Charles McAlpine of CitiSculpt to document the boundaries of aquatic resources within the survey area of Cascade Village Tracts A1-B1 project.

TABLE OF CONTENTS

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

CR	County Road
HUC	Hydrologic Unit Code
NAD	North American Datum
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OHWM	Ordinary high-water mark
PEM	Palustrine emergent
ROW	Right-of-way
R4SB	Riverine Intermittent Streambed
RPW	Relatively Permanent Water
SME	SME Environmental, Inc.
TNW	Traditional Navigable Water
US 550	U.S. Highway 550
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

Project Name: Cascade Village Tracts A1-B1

USACE File #: N/A, initial submittal
SME #: 240008

Applicant:
CitiSculpt
1355 Greenwood Cliff #150, Charlotte, NC 28204
Phone: Office (704) 361-3758
Contact: Mr. Charles Lindsey McAlpine; Email: Lmcalpine@citisculpt.com Transportation

Agent/Consultant:
SME Environmental, Inc. (SME)
679 East 2nd Avenue, Unit E2, Durango, CO 81301
Phone: (970) 259-9595; Fax: (970) 259-0050
Contact: Mr. Sean Moore, Principal; Email: smoore@sme-env.com

Survey Area Description: The area surveyed by SME in support of the project is west of US 550. The eastern portion of the survey area wetland areas. The western portion of the survey area is undeveloped forested land on an east facing slope. The area surrounding the survey area is low density residential buildings and Purgatory Resort.

Purpose: The purpose of this report is to identify and describe aquatic resources within the survey area for due diligence of Clean Water Act Section 404.

2.0 PROJECT LOCATION

Municipality: Durango ; **County:** San Juan County; **State:** Colorado; **Street Address:** South of and adjacent to 56 Meadowview Drive

Section, Township, Range (New Mexico Principal Meridian): Township 39 North, Range 9 West, parts of Section 13.

Lat/Long: Project area centroid (NAD 83) Lat: 37.647922° Long: -107.811529°

USGS Quad Name: Engineer Mountain, Colorado

Directions: The survey area is approximately 1.15 miles north of Purgatory Ski Resort and west of US 550. From the city of Durango head north on US 550 for approximately 25 miles. The survey can be accessed from a pullout on the west side of the highway. A Road Vicinity map is included as Figure 1 and a topographic map is provided as Figure 2 (Appendix A).

3.0 DELINEATION METHODS

Aquatic resources in the survey area were identified on June 19, 2025 using the methodology defined in the Routine Determination procedure set forth in the *1987 U.S. Army Corps of Engineers Wetlands Delineation Manual* (USACE 1987), the *Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast (Version 2.0),* and *National Ordinary High Water Mark Field Delineation Manual for Rivers and Streams: Final Version* (USACE 2025).Wetland boundaries were defined based on presence of hydrophytic vegetation, hydric soils, and hydrologic indicators that under normal conditions would indicate wetland conditions. In the absence of wetland conditions, the extent of aquatic resources was determined based on the lateral extent of the OHWM.

Prior to conducting the field survey, SME conducted a desktop survey of available publications covering the survey area including U.S. Geological Survey (USGS) 7.5' topographic quadrangles, U.S. Fish and Wildlife (USFWS) National Wetlands Inventory (NWI) data, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soils data, and *ESRI World Layer maps* for aerial imagery. The boundaries of aquatic resources were survey-located using Trimble R1 GNSS GPS unit (sub-meter accuracy) and are depicted in Figure 4.

4.0 EXISTING CONDITIONS

4.1 Landscape Setting

Size of Survey Area: Approximately 79.5 acres.

Watershed Name and Size (HUC 8): Animas Watershed, HUC 14080104, 1,371 square miles.

Elevation Range of Site: Approximately 8,850-9,710 feet above mean sea level (msl) (Figure 2).

Geographic Setting: The survey area is located in the San Juan Mountains just southwest of Coal Bank Pass. Boyce Lake is located approximately 0.3 mile east of the survey area. The survey area is surrounded primarily by undeveloped open and forested land, with scattered homes and US 550 to the east.

Geology: The underlying geology is comprised of Rico, Hermosa, and Molas Formations (U.S. Geological Survey). Rico formation consists of nonmarine red beds of shale, siltstone, arkosic sandstone, and grit. Hermosa formation west of the Los Pinos River is largely dark-gray marine shale, limestone, and sandstone. Molas formation is mostly nonmarine shale, siltstone, sandstone, conglomerate, and basal red breccia, maximum thickness about 125 feet.

Land Use: The survey area is located west of and adjacent to US 550 which receives high vehicular traffic. Purgatory Ski Resort is located south and east of the survey area which contains residential and commercial properties and is a high use recreation area during the summer and winter. The surrounding area is San Juan National Forest.

Precipitation: According to the Antecedent Precipitation Tool (USACE), the site visit was conducted during the dry season while the area was experiencing severe drought.

4.2 Aquatic Resources

The survey area contains two palustrine emergent (PEM) wetland areas. PEM Wetland Area B is north of the prosed driveway and PEM Wetland Area C is south of the proposed driveway (Figure 4). Although shrub stratum species such as shrubby cinquefoil (*Dasiphora fruticosa*) and mountain willow *(Salix monticola)* are present, the wetland areas are dominated by the herb stratum and are therefore classified as PEM. Additionally, PEM Wetland Area B has approximately 0.24 acre of open water (Area A). PEM Wetland Area B continues east of Tract B-1 and drains east under US 550 and into Cascade Creek. Cascade Creek is an (a)(3) Tributary of the Animas River (a)(1). Additionally, water is conveyed under the driveway from PEM Wetland Area B into PEM Wetland Area C towards Greyrock Village North. The boundaries of aquatic resources delineated within the survey area are depicted in Figure 4. Appendix B contains photographs of the aquatic resources within the survey area.

Table 1. Cowardin Classification, Acreage, and Linear Footage of Aquatic Resources within the Survey Area.

Waters of the U.S.	Square Feet	Acres	Linear Feet
Open Water (Area A)	10,440	0.240	N/A
Palustrine Emergent (PEM) Wetland (Area B)	307,189	7.052	N/A
Palustrine Emergent (PEM) Wetland (Area C)	3,051	0.070	N/A
TOTAL	**320,679**	**7.36**	**N/A**

Table 2. Characteristics of Aquatic Resources within the Survey Area.

Name	Flow Frequency	Flows to	Rationale
Open Water (Area A)	Seasonally Saturated	Cascade Creek	(a)(4) Adjacent Wetlands
PEM Wetland (Area B)	Seasonally Saturated	Cascade Creek	(a)(4) Adjacent Wetlands
PEM Wetland (Area C)	Seasonally Saturated	Cascade Creek	(a)(4) Adjacent Wetlands

4.3 Vegetation

The wetlands in the survey area are dominated by mountain willow (*Salix monticola*), reed canary grass (*Agrostis stolonfera*), carex species (*Carexs spp.),* and white marsh marigold (*Caltha leptosepala*). The uplands of the survey area are dominated by smooth brome (*Bromus inermis*), orchard grass (*Dactylis glomerata*), and common snowberry (*Symphoricarpos albus*). Appendix C provides a list of plant species observed during the field investigation. Wetland Determination Data forms for the Western Mountains, Valleys, and Coast Region are included with this report as Appendix D and include detailed information about the vegetation observed at each data point location.

4.4 Soils

Soil data for the survey area was obtained from the USDA NRCS. A soil map is included in Figure 3 and a complete description of the soil map series is included as Appendix E. The survey area is

located within the mapped *Cryaquolls-Typic Cryaquents complex 1 to 5 percent slopes*, *Needleton stony loam, 15 to 30 percent slopes, Clayburn-Hourglass complex, 5 to 25 percent slopes* and *Needleton-Snowdon-Rock outcrop complex, 30 to 80 percent slopes* soil units. The *Cryaquolls-Typic Cryaquents complex* soil map unit is listed on the State Soil Data Access (SDA) Hydric Soils List (NRCS 2018). Data collected from soil transects during the field investigation revealed primarily silty clay loam soils. The primary hydric soil indicator observed at the soil boring locations within the wetland areas was redoximorphic features (i.e., mottles) located within a dark soil matrix. Data from specific soil bores is presented on the data sheets in Appendix D.

4.5 Hydrology

The hydrology in survey area is sourced by two intermittent waterways that flow down the east facing slope into the valley where Tract B-1 is located. The topography to the west supports higher elevation slopes that carry stormwater and snowpack along the two unnamed intermittent channels from west to east, through the survey area and eventually flow to the Cascade Creek corridor. The unnamed waterways that support delineated wetlands are identified on the USGS Engineer Mountain, Colo. 7.5-minute Topographic Quadrangle 1:24,000 map as intermittent aquatic resources. The hydrology of these wetland areas is anticipated to primarily be the referenced unnamed intermittent channels.

4.7 Limitations

Field indicators can change with variations in hydrology and other factors. This report assesses the potential for aquatic resources at the site at the time of our review and does not address conditions at a given time in the future. Accordingly, on behalf of our client, SME reserves the right to revisit the jurisdictional status of boundaries of aquatic resources as presented herein, should any of this information warrant modifications. We make no other warranties, either expressed or implied, and our report is not a recommendation to buy, sell or develop the property. This report does not constitute a Jurisdictional Determination of Waters of the United States since such determinations must be verified by the USACE or the NRCS (as applicable) and are subject to review by the U.S. Environmental Protection Agency (USEPA).

5.0 REFERENCES – General and Cited

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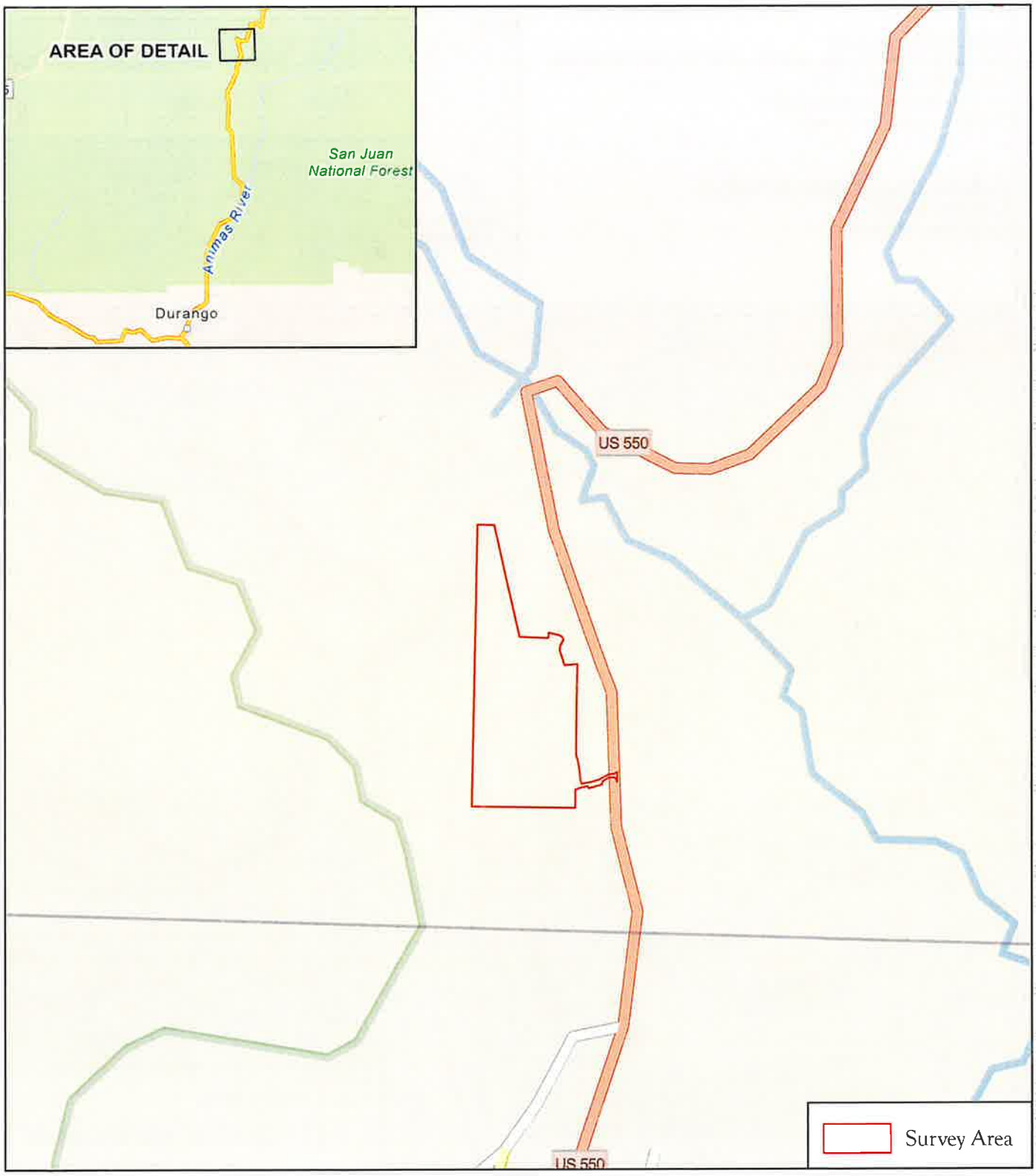
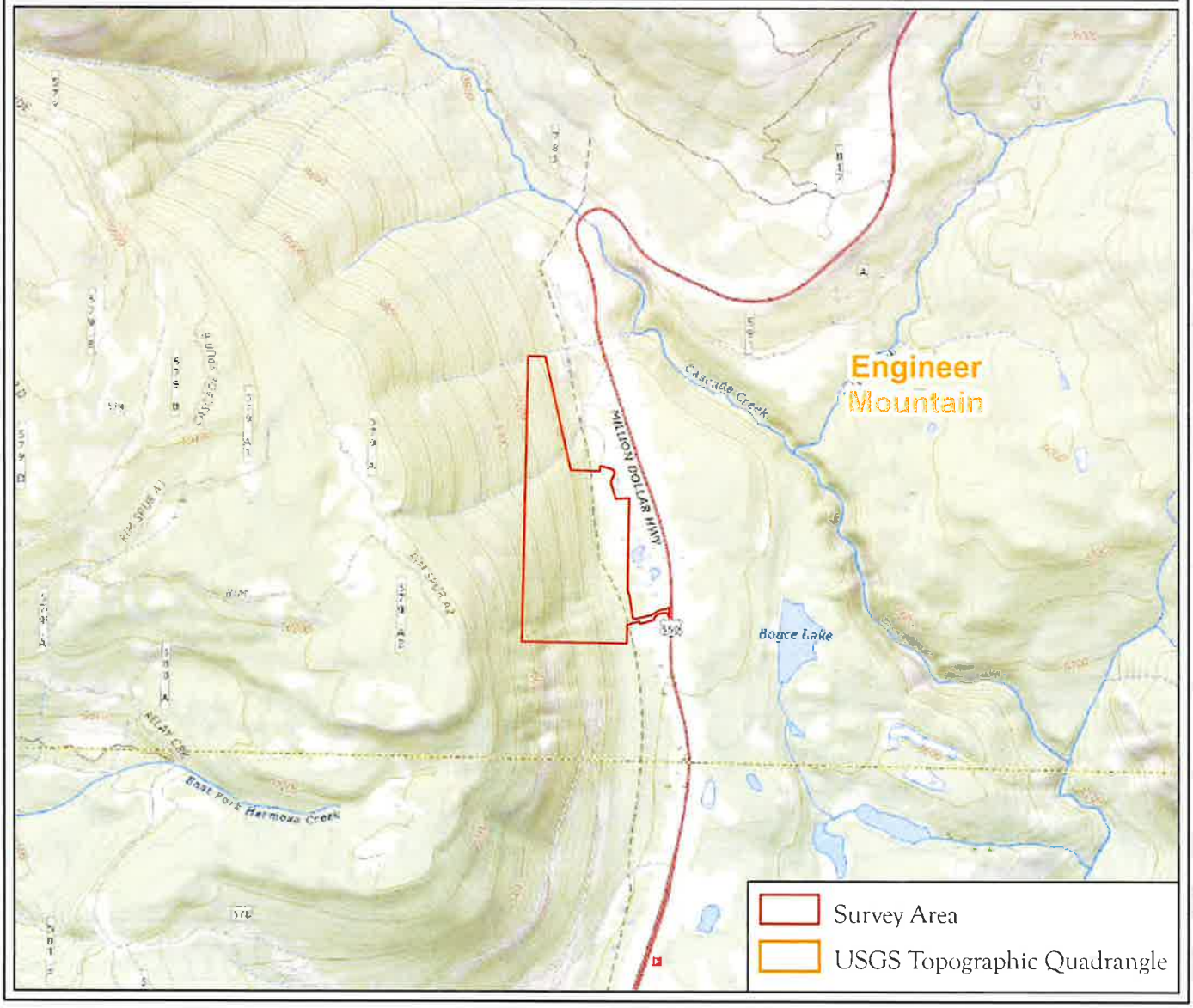
APPENDIX A
Figures 1-4



SME ENVIRONMENTAL CONSULTANTS 679 East 2nd Ave, Unit E2, Durango, Colorado 81301 www.sme-env.com (970) 259-9595	Drawn by: SB Rvwd. by: SM Project No.: 240008 Date: 6/30/2025 Rvsd. Date: NA Scale: 1:21,000 N 0 825 1,650 Feet	ROAD VICINITY MAP AQUATIC RESOURCES DELINEATION CASCADE VILLAGE TRACTS A1-B1 SAN JUAN COUNTY, CO	FIGURE 1

SURVEY LOCATION:
Township 39 North, Range 9 West, NENW, SENW, NESW, and NWSE of Section 13;
New Mexico Principal Meridian
San Juan County, Colorado.

SURVEY AREA CENTROID (NAD83):
Latitude: 37.64793°
Longitude: -107.81153°



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SB	SM	240008
Date:	Rvsd. Date:	Scale:
6/30/2025	NA	1:24,000

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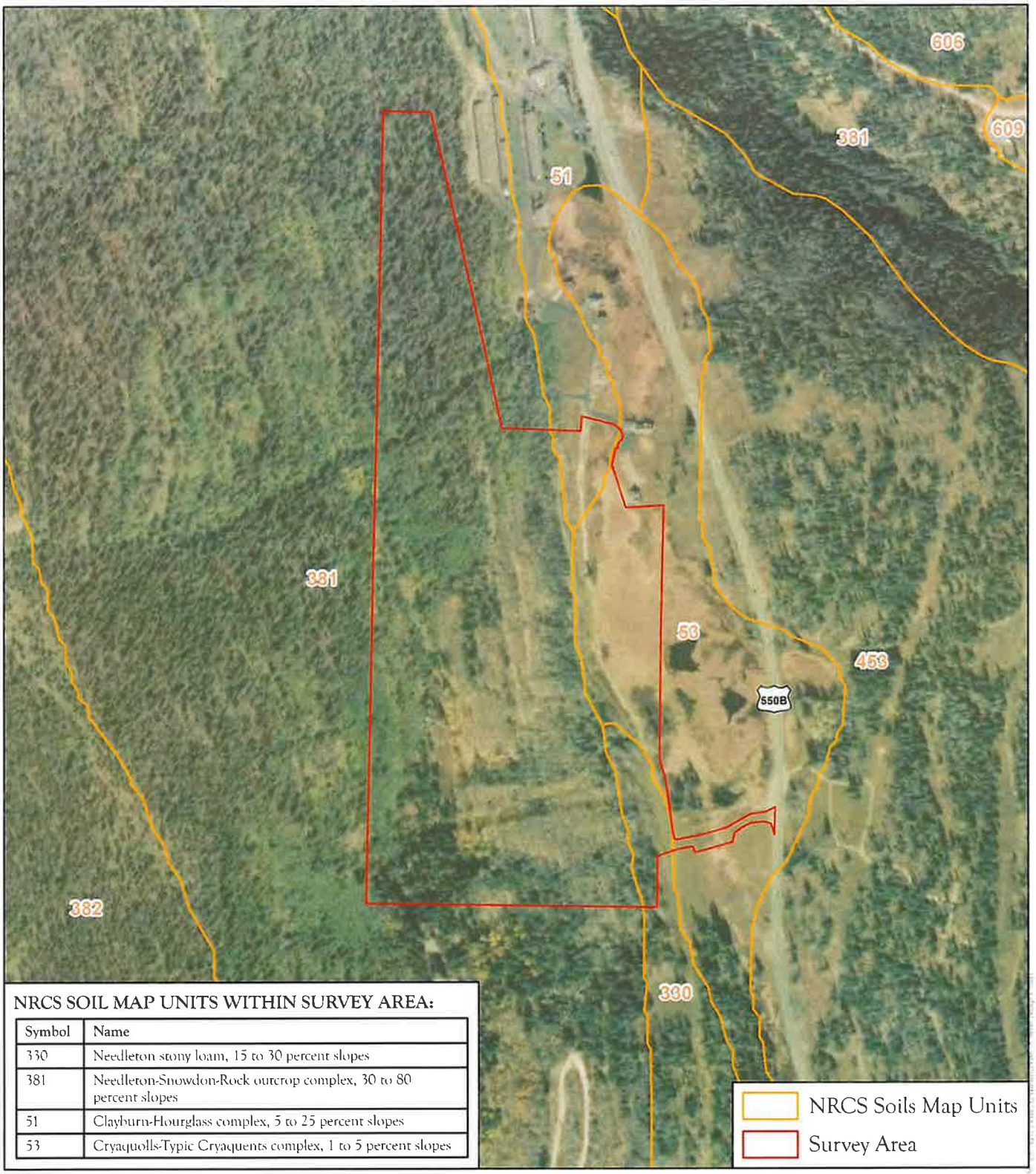
Feet

TOPOGRAPHIC LOCATION MAP

AQUATIC RESOURCES DELINEATION
CASCADE VILLAGE TRACTS A1-B1
SAN JUAN COUNTY, CO

FIGURE
2



NRCS SOIL MAP UNITS WITHIN SURVEY AREA:

Symbol	Name
330	Needleton stony loam, 15 to 30 percent slopes
381	Needleton-Snowdon-Rock outcrop complex, 30 to 80 percent slopes
51	Clayburn-Hourglass complex, 5 to 25 percent slopes
53	Cryaquolls-Typic Cryaquents complex, 1 to 5 percent slopes

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Drawn by:	Rvwd. by:	Project No.:
SB	SM	240008
Date:	Rvsd. Date:	Scale:
6/30/2025	NA	1:7,500

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0 310 620
Feet

SOILS MAP

AQUATIC RESOURCES DELINEATION
CASCADE VILLAGE TRACTS A1-B1
SAN JUAN COUNTY, CO

FIGURE 3

GENERAL NOTES

1. Survey tract boundary created by SME based on CAD data provided CHC Engineers.
2. SME Environmental, Inc. (SME) staff visited the site on June 18, 2025 to assess and delineate the boundaries of wetlands and other Waters of the U.S. (WOUS) in the area of interest using the methodology defined in the Routine Determination procedure set forth in the U.S. Army Corps of Engineers Wetlands Delineation Manual (USACE 1987), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains Region (USACE 2010), A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Western Mountains, Valleys, and Coast Region of the United States (USACE 2014), the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2010) and the Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States (USACE 2008).
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5. Areas which likely satisfy the USACE criteria as WOUS are labeled. Note that WOUS continue beyond the survey area boundary.
6. All WOUS boundaries, depicted hereon, are subject to modification until jurisdictional verification has been completed by the USACE.
7. Please be aware that impacts to WOUS may require authorization from Local, State and/or Federal regulatory agencies.
8. Aquatic resources delineation table represents acreages, linear footage, square footage and centroid locations.

AQUATIC RESOURCES DELINEATION TABLE

Area	Classification	Acres	Square Ft.	Centroid Y	Centroid X
A	Open Water	0.240	10,440	37.64888	-107.81005
B	PEM Wetland	7.052	307,189	37.64817	-107.80957
C	PEM Wetland	0.070	3,051	37.64507	-107.80808
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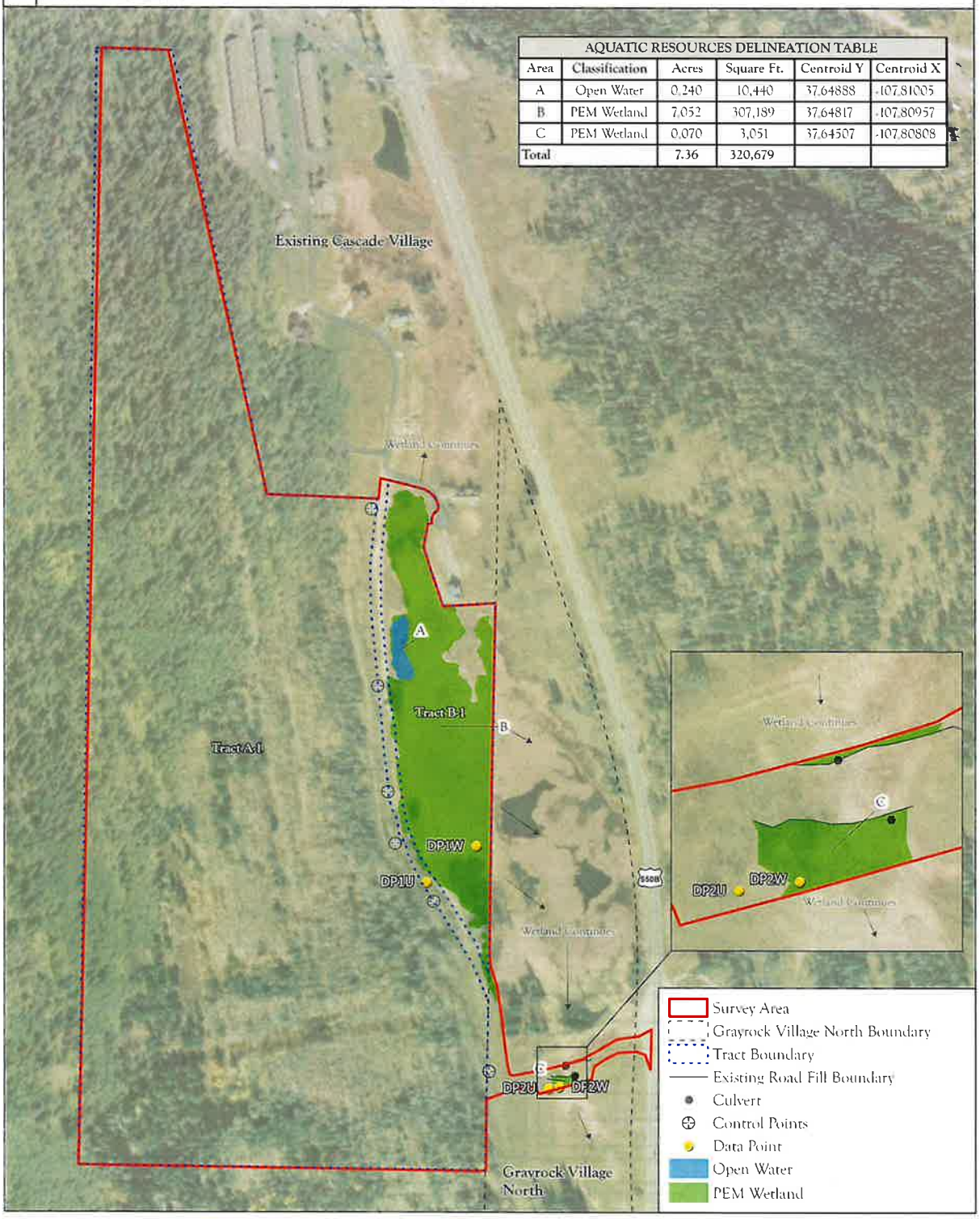

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SB	SM	240008
Date:	Rvsd. Date:	Scale:
7/2/2025	NA	1:3,800

N

0 240 480
Feet

AQUATIC RESOURCES DELINEATION MAP

AQUATIC RESOURCES DELINEATION
CASCADE VILLAGE TRACTS A1-B1
SAN JUAN COUNTY, CO

FIGURE
4

APPENDIX B
Photo Documentation

Photo 1: View of driveway looking NE

Photo 2: Southern wetland area

Photo 3: Southern wetland south of PA

Photo 4: Southern wetland connection

Photo 5: Looking North from Proposed driveway

Photo 6: Standing water in north wetland

Photo 7: Looking east across the northern wetland

Photo 8: Northern most portion of survey area

Photo 9: North end of survey area looking south

Photo 10: Upland area proposed driveway

Photo 11: Surface water connection under US 550

Photo 12: Channel east of US 550

APPENDIX C
Plant List

Appendix D: List of Dominant Plant Species Observed within the Survey Area.

Scientific Name*	Common Name	Wetland Indicator Status**
TREES		
Picea pungens	Blue spruce	FAC
Populus tremuloides	Quaking aspen	FACU
SHRUBS		
Cornus sericea	Redosier dogwood	NL
Dasiphora fruticosa	Shrubby cinquefoil	FAC
Ribes montigenum	Gooseberry currant	NL
Salix artica	Arctic willow	NL
Salix monticola	Mountain willow	OBL
Symphoricarpos albus	Common snowberry	FACU
HERBS		
Achillea millefolium	Common Yarrow	FACU
Actaea rubra	Red baneberry	NL
Carex spp.	Carex species	N/A
Caltha leptosepala	White marsh marigold	OBL
Cirsium arvense	Canada Thistle	FAC
Equisetum arvense	Field horsetail	FAC
Fragaria vesca	Wild strawberry	NL
Iris missouriensis	Rocky mountain iris	FACW
Maianthemum stellatum	Starry false solomon's-seal	FAC
Medicago sativa	Alfalfa	UPL
Taraxacum officinale	Common dandelion	FACU
Trifolium pratense	Red clover	FACU
Vicia americana	American Vetch	FAC
Viola nephrophylla	Northern Bog Violet	FACW
GRAMINOIDS		
Bromus inermis	Smooth brome	FACU
Dactylis glomerata	Orchardgrass	FACU
Juncus balticus	Baltic Rush	FACW
Phalaris arundinacea	Reed canarygrass	FACW

- OBL: Almost always is a hydrophyte, rarely in uplands
- FAC: Commonly occurs as either a hydrophyte or non-hydrophyte
- NL (Not Listed): Generally indicates upland species
- FACW: Usually is a hydrophyte but occasionally found in uplands
- FACU: Occasionally is a hydrophyte but usually occurs in uplands
- N/A: Unable to identify to species due to time of year

* Scientific names according to Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland (Kartesz 2009) and National Wetland Plant List (NWPL).

** 2016 NWPL is regionalized along the 10 wetland delineation supplement regions. Wetland indicator status based on Western Mountains, Valleys, and Coast Region.

APPENDIX D
Wetland Determination Data Forms

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region

See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Cascade Village Tracts A1-B1 City/County: San Juan Sampling Date: 6.18.25

Applicant/Owner: Charles McAlpine State: CO Sampling Point: DP2W

Investigator(s): Elijah Vargas and Sean Moore Section, Township, Range: S 13; T 39 N; R 9 W

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): LRR E Lat: Long: Datum:

Soil Map Unit Name: Cryaquolls-Typic Cryaquents complex, 1 to 5 percent slopes NWI classification: PEM1D

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No x (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area within a Wetland?** Yes X No ____
Hydric Soil Present?	Yes X	No ____	
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Area is in a severe drought

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 1 m)			
1. *Salix lutea*	10	Yes	OBL
2. *Dasiphora fruticosa*	20	Yes	FAC
3.			
4.			
5.			
	30 =Total Cover		
Herb Stratum (Plot size: 1 m)			
1. *Phalaris arundinacea*	80	Yes	FACW
2. *Carex sp.*	3	No	FACW
3. *Taraxacum officinale*	2	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	=Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	83	x 2 =	166
FAC species	20	x 3 =	60
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	115 (A)		244 (B)
Prevalence Index = B/A =			2.12

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
X 2 - Dominance Test is >50%
X 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes X No ____

Remarks:

SOIL

Sampling Point: DP2W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100					Loamy/Clayey	
6-12	10YR 2/2	90	7.5YR 6/8	10	C	PL	Loamy/Clayey	Prominent redox concentrations
12-20	10YR 2/1	50	5YR 6/8	50	C	PL/M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ 1 cm Muck (A9) **(LRR D, G)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR A, E)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2 4A, and 4B)**
- x Drainage Patterns (B10)
- x Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes ___	No x	Depth (inches): ___
Water Table Present?	Yes x	No ___	Depth (inches): 12
Saturation Present? (includes capillary fringe)	Yes x	No ___	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region

See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Cascade Village Tracts A1-B1 City/County: San Juan Sampling Date: 6.18.25

Applicant/Owner: Charles McAlpine State: CO Sampling Point: DP2U

Investigator(s): Elijah Vargas and Sean Moore Section, Township, Range: S 13; T 39 N; R 9 W

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR): LRR E Lat: Long: Datum:

Soil Map Unit Name: Cryaquolls-Typic Cryaquents complex, 1 to 5 percent slopes NWI classification: PEM1D

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No x (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Area is in a severe drought

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 1 m)			
1. *Dactylis glomerata*	30	Yes	FACU
2. *Trifolium pratense*	5	No	FACU
3. *Achillea millefolium*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	40 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum 60

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	40	x 4 =	160
UPL species	0	x 5 =	0
Column Totals:	40 (A)		160 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ 5 - Wetland Non-Vascular Plants[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: DP2U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	100						
10-20	10YR 3/2	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ 1 cm Muck (A9) **(LRR D, G)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR A, E)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ____ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ____ No ____ Depth (inches): ____

Water Table Present? Yes ____ No ____ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region

See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Cascade Village Tracts A1-B1 City/County: San Juan Sampling Date: 6.18.25

Applicant/Owner: Charles McAlpine State: CO Sampling Point: DP1W

Investigator(s): Elijah Varas and Sean Moore Section, Township, Range: S 13; T 39 N; R 9 W

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): concave Slope (%): 1-4

Subregion (LRR): LRR E Lat: 37.647138 Long: -107.809159 Datum: NAD 83

Soil Map Unit Name: Cryaquolls-Typic Cryaquents complex, 1 to 5 pecent slopes NWI classification: PEM1D

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No x (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes X No ____

Hydric Soil Present? Yes X No ____

Wetland Hydrology Present? Yes X No ____

Is the Sampled Area within a Wetland? **Yes** X **No** ____

Remarks:
Area is experience a Severe drought

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: *)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus tremuloides*	2	Yes	FACU
2. *Picea pungens*	3	Yes	FAC
3.			
4.			
	5	=Total Cover	
Sapling/Shrub Stratum (Plot size: *)			
1. *Dasiphora fruticosa*	15	Yes	FAC
2. *Salix monticola*	25	Yes	OBL
3. *Salix arctica*	10	Yes	FAC
4.			
5.			
	50	=Total Cover	
Herb Stratum (Plot size: *)			
1. *Phalaris arundinacea*	60	Yes	FACW
2. *Juncus balticus*	10	No	FACW
3. *Equisetum arvense*	6	No	FAC
4. *Carex sp.*	10	No	
5. *Typha latifolia*	1	No	OBL
6. *Caltha leptosepala*	3	No	OBL
7.			
8.			
9.			
10.			
11.			
	90	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
		=Total Cover	

% Bare Ground in Herb Stratum 2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 83.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	29	x 1 =	29
FACW species	70	x 2 =	140
FAC species	34	x 3 =	102
FACU species	2	x 4 =	8
UPL species	0	x 5 =	0
Column Totals:	135 (A)		279 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ 5 - Wetland Non-Vascular Plants[1]

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** X **No** ____

Remarks:
* Sampled entire wetland plant community

SOIL

Sampling Point: DP1W

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	90	7.5YR 5/8	10	C	PL	Mucky Loam/Clay	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ 1 cm Muck (A9) **(LRR D, G)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- X Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- X Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- x Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR A, E)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock layer

Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- x Surface Water (A1)
- x High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- x Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- x Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- x Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2 4A, and 4B)**
- x Drainage Patterns (B10)
- x Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- x Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- X FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present?	Yes x	No ___	Depth (inches): 1
Water Table Present?	Yes X	No ___	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers

WETLAND DETERMINATION DATA SHEET – Western Mountains, Valleys, and Coast Region

See ERDC/EL TR-10-3; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 11/30/2024
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Cascade Village Tracts A1-B1 City/County: San Juan Sampling Date: 6.18.25

Applicant/Owner: Charles McAlpine State: CO Sampling Point: DP1U

Investigator(s): Elijah Varas and Sean Moore Section, Township, Range: S 13; T 39 N; R 9 W

Landform (hillside, terrace, etc.): Valley Local relief (concave, convex, none): _____ Slope (%): 5

Subregion (LRR): LRR E Lat: 37.646804 Long: -107.809708 Datum: NAD 83

Soil Map Unit Name: Cryaquolls-Typic Cryaquents complex, 1 to 5 pecent slopes NWI classification: None

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No x (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes x No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area within a Wetland?** Yes ____ No X
Hydric Soil Present?	Yes ____	No X	
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Area is experience a Severe drought

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: ____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ =Total Cover		
Sapling/Shrub Stratum (Plot size: ____)			
1.			
2.			
3.			
4.			
5.			
	____ =Total Cover		
Herb Stratum (Plot size: 1 m)			
1. *Bromus inermis*	8	No	UPL
2. *Dactylis glomerata*	30	Yes	FACU
3. *Equisetum arvense*	60	Yes	FAC
4. *Trifolium pratense*	2	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 =Total Cover		
Woody Vine Stratum (Plot size: ____)			
1.			
2.			
	____ =Total Cover		

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	60	x 3 =	180
FACU species	32	x 4 =	128
UPL species	8	x 5 =	40
Column Totals:	100 (A)		348 (B)
Prevalence Index = B/A =			3.48

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ 5 - Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks:

SOIL

Sampling Point: DP1U

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/4	100					Loamy/Clayey	
6-20	10YR 4/4	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ 1 cm Muck (A9) **(LRR D, G)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(LRR A, E)**
- ___ Iron-Manganese Masses (F12) **(LRR D)**
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ___ Depth (inches): ___

Water Table Present? Yes ___ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX E
USDA NRSC Soils Report

Animas- Dolores Area, Colorado, Parts of Archuleta, Dolores, Hinsdale, La Plata, Montezuma, San Juan, and San Miguel Counties

***Map Unit:** 53—Cryaquolls-Typic Cryaquents complex, 1 to 5 percent slopes*

Component: Cryaquolls (50%)

The Cryaquolls component makes up 50 percent of the map unit. Slopes are 1 to 5 percent. This component is on flood plains, valley floors. The parent material consists of alluvium derived from mixed sources. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is moderate. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 13 inches during May, June. Organic matter content in the surface horizon is about 4 percent. This component is in the R048AY241CO Mountain Meadow ecological site. Nonirrigated land capability classification is 6w. This soil meets hydric criteria.

Component: Typic Cryaquents (35%)

The Typic Cryaquents component makes up 35 percent of the map unit. Slopes are 1 to 5 percent. This component is on flood plains, valley floors. The parent material consists of alluvium derived from mixed sources. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is occasionally flooded. It is not ponded. A seasonal zone of water saturation is at 13 inches (depth from the mineral surface is 9 inches) during May, June. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon the organic matter content is about 1 percent. This component is in the R048AY241CO Mountain Meadow ecological site. Nonirrigated land capability classification is 6w. This soil meets hydric criteria. There are no saline horizons within 30 inches of the soil surface.

***Map Unit:** 330 Needleton stony loam, 15 to 30 Percent Slopes*

Component: Needleton (85%)

The Needleton component makes up 85 percent of the map unit. Slopes are 15 to 30 percent. This component is on mountain slopes. The parent material consists of slope alluvium derived from rhyolite and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon the organic matter content is about 1 percent. This component is in the F048AY918CO Spruce-Fir Woodland ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Map Unit: *51 Clayburn-Hourglass complex, 5 to 25 percent slopes*

Component: Clayburn (55%)

The Clayburn component makes up 55 percent of the map unit. Slopes are 5 to 25 percent. This component is on mountain slopes. The parent material consists of slope alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R048AY250CO Subalpine Loam ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Component: *Hourglass (35%)*

The Hourglass component makes up 35 percent of the map unit. Slopes are 5 to 25 percent. This component is on mountain slopes. The parent material consists of slope alluvium derived from sandstone, limestone, and shale. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 3 percent. This component is in the R048AY250CO Subalpine Loam ecological site. Nonirrigated land capability classification is 6e. This soil does not meet hydric criteria.

Map Unit: *338 Needleton -Snowdon-Rock outcrop complex, 30 to 80 percent slopes*

Component: Needleton (45%)

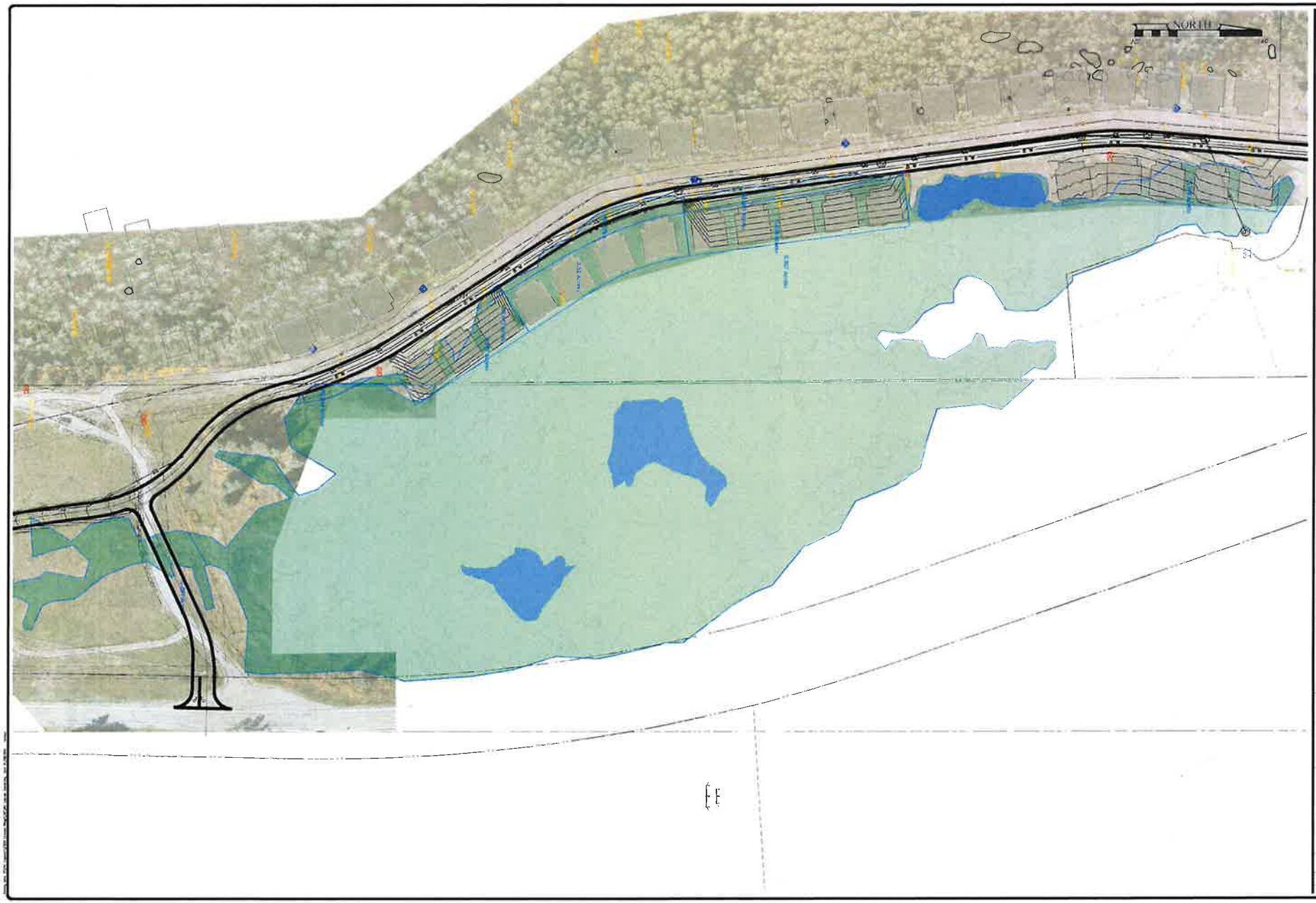
The Needleton component makes up 45 percent of the map unit. Slopes are 30 to 80 percent. This component is on mountain slopes. The parent material consists of slope alluvium and colluvium derived from rhyolite, limestone and sandstone. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches (or restricted depth) is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon the organic matter content is about 1 percent. This component is in the F048AY918CO Spruce-Fir Woodland ecological site. Nonirrigated land capability classification is 7e. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

Component: Snowdon (30%)

The Snowdon component makes up 30 percent of the map unit. Slopes are 30 to 80 percent. This component is on structural benches, mountain slopes. The parent material consists of residuum and slope alluvium derived from rhyolite, limestone and sandstone. Depth to a root restrictive layer, bedrock, lithic, is 10 to 20 inches. The natural drainage class is well drained. Water movement in the most restrictive layer is very low. Available water to a depth of 60 inches (or restricted depth) is very low. Shrink-swell potential is low. This soil is not flooded. It is not

ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 85 percent. Below this thin organic horizon the organic matter content is about 2 percent. This component is in the F048AY918CO Spruce-Fir Woodland ecological site. Nonirrigated land capability classification is 7s. This soil does not meet hydric criteria. There are no saline horizons within 30 inches of the soil surface.

ATTACHMENT 3
Engineer Drawings



Owner: Cascade

Project: MEADOWVIEW DRIVE

Sheet Description: CASCADE OVERALL - PLAN

Draft
Document
Not For
Construction

50 Valley Court
Durango, CO
970.259.8765

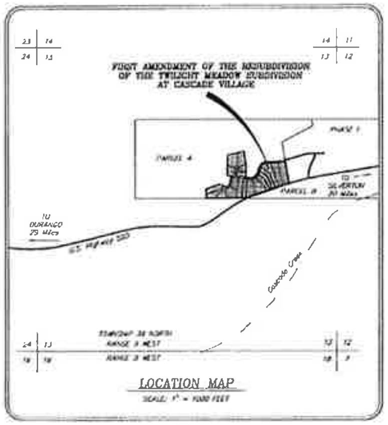
Project Date:
2024-12-02

Proj. 23028

1-1

FIRST AMENDMENT OF THE RESUBDIVISION OF THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M. SAN JUAN COUNTY, COLORADO



CERTIFICATE OF OWNERS:
KNOW ALL MEN BY THESE PRESENTS:

That Cascade Village Investment Venture, whose address is 50827 U.S. Highway 550, Durango, Colorado, being the legal and record owner of the Resubdivision of the Twilight Meadow Subdivision at Cascade Village recorded in the Office of the San Juan County, Colorado, Clerk and Recorder under Reception Number 136239, LESS AND EXCEPT Lots 4R through 6R, Lot 9R and Lot 17R:
AND
That Bouldercrest Estates, Inc., a Colorado corporation whose address is 381 Bouldercrest Dr., Durango, Colorado, 81301, being the legal and record owner of Lots 4R through 6R as shown on the Resubdivision of the Twilight Meadow Subdivision at Cascade Village recorded in the Office of the San Juan County, Colorado, Clerk and Recorder under Reception Number 136239:
AND
That Russell A. Mcneely and Janet C. Mcneely whose address is 4829 Warwana, Houston, Texas, 77080, being the legal and record owners of Lot 9R as shown on the Resubdivision of the Twilight Meadow Subdivision at Cascade Village recorded in the Office of the San Juan County, Colorado, Clerk and Recorder under Reception Number 136239 and being more particularly described to wit:

A tract of land located in Section 13, Township 39 North, Range 9 West, New Mexico Principal Meridian, in San Juan County, Colorado, being more particularly described as follows:
Beginning on the east line of the Northwest 1/4 of said Section 13 and the southeasterly corner of Lot 14R as shown on Resubdivision of the Twilight Meadow Subdivision at Cascade Village recorded in the Office of the San Juan County, Colorado, under Reception Number 136239 whence the Center 1/4 Corner of said Section 13 bears S 00° 19' 52" E. 535.96 feet;
Thence S 85° 00' 00" W. 172.64 feet along the southerly line of said Lot 14R;
Thence N 14° 04' 20" W. 205.23 feet;
Thence N 09° 53' 36" E. 76.49 feet;
Thence N 75° 48' 47" E. 13.66 feet to the westerly right-of-way of Meadow Lane;
Thence along the arc of a non-tangent curve to the right with a delta angle of 68° 21' 47" and a radius of 35.00 feet for a distance of 41.76 feet the long chord bears N 17° 10' 50" E. 39.33 feet along the westerly right-of-way of Meadow Lane;
Thence along the arc of a tangent curve to the left with a delta angle of 62° 27' 02" and a radius of 20.00 feet for a distance of 21.80 feet the long chord bears N 20° 08' 04" E. 20.74 feet along the westerly right-of-way of Meadow Lane;
Thence along the arc of a tangent curve to the left with a delta angle of 64° 54' 33" and a radius of 69.05 feet for a distance of 78.23 feet the long chord bears N 43° 32' 44" W. 74.11 feet along the westerly right-of-way of Meadow Lane;
Thence N 76° 00' 00" W. 144.57 feet along the westerly right-of-way of Meadow Lane to the easterly line of Lot 15R, Reception Number 136239;
Thence S 05° 27' 00" W. 70.65 feet along the easterly line of said Lot 15R to the southerly line of said Lot 15R;
Thence N 89° 00' 00" W. 360.56 feet along the southerly line of Lots 15R and 16R, Reception Number 136239 to the westerly line of said Lot 16R;
Thence N 13° 33' 05" W. 189.49 feet along the westerly line of said Lot 16R to the northerly line of said Lot 16R;
Thence S 84° 33' 00" E. 242.17 feet along the northerly line of said Lot 16R to the northerly right-of-way of Meadow Circle;
Thence along the arc of a non-tangent curve to the right with a delta angle of 141° 00' 30" and a radius of 35.00 feet for a distance of 86.15 feet the long chord bears N 75° 58' 19" E. 65.99 feet along the northerly right-of-way of Meadow Circle;
Thence along the arc of a tangent curve to the left with a delta angle of 51° 00' 43" and a radius of 21.60 feet for a distance of 19.23 feet the long chord bears S 59° 02' 09" E. 18.60 feet along the northerly right-of-way of Meadow Circle;
Thence S 84° 33' 00" E. 80.00 feet along the northerly right-of-way of Meadow Circle;
Thence along the arc of a tangent curve to the left with a delta angle of 90° 00' 00" and a radius of 20.00 feet for a distance of 31.42 feet the long chord bears N 50° 27' 00" E. 28.28 feet along the westerly right-of-way of Meadow Circle;
Thence N 05° 27' 00" E. 212.44 feet along the westerly right-of-way of Meadowview Drive;
Thence along the arc of a tangent curve to the left with a delta angle of 79° 09' 00" and a radius of 131.18 feet for a distance of 181.22 feet the long chord bears N 34° 07' 30" W. 167.15 feet along the westerly right-of-way of Meadowview Drive;
Thence N 73° 42' 00" W. 89.85 feet along the westerly right-of-way of Meadowview Drive;
Thence along the arc of a tangent curve to the right with a delta angle of 72° 52' 00" and a radius of 139.00 feet for a distance of 176.78 feet the long chord bears N 37° 16' 00" W 165.10 feet along the westerly right-of-way of Meadowview Drive;
Thence N 00° 50' 00" W. 163.97 feet along the westerly right-of-way of Meadowview Drive;
Thence along the arc of a tangent curve to the left with a delta angle of 17° 10' 00" and a radius of 158.48 feet for a distance of 47.48 feet the long chord bears N 09° 25' 00" W. 47.31 feet along the westerly right-of-way of Meadowview Drive;
Thence N 18° 00' 00" W. 32.10 feet along the westerly right-of-way of Meadowview Drive to the southerly line of that tract of land as shown on Cascade Village - Second Amendment to Phase 1;
Thence East 20.67 feet along the southerly line of said Cascade Village - Second Amendment to Phase 1;
Thence N 09° 00' 00" W. 84.81 feet to the northerly line of Lot 1R, Reception Number 136239;
Thence N 80° 00' 00" E. 387.30 feet along the northerly line of said Lot 1R to the westerly right-of-way of U.S. Highway 550;
Thence S 19° 00' 00" E. 804.45 feet along the westerly right-of-way of U.S. Highway 550 to the west line of the Northwest 1/4 of said Section 13;
Thence S 00° 19' 52" E 655.29 feet along the west line of the Northwest 1/4 of said Section 13 to the point of beginning.
Contains 12.825 acres, more or less.

Have caused the same to be resubdivided, replatted and designated as the FIRST AMENDMENT OF THE RESUBDIVISION OF THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE.

NOTES:
1. The research for recorded easements was conducted by Land Title Guarantee Company under Title Commitment Order No. DU19847 and this property may be subject to the following easements, rights and restrictions as listed in said policy:
- Ditch and water rights, canals and other waterways, oil gas, coal and other minerals and the rights of the proprietor to extract his ore;
- Pipeline easement to Western Colorado Power Company, Book 175 Page 407;
- Right-of-way to Mountain States Telephone and Telegraph, Book 152 Page 412;
- Pipeline easement to Colorado-Ute Electric, Book 222, Page 97;
- Right-of-way to Colorado-Ute Electric, Book 222, Page 112;
- Terms, conditions and provisions as contained in the Declaration of Covenants, Conditions and Restrictions, Book 222, Pages 385 through 423, re-recorded in Book 224, Pages 464 through 505; amendment to declarations, Book 224, Pages 908 through 919; consent to amendment to Declaration, Book 224, Page 921; amendment to Declaration of Covenants, Conditions and Restrictions in Book 230, Pages 193 through 195; Declaration of Covenants, Conditions and Restrictions as recorded in Book 230, Pages 373 through 402 and amended recorded in Book 230, Page 497;
- Right-of-way granted to Grantor use of all public and private roads for ingress and egress to all remaining property;
- Terms, conditions and agreements as outlined in Sewage Services Agreement in Book 227, Pages 35 through 45;
- Easements and rights-of-way as shown and reserved on plats;
- Effect of the Master Plat recorded in Book 230, Page 367 and the Grading and Drainage Plat recorded in Book 230, Page 369;
- Building setbacks as shown on plat;
2. This plat supersedes that plat of Resubdivision of the Twilight Meadow Subdivision at Cascade Village less and except Lot 17R, recorded under Reception Number 136239 and The Twilight Meadow Subdivision at Cascade Village recorded in Book 230 at Page 368 less and except Lots 21 and 22.

SURVEYOR'S STATEMENT
I hereby state that the survey and plat was prepared by me or under my direct responsibility, supervision and checking and that, in my professional opinion, it is true and correct to the best of my knowledge, belief and information based on the standards of care of Professional Land Surveyors practicing in the State of Colorado.

Daryl Z. Crites, P.L.S.   June 9, 1994
Colorado Registration No. 18450   Date:

THIS PLAT IS HEREBY EXECUTED BY THE FOLLOWING PARTIES:

CASCADE VILLAGE INVESTMENT VENTURE

By: MARK ZEMPEL PARTNER

State of Colorado:
SS:
County of La Plata:
This plat was acknowledged before me by Mark Zempel, Partner of Cascade Village Investment Venture on this 10th day of June, 1994 for the aforementioned purposes.

My commission expires: ______ Notary: Dorothy A. Zanoni Clerk
Lindasha L. Garamillo Deputy

BOULDERCREST ESTATES, INC., a Colorado corporation

By: HOWARD HICKS - PRESIDENT

State of Colorado:
SS:
County of La Plata:
This plat was acknowledged before me by Howard Hicks, President of Bouldercrest Estates, Inc. on this 1st day of June, 1994 for the aforementioned purposes.

My commission expires: 9-14-94 Notary:

By: RUSSELL A. MCNEELY - owner   By: JANET C. MCNEELY - owner

State of Texas
SS:
County of ______
This plat was acknowledged before me by Russell and Janet C. McNeely, owners, on this ___ day of ______, 1994 for the aforementioned purposes.

My commission expires: ______ Notary: ______

GENERAL DEDICATION:
1. Dashed lines ---------------- depict building setback lines.
2. The areas outside of the building setbacks as shown hereon are utility easements for the installation, maintenance and replacement of utility and drainage lines appurtenant to and for the benefit of all lands contained within the perimeter of Cascade Village as it now exists, or as it may be enlarged in the future and they are for the exclusive use of Cascade Village.
3. Meadowview Drive, Meadow Lane and Meadow Circle as shown hereon are twenty-eight (28) feet wide, fourteen (14) feet each side of centerline and shall be used as access and utility easements for all of Cascade Village, public and private utility providers and for future phases of Cascade Village.
4. The driveway envelope between Lots 14R and 13R as shown hereon is hereby dedicated to the owners of Lots 14R and 13R and public and private utility providers for the purpose of ingress and egress and the installation, maintenance and replacement of utility and drainage lines.

The plat was approved by the San Juan Regional Planning Commission on this 10th day of June, 1994.

By: ______ Chairman   Attest: ______ Secretary

This project was reviewed and approved by the Board of County Commissioners of San Juan County, Colorado, on this 16th day of June, 1994.

BOARD OF COUNTY COMMISSIONERS
OF SAN JUAN COUNTY, COLORADO

By: ______ Chairman   Attest: ______ County Clerk

VACATION STATEMENT:
The following utility companies hereby consent to the abandonment and vacation of the utility easements as shown on the Twilight Meadow Subdivision at Cascade Village, Book 230 at Page 368 and the Resubdivision of Twilight Meadow Subdivision at Cascade Village, Reception Number 136239.

La Plata Electric Association, Inc.   U.S. West Communications, Inc.

GOFF ENGINEERING & SURVEYING 555 SOUTH CAMINO DEL RIO P.O. BOX 97 DURANGO, COLORADO 81302 (303) 247-1705	FIRST AMENDMENT OF THE RESUBDIVISION OF THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE CASCADE VILLAGE INVESTMENT VENTURE LOCATED IN SECTION 13, T.39 N., R.9 W., N.M.P.M. SAN JUAN COUNTY, COLORADO PREPARED BY: G. CUNNINGHAM — CHECKED BY: A. BLACKBURN SCALE: 1" = 50 FEET — DATE: MAY 30, 1994
SHEET 1 OF 2	

DRAWING NUMBER
MAP # 202

DRAWING NUMBER

DRAWING NUMBER
22-Section 6 (No 49)
BK 243 PGS 110, 111

DRAWING NUMBER

FIRST AMENDMENT OF THE RESUBDIVISION OF THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE

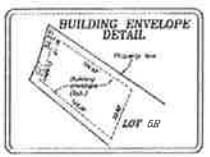
LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M. SAN JUAN COUNTY, COLORADO

CURVE TABLE

DESCRIPTION OF MONUMENTS

- SET 5/8" X 24" REBAR WITH A 1-1/2" ALUMINUM CAP STAMPED PLS 16450
- FOUND 5/8" REBAR WITH 2" ALUMINUM CAP STAMPED PLS 16359
- FOUND A 5/8" REBAR WITH A 1-1/2" ALUMINUM CAP STAMPED LS 25963
- FOUND A STANDARD B.L.M. MONUMENT A 3-1/2" PIPE WITH A 3-1/4" CAP
- POSITION FOR CORNER - MONUMENT NOT FOUND OR SET

BUILDING ENVELOPE DETAIL



LEGEND

BUILDING AREA WHICH WILL BE ENCUMBERED UPON BY BUILDING ENVELOPES. TOTAL AREA = 2.83 AC. NOTE: AREAS SHOWN IN PARENTHESES ( ) ARE AREAS OF ENCUMBRANCE

WETLANDS WITH LIMITS

NOTE: WETLANDS LIMIT DETERMINATION SHOWN PER JIM CRUMPACKER, BIOLOGIST, FOR ORACA RESEARCH ASSOCIATES - SEPTEMBER 3, 1993

SEWER LINE

WATER LINE

FIRE HYDRANT

NOTE:
This plat amends the original plat of the Resubdivision of the Twilight Meadow Subdivision at Cascade Village as recorded in the Office of the San Juan County, Colorado, Clerk and Recorder under Reception Number 198239, in Book 240 at Page 307. This plat reflects the reconfiguration and resubdivision of Lots 12R, 13R, and 14R and the addition of Lot 16R to the said Resubdivision to the extent as shown hereon. Street, utility and drainage easements as originally platted and dedicated are hereby vacated, replatted and rededicated.

NOTE:
UTILITY LOCATIONS AS SHOWN HEREON ARE AS SHOWN ON THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE RECORDED IN BOOK 330 AT PAGE 358 AND NOT FROM ACTUAL FIELD LOCATION INFORMATION.

NOTICE ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE (3) YEARS AFTER YOU FIRST DISCOVERED SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN (10) YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

GOFF
ENGINEERING & SURVEYING
555 SOUTH CAMINO DEL RIO
P.O. BOX 97
DURANGO, COLORADO 81302
(303) 247-1705

FIRST AMENDMENT OF THE RESUBDIVISION OF THE TWILIGHT MEADOW SUBDIVISION AT CASCADE VILLAGE

CASCADE VILLAGE INVESTMENT VENTURE

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO

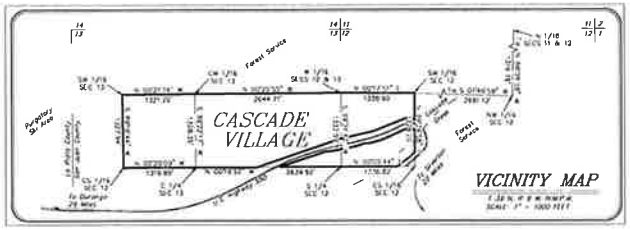
PREPARED BY: S. CUNNINGHAM | CHECKED BY: K. RADCLIFFE

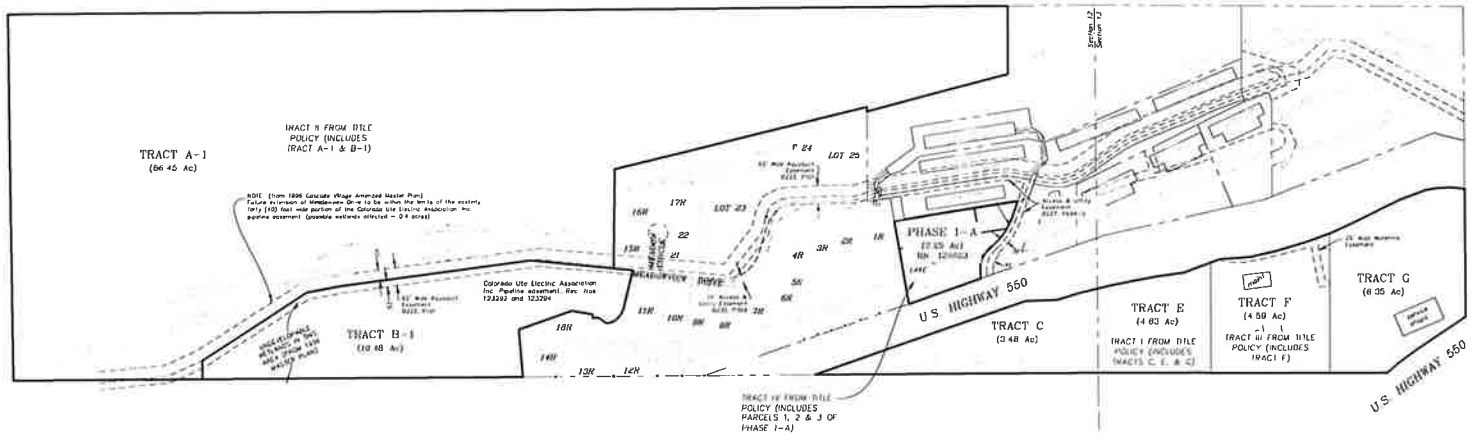
SCALE: 1" = 60 FEET | DATE: MAY 30, 1994

SHEET 2 OF 2

CASCADE VILLAGE
OVERALL MAP

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO





LAND USE TABLE

ORIGINAL MASTER PLAN

TRACT	UNITS	AREA	DENSITY	DEDICATION
TRACT A	0	52.91 Ac.		OPEN SPACE
TRACT B (AND FUTURE PHASES)	177	29.26 Ac.	6.05 UNITS/Ac.	RESIDENTIAL
PHASE 1-A	0	2.25 Ac.		COMMERCIAL/OPEN SPACE
C	0	3.48 Ac.		LODGE/COMMERCIAL
E	0	4.63 Ac.		OPEN SPACE
F	0	4.59 Ac.		MAINTENANCE/SEWER
G	0	6.35 Ac.		COMMERCIAL/RECREATION
TOTALS	485	148.44 Ac.	3.27 UNITS/Ac.	

AMENDED MASTER PLAN 1996 (REC. NO. 137955)

TRACT	UNITS	AREA	DENSITY	DEDICATION
TRACT A-1	177	71.69 Ac.	2.47 UNITS/Ac.	RESIDENTIAL
TRACT B-1	0	10.48 Ac.		OPEN SPACE (UNDEVELOPABLE RESTRICTED)
PHASE 1-A	0	2.25 Ac.		COMMERCIAL/OPEN SPACE
C	0	3.48 Ac.		LODGE/COMMERCIAL
E	0	4.63 Ac.		OPEN SPACE
F	0	4.59 Ac.		MAINTENANCE/SEWER
G	0	6.35 Ac.		COMMERCIAL/RECREATION
TOTALS	485	148.44 Ac.	3.27 UNITS/Ac.	

1" = 200'
200 100 0 200
Units shown hereon = U S Survey Feet

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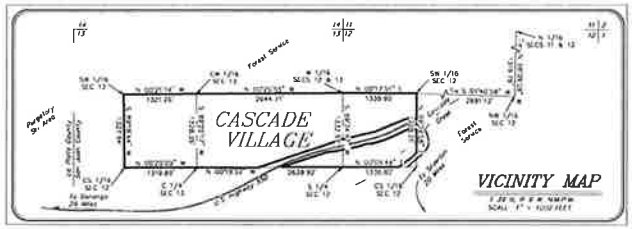
136 ROCK POINT DRIVE
PO BOX 187
DURANGO, COLORADO 81302
970.247.1705

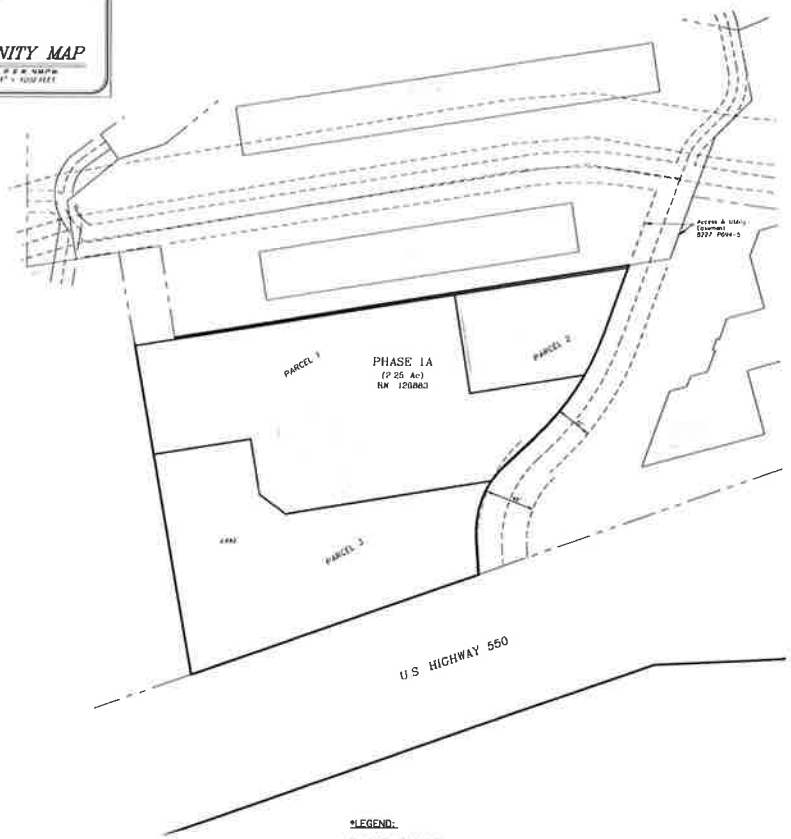
CASCADE VILLAGE
OVERALL MAP

SHT 1 OF 4

PHASE 1A, CASCADE VILLAGE MAP

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO





Units shown hereon = U.S. Survey Feet

*LEGEND:

BUILDING USE & SIZE

PARCEL 1
Use: Retail, Offices, Sales, Public Restrooms
Size: Net - 5300 Sq. Ft.
Gross - 8000 Sq. Ft.

PARCEL 2
Use: Retail, Offices, Sales, Rental
Size: Net - 250 Sq. Ft.
Gross - 3000 Sq. Ft.

PARCEL 3
Use: Lake, Open Space

Total Max. Building Use For Phase 1a - 7800 Sq. Ft. - Net

*This Land Use Table is from the "Cascade Village Phase 1A & Replat of a Portion of Cascade Village Phase 1" recorded October 16, 1984 under Reception No. 128883

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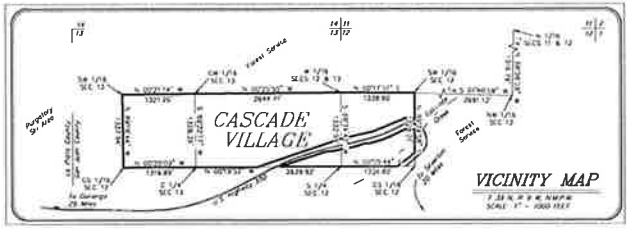
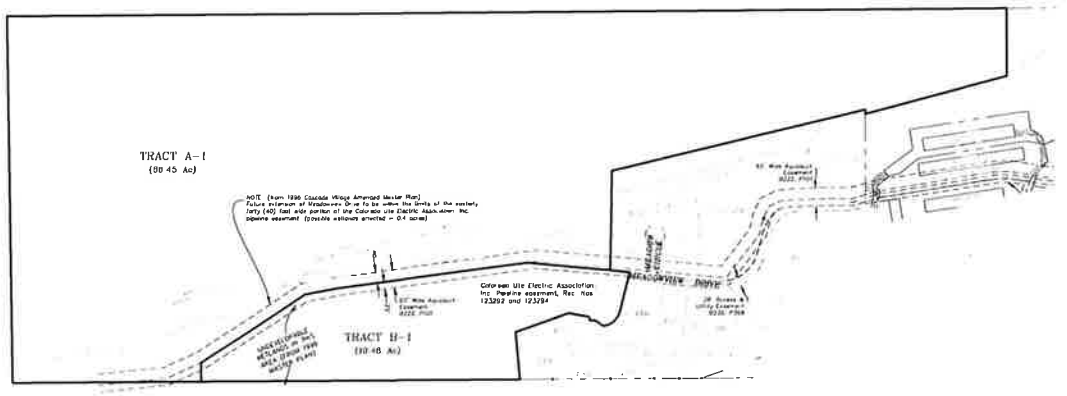
PHASE 1A, CASCADE VILLAGE MAP

SHT 2 OF 4

TRACT A-1 & B-1, CASCADE VILLAGE MAP

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO





Units shown hereon = U.S. Survey Feet

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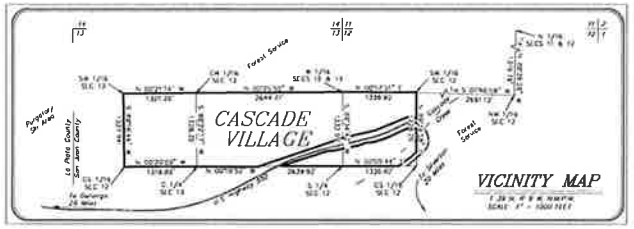
236 ROCK POINT DRIVE
PO BOX 87
DURANGO, COLORADO 81302
970.247.1705

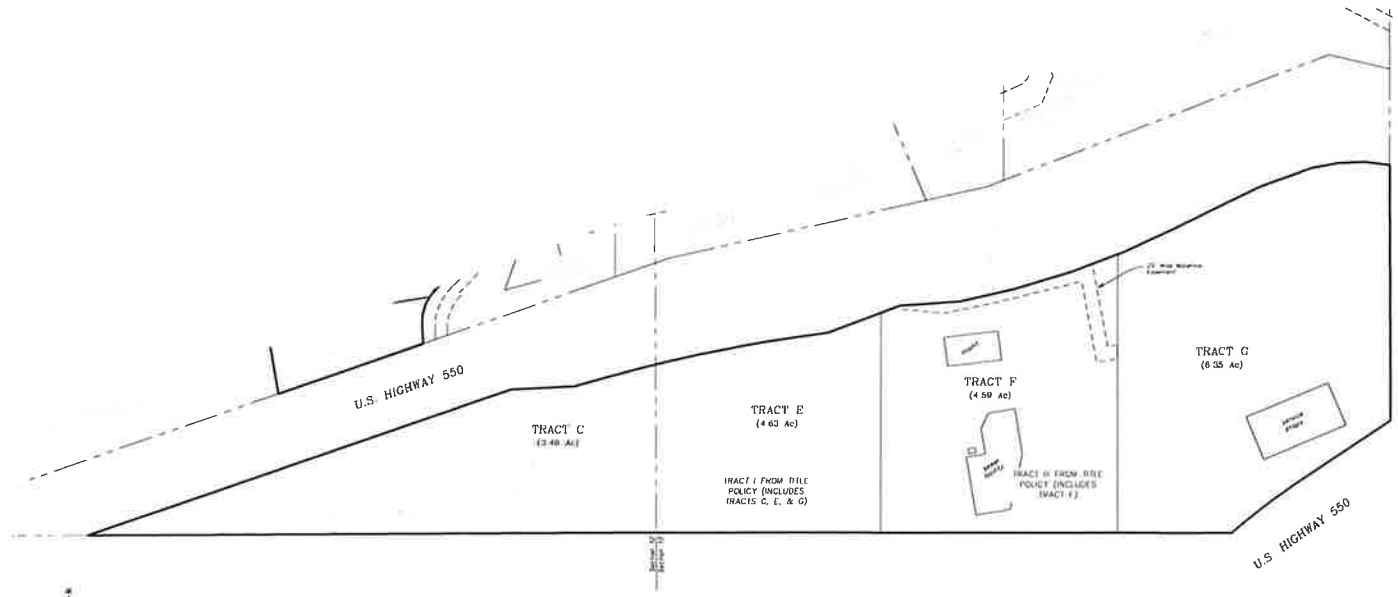
TRACT A-1 & B-1, CASCADE VILLAGE MAP

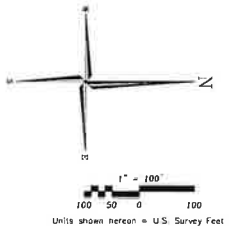
SHT 3 OF 4

TRACTS C, E, F & G, CASCADE VILLAGE MAP

LOCATED IN SECTION 13, T 39 N, R 9 W, N.M.P.M.
SAN JUAN COUNTY, COLORADO







GOFF ENGINEERING + SURVEYING, LLC
226 ROCK POINT DRIVE
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DURANGO, COLORADO 81302
970.247.1705

TRACTS C, E, F & G, CASCADE VILLAGE MAP

SHT 4 OF 4

ATTACHMENT 4
Species List- IPaC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Western Colorado Ecological Services Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501-5711
Phone: (970) 628-7180 Fax: (970) 245-6933

In Reply Refer To:
Project Code: 2025-0117716
Project Name: Cascade Village Condo

07/03/2025 16:43:53 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat (Colorado Ecological Services Field Office). Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the ESA is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR

402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf.

Projects and activities without a Federal nexus (e.g., without Federal funding, permit, or authorization) should be evaluated for the potential to "take" listed wildlife. Take does not apply to listed plants and to designated critical habitat. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (ESA Section 3, Definitions). Harm in the definition of "take" in the ESA means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering (50 CFR 17.3).

Gray Wolf: On November 8, 2023, the Service promulgated an ESA section 10(j) (i.e., experimental population) rule (10(j) rule) for gray wolf (*Canis lupus*) within the State of Colorado (88 FR 77014). For purposes of ESA section 7 consultation, we treat experimental populations as if they are proposed for listing, except on National Park Service and Service lands, where they are treated as threatened. Evaluations for proposed species are completed under the regulations for conferencing (50 CFR 402.10). Conferencing for species that are proposed for Federal listing, or for proposed critical habitat, is only required if a proposed action is likely to jeopardize the continued existence of a species or will result in destruction or adverse modification of proposed critical habitat. If an action agency determines that their action would not jeopardize the continued existence of the species, and/or would not result in the destruction or adverse modification of critical habitat, and the Service concurs, the conferencing requirement is fulfilled.

Colorado River Fish/Depletions: Formal interagency consultation under section 7 of the ESA is required for projects that may lead to depletions of water from any system that is a tributary to the Colorado River. Federal agency actions resulting in water depletions to the Colorado River system may affect the endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and the threatened humpback chub (*Gila cypha*), and their designated critical habitats.

Water depletions include evaporative losses and consumptive use of surface or groundwater within the affected basin, often characterized as diversion minus return flows. Project elements that could be associated with depletions include, but are not limited to: ponds, lakes, and reservoirs (e.g., detention, recreation, irrigation, storage, stock watering, municipal storage, and power generation); drilling, hydraulic fracturing and completion of oil and gas wells; hydrostatic testing of pipelines; water wells; dust abatement; diversion structures; and water treatment facilities. Any actions that may result in water depletions should be identified. An analysis of the water depletion should include: an estimate of the amount and timing of the average annual water use (both historic and new uses) and methods of arriving at such estimates; location of water use or where diversion occurs, as specifically as possible; if and when the water will be returned to the system; and the intended use of the water. Depending on Project details, the Service may have more specific questions regarding the potential consumptive use of the water.

The Service, in accordance with the Upper Colorado River Endangered Fish Recovery Program (https://coloradoriverrecovery.org/uc/), adopted a *de minimis* policy, which states that water-related activities in the Upper Colorado River Basin that result in less than 10 acre-foot per year of depletions in flow have no effect on the Colorado River endangered fish species and their critical habitat, and thus do not require consultation for potential effects on those species and critical habitat. While no section 7 consultation is needed, the Service requests Federal agencies notify the Upper Colorado Fishes Coordinator of depletions between 0.1 and 10 acre-feet per year with the approximate location of the project (e.g., reference to the most proximate surface water or tributary), the water use (e.g., agricultural, oil and gas, energy), and the timing of and depletion

amount. Detention basins designed to detain runoff for less than 72 hours, and temporary withdrawals of water outside of critical habitat (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days, are considered to have no effect and do not require consultation.

Suckley's Cuckoo Bumble Bee: On December 17, 2024, Suckley's cuckoo bumble bee (*Bombus suckleyi*) (Suckley's) was proposed for listing as an endangered species (89 FR 102074). Suckley's is an obligate social parasite of social bumble bees in the genus *Bombus*. Suckley's cannot successfully reproduce without the availability of suitable host colonies. It is a semi-specialist parasite and confirmed to usurp nests of Western bumble bee *(Bombus occiddentalis)* and Nevada bumble bees (*Bombus nevadensis*) (Service 2024).

Based on the best available information, no Suckley's have been observed in Colorado since 2014 despite ongoing surveys. The Species Status Assessment (SSA) shows observations since 2018 occur only in northern latitudes, primarily in Canada (Service 2024), but the species may persist in high quality upper elevation habitats in western States. While Suckley's is proposed for listing, there is no prohibition of "take" under Section 9 of the ESA; therefore, projects without a federal nexus, do not need to engage with the Service to exempt take under the ESA. However, we encourage including conservation measures benefiting pollinators and pollinator habitat into projects. Examples include retaining suitable foraging (diversity and abundance of native floral resources), nesting (suitable host colony above or below ground), and overwintering habitat (loose substrates such as leaf litter, duff, rotting logs); maintaining habitat for host bumble bees by avoiding impacts to abandoned underground holes (rodent burrows); and revegetation efforts that include native seed mixes to promote an abundance and diversity of native floral resources. Additionally, we recommend supporting and conducting general bumble bee and pollinator surveys.

While the species is not currently known to occur in Colorado, we encourage proactive conservation actions to protect and conserve pollinators and pollinator habitat. Examples include retaining suitable foraging (diversity and abundance of native floral resources), nesting (suitable host colony above or below ground), and overwintering habitat (loose substrates such as leaf litter, duff, rotting logs); maintaining habitat for host bumble bees by avoiding impacts to abandoned underground holes (rodent burrows); and revegetation efforts that include native seed mixes to promote an abundance and diversity of native floral resources. Additionally, we recommend supporting and conducting general bumble bee and pollinator surveys.

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Western Colorado Ecological Services Field Office
445 West Gunnison Avenue, Suite 240
Grand Junction, CO 81501-5711
(970) 628-7180

PROJECT SUMMARY

Project Code: 2025-0117716
Project Name: Cascade Village Condo
Project Type: Residential Construction
Project Description: condo
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.64857995,-107.81129202247925,14z

Counties: San Juan County, Colorado

ENDANGERED SPECIES ACT SPECIES

There is a total of 10 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Canada Lynx *Lynx canadensis* Population: Wherever Found in Contiguous U.S. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3652	Threatened
Gray Wolf *Canis lupus* Population: CO No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4488	Experimental Population, Non-Essential
New Mexico Meadow Jumping Mouse *Zapus hudsonius luteus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7965	Endangered

BIRDS

NAME	STATUS
Mexican Spotted Owl *Strix occidentalis lucida* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8196	Threatened
Southwestern Willow Flycatcher *Empidonax traillii extimus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6749	Endangered

FISHES

NAME	STATUS
Colorado Pikeminnow *Ptychocheilus lucius* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/3531	Endangered
Razorback Sucker *Xyrauchen texanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Water depletions in the upper Colorado River basin adversely affect this species and its critical habitat. Effects of water depletions must be considered even outside of occupied range. Species profile: https://ecos.fws.gov/ecp/species/530	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened
Silverspot *Speyeria nokomis nokomis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2813	Threatened
Suckley's Cuckoo Bumble Bee *Bombus suckleyi* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10885	Proposed Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

REFUGE INFORMATION WAS NOT AVAILABLE WHEN THIS SPECIES LIST WAS GENERATED. PLEASE CONTACT THE FIELD OFFICE FOR FURTHER INFORMATION.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

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1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are Bald Eagles and/or Golden Eagles in your project area.

Measures for Proactively Minimizing Eagle Impacts
For information on how to best avoid and minimize disturbance to nesting bald eagles, please review the National Bald Eagle Management Guidelines. You may employ the timing and activity-specific distance recommendations in this document when designing your project/ activity to avoid and minimize eagle impacts. For bald eagle information specific to Alaska, please refer to Bald Eagle Nesting and Sensitivity to Human Activity.

The FWS does not currently have guidelines for avoiding and minimizing disturbance to nesting Golden Eagles. For site-specific recommendations regarding nesting Golden Eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

If disturbance or take of eagles cannot be avoided, an incidental take permit may be available to authorize any take that results from, but is not the purpose of, an otherwise lawful activity. For assistance making this determination for Bald Eagles, visit the Do I Need A Permit Tool. For assistance making this determination for golden eagles, please consult with the appropriate Regional Migratory Bird Office or Ecological Services Field Office.

Ensure Your Eagle List is Accurate and Complete
If your project area is in a poorly surveyed area in IPaC, your list may not be complete and you may need to rely on other resources to determine what species may be present (e.g. your local FWS field office, state surveys, your own surveys). Please review the Supplemental Information on Migratory Birds and Eagles, to help you properly interpret the report for your specified location, including determining if there is sufficient data to ensure your list is accurate.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to bald or golden eagles on your list, see the "Probability of Presence Summary" below to see when these bald or golden eagles are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

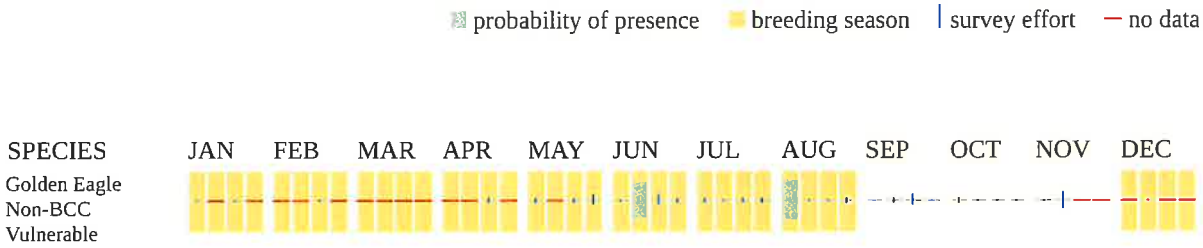
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service).

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Black Swift *Cypseloides niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8878	Breeds Jun 15 to Sep 10
Broad-tailed Hummingbird *Selasphorus platycercus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/11935	Breeds May 25 to Aug 21
Cassin's Finch *Haemorhous cassinii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9462	Breeds May 15 to Jul 15
Clark's Nutcracker *Nucifraga columbiana* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9421	Breeds Jan 15 to Jul 15
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10
Flammulated Owl *Psiloscops flammeolus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/7728	Breeds May 10 to Aug 15
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Olive-sided Flycatcher *Contopus cooperi* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15

NAME	BREEDING SEASON
Virginia's Warbler *Leiothlypis virginiae* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

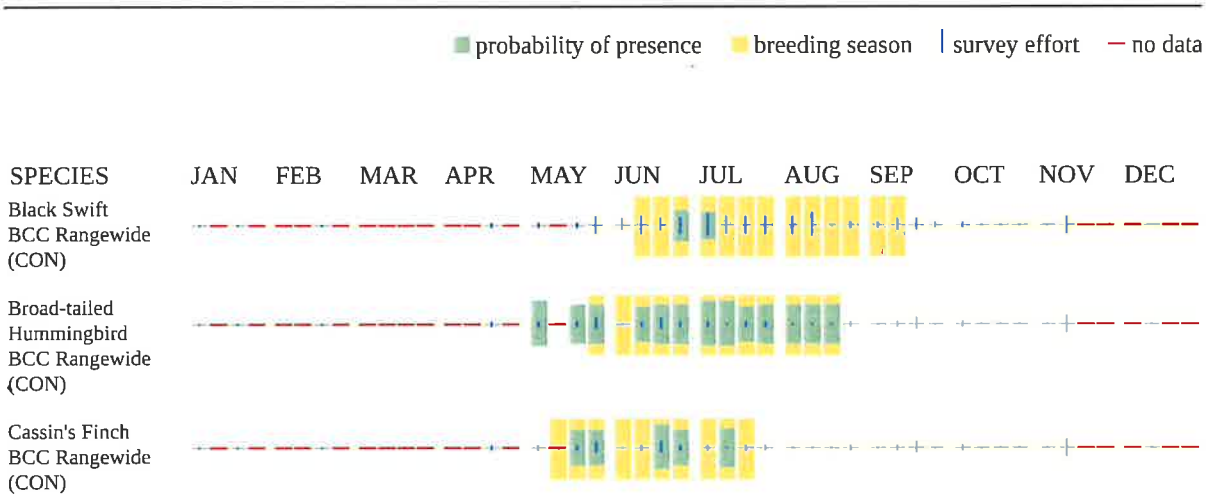
Probability of Presence (▪)

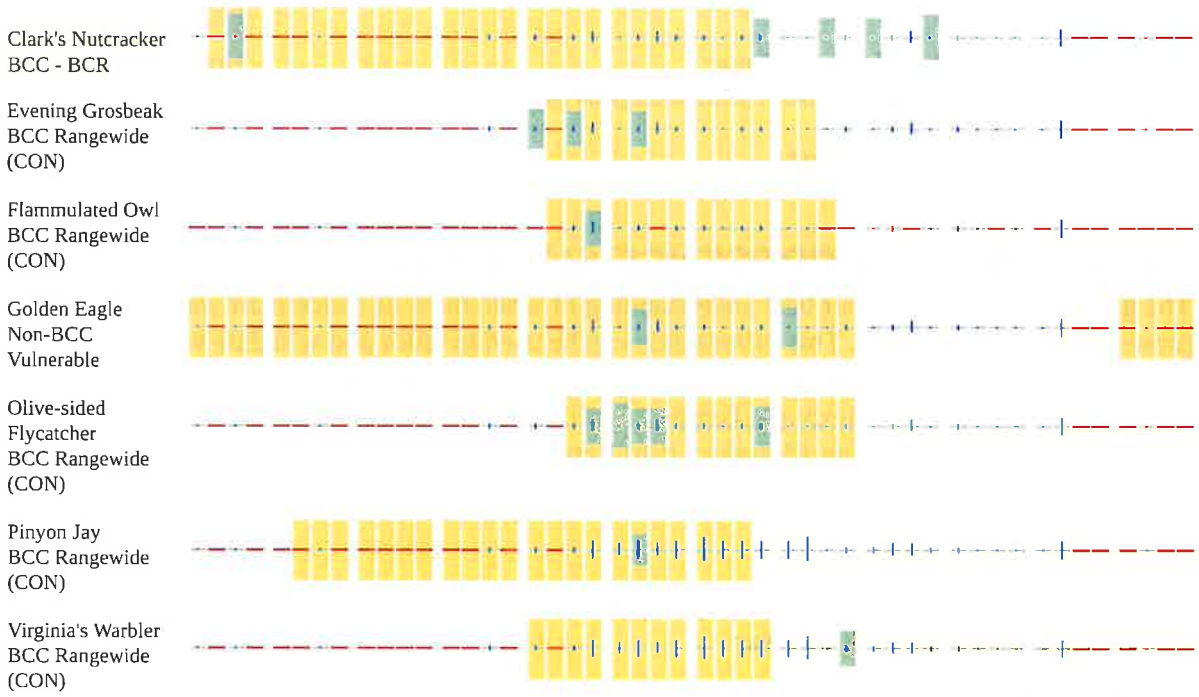
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER EMERGENT WETLAND

- PEM1C

- PEM1D

RIVERINE

- R4SBC

IPAC USER CONTACT INFORMATION

Agency: SME Environmental Inc.
Name: Nathan Kirker
Address: 679 East 2nd Ave
City: Durango
State: CO
Zip: 81301
Email nkirker@sme-env.com
Phone: 9702599595

ATTACHMENT 5
Cultural Memo

Thank you for submitting a request to the Office of Archaeology and Historic Preservation!

If you have requested a cost estimate, we will be in touch once we review the details of your request. Otherwise, we will be in touch as soon as the your request has been completed. If you need to make changes to your request, please reply to this email. The details of your submission are below.

Select a Service	File Search
Project Reference	Cascade Village Tracts A1-B1
Do you need a cost estimate for this service?	No
Submission Date	06/30/2025
Select a Search Method	Search based on a mapped area
Upload the Search Area	SurveyArea.kmz
Select a Processing Option	Standard processing: 20 business days
Requestor Name	SANDER APLET
Organization or Agency	SME Environmental
Email	sander@sme-env.com
Phone Number	(720) 217-1694
Address	No change to address

Select your qualifications.	None of the above applies to me, I understand I will only receive non-sensitive data.
What is the reason for this request?	Background research for a SHPO consultation, federal or state permitting activity, or a due diligence project
Terms and Conditions	Accepted
Accounts Payable	The billing contact is different.
Billing Contact	Sean Moore
Billing email	smoore@sme-env.com
Billing phone	(970) 259-9595
Billing address	679 2ND AVE Unit 8, DURANGO, Colorado, 81301
Terms and Conditions	Accepted
Submission number	S-999

APPENDIX C
March 2025 USEPA Memo regarding "Adjacent Wetlands"

New Guidance on Adjacent Wetlands Under the Clean Water Act

Today the EPA and U.S. Army Corps of Engineers issued a memorandum that clarifies the definition of "adjacent wetlands" under the Clean Water Act (CWA) following the Supreme Court's ruling in Sackett v. EPA (2023). The March 12, 2025 guidance emphasizes that wetlands must have a "continuous surface connection" to a jurisdictional water to be considered adjacent and thus fall under CWA protection.

Key points include:

- Legal Basis: Sackett v. EPA (2023) reaffirmed that wetlands must physically abut a jurisdictional water, rejecting broader interpretations based on hydrologic or intermittent connections.
- New Definition: Wetlands separated by berms, dikes, uplands, or indirect hydrologic features (ditches, swales, pipes, etc.) no longer qualify as adjacent.
- Practical Implications: Field assessments must confirm direct physical contact between a wetland and a jurisdictional water. Previous guidance allowing broader interpretations is rescinded.
- Public Input & Future Steps: The agencies plan to open a public docket titled "WOTUS Notice: The Final Response to SCOTUS" for feedback and may issue further guidance.

Overall, the memorandum narrows the definition of adjacent wetlands, aligning with Supreme Court precedent and limiting CWA jurisdiction to wetlands that are physically indistinguishable from abutting waters. Click the link below to learn more about this important memorandum.

Grizzly Peak Water Sales and Distribution, LLC

1424 CR 223

Durango, CO 81301

970 759 1609

swwastewater@yahoo.com

June 20, 2025

To Whom It May Concern:

I am writing in my capacity as the Manager and ORC of Grizzly Peak Water Sales and Distribution, LLC, to confirm that our utility system has the capacity to serve an additional 66 new residential dwelling units, with significant capacity available beyond that number.

Grizzly Peak owns and operates the central water PWSID # CO0156300 and wastewater facilities Discharge permit # CO0039691 serving the Cascade development area. Our infrastructure was originally designed to support a substantially larger number of units than are currently in service, and the system continues to operate well within its engineered design parameters. Our storage, treatment, and distribution systems all have ample reserve capacity.

Grizzly Peak Water Sales and Distribution, LLC is a regulated utility in good standing with the State of Colorado Public Utilities Commission (PUC). We operate in compliance with applicable state regulations and utility service standards. Our facilities are subject to State inspections, and we submit to and pass all required regulatory reviews and inspections as mandated by the PUC.

If you have any questions or require additional documentation, please feel free to contact me directly.

Sincerely,

David Marsa

Manager and ORC

Grizzly Peak Water Sales and Distribution, LLC

swwastewater@yahoo.com

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

GEOLOGIC HAZARDS ASSESSMENT
PROPOSED CASCADE VILLAGE SOUTH TOWNHOME PROJECT
DURANGO, SAN JUAN COUNTY, COLORADO

May 16, 2025

PREPARED FOR:

Lauren Davis, AIA, AICP
Reynolds, Ash + Associates
ldavis@ra-ae.com
PROJECT NO. 58565GH

649 Tech Center Drive Suite A • Durango, CO 81301 • 970/259-5095 • Fax 970/382-2515

Table of Contents

ATTACHMENT

Geotechnical Engineering Study, Proposed Cascade Village Townhomes South Project, January 27, 2025, Project No. 58656GE

1.0 REPORT INTRODUCTION

This report presents our Geologic Hazards Assessment for the proposed townhome development north of Purgatory Resort in the Cascade area near Durango in San Juan County, Colorado. This report was requested by Lauen Davis of Reynolds, Ash + Associates and was prepared in accordance with our proposal dated November 4, 2024, Proposal No. 24419P.

As outlined within our proposal for services for this project the client is responsible for appropriate distribution of this report to other design professionals and/or governmental agencies unless specific arrangements have been made with us for distribution.

The following outline provides a synopsis of the various portions of this report;

- Section 1.0 provides an introduction, background and statute and the scope of the proposed development.
- Section 2.0 provides a geologic setting overview.
- Section 3.0 provides our geologic hazard discussion.
- Sections 4.0 and 5.0 presents our conclusions and limitations.

This geologic hazard study presents our interpretation of the surface characteristics and geologic exposures at the project site. Our hazard assessment is based on our surface observations, a review of available literature, geologic mapping for the area, and on our experience in the area.

1.1 Background and Statute

There are three statutes that were adopted by the Colorado Legislature that are pertinent to geologic hazards and land use. "The Land Use Act" of 1970 established the basis for which later bills could be enforced. The Land Use Act mandated that decisions and authority to develop and enforce land use planning regulations should be conducted at local government levels. Senate Bill 35 was passed in 1972. This bill required that local county governments either adopt a land use planning regulations for subdivisions or follow a model set of regulations developed by the state. In 1974 the Colorado House amended the Land Use Act by adopting House Bill 1041.

House Bill 1041 provided legal definition of natural and geologic hazards. A natural hazard is considered any hazard from geologic conditions, wildfire, or flooding. A geologic hazard is defined as "a geologic phenomenon which is so averse to past, current, or foreseeable construction or land use as to constitute a significant hazard to public health and safety or to property". The geologic hazards identified and defined in HB 1041 include; avalanche, landslide, rockfall, mudflow and debris fans, unstable or potentially unstable slopes, seismic effects, radioactivity and ground subsidence. We have provided excerpts from "Guidelines and Criteria for Identification and Land Use Controls of Geologic Hazard and Mineral Resource Areas", 1974, Rogers, W.P. et al., Special Publication 6, Colorado Geological Survey, in Appendix A which provided legal and descriptive definitions of the geologic hazards outlined in House Bill 1041.

1.2 Current Scope of Development

The project area generally encompasses an approximate 10.5-acre parcel of land acres north of

Purgatory Resort in San Juan County, Colorado. The approximate coordinates of the site are 37.647462°, -107.809476°. The site location is shown on Figure 1.1 below.

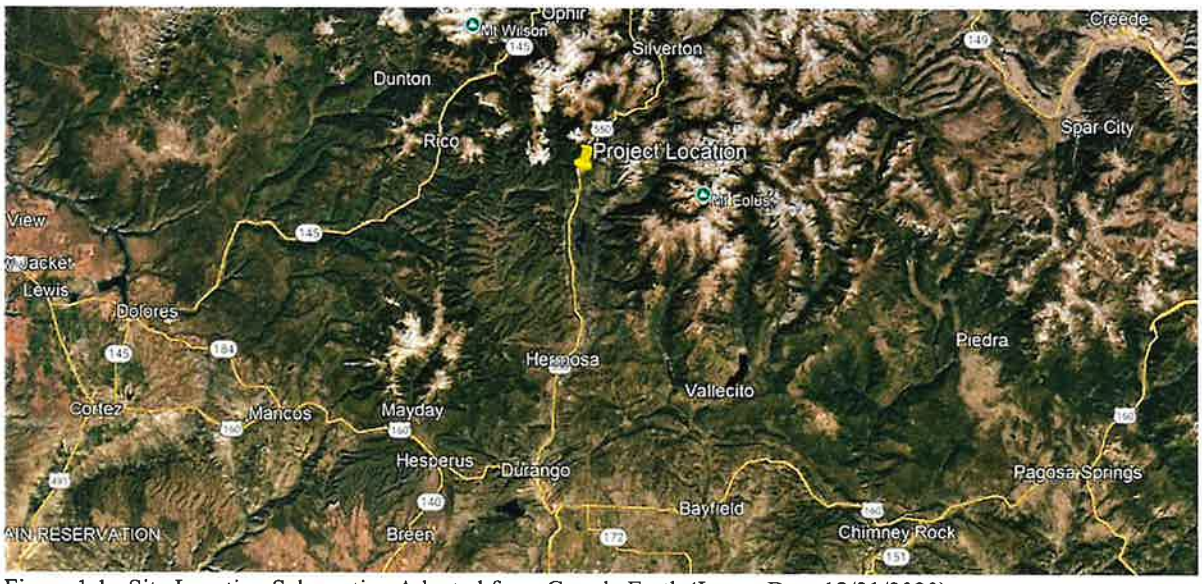


Figure 1.1: Site Location Schematic. Adapted from Google Earth (Image Date 12/31/2020).

We understand conceptual plans include 33 to 37 residential townhomes on the site. A conceptual schematic prepared by CHC Engineers, LLC is provided below as Figure 1.2.

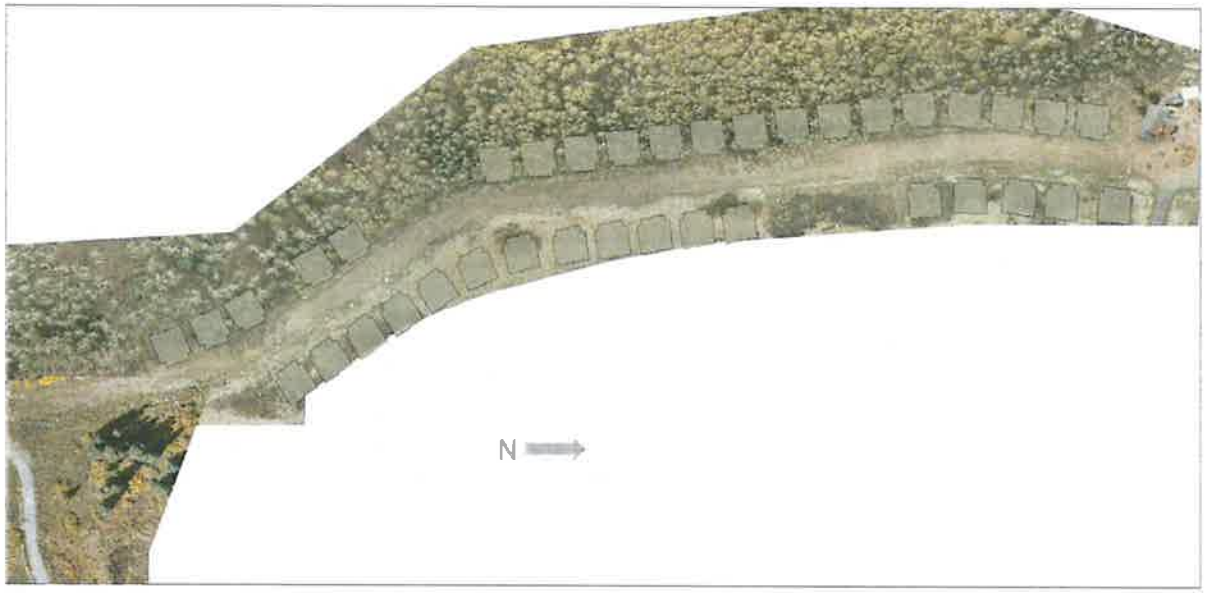


Figure 1.2: Conceptual Site Plan prepared by CHC Engineers, LLC.

2.0 GEOLOGIC OVERVIEW

This section provides an overview of our site reconnaissance and literature research for the project site. A description of the site assessment methodology is provided, followed by a discussion of

the regional, local and site-specific geology.

2.1 Scope of Assessment

We performed a geologic field reconnaissance of the site on November 17, 2021. The geologic reconnaissance included detailed observations of the site to evaluate the existence and potential significance of geologic hazards that may influence the proposed development. The general scope of our study included the following;

- Literature and map review of the site.
- Geologic field observations and measurements including a description of the site topography, geologic character and geomorphology.
- Identification and analysis of geologic hazards that may influence the project development and proposed lot layout.

This study focused on the following geologic hazards (these are the hazards defined by HB 1041):

- **Avalanche**; an evaluation and discussion of the site exposure to avalanche hazards.
- **Landslides**; identification of landslides in the site vicinity including recommendations for analysis of these features if they exist in areas that will influence the proposed development.
- **Rockfall**; observations of potential rockfall source areas and identification of areas which may be influenced by rockfall. Computer modeling analysis was performed to quantify hazard potential.
- **Expansive soil and rock**; an evaluation of the potential for expansive soil and rock was performed based solely on surface observations. A geotechnical engineering study is required to evaluate the extent of the site expansive soil conditions.
- **Mudflow and debris fans**; identification of areas of the site which may be influenced by debris flow activity.
- **Unstable and potentially unstable slopes**; identification of potentially unstable and unstable slope areas based on our geologic field reconnaissance and available maps. This is also based on surface observations and is more completely analyzed as part of a geotechnical engineering study.
- **Radioactivity**; literature review regarding the potential for hazards associated with radiation.
- **Seismic effects**; identification of local faults and recent activity based on the available literature and field observations.
- **Ground subsidence**; identification of subsidence prone areas and recent activity based on the available literature and field observations.

A discussion of the hazards as they pertain to the project is included in Section 10.5 of this report.

2.2 Geologic Observations

We have provided a brief discussion of the regional and local geology followed by a more specific discussion of the site geology below to provide background information prior to discussing the site-specific geologic hazard considerations.

2.2.1 Regional Geology Discussion

The site is located in the San Juan Mountains of southwestern Colorado. There are diverse geologic conditions in the area, all of which may have an influence on geologic hazard considerations and land use.

Geologic rock units in the area range from Pre-Cambrian Granite and Gneiss to late Cretaceous to early Tertiary sedimentary shale and sandstone units. Middle to late tertiary volcanic units are common in the Alpine regions of the area. Later quaternary glacial, eolian soils and soil deposits produced by weathering overly the rock units are common. The shale and sandstone rock units and associated soils produced from weathering of these materials are commonly encountered in developed areas.

During the middle to late Cretaceous approximately 80 to 66 million years ago a mountain building episode termed the "Laramide Orogeny" caused regional uplift of the area. The San Juan Dome was formed, the erosional remnant of which exists under the mountainous areas in the region. The San Juan Basin which has since filled with sediment was formed in the area south of the San Juan Mountains. This activity caused upwarping and deformation of the geologic units in the area. This uplift is evidenced nearly everywhere in the region. The sedimentary unit bedding planes all dip (tilt) generally toward the south, and the center of the San Juan Basin. The numerous hogback ridges and cuestas in the area are formed by steeply dipping sedimentary units.

There have been several glacial episodes which have occurred in the area. Glacial moraine and outwash terrace deposits are common in the area. The U-shaped valleys in the region are a testament to the erosional forces imposed by the glaciers.

The steeply dipping geologic units forming the ridges in the area are associated with numerous areas of active landslides and unstable slope areas. In areas where the bedding planes parallel the slope inclinations; translational landslide activity is common. In areas north of Durango, in the north Animas Valley, there are several rotational and multi-unit landslide complex areas where movement was initiated during glacial melt and saturated soil conditions. Many of these areas are located within and immediately adjacent to highly developed areas.

The soils produced by weathering of the sedimentary units in the area often have expansive characteristics, as do many of the eolian deposits. The glacial outwash and alluvial soil deposits are relatively benign, from a development and foundation design perspective. Historic floodplain deposits and wetland areas that are common in the river valleys often contain fine-grained sands and silts that may be unstable and have settlement concerns under foundation loading.

2.2.2 Local Geology Discussion

The Purgatory area is located along the west margin of the Animas River glacio-fluvial valley. Cascade Creek flows from the northwest toward the Animas River and captures Lime Creek on the way. Each of these three drainages were once glaciated. The area north and east of the project site was the confluence of these three glaciers. There are numerous steep gullies in these glacial valleys that flow into the creeks and rivers.

Geologic units in the area consists of Precambrian metasedimentary and igneous units as well as Paleozoic and Mesozoic sedimentary layers of sandstone, limestone, shale and conglomerate. The sedimentary units exposed in the area include the Permian Cutler Formation (Pc), the Permian-Pennsylvanian Hermosa/Rico/Molas Formations undifferentiated (PIPrm) and the Mississippian-Cambrian Leadville Limestone/Ouray Limestone/Elbert Formation/Ignacio Formation undifferentiated (MCli*). These units are generally south dipping and cliff forming. Precambrian Irving Formation (pCi), Twilight Gneiss/Schist (pCtw) and Electra Lake Gabbro (pCel) outcrop east of the site in the West Needle Mountains and along the Animas River. Tertiary volcanics cap the mountains to the north and west of the site. Rock units in the area are often overlain by Quaternary sediments from glacial, fluvial, eolian, mass wasting and colluvial processes that continue to shape the landscape. Quaternary surficial deposits in the site vicinity are mapped as Glacial Drift (Qd) and Alluvium (Qa). A vicinity geologic map is presented in Figure 3.

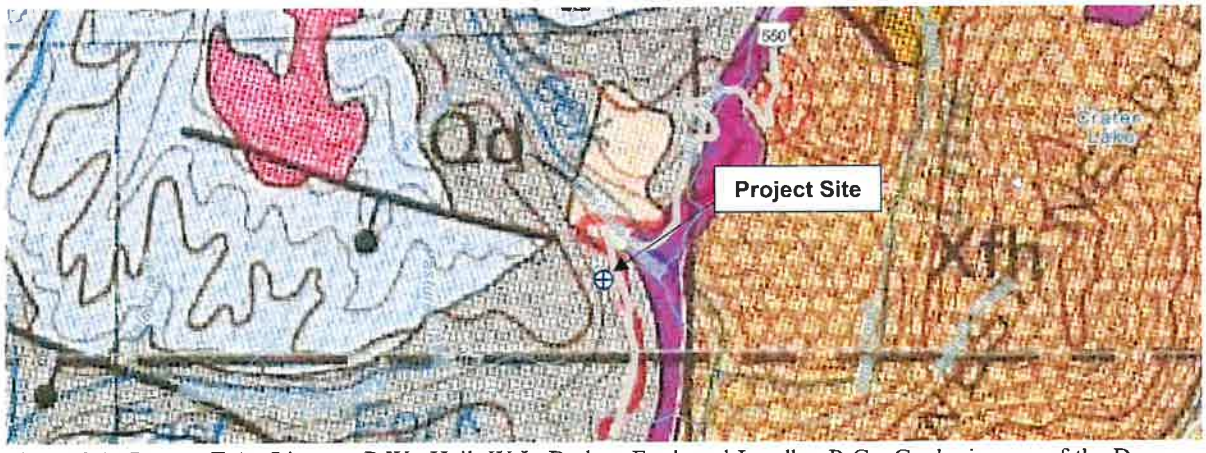


Figure 2.1: Steven, T.A., Lipman, P.W., Hail, W.J., Barker, Fred, and Luedke, R.G. Geologic map of the Durango quadrangle, southwestern Colorado. United States Geological Survey, Miscellaneous Investigations Series Map I-764, 1974. Map Scale 1:250,000.

2.2.3 Site Geology Discussion

The subject property is a generally north to south trending parcel that encroaches on a relatively steep hillside up to the west down to the Tacoma Flowline and into a relatively flat wetland area on the east side of the parcel. The site is mapped as Hermosa Group; however, within the site boundary we did not observe any formational outcrops. The site is primarily covered by colluvial, debris flow and likely glacially transported deposits in the flatter portion of the site. There are outcrops of Hermosa Group limestone and sandstone above the site, which are a source of potential rockfall debris. We completed a Geotechnical Engineering Study for the site in our report dated January 27, 2025, Project No. 58656GE. We encountered formational sandstone, shale and limestone throughout the site at depths ranging from about 4½ to 32½ feet. Based on these results, the depth to formational material should be assumed to be variable throughout the site. The overburden material on the west side of the site is primarily a mix of clay, sand, gravel, cobbles and boulder that a colluvial and debris flow related. The debris flow deposition is related to a drainage feature at the southwest corner of the project area and is discussed in greater detail in Section 3.5. The east side of the site has wetland soils that likely result from infill of the glacially carved site.

3.0 GEOLOGIC HAZARD DISCUSSION

This geologic hazard study presents our interpretation of the surface characteristics and geologic exposures at the project site. Our hazard assessment is based on our surface observations, a review of available literature, geologic mapping for the area, and on our experience in the area.

As discussed in the scope of service section above, we investigated for evidence that the following geologic hazards may influence the proposed project development;

- Avalanches
- Landslides
- Rockfall
- Expansive Soil and Rock
- Mudflows and Debris Fans
- Unstable or Potentially Unstable Slopes
- Radioactivity
- Seismic Effects
- Ground Subsidence

We have provided a brief discussion of the potential hazards, followed by the observed and predicted conditions.

3.1 Avalanches

Avalanches typically occur on slopes between 30 and 45 degrees in gradient where there is enough snow to cover low-lying vegetation. Avalanche paths generally consist of three parts:

- **the starting zone**; where avalanches initiate,
- **the track**; where avalanches reach maximum velocity, and
- **the runout zone**; where avalanches decelerate and deposit snow and debris.

Avalanche paths can be unconfined, channelized, or a combination of both. In Colorado many avalanche paths are confined by gullies and with the limits of regular/recent activity being defined by the forested areas adjacent to the path.

Trautner Geotech does not provide detailed avalanche studies or mitigation recommendations. We have provided the information above to aid the reader in a general understanding of avalanche hazards. Our commentary below is based our general geologic hazard experience and on our review of literature that is locally available in regard to avalanche hazards.

Basic avalanche hazard mapping is available from San Juan County and is provided below showing the approximate project extents in red.

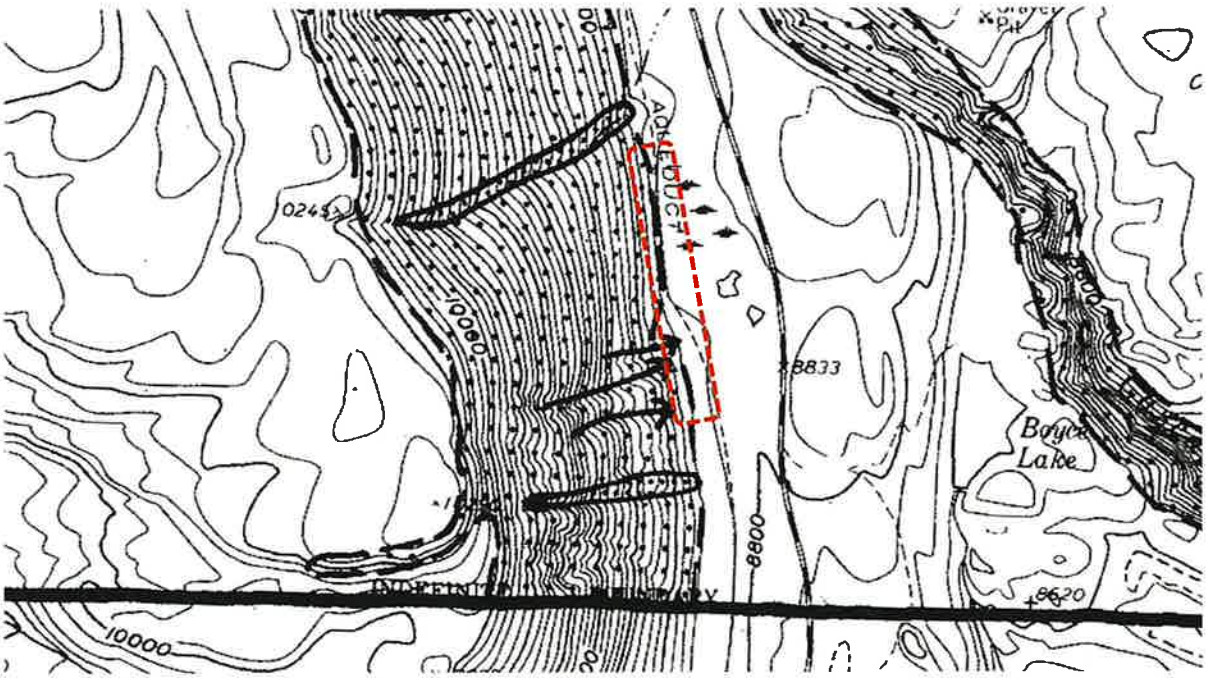


Figure 3.1: San Juan County Avalanche Hazard Instaar, Engineer Mountain, Colorado, U.S. Geological Survey, June 2, 1976. Arrows represent avalanche pathways. Approximate project area outlined in red.

Based on review of the available mapping there is a potential avalanche path on the south end of the site that may affect some of the southern units. This is consistent with our field observations. We did not observe any recent evidence of large-scale avalanche activity; however, the central drainage feature in this area has relatively sparce tree cover which could be the result of periodic avalanche activity. A photograph of this feature from N. US Highway 550 is provided below.

Photograph 1: View of potential avalanche slide path at south end of site looking west from N. US Highway 550.

Based on our review of available mapping and our site reconnaissance, a conceptual hazard zone may result in impacts to the southern 8 to 10 proposed townhome units as shown below.

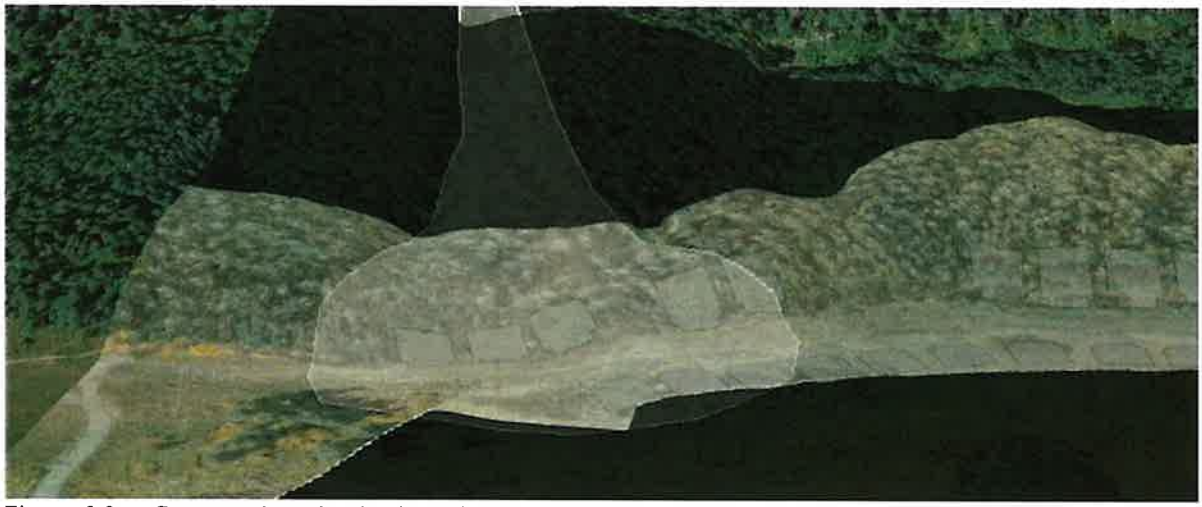


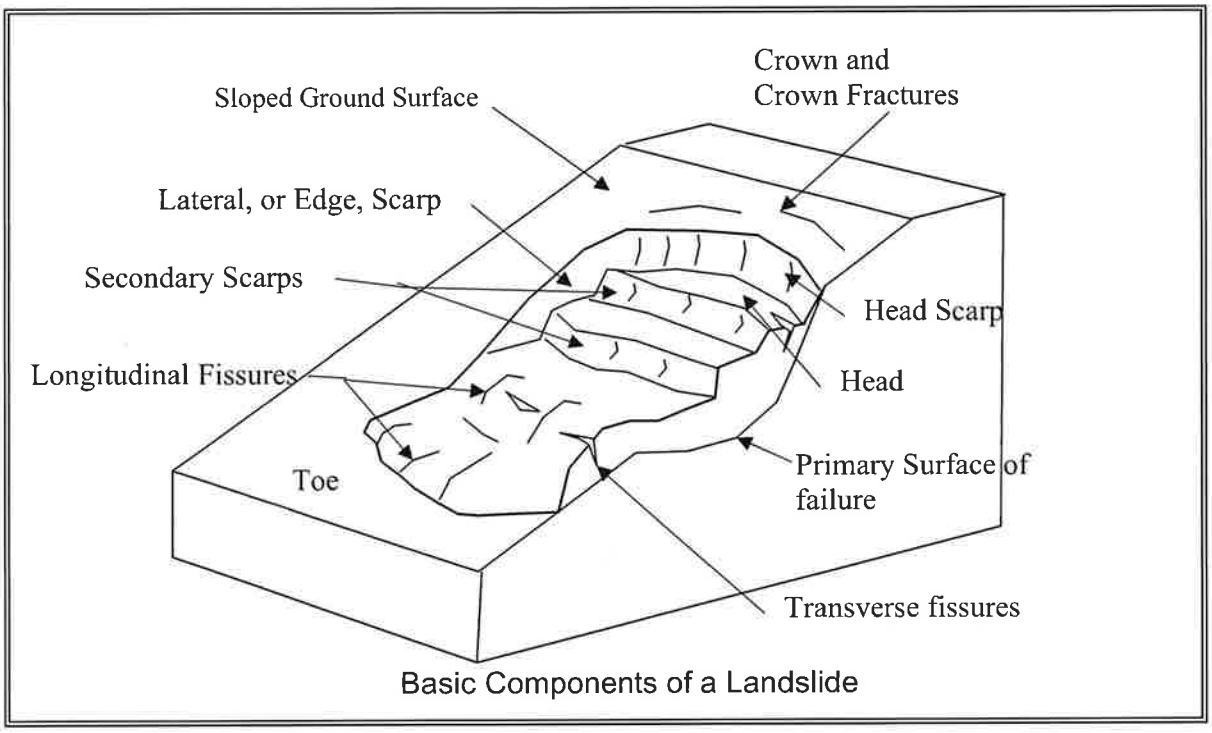
Figure 3.2: Conceptuel avalanche hazard zone schematic. Limits of avalanche area should be considered approximately and for general reference purposes only.

The schematic above should be considered approximate and is not suitable for design purposes. This schematic should only be used for conceptual planning purposes. We do not provide detailed avalanche hazard mapping including deposition depths, velocities and runout zones. If the owner is concerned about avalanche risk at the project site and is considering development at the southern

end of the project area, we recommend that an avalanche consultant be contacted.

3.2 Landslides

"Landslide" is a term to describe active slope movement. It is often used in a broad sense to describe any unstable slope or soil movement. A generalized depiction of a typical landslide is shown below.



Basic Components of a Landslide

Landslides may be relatively small slumps or may be larger scale slope failures. Mitigation of active landslides is often difficult and always costly. Evaluation of active landslide areas must include detailed subsurface investigation, laboratory analysis of the soils and detailed engineering analysis/computer modeling as the basis for mitigation design. The subsurface investigation typically includes placement of monitor well (piezometers) and often inclinometers at select locations on the project site.

We performed a site reconnaissance of the project area to identify potential mass movements within or adjacent to the project area. No evidence of large mass movement events in recent history were observed within the project area; however, we did observe suspected shallow surface creep evidenced by geotropism within trees throughout site slopes.

Photograph 2: Typical geotropism (aka tree pistol-butting) along slopes above the site.

We anticipate significant excavations on steeper slopes throughout the site for home sites and infrastructure. Our Geotechnical Engineering Study, which is included as an attachment to this report, provided a limited slope stability analysis along multiple cross sections at the site and may be referenced for slope stability concerns.

Concentrated or poor drainage resulting in saturated soils conditions could reduce the soil strength over the overburden colluvial debris throughout the development. This could increase the risk of future slope failures in steeper slopes. Additional analysis and recommendations are provided below in the Unstable or Potentially Unstable Slopes section of this report.

3.2 Unstable and Potentially Unstable Slopes

As a general standard, any slope with a gradient of 30 degrees or greater is considered potentially unstable, although flatter slopes can be potentially unstable depending on the soil characteristics and subsurface water conditions. Any slope that exhibits evidence of prior movement is considered unstable. Mechanisms of movement in unstable slopes include falls, topples, slides, spreads, and flows. These mechanisms can all be categorized as other hazards discussed in this report. We previously discussed slides and spreads as "landslides" (Section 3.2), falls and topples as "rockfall" (Section 3.4) and flows as "mudflow, debris flow, and debris fans" (Section 3.5). Unstable slope areas may be distinguished from other geologic hazards by the lack of associated

definable features; however, the physical processes are analogous. As discussed in Section 3.2 it is a critical concern for construction in potentially unstable and unstable slope areas not to alter the landscape in a way which will increase the potential for movement.

Based on schematic plans, we anticipate cuts into slopes that are greater than 30 percent. Our Geotechnical Engineering Study provided a limited slope stability analysis for existing slope and conceptual cut slopes at the site. Based on the results of the limited analysis, we anticipate marginally stable to stable natural slopes and marginally stable to potentially unstable cut slopes will be encountered across the site. Temporary or permanent excavation shoring will likely be necessary in some locations. We recommend site-specific stability analyses for individual cuts once grading plans have been established.

3.4 Rockfall

Rockfall hazard exists wherever rock has the potential to dislodge and move downhill by forces of gravity. This process is usually associated with a weathering of formational material. Freeze-thaw cycles and availability of free water promote rockfall; therefore, spring is the most active season for rockfall. The steep topography and fractured rock outcrops that are common to this region make rockfall a common hazard.

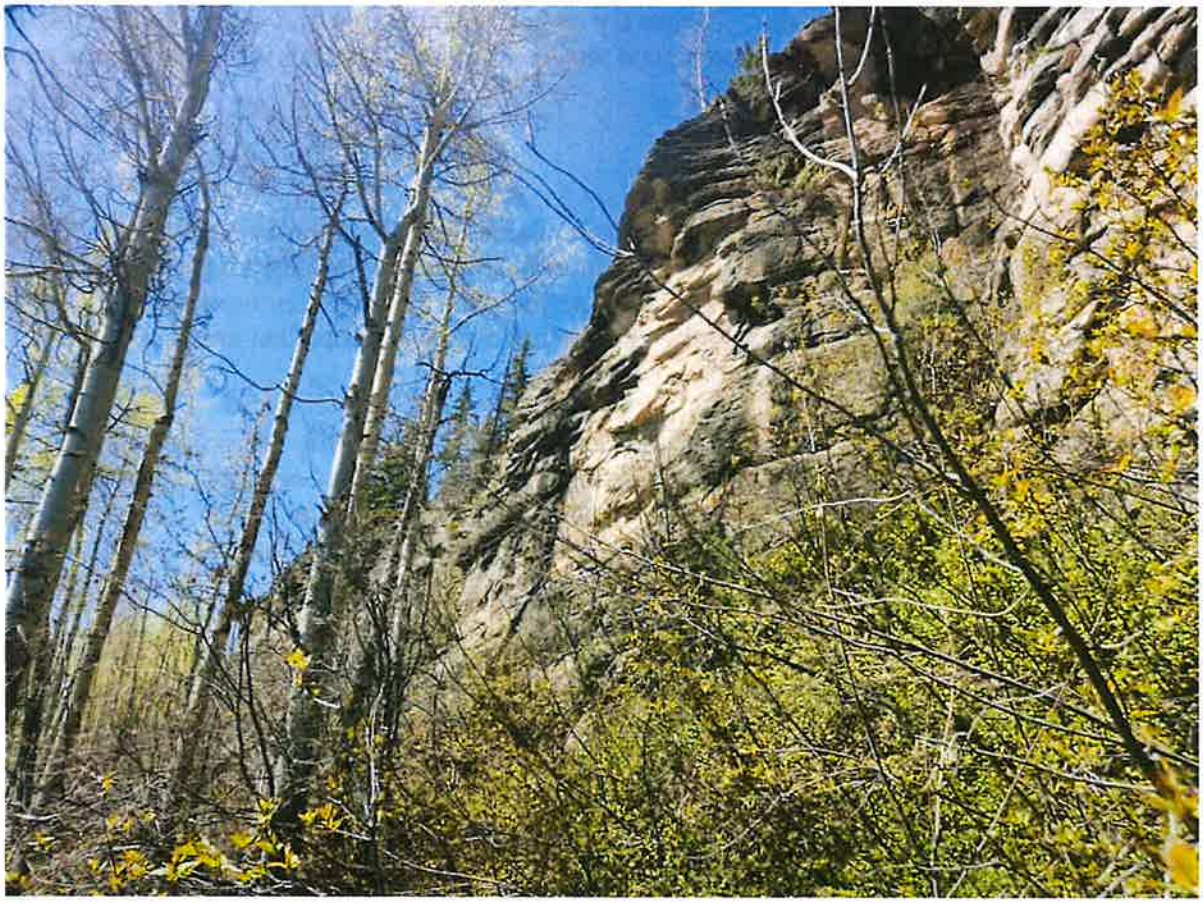
Rockfall can occur without warning and can be destructive to both life and property. Rockfall frequency is very difficult to predict, but modeling techniques allow us to estimate the trajectory and intensity of rockfall events. Simulation of rockfall events to provide an analysis of the potential destructive properties are typically performed using field mapping and observations in addition to computer modeling analysis.

Outcrops of the Hermosa Group sandstone and limestone above the site are potential source areas for rockfall hazard into the proposed development areas. Two main source areas were identified, one at the north end of the site and one at the south end of the site. The general source areas are identified below.

Figure 3.2: Location of Rockfall Source Areas.

3.4.1 Source Area 1 Rockfall Hazard Evaluation

The source area at the north end of the site consists of an approximate 50 foot tall cliff exposure of the Hermosa Group sandstone. The source area is roughly 300 to 350 feet up slope from the proposed northern townhome units. The source area was observed to be highly fractured. Evidence of recent rockfall activity along the slope below the source area was observed during our site reconnaissance. A photograph of the source area is provided below.



Photograph 1: View of Source Area 1.

We conducted our rockfall analysis using the RocScience RocFall® 2020 (RocFall) rockfall modeling software to predict rockfall behavior at the subject property. The RocFall program is a tool to predict rockfall behavior and to assist in the design of rockfall protection measures. We created a topographic profile using field measurements with a Brunton compass, GPS, range finder and measuring tape. The topographic profile was input into the RocFall model. We utilized RocFall to simulate the existing conditions at the subject property. The RocFall model's input parameters such as surface roughness, vegetation, tangential and normal and dynamic and rolling friction coefficients were manipulated to approximate the existing conditions. Once we were satisfied that we had simulated the existing conditions, we performed numerous iterations of theoretical rockfall with the program while varying sizes and shapes of rocks to model the rockfall behavior at the proposed development. The approximate analysis profile is shown in Figure 3.3

below which also includes the approximate hazard zone. We have also included our RocFall analysis profile as Figure 3.4.

Figure 3.3: Approximate Location of Rockfall Analysis Profile and approximate hazard zone.

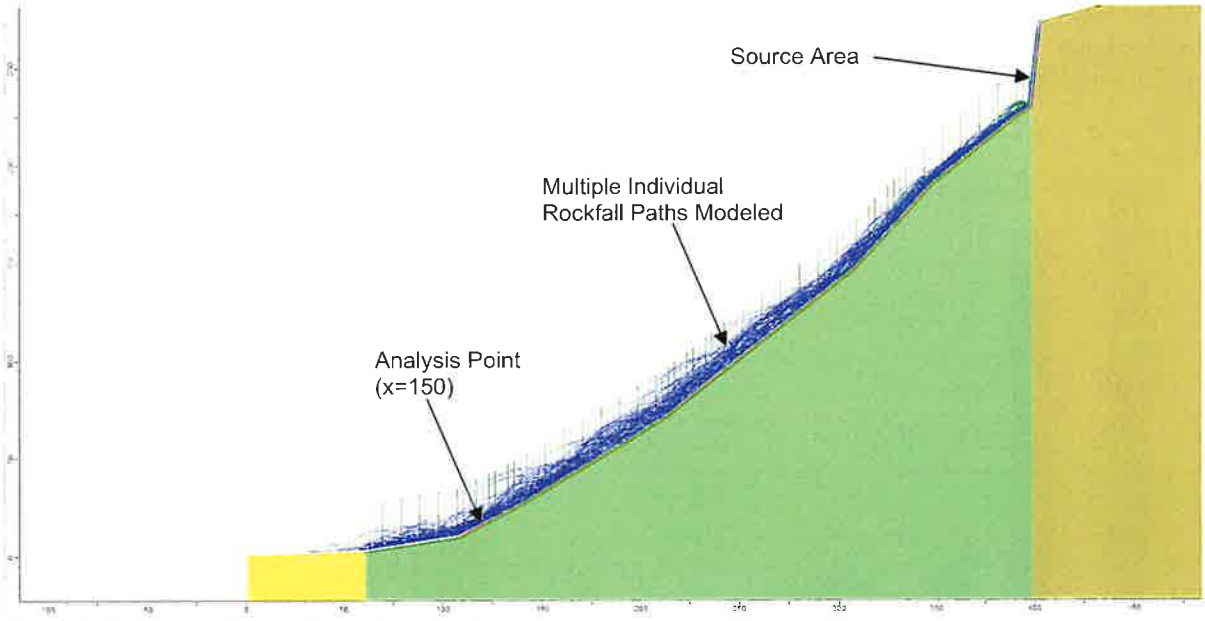


Figure 3.4: Topographic profile used in RocFall analysis.

Based on our site observations and analysis, rocks have the potential to move from the source area down to the assumed edge of building sites (X = 150 feet). The approximate hazard zone includes the northern eight townhome units on the current site development plan. This location was chosen as a likely location for rockfall mitigation fencing; however, it must be understood that rockfall impact energy and bounce heigh will vary at different locations along the slope profile. Below, we have provided graphical representation of the estimated bounce heights and total kinetic energy values for various sizes and shapes of rocks observed calculated along the slope. As shown, bounce heights and energy values vary greatly at different points along the slope; however, most rocks were shown reach the development area as shown below on the Distribution of Rock Path End Locations, Figure 3.5.

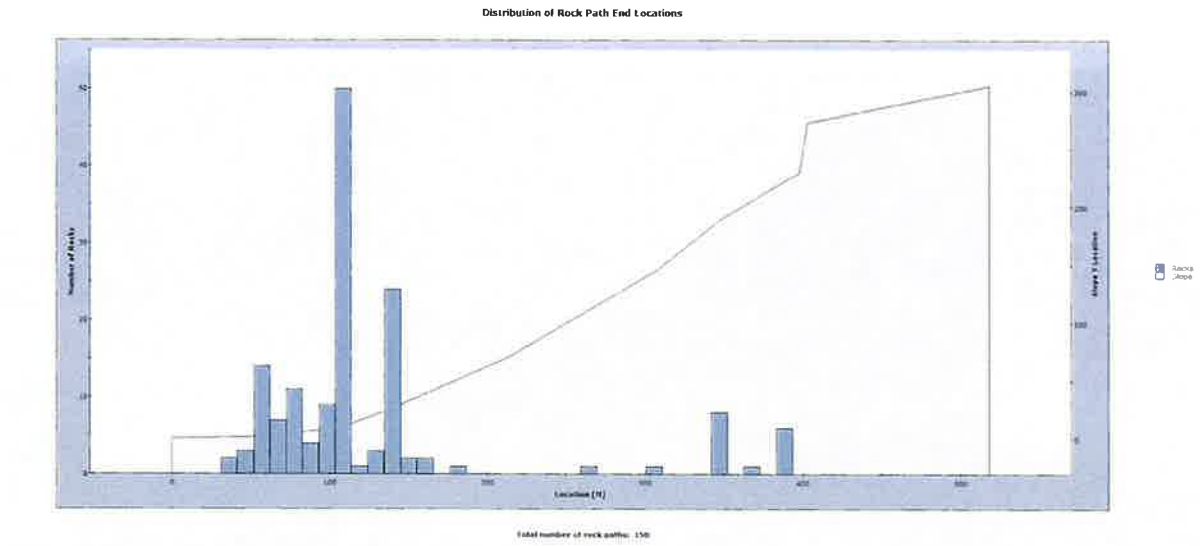


Figure 3.5: Distribution of Rock Path End Locations.

At the analysis point, we estimated total kinetic energy of about 200,000 foot-pounds (approximately 270 kilojoules). Bounce heights were highly variable in the model which is fairly typical. Highest values were up to about 19 feet; however of the 130 rocks analyzed that reach the analysis point, 117 (90%) of those rocks have a bounce height of 10 feet or less with the majority (79 rocks) with a bounce height of 1 foot or less.

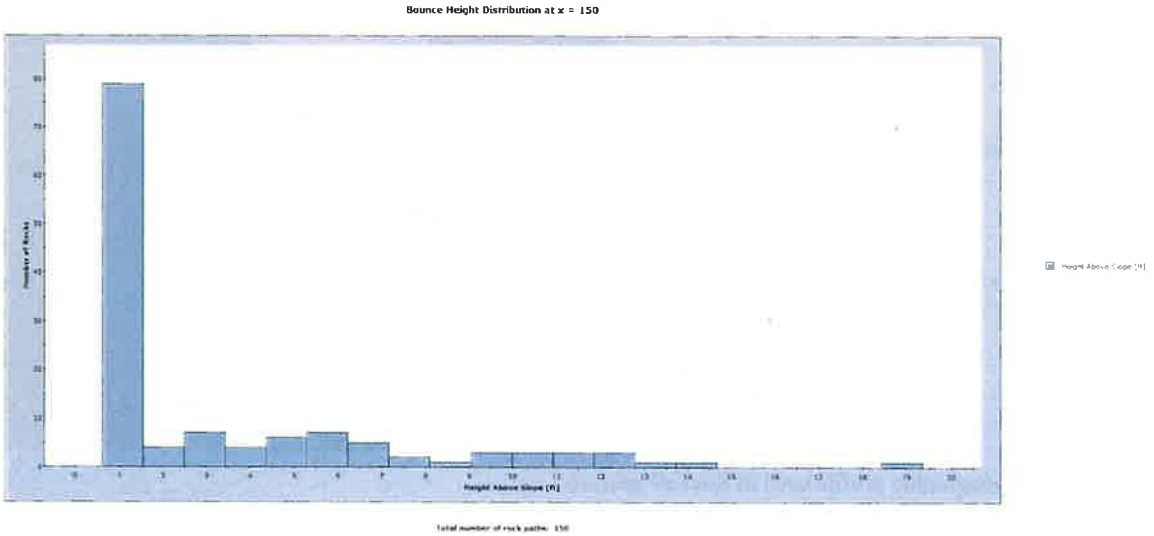


Figure 3.6: Bounce Height distribution table at analysis point (X=150)

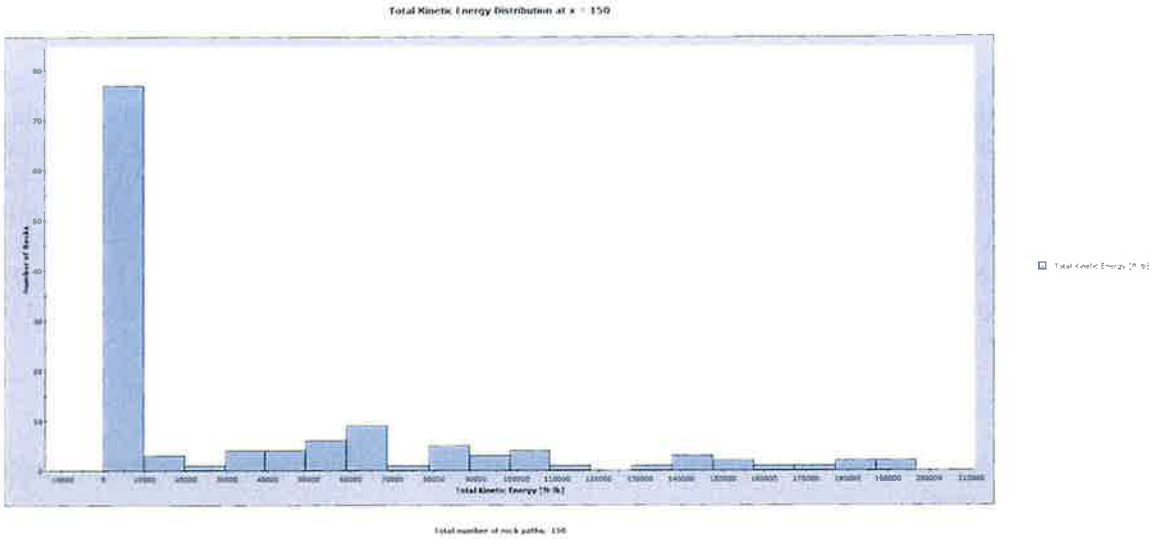


Figure 3.7: Total Kinetic Energy distribution table at analysis point (X=150)

Our rockfall analysis included "typical" design rocks based on our site observations of recent rockfall debris and fracture patterns within the source area rock. These rocks represent most typical or likely rockfall debris within the hazard zone. However, larger rocks outside of the normal range are possible. One rock over 10 feet in diameter was observed at the base of the slope; however, it is unclear whether this rock was related to a rockfall event or transported by other means. Our analysis does not include non-typical rocks as these are considered to be very rare an unlikely events. However, it should be noted that larger atypical rocks may not be mitigatable by conventional mitigation methods discussed later this this report.

3.4.2 Rockfall Mitigation Concepts

Based on the evaluation above, the proposed townhomes below Source Area 1 are within a potential rockfall hazard zone and additional mitigation is warranted. This section provides mitigation concepts and alternatives for hazard reduction at the site. Typical mitigation concepts include:

- Avoidance of the areas influenced by the hazard,
- Scaling or in-place stabilization of rocks prone to movement, and,
- Design and construction of arrest barriers, typically:

    - Rockfall mitigation fencing, and/or
    - Earthen trough and berms
    - Rigid Architectural Barriers

Often a select combination of one or more of these types of mitigation are included in rockfall hazard mitigation. We have provided a brief discussion of these concepts including how they pertain to this project.

Avoidance - Although avoidance of a particular hazard, such as rockfall is always the best option, this is not always possible due to property boundary, topographic, or other constraints imposed by a particular project site. Often slight changes in structure location, orientation, and/or elevation can influence the exposure to or severity of rockfall hazards. It must be understood that there are many variables that go into rockfall hazard prediction and relatively small changes in the model input parameters can alter the results;

therefore, the owner/developer should consider what, if any, factors of safety to consider in structure placement.

Scaling or In-place Stabilization of Rocks Prone to Movement - A relatively common mitigation for rockfall includes scaling, movement of rocks downslope prior to construction, and/or in-place stabilization. These efforts are largely conducted with hand labor and hand tools. Some in-place stabilization can be developed by the use of rock bolts or other aggressive means requiring the use of pneumatic drilling equipment and other techniques. Blasting is also a form of scaling. Often larger rocks may be blasted, with hand-scaling or in-place stabilization performed on the smaller rocks produced from the blasting effort. Due to the magnitude of rock source areas above the site, scaling and/or in-place stabilization is not likely a feasible alternative for the project site.

Rockfall Mitigation Arrest Barriers

There are numerous types of arrest barriers commonly included in rockfall mitigation. Perhaps the most common types being;

- Earthen trough and berm configurations, and
- Flexible rockfall mitigation fencing
- Architectural Design Strategies

Earthen Trough and Berm Configurations

Earthen trough and berms and flexible rockfall mitigation fencing are common mitigation strategies utilized in the area. However, due to the steepness of the slope above the site and limited property line setbacks, these strategies were determined not to be feasible alternatives for the site. We can provide more details regarding an earthen berm/trough upon request.

Flexible Rockfall Mitigation Fencing

Rockfall mitigation fencing has been used successfully within the Southwest Colorado area for many projects. Rockfall mitigation fencing is typically designed by an engineer or contractor with experience in rockfall mitigation. Many manufacturers of rockfall fencing have design capabilities and may utilize information provided in reports such as this to develop a design that is based on the impact energies estimated through the use of computer modeling, such as our RocFall analysis. Rockfall fence design is typically based on an impact energy, or total kinetic energy, and a maximum bounce height. The energy from a rockfall event and the bounce height can vary greatly based on the size of rock and location along the slope. For the purposes of this investigation, we have assumed a rockfall mitigation fence will likely be located along the slope at a location on the west property boundary (x=150). Based on our analysis, maximum impact energies at this location will be approximately 270 kilojoules for the typical rocks analyzed. Typical bounce heights were 10 feet or less; however, less common higher bounce heights were also modelled.

However, anisotropies in the model and variations in the slope can alter the estimated impact energies and bounce heights. Larger rocks are possible with higher impact energies. Appropriate factors of safety should be added by the designer, as necessary. We recommend a minimum fence design of 500 kilojoules with a minimum height to 10 feet to accommodate typical rockfall events. If higher factors of safety are desired to accommodate less typical, but still possible, events a more robust fence system may be considered. Further, our estimated energy and bounce height only applies to one location along the slope and variations will occur at different locations. Once the final residence and fence location has been chosen, we should be contacted to re-evaluate our analysis.

Flexible rockfall fencing is available from two main manufacturers, Geobrugg and Maccaferri. Fence heights and impact energy ratings vary per the manufacturer and necessary design configurations. We do not provide design of rockfall mitigation fencing systems; however, we are available to assist the design team, as necessary.

Architectural Design Strategies

Architectural design strategies are commonly included on structures that are located within rockfall hazard area of low to moderate probability or as an additional protective measure against potential rockfall events. Typical design concepts include locating high occupancy rooms with the structure away from the up-slope side of the proposed structure where rockfall impacts are likely to occur. Low occupancy rooms such as laundry, utility or storage areas, and hallways are best located on the side of the structure where impacts associated with rockfall activity are likely to occur. Windows on the upslope side should be avoided, if possible. Windows should be generally of smaller size, where necessary, and they should be placed as high as possible. Architectural design strategies may be prudent for this project; however, due to the impact energies and bounce heights calculated, these strategies are not likely feasible as a first defense against rockfall impacts.

Rigid Concrete Barriers

Rigid concrete barriers can be utilized successfully in some cases; however, there are some limitations. The impact energies associated with rockfall events are often too great to accommodate reasonable structural design strategies relative to rigid barriers. Rigid barriers can also propagate much of the impact energy into the structure resulting in potential for severe structural damage to both the interior and exterior of the structure. Separation of the barrier can result in less damage propagated to the habitable portion of the structure. The owner, designer and structural engineer should evaluate the feasibility of a rigid barrier for the impact energies and bounce heights associated with potential rockfall events at the site.

3.4.3 Source Area 2 Rockfall Hazard Evaluation

The southern source area (Source Area 2) is located nearly twice as high on the slope as Source Area 1 and is located above the southern portion of the of the project area as shown on Figure 3.2 above. The approximate analysis profile is shown in Figure 3.8 below. We have also provided our RocFall profile which is provided below as Figure 3.9.

Figure 3.8: Approximate RocFall Analysis Profile.

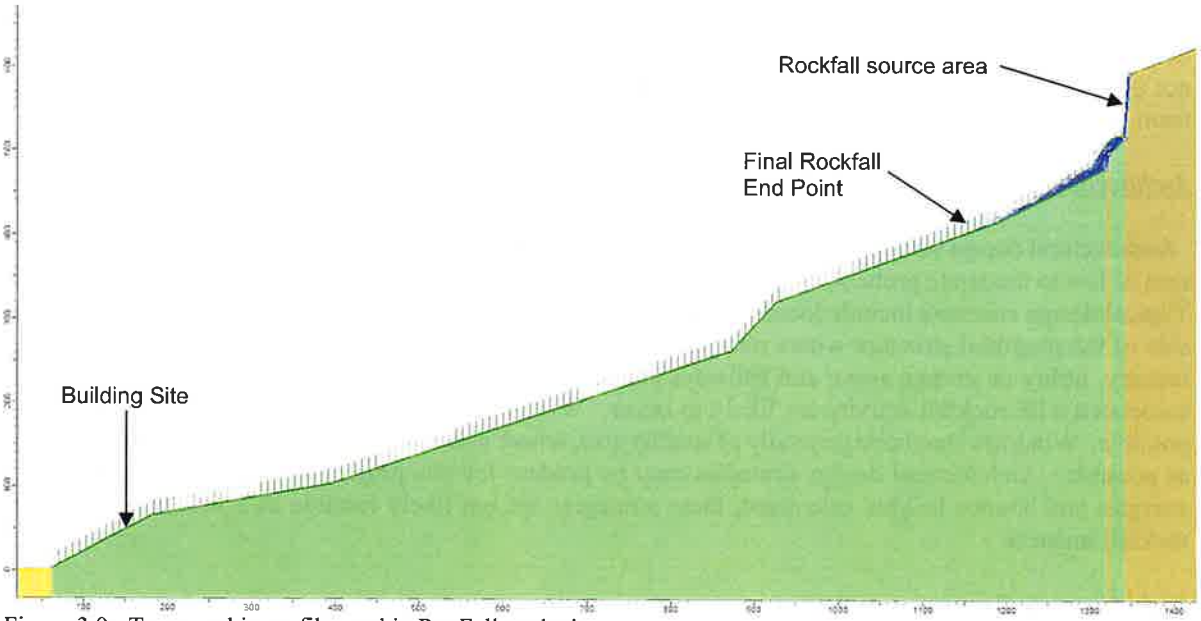


Figure 3.9: Topographic profile used in RocFall analysis.

Based on our site observations and analysis, rocks have the potential to move from the source area down the slope; however, no rocks were modeled to impact the building sites. This analysis is consistent with the observed conditions in the field. Based on our observations and analysis, it is our opinion that the site is not located within a rockfall hazard zone and no mitigation or additional analysis is considered warranted at this time below Source Area 2.

3.4 Expansive Soil and Rock

Uplift associated with swelling soils typically occurs only where the foundation support soils have been exposed to water; therefore, the uplift may impose shear stresses in the foundation system. The magnitude of the imposed shear stress is related to the swell pressure of the support soil, but is difficult to estimate. Properly designed and constructed foundation systems have the ability to distribute the forces associated with swelling of the support soil. We performed a Geotechnical Engineering Study concurrently with this geologic hazard assessment. Geotechnical considerations related to expansive soils can be found under our attached Geotechnical Engineering Study.

3.5 Mud Flows, Debris Flows, Debris Fans and Flood

Mud flows and debris flows initiate in drainage basins during significant precipitation when large concentrations of sediment become entrained and flow down-slope, often carrying boulders and organic debris within a matrix of clay and water. Debris fans are areas where debris flows or mud flows deposit material that spreads out in a fan-like shape at the mouth of channels where the smaller, steeper channels meet larger, low gradient stream valleys. Debris flows and mud flows contain larger concentrations of entrained solids than floods and move with high energy down steep slopes, thus they can be very destructive. Historically, debris flows are more threatening to property than to life. Debris flows differ from mud flows in that they contain larger material (debris) the size and weight of which is mostly limited by availability and channel size, not the

ability of the flow to transport. Because of this they tend to be more destructive and so debris flows will be the focus of this report.

Debris flows have return periods similar to floods, and often flooding occurs in conjunction with debris flow events. There are four conditions that must be present within a basin in order for it to be susceptible to debris flow (Mears, 1977).

- Sufficient loose sediment/debris
- Sufficient clay content of sediment
- Sufficient gradient of the channel and slopes
- Low ratio of available water to available debris

If all of these conditions are met, a precipitation event of sufficient intensity and/or duration can trigger a debris flow. Processes of damming and pooling can serve to increase the likelihood and/or magnitude of a debris flow event relative to the precipitation event that triggers it. Stream drainage basins that have been denuded of vegetation due to fire are particularly prone to debris flow activity. When present, these conditions combine to facilitate debris flows by increasing viscosity, strength, entrainment, and energy of captured precipitation. Otherwise, if the conditions are not met, the same precipitation event would instead trigger a flood.

Debris flows transport boulders and debris along the upper surfaces of flow (Mears, 1977). This means that the greatest impacts from debris flows occur along this upper surface elevation which can be several feet above ground level. Channelization of debris flows is not always a given, particularly at the debris fan below the mouth of the drainage. Debris flows can vacate a channel by a process known as avulsion, in which a previous debris deposit can block and divert subsequent flow. Debris flows also exhibit confined flow on unconfined surfaces due to shearing off of material from the margins leaving behind lateral levee deposits and thereby creating its own channel as it flows. These factors dictate that the entirety of a debris fan surface is susceptible to flow hazards that can exist several feet above the ground. Often development and proposed development that is affected by debris flow hazard is located on these debris fans.

Based on our site reconnaissance, and review of available literature, the southern portion of the site is located within a potential debris flow hazard area. The hazard area is generally located in the same drainage feature as the avalanche hazard risk area identified in Section 3.1 above which is not uncommon. Basic geologic hazard mapping is available from San Juan County and is provided below showing the approximate project extents in red.

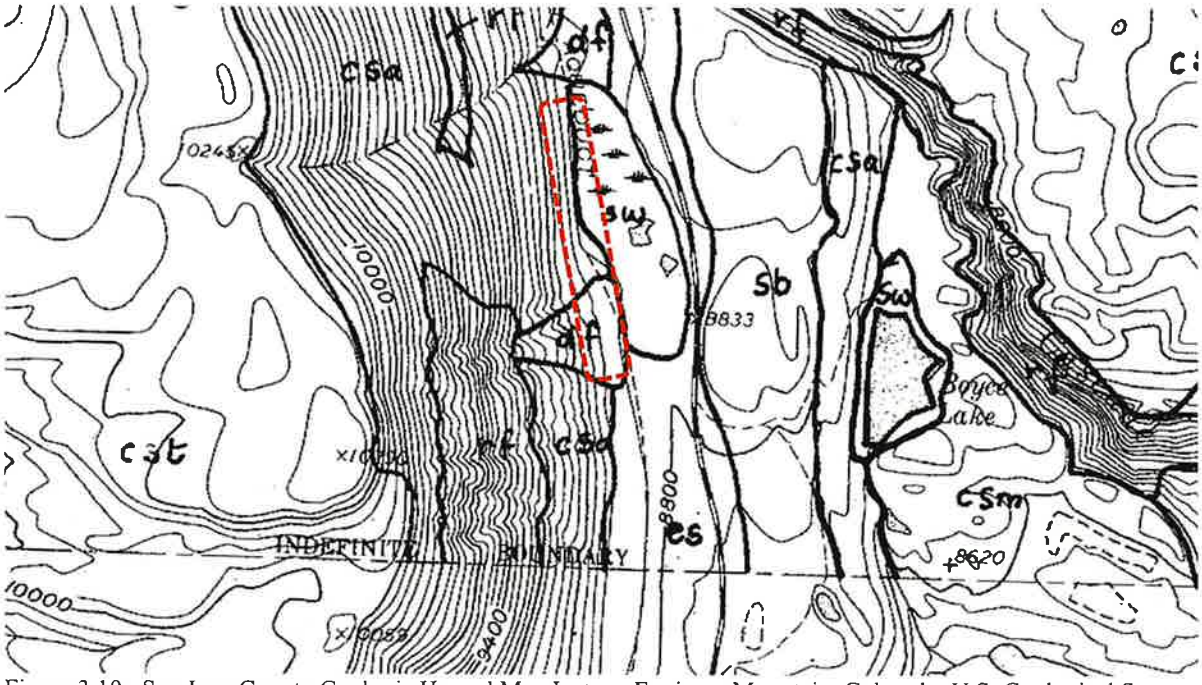


Figure 3.10: San Juan County Geologic Hazard Map Instaar, Engineer Mountain, Colorado, U.S. Geological Survey, June 2, 1976. Approximate project area outlined in red.

We performed a site reconnaissance of the potential debris flow area and outlined some approximate boundaries of the potential hazard zone. It must be noted that the schematic provided below should be considered appropriate and does not constitute a full engineering debris flow analysis including extent, deposition depths and flow velocities, which may be required for development in this area. There are engineering firms who specialize in these analyses.

We did not observe any recent debris flow activity within the hazard zone; however, the site represents a classic debris flow zone with debris fan. The hazard zone originates within a channel up slope, just north of another cliff band south of the site. The channel flows into a wide debris fan with hummocky terrain characterized by abundant boulders that are imbedded in the historic deposition area. A schematic showing the approximate extent of the debris fan is provided below. A similar number of units are potentially affected by the debris flow hazard as was affected by the avalanche hazard. Roughly the southern 10 units are affected. If development is planned in this area a debris flow specialist should be consulted.

Figure 3.11: Debris flow and fan hazard area outlined on the site schematic.

3.7 Radioactivity (Radon Issues)

Many soils and formational materials in western Colorado produce radon gas. Radon is a radioactive gas that forms from the natural breakdown of uranium in soil, rock and water. There are no known sources of radioactivity on the site. However, according to the San Juan Basin Public Health Department, the average radon level in La Plata County homes exceed 4pCi/L. The Environmental Protection Agency recommends radon mitigation in homes with levels higher than 4 pCi/L. Radon tends to accumulate in poorly ventilated areas below ground level; however, radon may accumulate inside any above- or below-grade construction. According to the EPA, elevated radon levels in buildings can be reduced by several methods, including pressurization of the building using a heating, ventilating and air-conditioning system, sealing of cracks in foundation walls and floor slabs which may allow entry of radon, and using active soil depressurization (ASD) systems. If radon gas is a concern in the completed structures, as specialist in radon mitigation should be consulted.

3.8 Seismic Effects

Seismic effects manifest in the form of earthquakes and volcanic activity. Seismic effects are evidenced in the geologic record by faulting and jointing of formational materials. Earthquakes experienced by humans in recent history have been monitored, recorded, and compiled in databases; locally the "Colorado Geological Survey's Colorado Late Cenozoic Fault, Fold and Earthquake Database". Earthquakes cause damage by ground shaking, surface rupture and other deformation, liquefaction, and Tsunamis. The orogenic history of the region (refer to Section 3) was accompanied with a multitude of seismic effects. These seismic effects have since largely subdued. Colorado is considered to be outside of the high risk area of the western US (Nuhfer et al., 1993). The modern seismic environment in the region is relatively benign, however not insignificant. Several formidable events have been recorded in the Dulce, New Mexico area south

of Pagosa Springs. Mitigation of seismic effects is typically included in the structural design and requirements are based on zoning.

The most recent earthquake activity in the region of the project site occurred along the Ridgway Fault on November 21, 2006 with a magnitude of 3.3 on the Richter scale and a Modified Mercalli Intensity of III. The Ridgway fault is defined by a 1,500 foot high fault-line scarp, but there is no observable surface rupture in middle to late Quaternary deposits indicating no recent activity that has manifested at the ground surface. Although this fault is considered to be potentially active, the recent activity on the fault, such as the 2006 event mentioned above as well as the November 19, 1989 event with a magnitude of 3.0, are low intensity, non-destructive

events. Other seismic activity in the region occurred in Ouray, CO on November 22, 1989 with a magnitude of 2.9 on the Richter scale, and in the Telluride vicinity in 1894. Based on newspaper accounts from this time it was rated as IV on the Modified Mercalli Scale. This information was obtained from the Colorado Geologic Survey, Earthquake and Late Cenozoic Map Server.

Although seismic activity has occurred in recent history, the low magnitude and lack of proximity to plate boundaries indicate that there is a low hazard related to seismicity at the project site. Due to the low seismic effect hazard at this site we do not feel that mitigation practices outside of that which is required by building codes is necessary.

3.9 Ground Subsidence

Ground subsidence is the process by which ground level rapidly drops. This drop is often related to an undermining of the material present at the surface, but may also occur from tectonic processes and hydrocompaction (a process related to increased water content of soils). Undermining of material is caused by solubility, karst topography, fluid withdrawal, and mining. Subsidence due to undermining is often termed a "sinkhole"; descriptive of the manifestation of the subsidence at the surface as the once overlying material collapses into a void beneath. Mined localities are particularly susceptible to ground subsidence because of the unnatural state in which they are fashioned (Coduto, 1999).

Mine sites in the region likely present the highest risk areas for ground subsidence. No known mine adits or subsidence prone materials exist at or under the project site. There is no evidence of ground subsidence at the project site. Very low strength wetland soils encountered at the site may also pose a risk of ground subsidence specifically in the vicinity of Borings TB-10, -11 and -12 in our Geotechnical Engineering Study as shown below.

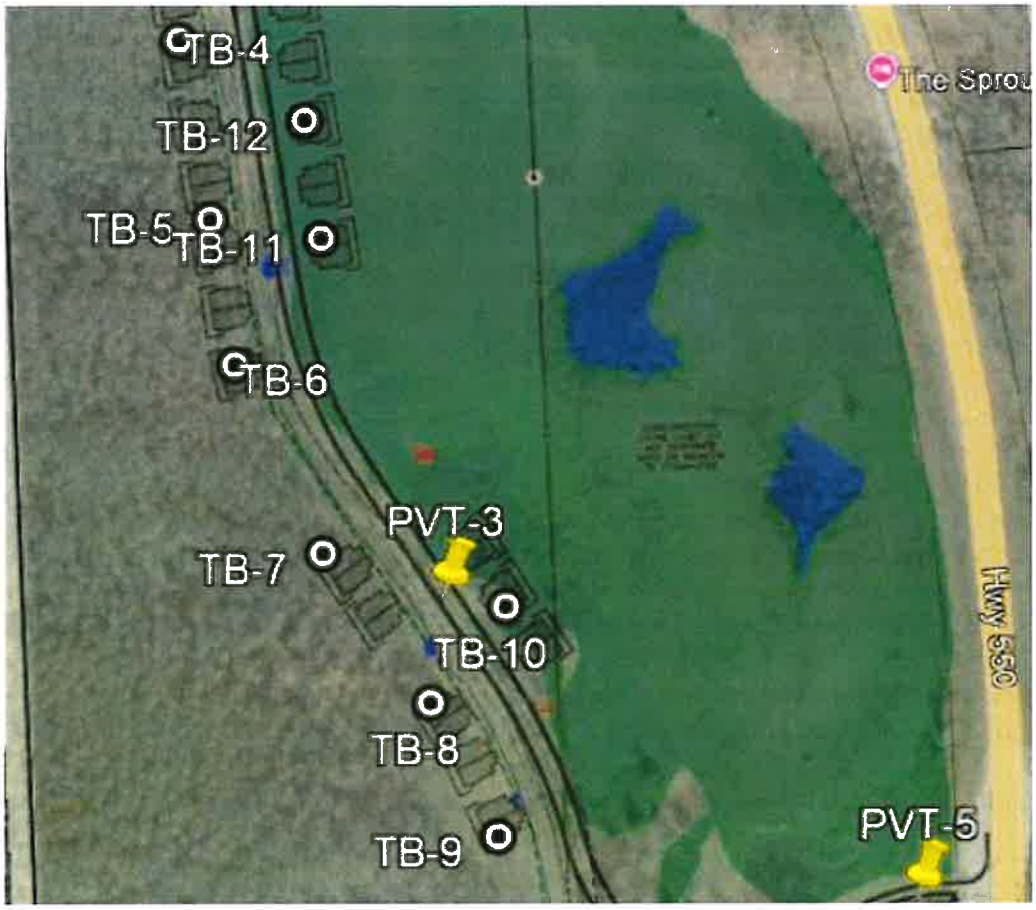


Figure 3.10: Locations of Exploratory Borings.

Structures located in wetland areas on the east side of the main access road have low strength soils which are prone to settlement under foundation loads. Therefore, as noted our earlier study, these structures should be supported with deep foundation systems supported by the underlying formational materials. Typical shallow foundation systems are not suitable for support in these areas.

4.0 CONCLUSIONS

Based on our site observations and analysis, geologic hazards should be considered a major driving factor as to the feasibility of the proposed development. As discussed in Section 3, there are multiple considerations regarding geologic hazards, specifically avalanche, rockfall, potentially unstable slopes, and debris flow characterization. Additional analysis will likely be required regarding avalanche and debris flow unless development can be avoided in the southern portion of the site.

5.0 LIMITATIONS

This study has been conducted based on the engineering geology standards of care in this area at the time this report was prepared. We make no warranty as to the analysis contained in this report,

either expressed or implied. The information presented in this report is based on our understanding of the proposed subdivision that was provided to us and on the data obtained from our field study.

The analysis presented above are intended to be used only for this project site and the proposed construction which was provided to us. The analysis presented above are not suitable for adjacent project sites, or for proposed construction that is different than that outlined for this study.

This report does not provide an environmental assessment nor does it provide environmental recommendations such as those relating to Radon or mold considerations. If recommendation relative to these or other environmental topics are needed and environmental specialist should be contacted.

The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. In addition, changes in applicable or appropriate standards can occur, whether they result from legislation or the broadening of knowledge. Therefore, the recommendations presented in this report should not be relied upon after a period of two years from the issue date without our review.

We are available to review and tailor our recommendations as the project progresses and additional information which may influence our recommendations becomes available.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully,
TRAUTNER GEOTECH

Jason A. Deem, P.G.
Principal Engineering Geologist

Reviewed by: TRH

ATTACHMENT

Geotechnical Engineering Study, Proposed Cascade Village Townhomes South Project

January 27, 2025

Project No. 58656GE

TRAUTNER GEOTECH LLC

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

GEOTECHNICAL ENGINEERING STUDY
PROPOSED
CASCADE VILLAGE TOWNHOMES SOUTH PROJECT
SAN JUAN COUNTY, COLORADO

January 27, 2025

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PROJECT NO. 58656GE

Table of Contents

1.0 REPORT INTRODUCTION

This report presents our geotechnical engineering recommendations for the proposed Cascade Village Townhomes South project located south of Cascade Village in San Juan County, Colorado. This report was requested by Ms. Lauren Davis, AIA, AICP, Reynolds, Ash, and Associates and was prepared in accordance with our proposal dated November 4, 2024, Proposal No. 24419P.

As outlined within our proposal for services for this project the client is responsible for appropriate distribution of this report to other design professionals and/or governmental agencies unless specific arrangements have been made with us for distribution.

Geotechnical engineering is a discipline which provides insight into natural conditions and site characteristics such as; subsurface soil and water conditions, soil strength, swell (expansion) potential, consolidation (settlement) potential, and often slope stability considerations. The information provided by the geotechnical engineer is utilized by many people including the project owner, architect or designer, structural engineer, civil engineer, the project builder and others. The information is used to help develop a design and subsequently implement construction strategies that are appropriate for the subsurface soil and water conditions, and slope stability considerations. We are available to discuss any aspect of this report with those who are unfamiliar with the recommendations, concepts, and techniques provided below.

This geotechnical engineering report is the beginning of a process involving the geotechnical engineering consultant on any project. It is imperative that the geotechnical engineer be consulted throughout the design and construction process to verify the implementation of the geotechnical engineering recommendations provided in this report. Often the design has not been started or has only been initiated at the time of the preparation of the geotechnical engineering study. Changes in the proposed design must be communicated to the geotechnical engineer so that we have the opportunity to tailor our recommendations as needed based on the proposed site development and structure design.

The following outline provides a synopsis of the various portions of this report;

- Sections 1.0 provides an introduction and an establishment of our scope of service.
- Sections 2.0 and 3.0 of this report present our geotechnical engineering field and laboratory studies
- Sections 4.0 and 5.0 presents our geotechnical engineering design parameters and recommendations which are based on our engineering analysis of the data obtained.
- Section 6.0 presents our limited slope stability study.
- Section 7.0 presents our subsurface foundation drain recommendations.
- Section 8.0 presents our concrete flatwork recommendations.
- Section 9.0 presents our pavement section thickness design.
- Section 10.0 provides a brief discussion of construction sequencing and strategies which may influence the geotechnical engineering characteristics of the site. Ancillary information such as some background information regarding soil corrosion and radon considerations is also presented as general reference.
- Section 11.0 provides our general construction monitoring and testing recommendations.
- Sections 12.0 and 13.0 provides our conclusions and limitations.

The data used to generate our recommendations are presented throughout this report and in the attached figures.

All recommendations provided within this report must be followed in order to achieve the intended performance of the foundation system and other components that are supported by the site soil.

1.1 Proposed Construction

We reviewed a conceptual site plan prepared by CHC Engineers, LLC, at the time of this report. We understand that the proposed project will consist of designing and constructing 33 duplex townhome structures that are supported by steel reinforced concrete foundation systems. We assume relatively light foundation loadings, typical of the proposed type of construction.

We anticipate grading for some of the structures along the western portion of the site will need to include up to 15-foot restrained excavation cuts, and the grading for the remaining structures are assumed to be relatively minor with cuts of approximately 5 to 6 feet below the adjacent ground surface.

As discussed in our proposal for services, the project will require temporary and/or permanent shoring. Trautner Geotech does not provide shoring design or observations of shoring systems. A shoring design engineer will need to be consulted to provide a stamped/sealed engineering design for the project shoring needs. The selected shoring design engineer will need to perform their own slope stability analyses based on the project excavations in conjunction with their shoring design. The selected shoring design engineer will need to take the appropriate steps to verify that the actual exposed subsurface conditions including soil strength characteristics, subsurface water characteristics and fracture patterns within the formational materials are consistent with their shoring design. It is imperative that the selected shoring design engineer and structural engineer work closely to coordinate the shoring design with the structural design of the project.

When final building locations, grading and loading information have been developed, we should be notified to re-evaluate the recommendations presented in this report.

2.0 FIELD STUDY

2.1 Site Description and Initial Geological Hazard Discussion

The project site is located at the south end of Cascade Village. The ground surface ranges from relatively steep slopes down to the east along the western portion of the property to relatively flat ground on the eastern portion of the site. The Tacoma Water Line running north to south bisects the property.

Due to the approximately 2 to 3 feet of snow on the ground at the time of our field study, we could not perform our geological hazard study for the site. We will need to wait until spring or early summer once the snow melts to further assess the geological hazards potentially impacting the site. Based on our initial observations, we feel the following geological hazards may exist;

- Debris flow/alluvial fan deposits in the southern portion of the site.
- Rockfall potential along portions of the western side of the site.
- Avalanche potential along portions of the western side of the site.
- Ground subsidence in wetland areas of the eastern side of the site.

Our geological hazard study will not provide detailed debris flow or avalanche hydrologic calculations and mapping. If required, we can provide recommendations for additional assessment.

2.2 Subsurface Soil and Water Conditions

We advanced sixteen test borings in the vicinity of the proposed structures and five shallow test borings in the vicinity of the proposed roadways. A schematic showing the approximate boring locations is provided below as Figure 1. The logs of the soils encountered in our test borings are presented in Appendix A.

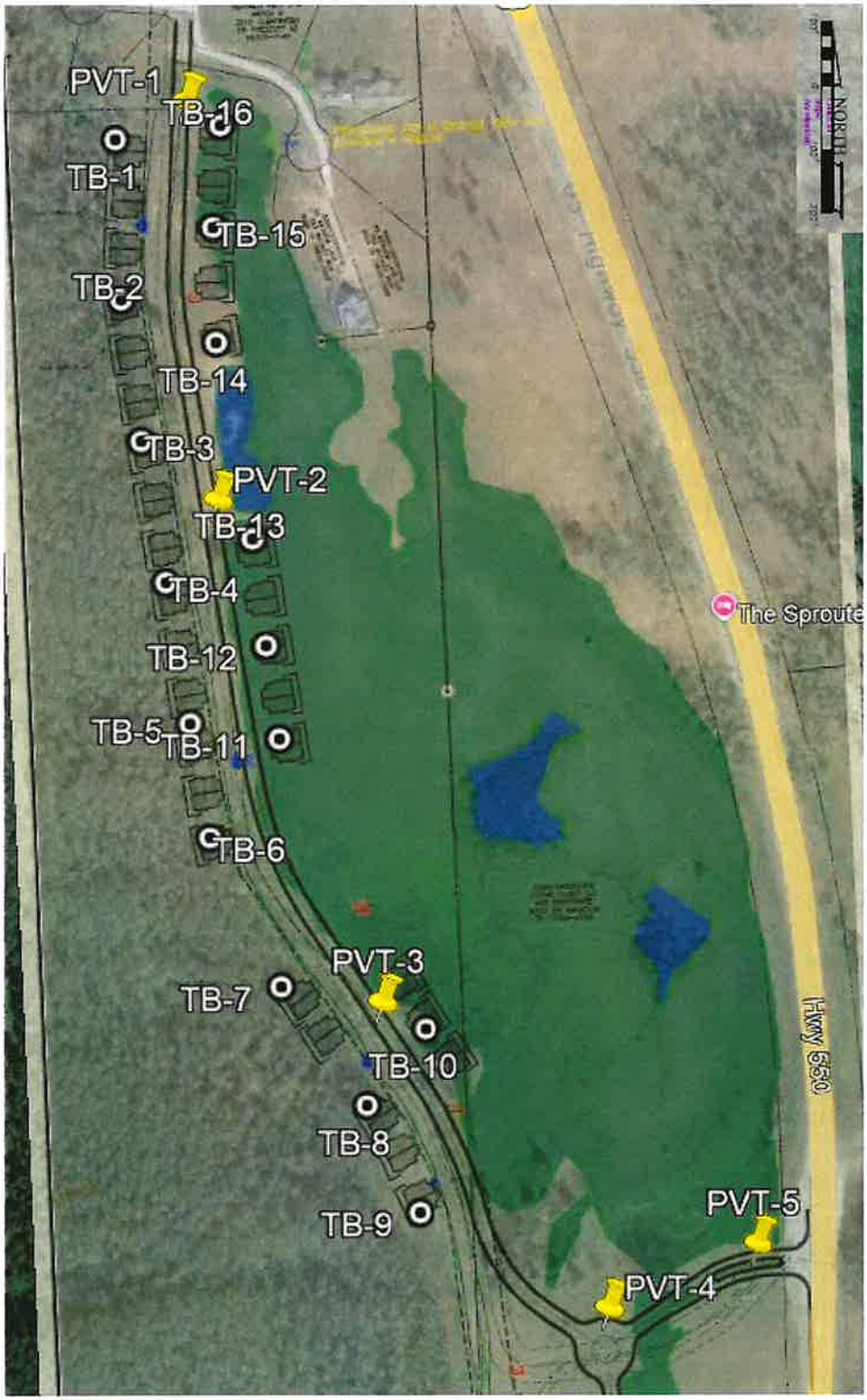


Figure 1: Locations of Exploratory Borings. Adapted from a site plan prepared by CHC Engineers LLC.

The schematic presented above was prepared using notes and field measurements obtained during our field exploration and is intended to show the approximate test boring locations for reference purposes only.

The subsurface conditions encountered in our test borings consisted of various combinations of silty, sandy, lean clay with organics, (CL), clayey gravel and cobbles with boulders (GC), and formational material encountered at various depths. Formational shale, sandstone or limestone was encountered at depths that ranged from 6.5 to 32.5 feet. Practical auger refusal or termination of the test borings occurred within 2 to 3 feet into the formational material.

We encountered high organic content soils/peat to depths of 21.5 feet in TB-11, 8 feet in TB-12, and 4.5 feet in TB-13. Based on the laboratory consolidation, we suspect this area will experience high consolidation under any new loading from either structures or man-placed fill.

We encountered free subsurface water in some of our test borings at the time of the advancement. The ground water depths are tabulated below.

Test Boring Number	Ground Water Depth (feet)
TB-8	16
TB-9	18
TB-10	10
TB-11	2
TB-12	2
TB-13	2
TB-16	4

We suspect that the subsurface water elevation and soil moisture conditions will be influenced by snow melt and/or precipitation and local irrigation.

The logs of the subsurface soil conditions encountered in our test borings are presented in Appendix A. The logs present our interpretation of the subsurface conditions encountered in the test borings at the time of our field work. Subsurface soil and water conditions are often variable across relatively short distances. It is likely that variable subsurface soil and water conditions will be encountered during construction. Laboratory soil classifications of samples obtained may differ from field classifications.

3.0 LABORATORY STUDY

The laboratory study included tests to estimate the strength, swell and consolidation potential of the soils tested. We performed the following tests on select samples obtained from the test borings. The laboratory test results are provided in Appendix B.

- Moisture Content and Dry Density
- Sieve Analysis (Gradation)
- Atterberg Limits, Liquid Limit, Plastic Limit and Plasticity Index
- Swell Consolidation Tests
- Direct Shear Strength Test

- Moisture Content Dry Density Relationship Test
- California Bearing Ratio Test

A synopsis of some of our laboratory data for some of the samples tested is tabulated below.

Sample Designation	Percent Passing #200 Sieve	Atterberg Limits LL/PI	Moisture Content (percent)	Dry Density (PCF)	Measured Swell Pressure (PSF)	Swell or Consolidation Potential	Phi (°)	Cohesion (PSF)
TB-1 @ 3'	-	-	8.2	112.7	4,000*	6.0 (% under 100 psf load)	-	-
TB-2 @ 2'	-	-	12.9	86.8	3,370*	6.0 (% under 100 psf load)	-	-
TB-2 @ 5-9'	30.8	23/10	6.1	-	-	-	-	-
TB-3 @ 3.5'	-	-	10.0	112.8	5,000*	7.6 (% under 100 psf load)	-	-
TB-4 @ 5-9'	-	-	9.2	-	-	-	30	100
TB-5 @ 3.5-8.5'	31.2	22/8	6.3	-	-	-	-	-
TB-6 @ 8.5'	-	-	6.4	140.7	0	-0.8 (% under 500 psf load)	-	-
TB-7 @ 2'	-	-	12.7	125.7	350	0.3 (% under 100 psf load)	-	-
TB-8 @ 3.5'	-	-	5.4	128.6	720	1.2 (% under 100 psf load)	-	-
TB-8 @ 14-19'	-	-	8.3	-	-	-	30	85
TB-9 @ 3.5'	-	-	7.8	119.8	1,860*	0.8 (% under 500 psf load)	-	-
TB-9 @ 5-9'	46.5	32/13	15.8	-	-	-	-	-
TB-10 @ 3.5'	-	-	10.7	111.0	360	1.1 (% under 100 psf load)	-	-
TB-10 @ 4.5-8.5'	40.7	38/16	26.0	-	-	-	-	-
TB-11 @ 4'	-	-	93**	7.0**	0	-0.1** (% under 100 psf load)	-	-
TB-14 @ 3.5'	-	-	5.3	127.0	270	0.2 (% under 100 psf load)	-	-
TB-15 @ 0-3.5'	63.4	42/22	33.7	-	-	-	-	-
TB-15 @ 3.5'	-	-	23.4	103.2	0	-0.2 (% under 100 psf load)	-	-
TB-16 @ 3.5'	-	-	26.0	99.3	0	-0.1 (% under 100 psf load)		

Bulk from Test Borings 0-4'	39	40/21	11.8	-	-	-	-	-

*NOTES:

1. We determine the swell pressure as measured in our laboratory using the graphically estimated load-back swell pressure method.
2. Negative Swell-Consolidation Potential indicates compression under conditions of loading and wetting.
3. * = Swell-Consolidation test performed on remolded sample due to rock content. Test results should be considered an estimate only of the swell or consolidation potential at the density and moisture content indicated.
4. ** = High Moisture Content and Low Dry Density due to the High Organic Content Soils/Peat. Total consolidation of the sample in 50+% range.

Direct Shear Strength Tests (Residual Strength Tests): We performed two residual strength direct shear strength tests on minus #10 sieve screen size particles obtained from borings TB-4 at 5-9' and TB-8 at 14-19'. We obtained a range of angle of internal friction (phi) value of 30 degrees and a cohesion of about 85 to 100 pounds per square foot.

4.0 FOUNDATION RECOMMENDATIONS

There are two general types of foundation system concepts, "deep" and "shallow", with the designation being based on the depth of support of the system. We have provided a discussion of viable foundation system concepts for this project below. The choice of the appropriate foundation system for the project is best made by the project structural engineer or project architect. We should be contacted once the design choice has been made to provide consultation regarding implementation of our design parameters.

Base on the subsurface soil conditions encountered, we feel a shallow foundation system will be a viable option for the proposed townhome units located along the western side of the project site in the areas of TB-1 through TB-9 and in the northeastern portion of the site near TB-14 through TB-16 and possibly near TB-13. Due to the high organic content in the soils, high consolidation potential, and shallow ground water near TB-10 through TB-12, the soils in this area are not suitable for shallow foundation systems. We do not recommend structures be located in this area if possible due to the large amount of ariel settlement that will tend to occur under any additional loading from either structures or man placed fill. If structures will be located in this area, the structures will need to be completely supported, including floors, by a deep foundation system.

Preloading of the ground surface and a settlement monitoring program may be necessary prior to construction to limit the amount of post construction ariel settlement. Conceptually, the preloading program would likely consist of placement of a series of steel plates at the base of a controlled fill. The plates would have steel rods that extend to the ground surface as survey monuments. Settlement of the fill mass could then be monitored by a survey program to determine amount of settlement and when settlement ceases.

4.1 Shallow Foundation System Concepts

Subsurface data indicate that clayey gravel with sand and cobbles will likely be the predominant soil type encountered beneath shallow foundations. With the exception of the areas around TB-10 though TB-12, the anticipated soils at the foundation level are considered suitable for shallow foundation support. Deep foundation system design concepts which include isolation of shallow components including floor systems from shallow soils are less likely to experience post-construction movement due to volume changes in the site soil.

There are numerous types of shallow foundation systems and variants of each type. Shallow foundation system concepts discussed below include:

- Spread Footings (continuous) and stem walls

The integrity and long-term performance of each type of system is influenced by the quality of workmanship which is implemented during construction. It is imperative that all excavation and fill placement operations be conducted by qualified personnel using appropriate equipment and techniques to provide suitable support conditions for the foundation system.

4.1.1 Spread Footings

A spread footing foundation system consists of a footing which dissipates, or spreads, the loads imposed from the stem wall (or beam) from the structure above. The soil samples tested from the anticipated support elevations in our test borings had a measured swell pressure of about 0 to 5,000 pounds per square foot and a swell potential magnitude of about -0.8 to 7.6 percent under a 100 or 500 pound per square foot surcharge load. A majority of the samples had to be remolded with only material passing the #10 screen due to the rock content of the site soil; therefore, the overall swell potential of the will likely be lower than the measures swell potential on the remolded samples. The owner must understand that regardless of the expansive soil mitigation design concepts presented below, if the swell pressure generated by the expansive soil on this site exceeds the minimum dead load which is imposed by the spread footing or other structural components, and the expansive site soils become wetted, uplift of the foundation system and other structural components is highly likely. Drilled piers, or other deep foundation system design will provide the least likelihood of post construction movement associated with soil volume changes.

The actual magnitude of the potential uplift of the foundation system depends on the volume (or depth) of the support soils which become moistened after construction. It is difficult to predict the amount of soil which will become moistened after construction, some theories suggest that with time the entire soil mantle may become moistened. Based on our experience in the area we feel that it is possible for at least 4 to 5 feet of soil below the footings to be influenced by subsurface moisture. Based on the assumed depth of moistened soil, laboratory test data, and the soil characteristics we estimate that the magnitude of the potential uplift associated with swelling of the expansive support soil materials may be in the range of about 1 to 1½ inches. If the entire soil mantle becomes moistened the total potential uplift may be considerably higher. The project structural engineer or architect should determine if the potential uplift is tolerable for the proposed structure on this project site.

Uplift associated with swelling soils occurs only where the foundation support soils have been exposed to water; therefore, the uplift may impose shear stresses in the foundation system. The magnitude of the imposed shear stress is related to the swell pressure of the support soil, but is difficult to estimate. Properly designed and constructed continuous spread footings with stem walls (or beams) have the ability to distribute the forces associated with swelling of the support soil. The rigidity of the system helps reduce differential movement and associated damage to the overlying structure. Swelling of the soil supporting isolated pad footings will result in direct uplift of the columns and structural components supported by the columns. Damage to the structure due to this type of movement can be severe. We recommend that isolated pad footings be avoided and

that the foundation system be designed as rigid as is reasonably possible.

High foundation dead load, careful preparation of the support soils, placement of granular compacted structural fill, careful placement and compaction of stem wall backfill and positive surface drainage adjacent to the foundation system all help reduce the influence of swelling soils on the performance of the spread footing foundation system.

We recommend that the footings be designed with a high dead load and supported by a layer of moisture conditioned and compacted natural soil which is overlain by a layer of compacted structural fill material. This concept is outlined below:

- The foundation excavation should be excavated to 18 inches below the proposed footing support elevation.
- The natural soils exposed in the bottom of the excavation should be scarified to a depth of about 6 to 8 inches
- The scarified soil should be thoroughly moisture conditioned to about 2 percent above the laboratory determined optimum moisture content and then compacted.
- After completion of the compaction of the moisture conditioned natural soil an 18-inch-thick layer of granular aggregate base course structural fill material should be placed, moisture conditioned and compacted.
- The moisture conditioned natural soil material, and the granular soils should be compacted as discussed under the Compaction Recommendations portion of this report below.
- In the absence of structural engineering design and for general geotechnical engineering purposes, we recommend the stem walls be designed to act as beams and reinforced with continuous steel reinforcement, 4 reinforcement bars, 2 top and 2 bottom. Taller walls may require additional reinforcement bar.
- The structural engineer should be contacted to provide the appropriate reinforcement bar diameter and locations.

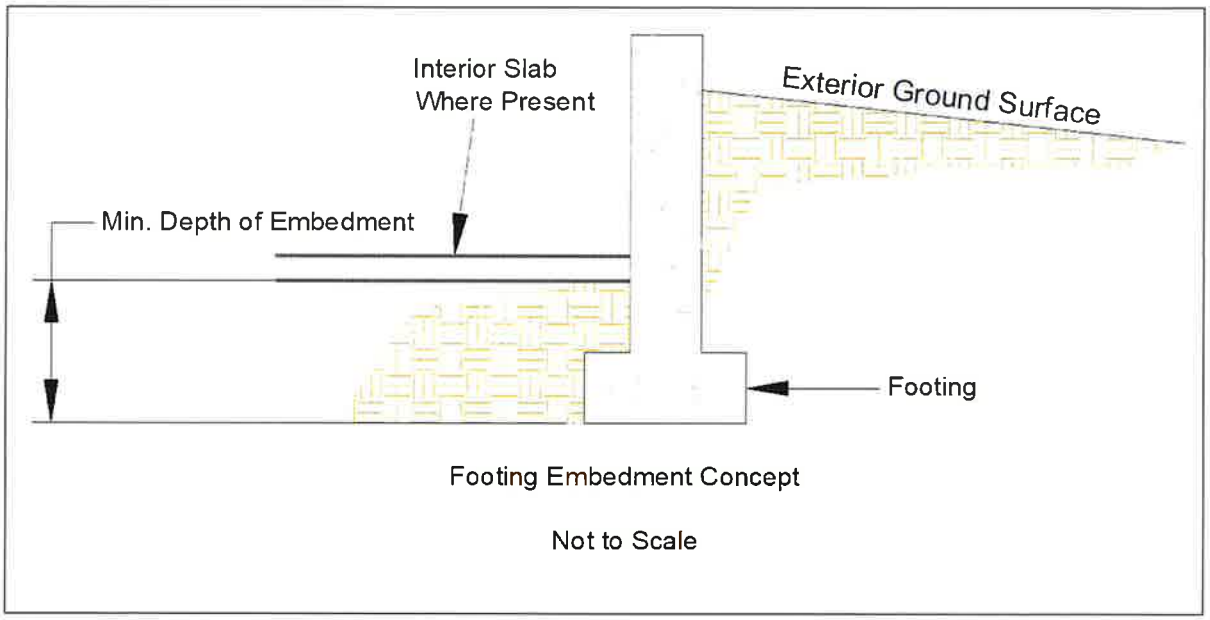
We recommend that particular attention and detail be given to the following aspects of the project construction for this lot;

- A subsurface drain system should be installed adjacent to the residential structure foundation system. Concepts for a subsurface drain system are presented in Section 6.0 of this report.
- The landscaping drainage concept provided in Section 8.5 below is imperative for this site to limit the moisture available to the foundation bearing soils.
- The exterior foundation backfill must be well compacted and moisture conditioned to above optimum moisture content. Recommendations for exterior foundation backfill are provided later in this report.

We recommend below-grade construction, such as retaining walls, crawlspace and basement areas, be protected from wetting and hydrostatic pressure buildup by an underdrain and wall drain system. Topographic conditions on the site may influence the ability to install a subsurface drain system which promotes water flow away from the foundation system. The subsurface drain system concept is discussed under the Subsurface Drain System section of this report below.

The footing embedment is a relatively critical, yet often overlooked, aspect of foundation construction. The embedment helps develop the soil bearing capacity, increases resistance of the footing to lateral movement and decreases the potential for rapid moisture changes in the footing support soils, particularly in crawl space areas. Interior footing embedment reduces the exposure of the crawl space support soils to dry crawl space air. Reduction in drying of the support soil helps reduce downward movement of interior footings due to soil shrinkage.

All footings should have a minimum depth of embedment of at least one 1 foot. The embedment concept is shown below.



Footing Embedment Concept

Not to Scale

Spread footings located away from sloped areas may be designed using the allowable gross bearing capacity information tabulated below.

Minimum Depth of Embedment (Feet)	Continuous Footing Design Capacity (psf)	Isolated Footing Design Capacity (psf)
1	1,500	Not Recommended
2	1,700	
3	1,900	

The bearing capacity values tabulated above may be increased by 20 percent for transient conditions associated with wind and seismic loads. Snow loads are not transient loads.

The bearing capacity values above were based on footing placed directly on the natural soils and on a continuous spread footing width of 1.5 feet. Larger footings and/or footings placed on a blanket of compacted structural fill will have a higher design soil bearing capacity. Development of the final footing design width is usually an iterative process based on evaluation of design pressures, footing widths and the thickness of compacted structural fill beneath the footings. We

should be contacted as the design process continues to re-evaluate the design capacities above based on the actual proposed footing geometry.

Footings located on, or near slopes may need to have an additional embedment to establish a suitable footing/slope stability condition for the system. We should be contacted to provide additional information for footings located on, or near, sloped areas.

Due to the relatively high measured swell pressure of the soils tested we recommend isolated footings for support of interior column loads be avoided. A more rigid structure consisting of interior continuous footings and grade beams will help reduce the potential for damage due to swelling soils.

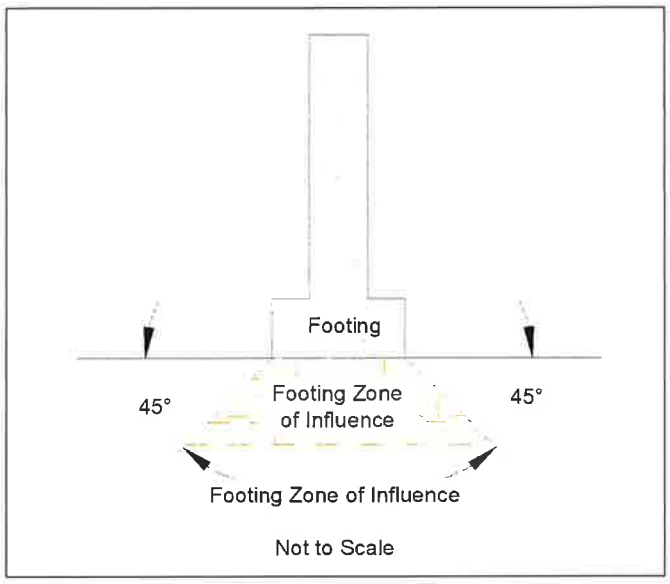
The settlement of the spread footing foundation system will be influenced by the footing size and the imposed loads. We estimated the total post construction settlement of the footings based on our laboratory consolidation data, the type and size of the footing. Our analysis below assumed that the highest bearing capacity value tabulated above was used in the design of the footings. The amount of post construction settlement may be reduced by placing the footings on a blanket of compacted structural fill material.

The estimated settlement for continuous footing with a nominal width of about 1½ to 2½ feet are tabulated below.

Thickness of Compacted Structural Fill (feet)	Estimated Settlement (inches)
0	½ - ¾
B/2	¼ - ½
B	About ¼

B is the footing width

The compacted structural fill should be placed and compacted as discussed in the Construction Considerations, "Fill Placement Recommendations" section of this report, below. The zone of influence of the footing (at elevations close to the bottom of the footing) is often approximated as being between two lines subtended at 45 degree angles from each bottom corner of the footing. The compacted structural fill should extend beyond the zone of influence of the footing as shown in the sketch below.



A general and simple rule to apply to the geometry of the compacted structural fill blanket is that it should extend beyond each edge of the footing a distance which is equal to the fill thickness.

We estimate that the footings designed and constructed above will have a total post construction settlement of about 1 inch or less.

All footings should be support at an elevation deeper than the maximum depth of frost penetration for the area. This recommendation includes exterior isolated footings and column supports. Please contact the local building department for specific frost depth requirements.

The post construction differential settlement may be reduced by designing footings that will apply relatively uniform loads on the support soils. Concentrated loads should be supported by footings that have been designed to impose similar loads as those imposed by adjacent footings.

Under no circumstances should any footing be supported by more than 3 feet of compacted structural fill material unless we are contacted to review the specific conditions supporting these footing locations.

The design concepts and parameters presented above are based on the soil conditions encountered in our test borings. We should be contacted during the initial phases of the foundation excavation at the site to assess the soil support conditions and to verify our recommendations

4.1.2 General Shallow Foundation Considerations

Some movement and settlement of any shallow foundation system will occur after construction. Movement associated with swelling soils also occurs occasionally. Utility line connections through and foundation or structural component should be appropriately sleeved to reduce the potential for damage to the utility line. Flexible utility line connections will further reduce the potential for damage associated with movement of the structure.

4.2 Deep Foundation System Concepts

Deep foundation system design concepts will provide the least likelihood of post-construction movement associated with volume changes within the soil. Due to the high consolidation potential, we recommend a deep foundation system for the structures located near TB-10 through TB-12. Deep Foundation System Concepts Discussed below include:

- Driven Piles

Cased micropiles or helical piers may also be alternatives for deep foundation support; however, due to the subsurface conditions additional field testing should be completed to determine if these options are feasible. This would likely include installation of a series of test piles/piers. We are available to discuss these options in further detail and aid in coordinating additional field testing.

Regardless of the type of deep foundation system concept utilized, the system design must include provisions to isolate and structurally support and building components, including flatwork, that may be influenced by volume changes within the site soil. Grade beams are utilized with most deep foundation system design concepts to facilitate isolation and structural support of various building elements. Grade beams, and any other horizontal component of a deep foundation system must be isolated from the support soil with void forms, or similar concept.

The elevation of the existing ground surface at our test boring locations at the time the borings were advanced should be established as part of the design process for deep foundation systems for this project. It is critical that the depths to various strata delineated in our test borings logs can be correlated to final project elevations.

4.2.1 Driven Piles

We encountered formational shale, sandstone or limestone at depths that ranged from 6.5 to 32.5 feet in our test borings. We encountered auger refusal approximately two to three feet into the formational prior to auger refusal or termination.

Driven piles that are end/tip bearing in the competent formational materials that underlie the project site may be used to support the proposed bridge abutments and potential associated wingwall structures. Based on the subsurface conditions encountered in our test borings, obtaining a tip bearing condition on the hard formational material should be readily obtained for H-section piles. We anticipate that about 3 to 5 feet of penetration into the formational shale materials may be obtained for H-section piles.

There are numerous methods used to calculate the bearing capacity of driven piles. We typically prefer to establish the bearing capacity of the driven piles based on dynamic formulae which incorporates the rated energy of the installation hammer and the size, weight, depth of the driven pile, and the soil characteristics. We have provided depth and general pile load carrying capacity estimates below, but the actual load capacity of the driven piles must be determined once the pile type (and depth) and energy of the hammer to be used for installation have been determined.

H-piles typically can be driven on sites with difficult installation conditions which may be caused

by the presence of large cobbles and boulders. We recommend that H-piles be fitted with reinforcement driving tips to reduce the potential for damage to the pile tip during installation.

We encountered formational material in our test borings at a depth of about 33 feet below the ground surface. We recommend that the H-Piles be driven to an end-bearing support condition. For budgeting and planning purposes we suggest that you consider HP10x or HP12 x H-piles driven to a depth of about 20 to 35 feet below the ground surface. An allowable design capacity of 25 kips may be used if a pile hammer with a minimum rated energy of 20,000 foot pounds per stroke is used for pile installation. The actual depth of penetration of the H-piles into the formational material to establish the desired set criteria and associated bearing capacity will need to be determined during the initial phase of the installation operation.

Any tendency for pile deviation due to obstructions should be corrected immediately during the pile installations process. Piles that are installed out of plumb will have a lower support potential than the estimates provided above. Companion piles may need to be installed adjacent to piles which were installed out-of-plumb. If pile groups are planned, the minimum center to center spacing between the individual piles should be 30 inches or 2.5 times the pile diameter, whichever is greater.

We are available to provide a driving record for the installed piles and to provide geotechnical engineering consultation during the pile driving operations.

We anticipate that refusal will occur within 3 to 5 feet once the tip of the pile encounters the formational materials. We anticipate that damage to the pile could easily and rapidly occur if the potential energy of the hammer is greater than the yield stress of the selected pile section. The piles should be driven with high strength tip protection.

We recommend that the piles be driven with an appropriately sized hammer and/or adjustable stroke/energy hammer to avoid damage to the pile. When the tip elevation seats against the formational shale materials, then a set-criteria of 5 blows per 1/2 inch of pile penetration may be used to verify the set of the pile. Again, the energy output of the pile driving equipment must not exceed the structural capacity of the selected pile. We recommend that at least one pile per bridge abutment be monitored with signal matching pile driving analyzer (PDA) equipment, to verify that the needed capacity of the pile is obtained, and that the pile is not damaged at the set criteria discussed above (based on an allowable hammer energy for the selected pile).

We anticipate that penetration of the piles into the formational materials may be necessary to resolve lateral forces that act on the piles. Battered piles may be utilized to resolve lateral forces for the project. As discussed above, we anticipate that embedment of the piles into the formational materials will be relatively limited, and the penetration that does occur may cause fracturing/disturbance to the formational materials surrounding the pile. Achieving embedment of the piles into the formational materials may require predrilling the formational materials to the desired depth of pile embedment.

4.2.2 Grade Beams

Grade beams are utilized in a pier and grade beam foundation system to distribute the structure

loads to each of the piers. The grade beam reinforcement and associated span distance is developed by the project structural engineer. The structural considerations of the grade beam in association with an assessment of the structure being supported by them will, in part determine the spacing between each of the deep foundation components, such as drilled piers (or drilled shafts), helical piers, micropiles and driven piles.

5.0 RETAINING STRUCTURES

We understand that laterally loaded walls will be constructed as part of this site development. Lateral loads will be imposed on the retaining structures by the adjacent soils and, in some cases, additional surcharge loads will be imposed on the retained soils from vehicles or adjacent structures. The loads imposed by the soil are commonly referred to as lateral earth pressures. The magnitude of the lateral earth pressure forces is partially dependent on the soil strength characteristics, the geometry of the ground surface adjacent to the retaining structure, the subsurface water conditions and on surcharge loads.

Due to the expansive nature of the site soils, we do not recommend that the natural soils be used for retaining wall backfill. The retaining walls may be designed using the equivalent fluid pressure values for imported granular soil that are tabulated below.

Type of Lateral Earth Pressure	Level Imported Granular Soil Backfill (pounds per cubic foot/foot)
Active	35
At-rest	55
Passive	460
Allowable Coefficient of Friction	0.45

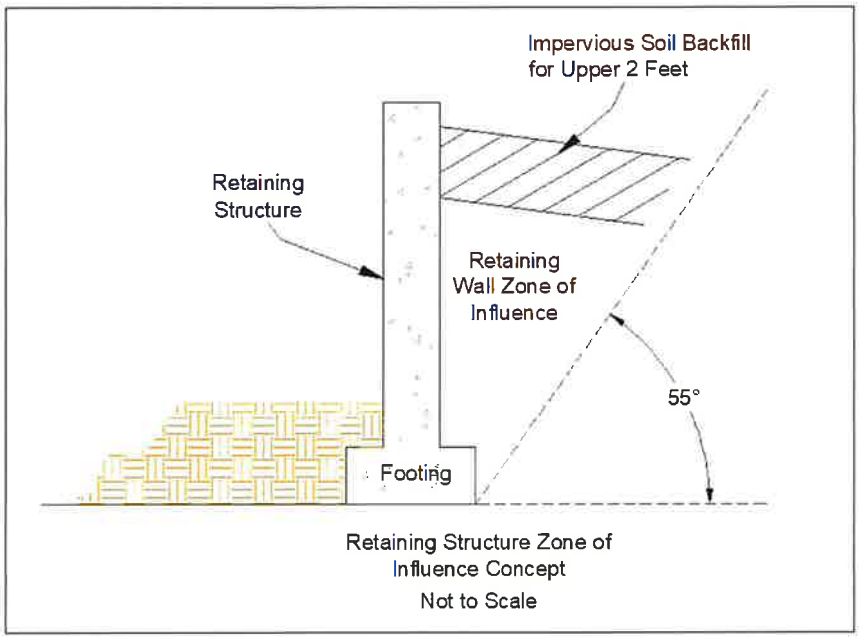
Unit Weight on Imported Gravel = 135.0 pcf ; Angle of Internal Friction = 35 degrees

The granular soil that is used for the retaining wall backfill may be permeable and may allow water migration to the foundation support soils. There are several options available to help reduce water migration to the foundation soils, two of which are discussed here. An impervious geotextile layer and shallow drain system may be incorporated into the backfill, as discussed in Section 9.5, Landscaping Considerations, below. A second option is to place a geotextile filter material on top of the granular soils and above that place about 1½ to 2 feet of moisture conditioned and compacted site clay soils. It should be noted that if the site clay soils are used volume changes may occur which will influence the performance of overlying concrete flatwork or structural components.

The values tabulated above are for well drained backfill soils. The values provided above do not include any forces due to adjacent surcharge loads or sloped soils. If the backfill soils become saturated the imposed lateral earth pressures will be significantly higher than those tabulated above.

The granular imported soil backfill values tabulated above are appropriate for material with an angle of internal friction of 35 degrees, or greater. The granular backfill must be placed within the retaining structure zone of influence as shown below in order for the lateral earth pressure values

tabulated above for the granular material to be appropriate.



If an open graded, permeable, granular backfill is chosen it should not extend to the ground surface. Some granular soils allow ready water migration which may result in increased water access to the foundation soils. The upper few feet of the backfill should be constructed using an impervious soil such as silty-clay and clay soils from the project site, if these soils are available. The 55 degree angle shown in the figure above is approximately correct for most clay soils. The angle is defined by 45 + (φ/2) where "φ" if the angle of internal friction of the soil.

Backfill should not be placed and compacted behind the retaining structure unless approved by the project structural engineer. Backfill placed prior to construction of all appropriate structural members such as floors, or prior to appropriate curing of the retaining wall concrete, may result in severe damage and/or failure of the retaining structure.

6.0 LIMITED SLOPE STABILITY ANALYSIS

This section of the report provides limited, conceptual stability modeling based on our understanding of the proposed excavation cuts that will be required for construction. We performed a limited slope stability analysis of the slope geometry cross section. We obtained measurements of the existing slopes during our field study and utilized cross sections produced by CHC Engineers LLC. The specific design of slope stabilization and shoring structures for the project is beyond our scope of services. The following analyses and concepts presented below are limited in nature and are intended to provide general, conceptual stabilization techniques that are applicable for the subject project. The specific design of the retaining and excavation shorting structures should be performed by a retaining/shoring system specialist. There are firms local to the area that specialize in the design and construction of these systems. We are available to assist you in selecting competent design professionals for the project.

Due to auger refusal on the formational material and/or boulders, we do not know the competency or characteristics of the formational material. Based on and as shown in our analysis below, the upper soil mantel will need to be stabilized, while the lower sandstone and shale layers may only need to incorporate face netting with shallow rock anchors to allow for a safe excavation and to prevent loose rock from scaling away from the rock face during construction. Due to the variability of the subsurface soil, water, and formational material conditions, we recommend a site-specific geotechnical engineering slope stability study be conducted for the structures planned in this portion of proposed development area.

The retaining wall excavations will likely need to be constructed in a top-down excavation strategy utilizing placement of soil nail anchors with steel reinforced shotcrete facing due to the steep nature and extent of the slope surfaces above the proposed rear structure retaining wall, and the potential for rock fall hazard from the excavation itself. It may be possible to utilize a heavy gauge mesh material such as Tecco Mesh for the north and south sides of the excavation that are oriented parallel with the slope fall line as these excavations are less critical with regards to slope stability.

We anticipate that seasonal subsurface water may be present within the slope mass during periods of snow melt or periods of heavy precipitation and included a water table in our analysis. Adequate surface drainage must be constructed in conjunction with the cut/fills to prevent the accumulation of water and hydrostatic pressures.

Our study included a parametric study to assess the sensitivity of the results of the analysis to the changes in the various parameters that were used in our analysis. Our study included observations of the topography and geomorphology of the project site and adjacent areas.

The geometry of the slope cross section that we analyzed is based on site measurements obtained during our field study and provided by CHC Engineers LLC.

There are numerous methods and techniques available for slope stability analysis. Most methods include an evaluation of;

- the strength of the soil materials within the slope,
- anisotropies within the slope materials, such as formational material bedding planes, and anomalous soil contacts,
- the subsurface water and soil moisture conditions, and,
- the pre-construction and post-construction geometry of the slope areas where development and construction are proposed.

The data developed during the analysis is condensed and used to estimate the forces within a soil mass that tend to drive movement and the forces that tend to resist movement. The ratio of resisting forces to driving forces is often referred to as the "theoretical slope factor of safety" (FOS) which is a somewhat misleading term to describe this ratio. The ratio is not a true factor of safety, but is a useful mathematical characterization of the forces within a soil mass and the associated stability condition of the slope being analyzed.

A ratio of less than 1.0 indicates that the driving forces within a soil mass are greater than the resisting forces, therefore movement of the slope is occurring. A ratio of 1.0 indicates that the driving forces are equal to the resisting forces, which indicates that movement within the soil can be triggered by only slight increases in the driving forces or slight reductions in the resisting forces. A ratio of greater than 1.0 is an indication that the driving forces are less than the resisting forces and the slope is not moving. Since there are numerous variables and incongruities within most soil masses, a slope is generally not considered as stable unless the ratio is about 1.5 or greater. Generally, slopes or slope/structure combinations with a theoretical factor of safety that is greater than 1.5 are considered appropriate for sites where structures are planned. A factor of safety greater than about 1.3 is often considered as being stable for roadways and other inhabitable structures. A ratio of 1.2 is often considered suitable for temporary excavation stability.

We used Slide® slope stability software to evaluate the stability of computer modeled slope cross sections of select portions of this site. We primarily used the Modified Bishop's Method of slices to analyze the computer modeled slopes. The Modified Bishop's Method of Slices evaluates the resisting and driving forces within slices of the sloped soil mass along a theoretical semi-circular failure plane. The semicircular failure plane with the lowest theoretical factor of safety is labeled the critical circle.

We have utilized two basic soil/rock horizon in our analyses below. The green-colored region represents the formational material. We estimated an angle of internal friction (phi) of 35 degrees, drained cohesion of 500 pounds per square foot (psf), and a density of 140 pounds per cubic foot for the formational material. The yellow-colored region represents the soil material. We estimated an angle of internal friction (phi) of 30 degrees, drained cohesion of 100 pounds per square foot (psf), and a density of 130 pounds per cubic foot for the formational material.

We analyzed profile cross sections 4, 5, and 6, as provided by CHC Engineers, LLC and shown below on Figure 2 and Figure 3.

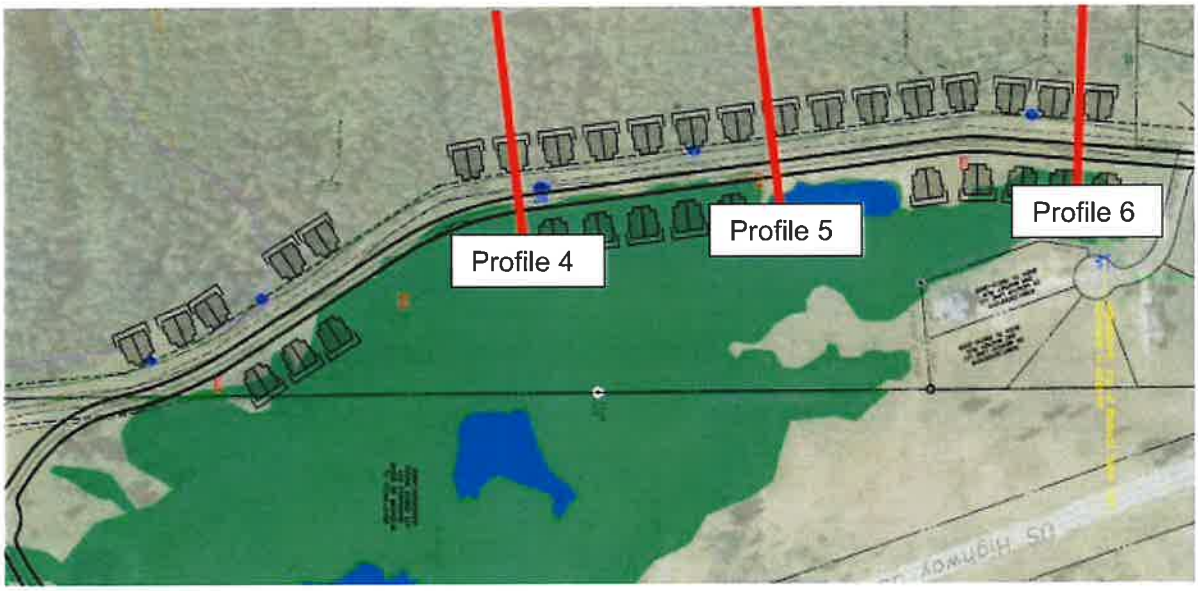


Figure 3. Plan View Locations Profiles 4, 5, and 6.

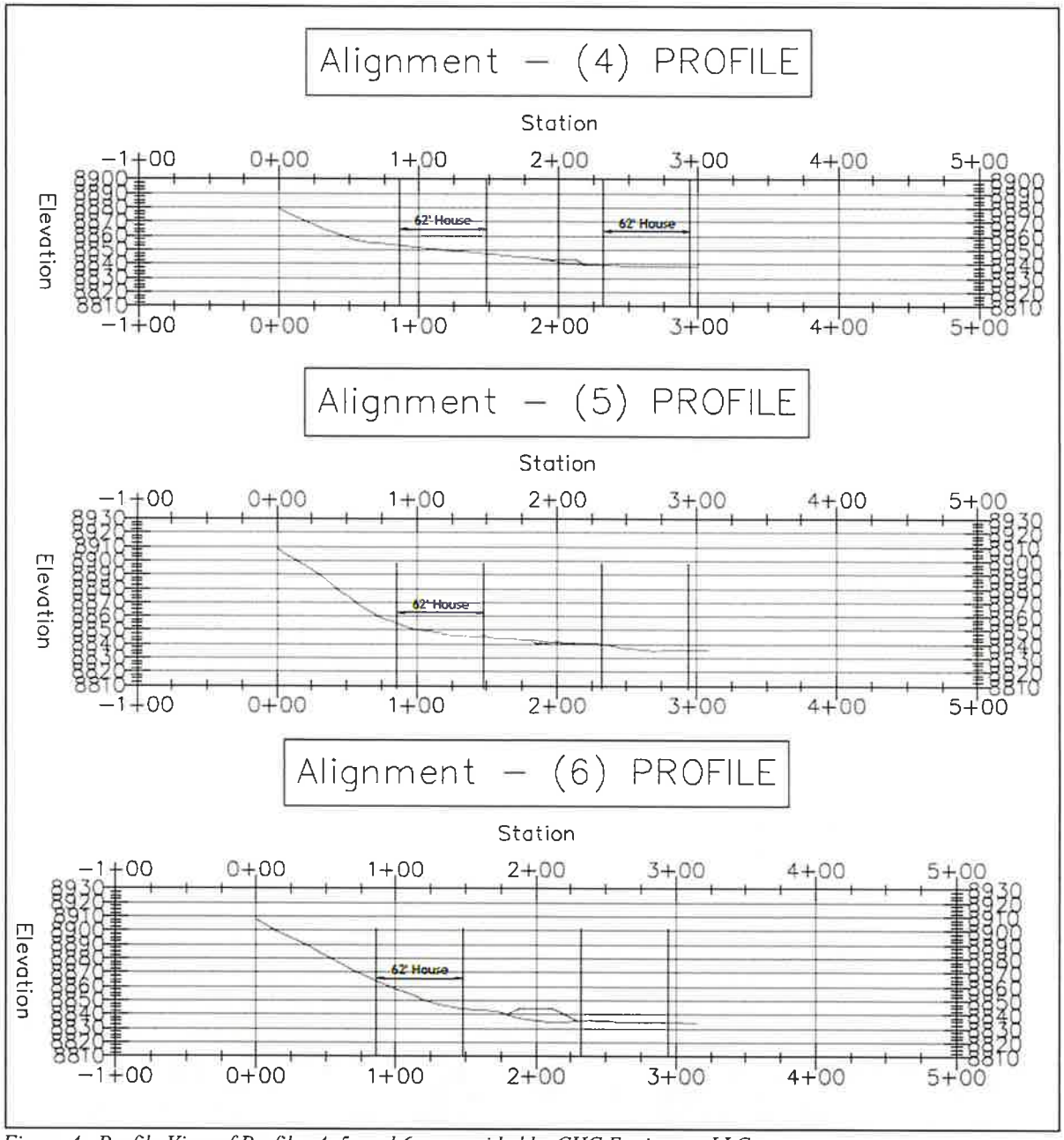


Figure 4. Profile View of Profiles 4, 5, and 6 as provided by CHC Engineers, LLC.

We modeled the existing slope along Profile 4 (not shown) and the resultant estimated factor of safety for the existing slope profile along Profile 4 is 2.125, which should be considered stable given the site soil and water conditions.

The slope profile and stability analysis for an estimated unrestrained 6-foot excavation cut along Profile 4 is shown below on Figure 5.

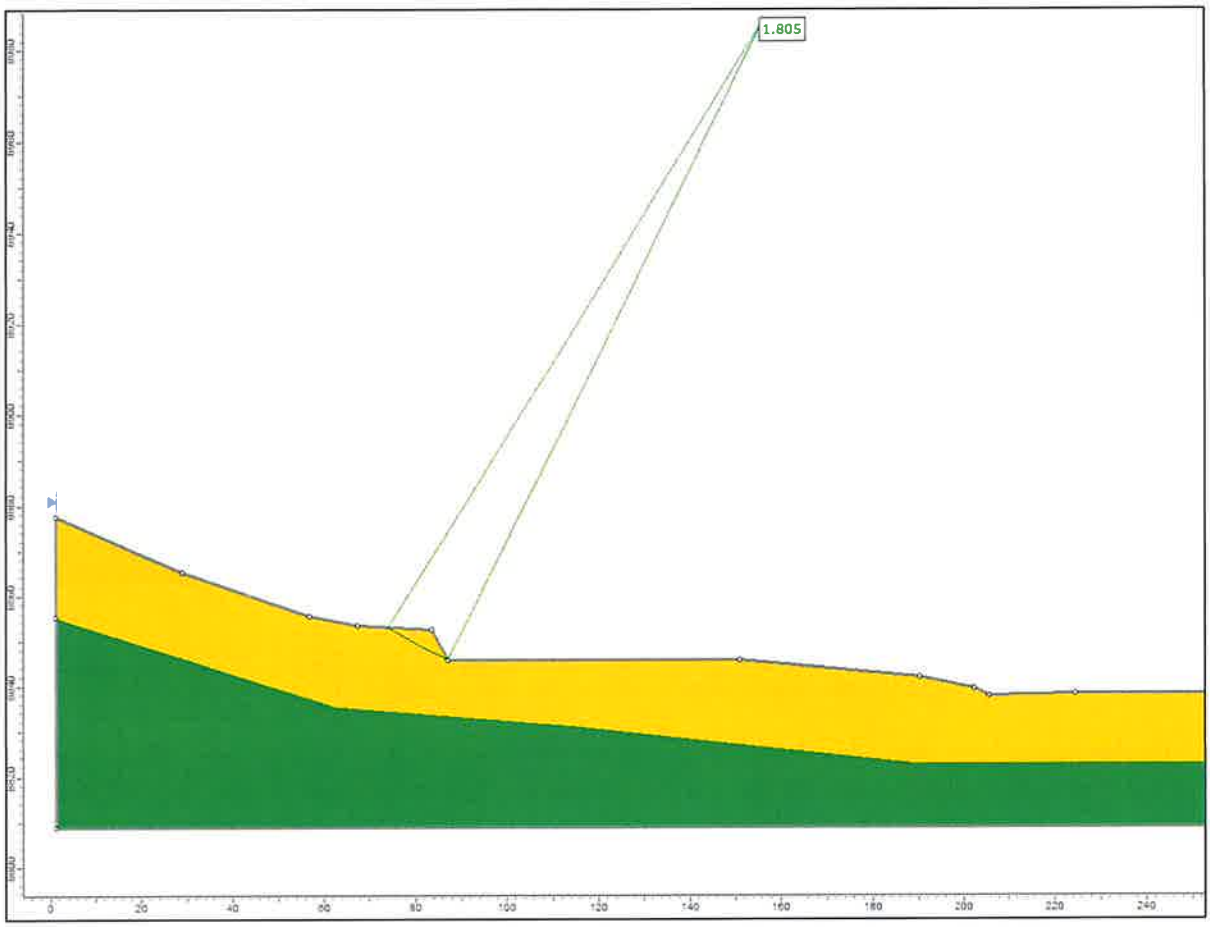


Figure 5: Theoretical F.O.S. for the estimated cut excavation slope conditions (Profile 4), FOS=1.805

The analysis above indicates the estimated factor of safety for the proposed unrestrained excavation cuts for profile 4 is 1.805, which should be considered stable given the site soil and water conditions. The estimated cut height is approximately 6 feet in the above model. If taller excavation cuts are required in this area, we should be contacted to perform an additional analysis.

The existing slope profile and stability analysis along Profile 5 is shown below on Figure 6.

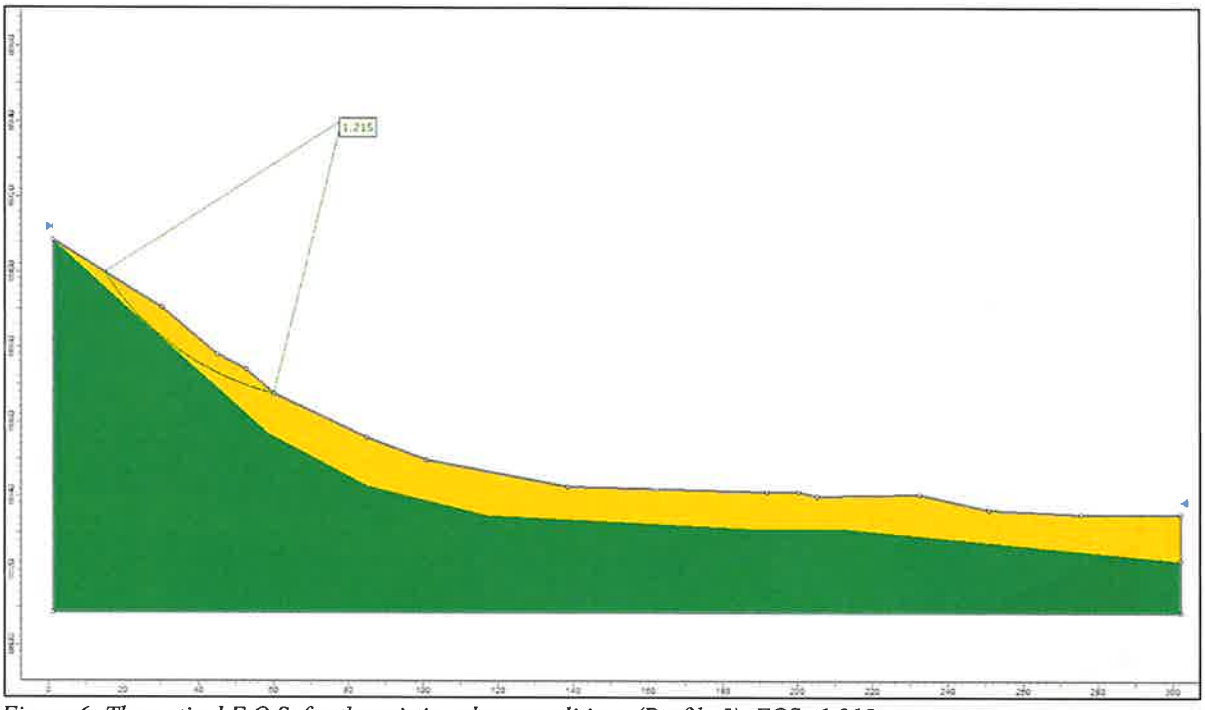


Figure 6: Theoretical F.O.S. for the existing slope conditions (Profile 5), FOS=1.215

The analysis above indicates the estimated factor of safety for the existing slope along Profile 5 is 1.215, which should be considered marginally stable given the site soil and water conditions.

The slope profile for an unrestrained estimated 12-foot excavation cut along Profile 5 is shown below on Figure 7.

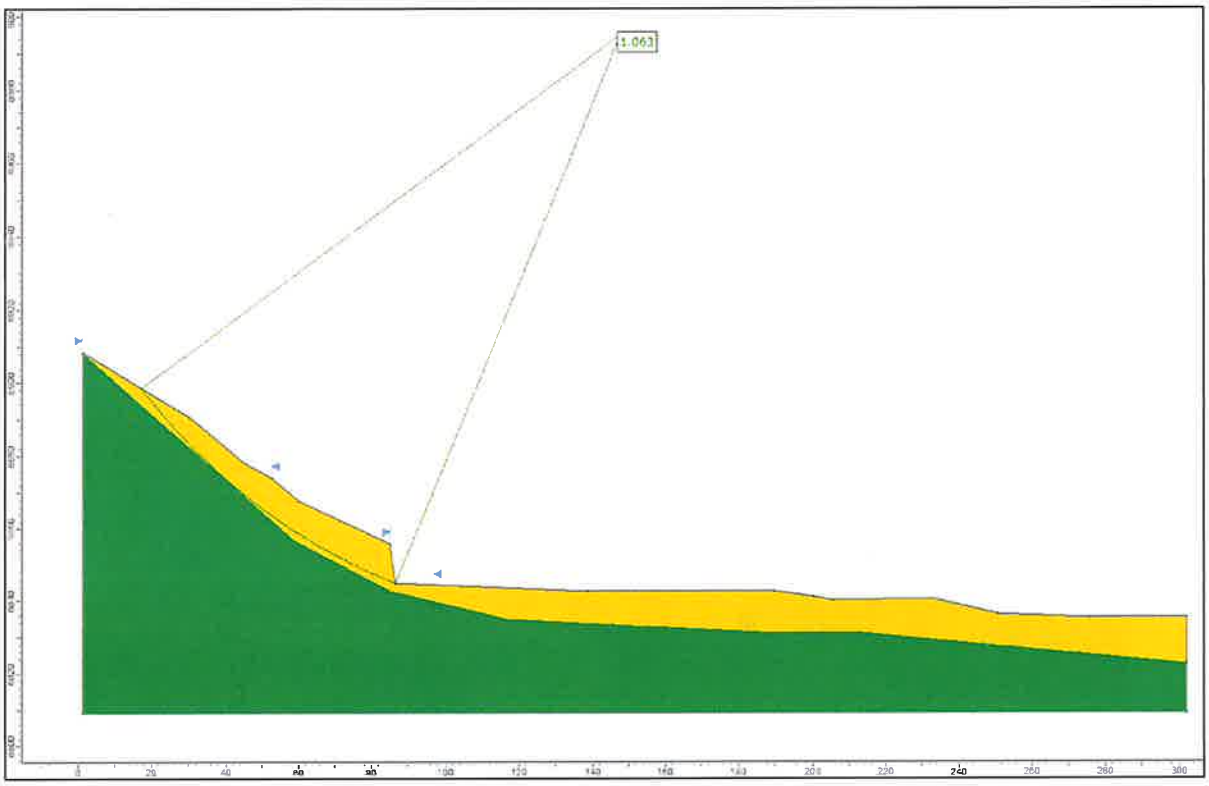


Figure 7: Unrestrained Estimated excavation cut slope conditions along Profile 5.

The analysis above indicates the estimated factor of safety for an unrestrained estimated 12 foot excavation cut for Profile 5 is 1.063, which should be considered unstable to marginally stable given the site soil and water conditions.

The slope profile and analysis for the estimated existing slopes along Profile 6 is shown below on Figure 8.

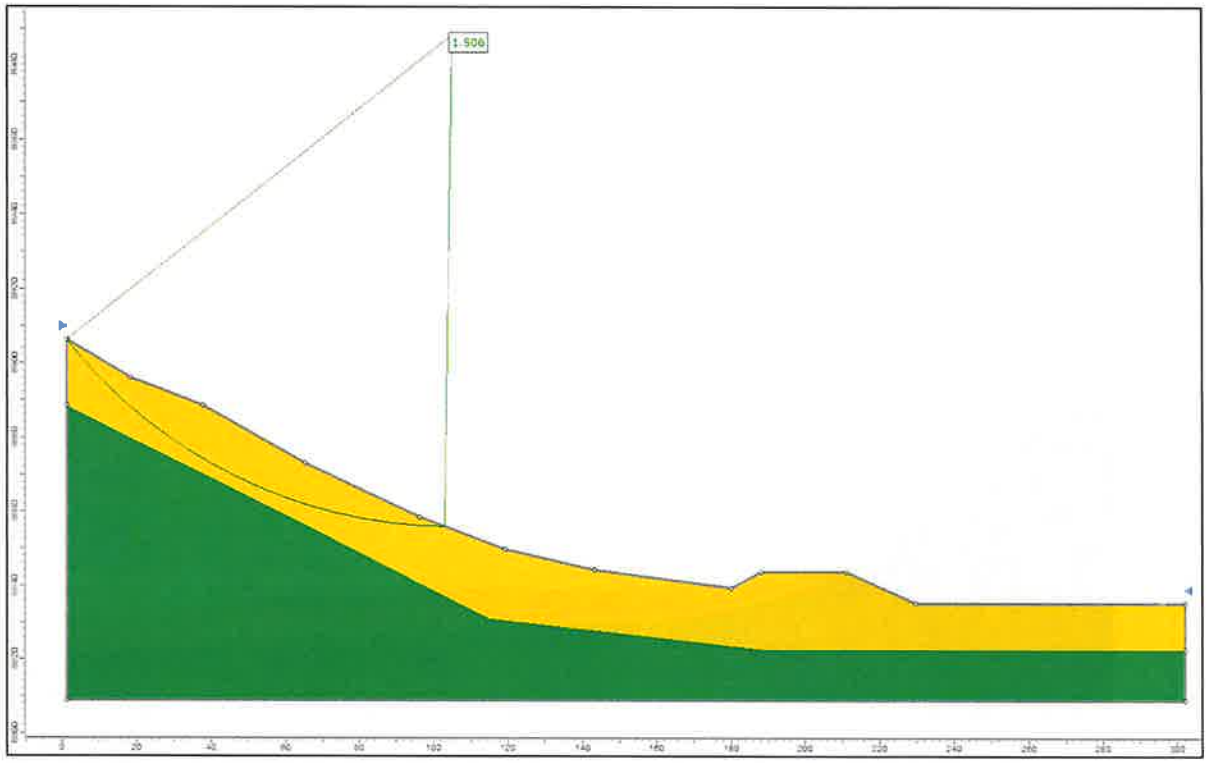


Figure 8: Theoretical F.O.S. for the estimated existing slope conditions along Profile 6, FOS=1.506

The analysis above indicates the estimated factor of safety for the estimated existing slope conditions along Profile 6 is 1.506, which should be considered stable given the site soil and water conditions.

The slope profile for an unrestrained estimated 14-foot excavation cut along Profile 6 is shown below on Figure 9.

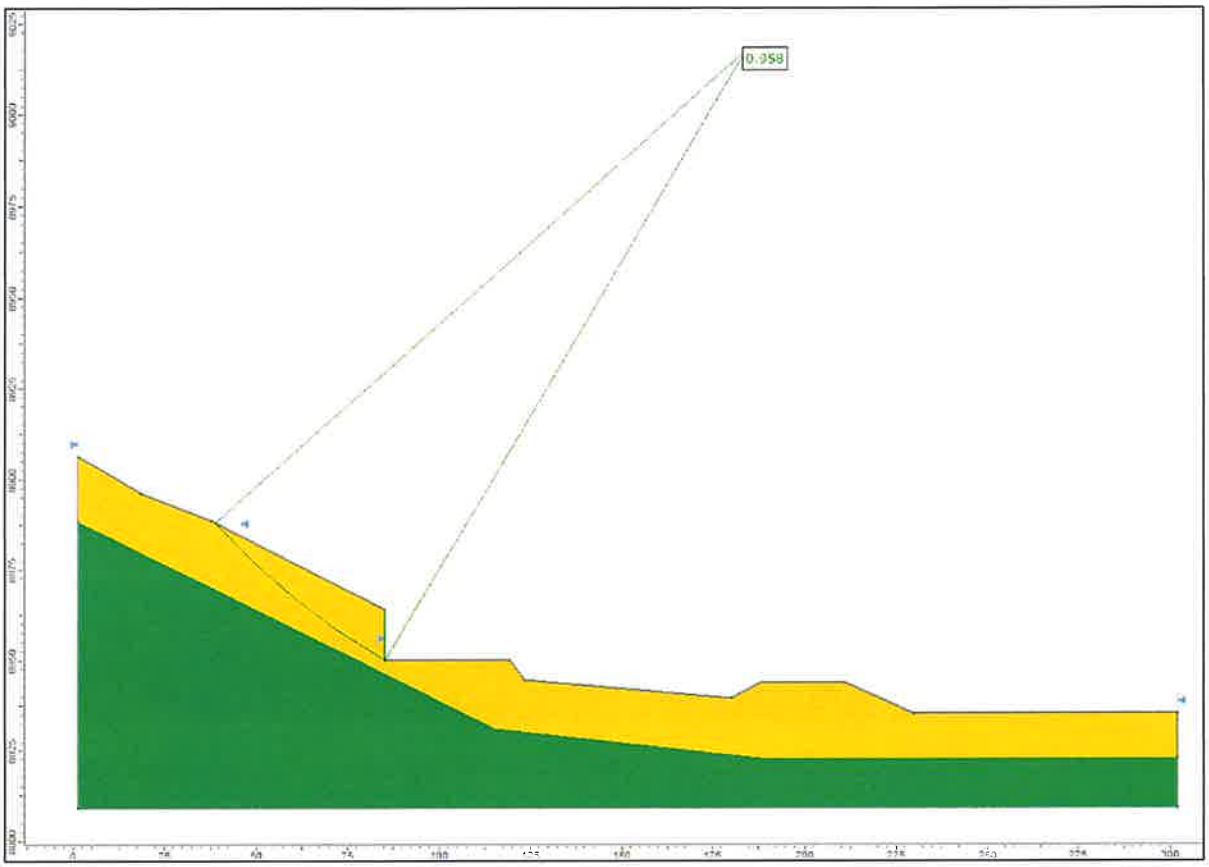


Figure 9: Unrestrained Estimated 14 foot excavation cut slope conditions along Profile 6, F.O.S. 0.958.

The analysis above indicates the estimated factor of safety for an unrestrained estimated 14 foot excavation cut for Profile 6 is 0.958, which should be considered unstable given the site soil and water conditions.

Due to the unstable to marginally unstable cut slope conditions along Profile 5 and Profile 6, we do not recommend additional excavation into the existing cut slope without temporary and/or permanent shoring. We have provided conceptual modeling for soil nail slope revetment for permanent shoring in Figures 10 and 11 below.

We anticipate that soil nails will need to be utilized to stabilize the upper project excavations in the soil mantel and into the site formational materials. The soil nails shown in the analysis below are modeled at 4 feet on center horizontally and vertically with a total embedment depth of 25 feet. The soil nails were modeled with a plunge inclination of about 15 degrees down from the horizontal.

Based on our limited field data to date, we have estimated an allowable soil to grout bond capacity of 1,500 pounds per square foot of nail embedment was used in our analysis and may be used in the design of temporary and/or permanent shoring system(s).

The grout should have a minimum 28 day compressive strength of at least 4,000 pounds per square inch. The amount of grout used to grout each soil nail anchor should be closely monitored in order to insure that the entire volume of the soil nail anchor boring is adequately filled.

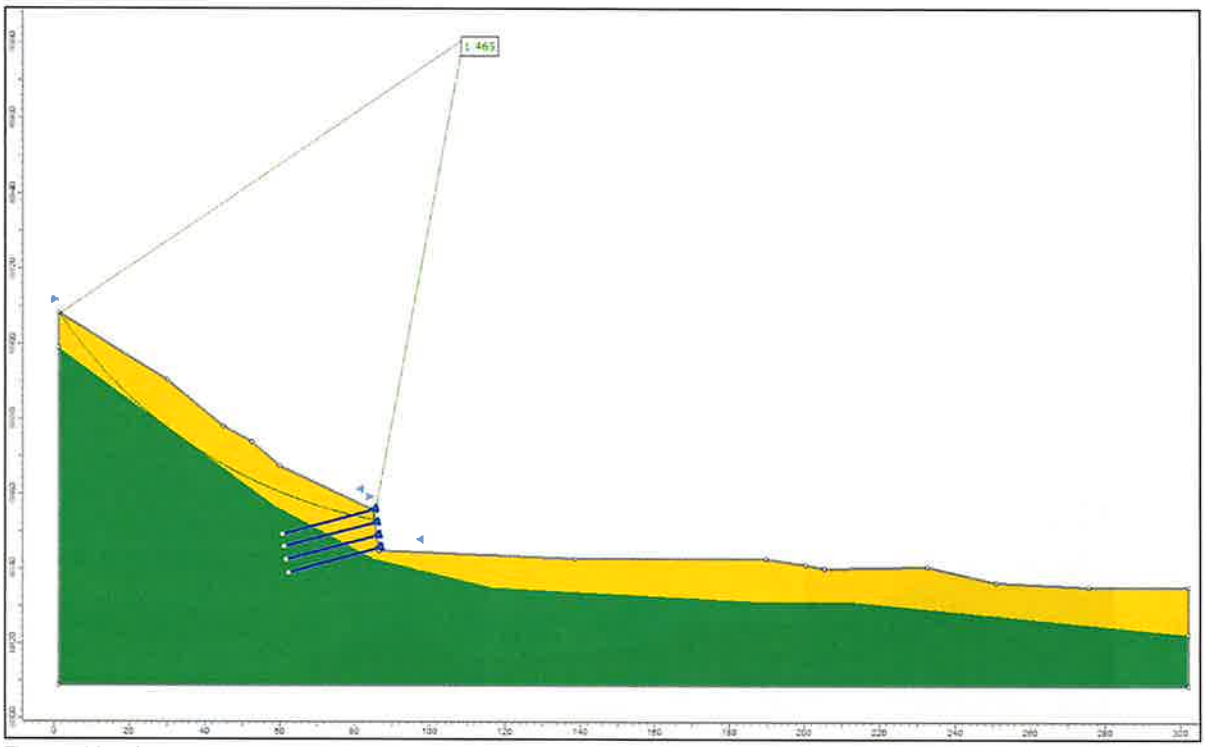


Figure 10: Theoretical F.O.S. for the conceptual cut excavation slope revetment conditions (Section F), FOS=1.465

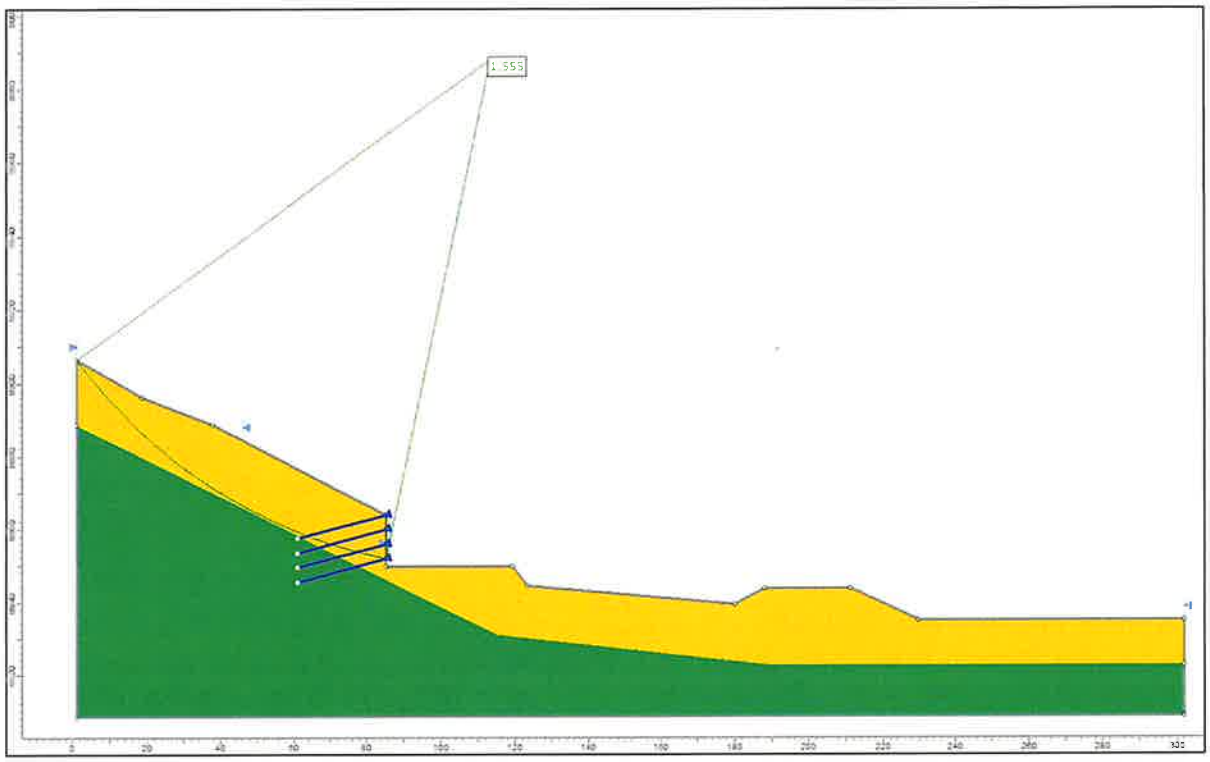


Figure 11: Theoretical F.O.S. for the conceptual cut excavation slope revetment conditions (Profile 6), FOS=1.555

As shown in the analyses presented above, a theoretical factor of safety of 1.465 to 1.555 was achieved in our analysis based on our approximation of the potential excavation cut slopes in these areas of the project. The formational material (green shaded area) will likely require some form of face netting coupled with some shallow nail lengths for where the formational material is encountered to reduce the potential for rocks generated by raveling of these faces from impacting and injuring workers below. We should be contacted to observe the formational material as it is being blasted/excavated to provide additional recommendations.

Saturation of the soil materials retained by the wall system will greatly reduce the stability of the wall system. Surface and subsurface drain systems must be constructed above and/or adjacent to the soil nail retaining wall, and any other retaining walls associated with the structure to help relieve buildup of hydrostatic pressures exerted on the wall systems. A drain blanket such as a Mira Drain product may be installed behind shotcrete structures. Surface water must not be allowed to pond in areas above the retaining wall structure and other unreinforced excavation cut slopes associated with the project.

The specific design of slope stabilization and shoring structures for the project is beyond our scope of services. The specific design of any retaining and excavation shorting structures should be performed by a retaining/shoring system specialist/engineer. There are firms local to the area that specialize in the design and construction of these systems. We are available to assist you in selecting competent design professionals for the project.

This section of our report provides geotechnical engineering design parameters but does not provide a shoring design. The project designer must be contacted to provide a design based on the information presented in this report.

We are available to review and tailor our recommendations as the project progresses and additional information which may influence our recommendations becomes available.

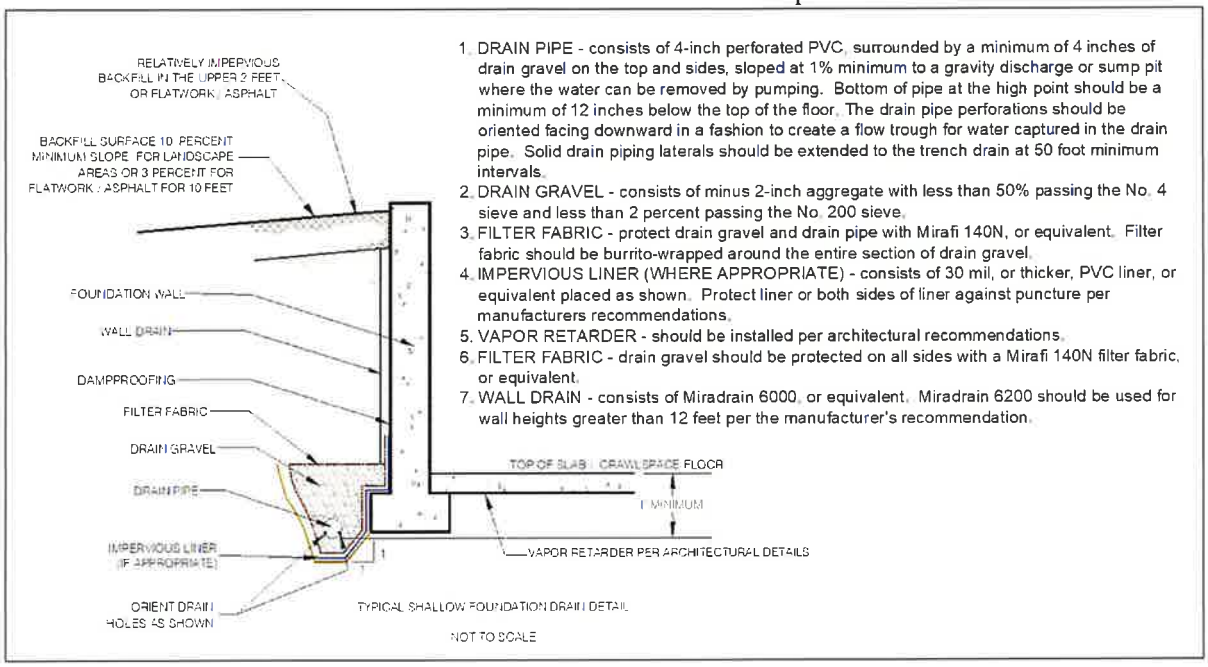
7.0 SUBSURFACE DRAIN SYSTEM

We recommend below-grade construction, such as retaining walls, crawlspace and basement areas, be protected from wetting and hydrostatic pressure buildup by an underdrain and wall drain system. Exterior retaining structures may be constructed with weep holes to allow subsurface water migration through the retaining structures. Topographic conditions on the site may influence the ability to install a subsurface drain system which promotes water flow away from the foundation system. The subsurface drain system concept is discussed under the Subsurface Drain System section of this report below.

A drain system constructed with a free draining aggregate material and a 4 inch minimum diameter perforated drain pipe should be constructed adjacent to retaining structures and/or adjacent to foundation walls. The drain pipe perforations should be oriented facing downward. The system should be protected from fine soil migration by a fabric-wrapped aggregate which surrounds a rigid perforated pipe. We do not recommend use of flexible corrugated perforated pipe since it is not possible to establish a uniform gradient of the flexible pipe throughout the drain system alignment. Corrugated drain tile is perforated throughout the entire circumference of the pipe and therefore water can escape from the perforations at undesirable locations after being collected. The nature of the perforations of the corrugated material further decreases its effectiveness as a subsurface drain conduit.

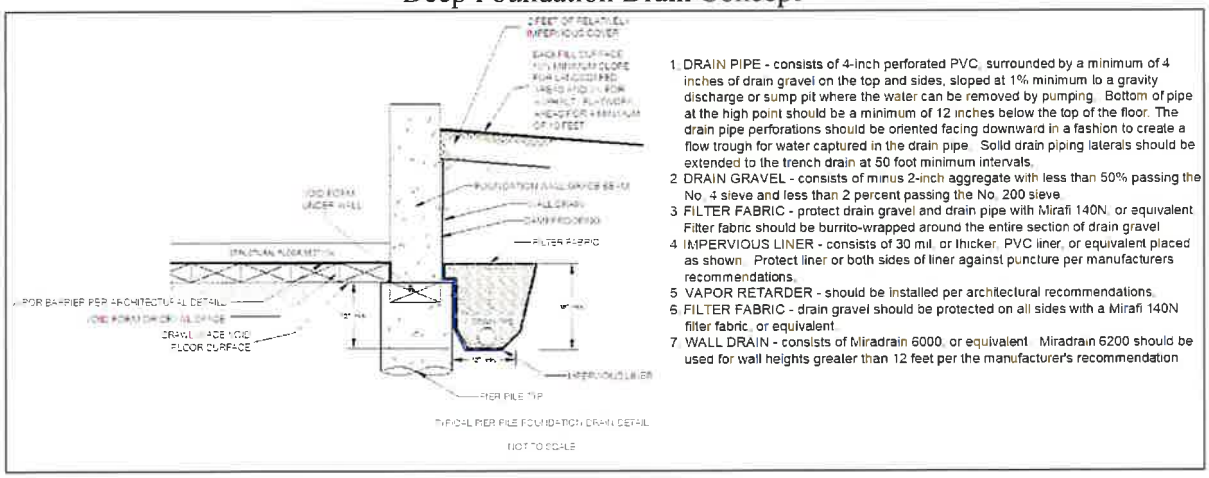
The drain should be placed at each level of excavation and at least 12 inches below lowest adjacent finish floor or crawlspace grade. The drain system pipe should be graded to surface outlets or a sump vault. The drain system should be sloped at a minimum gradient of about 2 percent, but site geometry and topography may influence the actual installed pipe gradient. Water must not be allowed to pool along any portion of the subsurface drain system. An improperly constructed subsurface drain system may promote water infiltration to undesirable locations. The drain system pipe should be surrounded by about 2 to 4 cubic feet per lineal foot of free draining aggregate. If a sump vault and pump are incorporated into the subsurface drain system, care should be taken so that the water pumped from the vault does not recirculate through pervious soils and obtain access to the basement or crawl space areas. An impervious membrane should be included in the drain construction for grade beam and pier systems or other foundation systems such as interrupted footings where a free pathway for water beneath the structure exists. Generalized subsurface drain system concepts are shown below.

Shallow Foundation Drain Concept



1. DRAIN PIPE - consists of 4-inch perforated PVC, surrounded by a minimum of 4 inches of drain gravel on the top and sides, sloped at 1% minimum to a gravity discharge or sump pit where the water can be removed by pumping. Bottom of pipe at the high point should be a minimum of 12 inches below the top of the floor. The drain pipe perforations should be oriented facing downward in a fashion to create a flow trough for water captured in the drain pipe. Solid drain piping laterals should be extended to the trench drain at 50 foot minimum intervals.
2. DRAIN GRAVEL - consists of minus 2-inch aggregate with less than 50% passing the No. 4 sieve and less than 2 percent passing the No. 200 sieve.
3. FILTER FABRIC - protect drain gravel and drain pipe with Mirafi 140N, or equivalent. Filter fabric should be burrito-wrapped around the entire section of drain gravel.
4. IMPERVIOUS LINER (WHERE APPROPRIATE) - consists of 30 mil, or thicker, PVC liner, or equivalent placed as shown. Protect liner or both sides of liner against puncture per manufacturers recommendations.
5. VAPOR RETARDER - should be installed per architectural recommendations.
6. FILTER FABRIC - drain gravel should be protected on all sides with a Mirafi 140N filter fabric, or equivalent.
7. WALL DRAIN - consists of Miradrain 6000, or equivalent. Miradrain 6200 should be used for wall heights greater than 12 feet per the manufacturer's recommendation.

Deep Foundation Drain Concept



1. DRAIN PIPE - consists of 4-inch perforated PVC, surrounded by a minimum of 4 inches of drain gravel on the top and sides, sloped at 1% minimum to a gravity discharge or sump pit where the water can be removed by pumping. Bottom of pipe at the high point should be a minimum of 12 inches below the top of the floor. The drain pipe perforations should be oriented facing downward in a fashion to create a flow trough for water captured in the drain pipe. Solid drain piping laterals should be extended to the trench drain at 50 foot minimum intervals.
2. DRAIN GRAVEL - consists of minus 2-inch aggregate with less than 50% passing the No. 4 sieve and less than 2 percent passing the No. 200 sieve.
3. FILTER FABRIC - protect drain gravel and drain pipe with Mirafi 140N, or equivalent. Filter fabric should be burrito-wrapped around the entire section of drain gravel.
4. IMPERVIOUS LINER - consists of 30 mil, or thicker, PVC liner, or equivalent placed as shown. Protect liner or both sides of liner against puncture per manufacturers recommendations.
5. VAPOR RETARDER - should be installed per architectural recommendations.
6. FILTER FABRIC - drain gravel should be protected on all sides with a Mirafi 140N filter fabric, or equivalent.
7. WALL DRAIN - consists of Miradrain 6000, or equivalent. Miradrain 6200 should be used for wall heights greater than 12 feet per the manufacturer's recommendation.

There are often aspects of each site and structure which require some tailoring of the subsurface drain system to meet the needs of individual projects. Drain systems that are placed adjacent to void forms must include provisions to protect and support the impervious liner adjacent to the void form. We are available to provide consultation for the subsurface drain system for this project, if desired.

Water often will migrate along utility trench excavations. If the utility trench extends from areas above the site, this trench may be a source for subsurface water within the proposed basement or crawl space. We suggest that the utility trench backfill be thoroughly compacted to help reduce the amount of water migration. The subsurface drain system should be designed to collect subsurface water from the utility trench and direct it to surface discharge points.

8.0 CONCRETE FLATWORK

We anticipate that both interior and exterior concrete flatwork will be considered in the project design. Concrete flatwork is typically lightly loaded and has a limited capability to resist shear forces associated with uplift from swelling soils and/or frost heave. It is prudent for the design and construction of concrete flatwork on this project to be able to accommodate some movement associated with swelling soil conditions.

The soil samples tested have a measured swell pressure up to about 5,000 pounds per square foot and a magnitude swell potential of about 7.6 percent under a 100 pound per square foot surcharge load. Due to the measured swell potential and swell pressure, interior floors supported over a crawl space are less likely to experience movement than are concrete slabs support on grade. The following recommendations are appropriate for garage floor slabs and for interior floor slabs if the owner is willing to accept the risk of potential movement beyond normal tolerances.

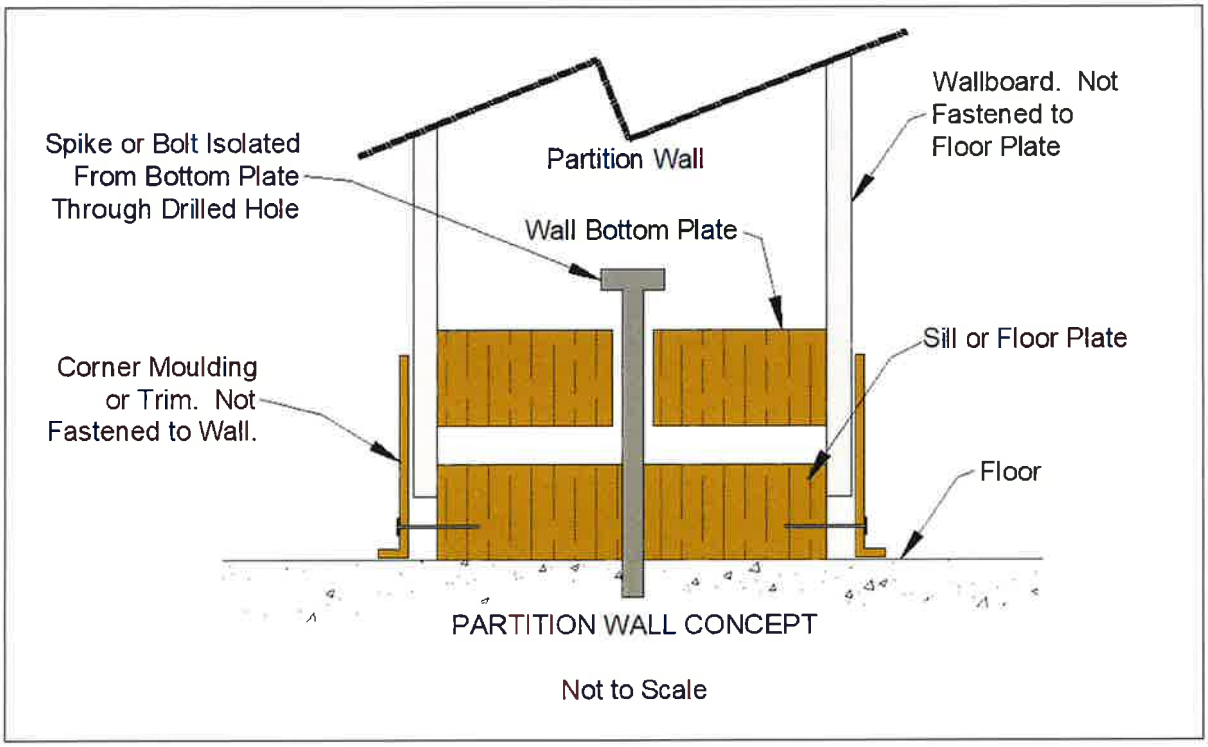
We do not recommend slab-on-grade floor construction in the areas noted to have high organic content soils with a high consolidation potential which are generally the areas between TB-10 and TB-12. If development is planned in these areas, all flooring systems should be structurally supported.

8.1 Interior Concrete Slab-on-Grade Floors

A primary goal in the design and construction of concrete slab-on-grade floors is to reduce the amount of post construction uplift associated with swelling soils, or downward movement due to consolidation of soft soils. A parallel goal is to reduce the potential for damage to the structure associated with any movement of the slab-on-grade which may occur. There are limited options available to help mitigate the influence of volume changes in the support soil for concrete slab-on-grade floors, these include:

- Preconstruction scarification, moisture conditioning and re-compaction of the natural soils in areas proposed for support of concrete flatwork, and/or,
- Placement and compaction of granular compacted structural fill material

Damage associated with movement of interior concrete slab-on-grade floor can be reduced by designing the floors as "floating" slabs. The concrete slabs should not be structurally tied to the foundations or the overlying structure. Interior walls or columns should not be supported on the interior floor slabs. Movement of interior walls or columns due to uplift of the floor slab can cause severe damage throughout the structure. Interior walls may be structurally supported from framing above the floor, or interior walls and support columns may be supported on interior portions of the foundation system. Partition walls should be designed and constructed with voids above, and/or below, to allow independent movement of the floor slab. This concept is shown below.



The sketch above provides a concept. If the plans include isolation of the partition walls from the floor slab, the project architect or structural engineer should be contacted to provide specific details and design of the desired system.

If the owner chooses to construct concrete slab-on-grade floors, the floors should be supported by a layer of granular structural fill overlying the processed natural soils. Interior concrete flatwork, or concrete slab-on-grade floors, should be underlain by scarification, moisture conditioning and compaction of about 6 inches of the natural soils followed by placement of at least 18 inches of compacted granular structural fill material that is placed and compacted as discussed in the Construction Considerations, "Fill Placement Recommendations" section of this report, below.

The above recommendations will not prevent slab heave if the expansive soils underlying slabs-on-grade become wet. However, the recommendations will reduce the effects if slab heave occurs. All plumbing lines should be pressure tested before backfilling to help reduce the potential for wetting. The only means to completely mitigate the influence of volume changes on the performance of interior floors is to structurally support the floors over a void space. Floors that are suspended by the foundation system will not be influenced by volume changes in the site soils. The suggestions and recommendations presented in this section are intended to help reduce the influence of swelling soils on the performance of the concrete slab-on-grade floors.

8.1.1 Capillary and Vapor Moisture Rise

Capillary and vapor moisture rise through the slab support soil may provide a source for moisture in the concrete slab-on-grade floor. This moisture may promote development of mold or mildew

in poorly ventilated areas and may influence the performance of floor coverings and mastic placed directly on the floor slabs. The type of floor covering, adhesives used, and other considerations that are not related to the geotechnical engineering practice will influence the design. The architect, builder and particularly the floor covering/adhesive manufacturer should be contacted regarding the appropriate level of protection required for their products.

Comments for Reduction of Capillary Rise

One option to reduce the potential for capillary rise through the floor slab is to place a layer of clean aggregate material, such as washed concrete aggregate for the upper 4 to 6 inches of fill material supporting the concrete slabs.

Comments for Reduction of Vapor Rise

To reduce vapor rise through the floor slab, a moisture barrier such as a 6 mil (or thicker) plastic, or similar impervious geotextile material is often be placed below the floor slab. The material used should be protected from punctures that will occur during the construction process.

There are proprietary barriers that are puncture resistant that may not need the underlying layer of protective material. Some of these barriers are robust material that may be placed below the compacted structural fill layer. We do not recommend placement of the concrete directly on a moisture barrier unless the concrete contractor has had previous experience with curing of concrete placed in this manner. As mentioned above, the architect, builder and particularly the floor covering/adhesive manufacturer should be contacted regarding the appropriate level of moisture and vapor protection required for their products.

8.1.2 Slab Reinforcement Considerations

The project structural engineer should be contacted to provide steel reinforcement design considerations for the proposed floor slabs. Any steel reinforcement placed in the slab should be placed at the appropriate elevations to allow for proper interaction of the reinforcement with tensile stresses in the slab. Reinforcement steel that is allowed to cure at the bottom of the slab will not provide adequate reinforcement.

8.2 Exterior Concrete Flatwork Considerations

Exterior concrete flatwork includes concrete driveway slabs, aprons, patios, and walkways. The desired performance of exterior flatwork typically varies depending on the proposed use of the site and each owner's individual expectations. As with interior flatwork, exterior flatwork is particularly prone to movement and potential damage due to movement of the support soils. This movement and associated damage may be reduced by following the recommendations discussed under interior flatwork, above. Unlike interior flatwork, exterior flatwork may be exposed to frost heave, particularly on sites where the bearing soils have a high silt content. It may be prudent to remove silt soils from exterior flatwork support areas where movement of exterior flatwork will adversely affect the project, such as near the interface between the driveway and the interior garage floor slab. If silt soils are encountered, they should be removed to the maximum depth of frost penetration for the area where movement of exterior flatwork is undesirable.

If some movement of exterior flatwork is acceptable, we suggest that the support areas be prepared by scarification, moisture conditioning and re-compaction of about 6 inches of the natural soils followed by placement of at least 12 inches of compacted granular fill material. The scarified material and granular fill materials should be placed as discussed under the Construction Considerations, "Fill Placement Recommendations" section of this report, below.

It is important that exterior flatwork be separated from exterior column supports, masonry veneer, finishes and siding. No support columns, for the structure or exterior decks, should be placed on exterior concrete unless movement of the columns will not adversely affect the supported structural components. Movement of exterior flatwork may cause damage if it is in contact with portions of the structure exterior.

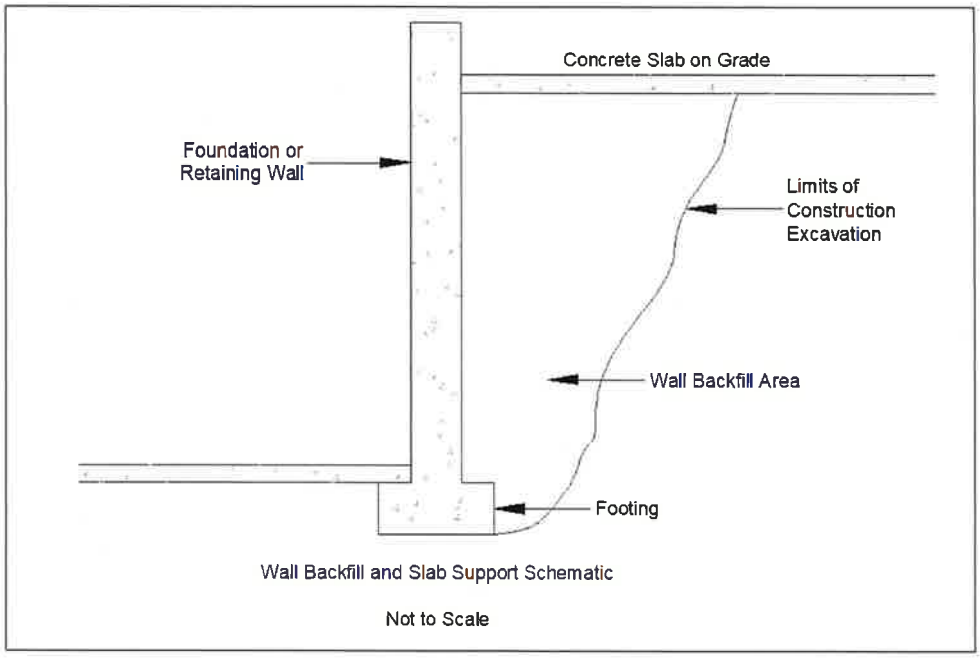
It should be noted that silt and silty sand soils located near the ground surface are particularly prone to frost heave. Soils with high silt content have the ability to retain significant moisture. The ability for the soils to accumulate moisture combined with a relatively shallow source of subsurface water and the fact that the winter temperatures in the area often very cold all contribute to a high potential for frost heave of exterior structural components. We recommend that silty soils be removed from the support areas of exterior components that are sensitive to movement associated with frost heave. These soils should be replaced with a material that is not susceptible to frost heave. Aggregate road base and similar materials retain less water than fine-grained soils and are therefore less prone to frost heave. We are available to discuss this concept with you as the plans progress.

Landscaping and landscaping irrigation often provide additional moisture to the soil supporting exterior flatwork. Excessive moisture will promote heave of the flatwork either due to expansive soil, or due to frost action. If movement of exterior slabs is undesirable, we recommend against placement of landscaping that requires irrigation. The ground surfaces near exterior flatwork must be sloped away from flatwork to reduce surface water migration to the support soil.

Exterior flatwork should not be placed on soils prepared for support of landscaping vegetation. Cultivated soils will not provide suitable support for concrete flatwork.

8.3 General Concrete Flatwork Comments

It is relatively common that both interior and exterior concrete flatwork is supported by areas of fill adjacent to either shallow foundation walls or basement retaining walls. A typical sketch of this condition is shown below.



Settlement of the backfill shown above will create a void and lack of soil support for the portions of the slab over the backfill. Settlement of the fill supporting the concrete flatwork is likely to cause damage to the slab-on-grade. Settlement and associated damage to the concrete flatwork may occur when the backfill is relatively deep, even if the backfill is compacted.

If this condition is likely to exist on this site it may be prudent to design the slab to be structurally supported on the retaining or foundation wall and designed to span to areas away from the backfill area as designed by the project structural engineer. We are available to discuss this with you upon request.

9.0 PAVEMENT SECTION THICKNESS DESIGN RECOMMENDATIONS

We have provided recommendations for a flexible asphalt and rigid Portland concrete pavement sections. We have provided our traffic estimates in Section 9.1 below. Our flexible asphalt pavement section thickness recommendations are provided in Section 9.2 and general asphalt pavement construction recommendations are provided in Section 9.3. Rigid Portland concrete recommendations are provided in Section 9.4.

9.1 Traffic Estimates

Traffic projections and corresponding 18,000 pound (18k) equivalent single axel load (ESAL) factors were not available at the time of this report. We have provided conceptual pavement section thickness recommendations for an assumed 100,000 ESALs. If higher ESAL values are anticipated or if alternative recommendations are required, the pavement sections presented in this report should be re-evaluated.

9.2 Asphalt Pavement Design Recommendations

The aggregate materials used within the pavement section should conform to the requirements outlined in the current Specifications for Road and Bridge Construction, Colorado Department of Transportation (CDOT). The aggregate base material should be a ¾-inch minus material that conforms to the CDOT Class 6 aggregate base course specifications and have an R-value of at least 78. The aggregate sub-base course should conform to the CDOT specifications for Class 2 material and should have a minimum R-value 70. Other material may be suitable for use in the pavement section, but materials different than those listed above should be tested and observed by us prior to inclusion in the project design or construction. Aggregate sub-base and base-course materials should be compacted to at least 95 percent of maximum dry density as defined by the modified Proctor test, ASTM D1557.

We recommend that the asphalt concrete used on this project be mixed in accordance with a design prepared by a licensed professional engineer, or an asphalt concrete specialist. We should be contacted to review the mix design prior to placement at the project site. We recommend that the asphalt concrete be compacted to between 92 and 96 percent of the maximum theoretical density.

We have provided several pavement section design thicknesses for 100,000 estimated ESALs. The project civil engineer, or contractor can evaluate the best combination of materials for economic considerations.

Based on the laboratory analysis of the native soils, we obtained a CBR value of 4.1 and estimated an R-Value of 9 and a resilient modulus of 3,450. Other assumptions made for our analysis are listed below.

- Reliability Factor R(%) = 85%
- Overall Standard Deviation, So = 0.44
- Estimated Total 18K-ESAL value(s) = 100,000
- Effective Roadbed Soils Resilient Modulus, Mr = 3,450
- Change is serviceability index, Delta PSI = 2.5
- Structural Coefficient of Asphalt Pavement = 0.44
- Structural Coefficient of Aggregate Base Course = 0.12
- Structural Coefficient of Aggregate Sub-Base Course = 0.09
- Modifying Structural Layer Coefficients for aggregate base course and aggregate sub-base course layers, mi = 1.0 (fair drainage conditions with 5%-25% saturation frequency)

We have estimated a pavement reliability factor (R) of 85 percent. The Federal Highway Administration defines R as "the probability that a pavement section will perform satisfactorily over the design period. It must account for uncertainties in traffic loading, environmental conditions, and construction materials. The AASHTO design method accounts for these uncertainties by incorporating a reliability level R to provide a factor of safety into the pavement design and thereby increase the probability that the pavement will perform as intended over its design life." A higher R will result in thicker pavement section materials; however, may lead to a greater reliability in the pavement performance. The designer or project civil engineer should

evaluate the desired R factor for the intended use. We can provide alternate reliability factors for the proposed pavement section upon request.

Based on the above assumptions and laboratory test data obtained for the native on-site soil materials, we obtained a structural number (SN) equal to 2.91 for an assumed 100,000 18k-ESAL. Our pavement thickness design recommendations are provided below. We have shown alternate pavement sections below that meet the minimum structural numbers.

Pavement Section Design Thickness – 100,000 ESAL (Minimum SN = 2.91)

Pavement Section Component	Alternative Thickness of Each Component (inches)			
Asphalt Concrete	4	4	4.5	5
Class 6 Roadbase	4	10	4	6
Class 2 Sub-Base	8	0	6	0
Structural Number	2.96	2.96	3.00	2.92

We do not recommend use of ¾ inch aggregate base course in layers less than 4 inches or the use of 3-inch minus sub-base in layers less than 6 inches. This may result in total structural numbers that are in excess of the minimum required by the anticipated traffic loading as can be seen in the tables above.

Water intrusion into the pavement section support materials will negatively influence the performance of the parking lot surface. Water from irrigation, water from natural sources that migrates into the soils beneath landscapes surface and water from any source that gains access to the support materials can all decrease the life of the parking lot surface. Care should be taken along curbs and any edge of the parking lot to develop an interface between the material that will reduce subsurface and surface water migration into the support soil and pavement section materials. Landscape islands and other irrigated features often promote water migration since no surface flow from these features typically occurs. The same can occur along perimeter cub areas.

Water will often migrate along the interface of concrete curbs and gutter areas early in the life of any parking area. The tendency for this type of migration often decreases with time but can be reduced by compaction of materials along the outside base of curb areas adjacent to the interface of the concrete curb and the underlying soil prior to placement of landscaping soil above this interface.

9.3 General Asphalt Pavement Recommendations

The asphalt pavement used on this project should be mixed in accordance with a design prepared by a licensed professional engineer, or an asphalt pavement specialist. We should be contacted to review the mix design prior to placement at the project site. We recommend that the asphalt pavement be compacted to between 92 and 96 percent of the maximum theoretical density.

We suspect that the subgrade soils will be well above the optimum moisture content in many areas of the project. We anticipate that conventional scarification and drying of the subgrade soils

will be sufficient for most areas of the roadway subgrade provided warm and preferably breezy weather conditions are present during the project construction, and there is adequate time to perform scarification and drying construction procedures. However, it is likely that some areas of the subgrade will require specialty stabilization techniques. We have provided cursory recommendations for stabilization of severely yielding soil materials in Section 5.0 below.

The subgrade soil materials should be scarified to a depth of about 8 inches, moisture conditioned, and compacted to at least 90 percent of the maximum dry density as defined by ASTM D1557 or AASHTO T180 (Modified Proctor). Proof rolling observations should then be performed over the prepared subgrade surface. Any areas of significant yielding should be stabilized as needed prior to placement of the overlying aggregate base course materials. The surface of the subgrade soil should be graded and contoured to be approximately parallel to the finished grade of the asphalt surface.

The aggregate materials used within the pavement section should conform to the requirements outlined in the current Specifications for Road and Bridge Construction, Colorado Department of Transportation (CDOT). The aggregate base material should be a ¾ inch minus material that conforms to the CDOT Class 6 aggregate base course specifications and have an R-value of at least 78. The aggregate sub-base course should conform to the CDOT specifications for Class 2 material and should have a minimum R-value 70. Other material may be suitable for use in the pavement section, but materials different than those listed above should be tested and observed by us prior to inclusion in the project design or construction. Aggregate sub-base and base-course materials should be compacted to at least 95 percent of maximum dry density as defined by the modified Proctor test, ASTM D1557.

Thorough proof rolling with a fully loaded tandem axle water truck should be performed across the prepared aggregate surface prior to placement of the asphalt cement. Any areas that are observed to yield should be stabilized as necessary. We should be contacted to observe the proof rolling operations and provide recommendations for stabilization if necessary.

The drainage characteristics of the roadway should be addressed by the project civil engineer. Surface water must not be allowed to pool in areas adjacent to the asphalt pavement roadway.

9.4 Portland Cement Concrete Pavement Recommendations

For concrete pavements (rigid pavements), we recommend a minimum of 5-inches of Portland cement concrete (PCC). Concrete pavement underlain by 12 inches Class 6 aggregate base course is recommended 1) to create a uniform subbase/base, 2) to limit potential of pumping of fines from beneath the pavement, 3) provide a working platform for construction, and 4) to help control frost heave soils.

All concrete should be based on a mix design established by a qualified engineer. A CDOT Class P or D mix would be acceptable. The design mix should consist of aggregate, Portland cement, water, and additives which will meet the requirements contained in this section. The concrete should have a modulus of rupture of third point loading of 650 psi. Normally, concrete with a 28-day compressive strength of 4,200 psi will meet this requirement. Concrete should contain approximately 6 percent entrained air. Maximum allowable slump should not exceed 4 inches.

The concrete should contain joints not greater than 10 feet on centers. Joints should be sawed or formed by pre-molded filler. The joints should be at least 1/3 of the slab thickness. Joints should be reinforced with dowels to provide load transfer between slabs. Concrete pavement joints should meet the requirements of CDOT Standard Plan No. M 412-1 and CDOT Standard Specifications Section 412.13. Expansion joints should be provided at the end of each construction sequence and between the concrete slab and adjacent structures. Expansion joints, where required, should be filled with a ½-inch thick asphalt impregnated fiber. Concrete should be cured by protecting against loss of moisture, rapid temperature changes and mechanical injury for at least three days after placement. After sawing joints, the saw residue shall be removed and the joint sealed.

10.0 CONSTRUCTION CONSIDERATIONS

This section of the report provides comments, considerations and recommendations for aspects of the site construction which may influence, or be influenced by the geotechnical engineering considerations discussed above. The information presented below is not intended to discuss all aspects of the site construction conditions and considerations that may be encountered as the project progresses. If any questions arise as a result of our recommendations presented above, or if unexpected subsurface conditions are encountered during construction we should be contacted immediately.

10.1 Fill Placement Recommendations

There are several references throughout this report regarding both natural soil and compacted structural fill recommendations. The recommendations presented below are appropriate for the fill placement considerations discussed throughout the report above.

All areas to receive fill, structural components, or other site improvements should be properly prepared and grubbed at the initiation of the project construction. The grubbing operations should include scarification and removal of organic material and soil. No fill material or concrete should be placed in areas where existing vegetation or fill material exist.

We observed evidence of previous site use and existing man-placed fill during our field work. We encountered man-placed fill in our test borings. We suspect that man-placed fill and subterranean structures may be encountered as the project construction progresses. All existing fill material should be removed from areas planned for support of structural components. Excavated areas and subterranean voids should be backfilled with properly compacted fill material as discussed below.

Preloading of the ground surface and a settlement monitoring program may be necessary prior to construction to limit the amount of post construction ariel settlement in the areas near TB-11 through TB-13. Conceptually, the preloading program would likely consist of placement of a series of steel plates at the base of a controlled fill. The plates would have steel rods that extend to the ground surface as survey monuments. Settlement of the fill mass could then be monitored by a survey program to determine amount of settlement and when settlement ceases.

10.1.1 Subgrade Soil Stabilization

We suspect that soft, yielding soil conditions may be encountered at various locations on the project site during construction. This material may be challenging to compact in preparation for placement of overlying fill material. We have provided two general categories of concepts to stabilize these soils to provide a suitable substrate for placement and compaction of overlying compacted fill. These include:

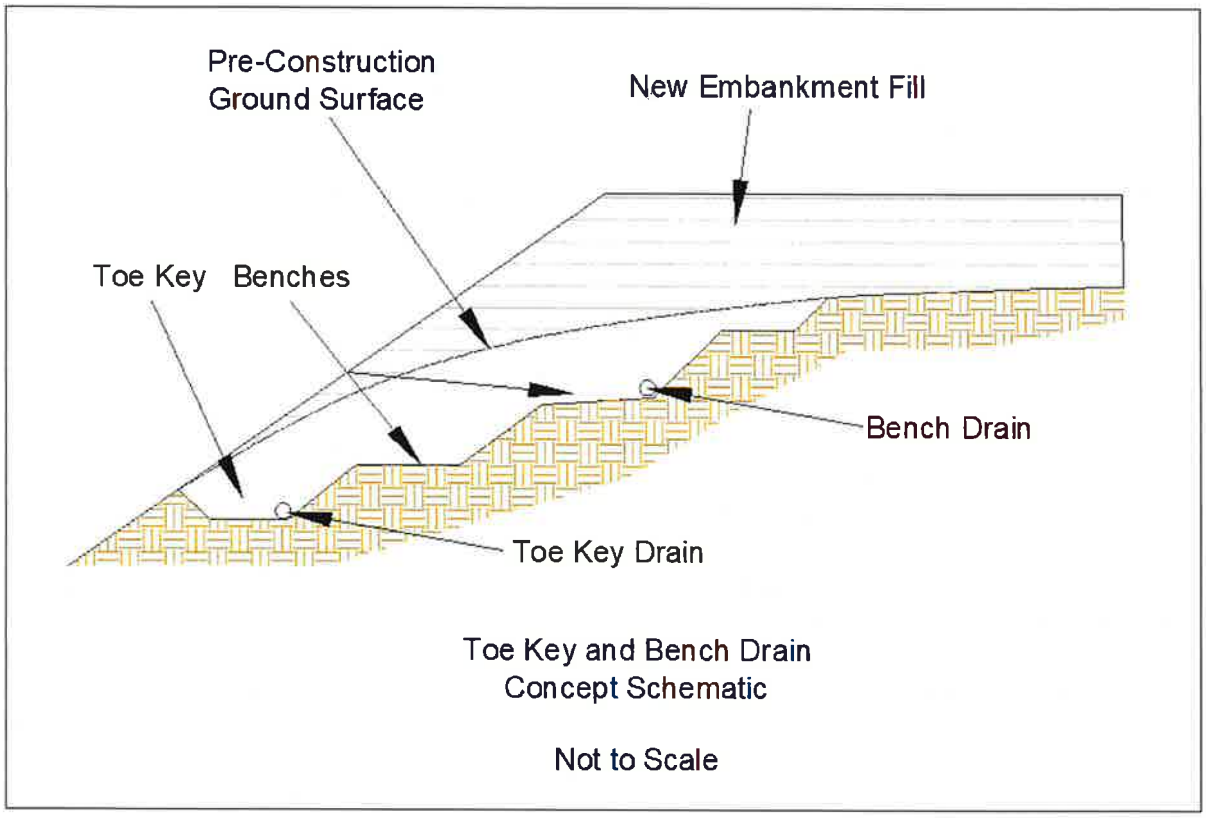
1.) Mechanical Stabilization; using soil and/or geotextile materials, and,
2.) Chemical Stabilization; using dry Portland cement.

Mechanical stabilization of soil often includes placement of aggregate material and/or larger cobbles (3-4 inch size) into an area where the soils are yielding. The most predictable technique is to over-excavate these soft areas by about 8 to 12 inches, (or more, if needed) lightly proof compact the exposed soil, place a layer of woven geosynthetic or geogrid-type material, such as or Mirifi RS 280i or BXG 120 geogrid, followed by placement of a "clean crushed aggregate" material with a nominal maximum size of 3 inches and not more than about 5 percent passing the #4 sieve. This clean crushed aggregate material should then be consolidated with a plate-type compactor. A less robust fabric, such as a non-woven geofabric, (such as Mirifi 140N) is placed on top of this aggregate layer followed by placement and compaction of the overlying fill material. For sites with extremely soft conditions it may be necessary to increase the clean aggregate layer to about 18 inches and place an intermediate layer of geogrid (or fabric) at mid-height of this layer.

Chemical stabilization using Portland cement is effective for most soils. Generally, this technique is more suitable for isolated soft areas. Generally dry Portland cement powder may be placed on the surface of the soft yielding material and subsequently mixed into the soil. The effectiveness of this technique is partially dependent upon the thoroughness of the mixing. If it can be thoroughly mixed the application rate of the Portland cement need not be more than 10 percent, and often an application of 5 to 7 percent will provide a significant decrease in free water and stabilize the material. After mixing, the material should be allowed to "rest" for about two of more hours prior to compaction. The treated material will often yield some during initial compaction, but will generally increase in rigidity as the process of hydration begins takes place. If yielding under compaction is excessive, the material should be allowed "cure" additionally prior to continued compaction effort being applied. Often it takes more time, such as overnight, to allow the cement to fully stabilize the material so this strategy is often implemented in an area at the end of a work day and allowed to cure overnight followed by subsequent fill placement on the following day.

10.1.2 Embankment Fill on Slopes

Embankment fill placed on slopes must be placed in areas that have been properly prepared prior to placement of the fill material. The fill should be placed in a toe key and benches constructed into the slope. The concept is shown below.



The width of the toe key should be at least one-fourth of the height of the fill. The elevation difference between each bench, width, and geometry of each bench is not critical; however, the elevation difference between each lift should not exceed about 3 to 4 feet. The benches should be of sufficient width to allow for placement of horizontal lifts of fill material; therefore, the size of the compaction equipment used will influence the bench widths.

Embankment fill material thicker than 5 feet should be analyzed on a site-specific basis. The fill mass may impose significant loads on, and influence the stability of the underlying slope. We suggest that no fill slopes steeper than two and one-half to one (2½:1, horizontal to vertical) be constructed unless a slope stability analysis of the site is conducted.

The toe key and bench drains shown above should be placed to reduce the potential for water accumulation in the embankment fill and in the soils adjacent to the embankment fill. The placement of these drains is more critical on larger fill areas, areas where subsurface water exists and in areas where the slopes are marginally stable.

The toe key and bench drains may consist of a perforated pipe which is surrounded by a free draining material which is wrapped by a geotextile filter fabric. The pipe should be surrounded by 4 to 6 cubic feet of free draining material per lineal foot of drain pipe.

10.1.2 Natural Soil Fill

Any natural soil used for any fill purpose should be free of all deleterious material, such as organic material and construction debris. Natural soil fill includes excavated and replaced material or in-place scarified material. Due to the expansive characteristics of the natural soil we do not recommend that it be used as fill material for direct support of structural components. The natural soils may be used to establish general site elevation. Our recommendations for placement of natural soil fill are provided below.

- The natural soils should be moisture conditioned, either by addition of water to dry soils, or by processing to allow drying of wet soils. The proposed fill materials should be moisture conditioned to between about optimum and about 2 percent above optimum soil moisture content. This moisture content can be estimated in the field by squeezing a sample of the soil in the palm of the hand. If the material easily makes a cast of soil which remains in-tact, and a minor amount of surface moisture develops on the cast, the material is close to the desired moisture content. Material testing during construction is the best means to assess the soil moisture content.
- Moisture conditioning of clay or silt soils may require many hours of processing. If possible, water should be added and thoroughly mixed into fine grained soil such as clay or silt the day prior to use of the material. This technique will allow for development of a more uniform moisture content and will allow for better compaction of the moisture conditioned materials.
- The moisture conditioned soil should be placed in lifts that do not exceed the capabilities of the compaction equipment used and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test.
- We typically recommend a maximum fill lift thickness of 6 inches for hand operated equipment and 8 to 10 inches for larger equipment.
- Care should be exercised in placement of utility trench backfill so that the compaction operations do not damage underlying utilities.
- The maximum recommended lift thickness is about 6 to 8 inches. The maximum recommended rock size for natural soil fill is about 3 inches. This may require on-site screening or crushing if larger rocks are present. We must be contacted if it is desired to utilize rock greater than 3 inches for fill materials.

10.1.3 Granular Compacted Structural Fill

Granular compacted structural fill is referenced in numerous locations throughout the text of this report. Granular compacted structural fill should be constructed using an imported commercially produced rock product such as aggregate road base. Many products other than road base, such as clean aggregate or select crusher fines may be suitable, depending on the intended use. If a specification is needed by the design professional for development of project specifications, a material conforming to the Colorado Department of Transportation (CDOT) "Class 6" aggregate road base material can be specified. This specification can include an option for testing and approval in the event the contractor's desired material does not conform to the Class 6 aggregate specifications. We have provided the CDOT Specifications for Class 6 material below.

Grading of CDOT Class 6 Aggregate Base-Course Material	
Sieve Size	Percent Passing Each Sieve
1 inch	100
¾ inch	95-100
#4	30-65
#8	25-55
#200	3-12

Liquid Limit less than 30

All compacted structural fill should be moisture conditioned and compacted to at least 90 percent of maximum dry density as defined by ASTM D1557, modified Proctor test. Areas where the structural fill will support traffic loads under concrete slabs or asphalt concrete should be compacted to at least 95 percent of maximum dry density as defined by ASTM D1557, modified Proctor test.

Although clean-screened or washed aggregate may be suitable for use as structural fill on sites with sand or non-expansive silt soils, or on sites where shallow subsurface water is present, clean aggregate materials must not be used on any site where expansive soils exist due to the potential for water to accumulate in the voids of the clean aggregate materials.

Clean aggregate fill, if appropriate for the site soil conditions, must not be placed in lifts exceeding 8 inches and each lift should be thoroughly vibrated, preferably with a plate-type vibratory compactor prior to placing overlying lifts of material or structural components. We should be contacted prior to the use of clean aggregate fill materials to evaluate their suitability for use on this project.

10.1.4 Deep Fill Considerations

Deep fills, in excess of approximately 3 feet, should be avoided where possible. Fill soils will settle over time, even when placed properly per the recommendations contained in this report. Natural soil fill or engineered structural fills placed to our minimum recommended requirements will tend to settle an estimated 1 to 3 percent; therefore, a 3 foot thick fill may settle up to approximately 1 inch over time. A 10 foot thick fill may settle up to approximately 3½ inches even when properly placed. Fill settlement will result in distress and damage to the structures they are intended to support. There are methods to reduce the effects of deep fill settlement such as surcharge loading and surveyed monitoring programs; however, there is a significant time period of monitoring required for this to be successful. A more reliable method is to support structural components with deep foundation systems bearing below the fill envelope. We can provide additional guidance regarding deep fills up on request.

10.2 Excavation Considerations

Unless a specific classification is performed, the site soils should be considered as an Occupational Safety and Health Administration (OSHA) Type C soil and should be sloped and/or benched according to the current OSHA regulations. Excavations should be sloped and benched to prevent wall collapse. Any soil can release suddenly and cave unexpectedly from excavation walls, particularly if the soils is very moist, or if fractures within the soil are present. Daily

observations of the excavations should be conducted by OSHA competent site personnel to assess safety considerations.

We did not encounter free subsurface water in our test borings. If water is encountered during construction, it may be necessary to dewater excavations to provide for suitable working conditions.

Scattered boulders were encountered in our test borings and large boulders are known to be present throughout the vicinity. Due to the size of the boulders encountered in the vicinity, if encountered, they may be difficult to remove using conventional excavation techniques and equipment. Removal of large boulders can also create a void of loose soil beneath structural components, which may require additional removal of loose soil and replacement with structural fill. In some instances, it may be preferable to leave boulders in place. Reduction in the thickness of the recommended structural fill beneath footings and slabs may also be prudent to limit disturbance to the bearing soils. If large boulders are encountered in the building footprint, a representative of the geotechnical engineer can provide field observations and provide additional recommendations for subgrade preparation.

If possible, excavations should be constructed to allow for water flow from the excavation the event of precipitation during construction. If this is not possible it may be necessary to remove water from snowmelt or precipitation from the foundation excavations to help reduce the influence of this water on the soil support conditions and the site construction characteristics.

10.2.1 Excavation Cut Slopes

We anticipate that some permanent excavation cut slopes may be included in the site development. Temporary cut slopes should not exceed 5 feet in height and should not be steeper than about 1:1 (horizontal to vertical) for most soils. Permanent cut slopes greater than 5 feet or steeper than 2½:1 must be analyzed on a site-specific basis.

Excavation cut slopes must be analyzed on a case/situation specific basis and restrained as necessary. The project shoring design engineer should be contacted for the design of the project shoring needs.

10.3 Utility Considerations

Subsurface utility trenches will be constructed as part of the site development. Utility line backfill often becomes a conduit for post construction water migration. If utility line trenches approach the proposed project site from above, water migrating along the utility line and/or backfill may have direct access to the portions of the proposed structure where the utility line penetrations are made through the foundation system. The foundation soils in the vicinity of the utility line penetration may be influenced by the additional subsurface water. There are a few options to help mitigate water migration along utility line backfill. Backfill bulkheads constructed with high clay content soils and/or placement of subsurface drains to promote utility line water discharge away from the foundation support soil.

Some movement of all structural components is normal and expected. The amount of movement may be greater on sites with problematic soil conditions. Utility line penetrations through any walls or floor slabs should be sleeved so that movement of the walls or slabs does not induce movement or stress in the utility line. Utility connections should be flexible to allow for some movement of the floor slab.

If utility line trenches are excavated using blasting techniques it is relatively common for surface and subsurface water to migrate along the fractures in the rock that may be created by blasting. If this water gains access to a utility line trench that has a gradient down toward the structure the water may gain access to the foundation support materials and/or subsurface portions of the proposed structure. Provisions should be made in the project construction plans to create an impervious barrier to prevent water from migrating into undesirable locations.

10.4 Exterior Grading and Drainage Comments

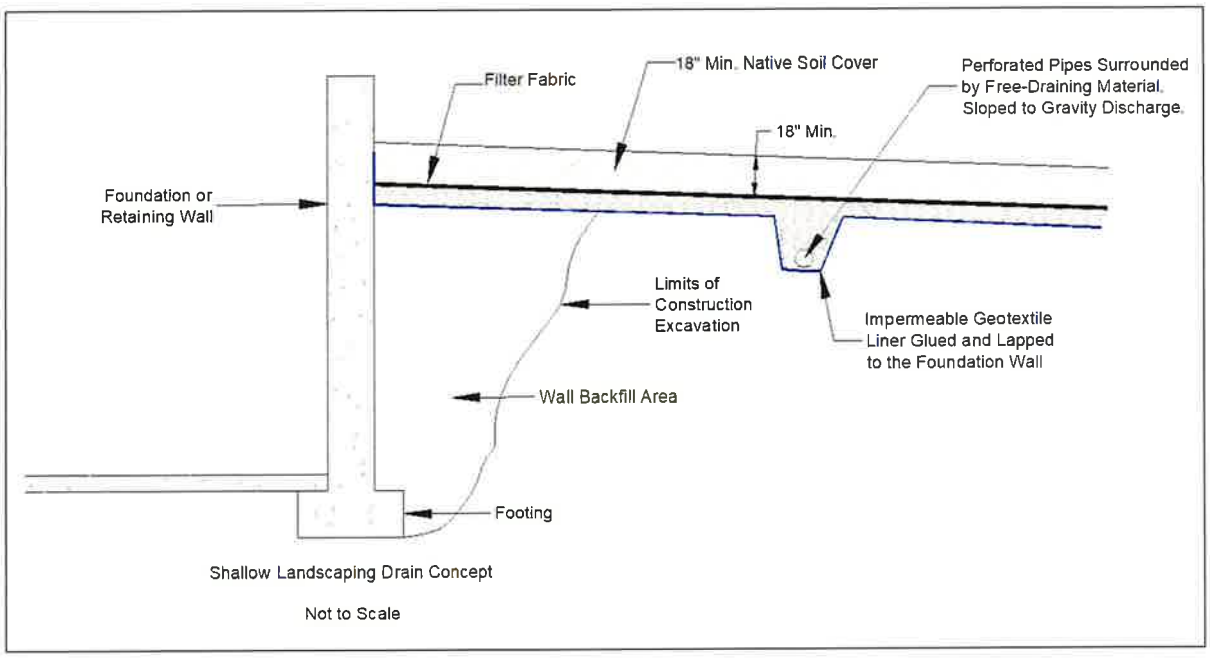
The following recommendations should be following during construction and maintained for the life of the structure with regards to exterior grading and surface drainage.

- The ground surface adjacent to the structure should be sloped to promote water flow away from the foundation system and flatwork.
- Snow storage areas should not be located in areas which will allow for snowmelt water access to support soils for the foundation system or flatwork.
- The project civil engineer, architect or builder should develop a drainage scheme for the site. We typically recommend the ground surface surrounding the exterior of the building be sloped to drain away from the foundation in all directions. We recommend a minimum slope of 12 inches in the first 10 feet in unpaved areas and a minimum slope of 3 inches in the first 10 feet in paved areas.
- Water flow from the roof of the structure should be captured and directed away from the structure. If the roof water is collected in an eave gutter system, or similar, the discharge points of the system must be located away from areas where the water will have access to the foundation backfill or any structure support soils. If downspouts are used, provisions should be made to either collect or direct the water away from the structure.
- Care should be taken to not direct water onto adjacent property or to areas that would negatively influence existing structures or improvements.

10.5 Landscaping Considerations

We recommend against construction of landscaping which requires excessive irrigation. Generally landscaping which uses abundant water requires that the landscaping contractor install topsoil which will retain moisture. The topsoil is often placed in flattened areas near the structure to further trap water and reduce water migration from away from the landscaped areas. Unfortunately, almost all aspects of landscape construction and development of lush vegetation are contrary to the establishment of a relatively dry area adjacent to the foundation walls. Excess water from landscaped areas near the structure can migrate to the foundation system or flatwork support soils, which can result in volume changes in these soils.

A relatively common concept used to collect and subsequently reduce the amount of excess irrigation water is to glue or attach an impermeable geotextile fabric or heavy mill plastic to the foundation wall and extend it below the topsoil which is used to establish the landscape vegetation. A thin layer of sand can be placed on top of the geotextile material to both protect the geotextile from punctures and to serve as a medium to promote water migration to the collection trench and perforated pipe. The landscape architect or contractor should be contacted for additional information regarding specific construction considerations for this concept which is shown in the sketch below.



A free draining aggregate or sand may be placed in the collection trench around the perforated pipe. The perforated pipe should be graded to allow for positive flow of excess irrigation water away from the structure or other area where additional subsurface water is undesired. Preferably the geotextile material should extend at least 10 or more feet from the foundation system.

Care should be taken to not place exterior flatwork such as sidewalks or driveways on soils that have been tilled and prepared for landscaping. Tilled soils will settle which can cause damage to the overlying flatwork. Tilled soils placed on sloped areas often "creep" down-slope. Any structure or structural component placed on this material will move down-slope with the tilled soil and may become damaged.

10.6 Soil Sulfate and Corrosion Issues

The requested scope of our services did not include assessment of the chemical constituents of corrosion potential of the site soils. Most soils in southwest Colorado are not typically corrosive to concrete. There has not been a history of damage to concrete due to sulfate corrosion in the area.

We are available to perform soluble sulfate content tests to assess the corrosion potential of the soils on concrete if desired.

10.7 Radon Issues

The requested scope of service of this report did not include assessment of the site soils for radon production. Many soils and formational materials in western Colorado produce Radon gas. The structure should be appropriately ventilated to reduce the accumulation of Radon gas in the structure. Several Federal Government agencies including the Environmental Protection Agency (EPA) have information and guidelines available for Radon considerations and home construction. If a radon survey of the site soils is desired, please contact us.

10.8 Mold and Other Biological Contaminants

Our services do not include determining the presence, prevention or possibility of mold or other biological contaminants developing in the future. If the client is concerned about mold or other biological contaminants, a professional in this special field of practice should be consulted.

11.0 CONSTRUCTION MONITORING AND TESTING

Engineering observation of subgrade bearing conditions, compaction testing of fill material and testing of foundation concrete are equally important tasks that should be performed by the geotechnical engineering consultant during construction. We should be contacted during the construction phase of the project and/or if any questions or comments arise as a result of the information presented below. It is common for unforeseen, or otherwise variable subsurface soil and water conditions to be encountered during construction. As discussed in our proposal for our services, it is imperative that we be contacted during the foundation excavation stage of the project to verify that the conditions encountered in our field exploration were representative of those encountered during construction. Our general recommendations for construction monitoring and testing are provided below.

- Consultation with design professionals during the design phases: This is important to ensure that the intentions of our recommendations are properly incorporated in the design, and that any changes in the design concept properly consider geotechnical aspects.
- Grading Plan Review: A grading plan was not available for our review at the time of this report. A grading plan with finished floor elevations for the proposed construction should be prepared by a civil engineer licensed in the State of Colorado. Trautner Geotech should be provided with grading plans once they are complete to determine if our recommendations based on the assumed bearing elevations are appropriate.
- Observation and monitoring during construction: A representative of the Geotechnical engineer from our firm should observe the foundation excavation, earthwork, and foundation phases of the work to determine that subsurface conditions are compatible with those used in the analysis and design and our recommendations have been properly implemented. Placement of backfill should be observed and tested to judge whether the proper placement conditions have been achieved. Compaction tests should be performed on each lift of material placed in areas proposed for support of structural components.

- We recommend a representative of the geotechnical engineer observe the drain and dampproofing phases of the work to judge whether our recommendations have been properly implemented.
- If asphaltic concrete is placed for driveways or aprons near the structure we are available to provide testing of these materials during placement.

12.0 CONCLUSIONS

While we feel that it is feasible to develop this site as planned using relatively conventional techniques we feel that it is prudent for us to be part of the continuing design of this project to review and provide consultation in regard to the proposed development scheme as the project progresses to aid in the proper interpretation and implementation of the recommendations presented in this report. This consultation should be incorporated in the project development prior to construction at the site.

13.0 LIMITATIONS

This study has been conducted based on the geotechnical engineering standards of care in this area at the time this report was prepared. We make no warranty as to the recommendations contained in this report, either expressed or implied. The information presented in this report is based on our understanding of the proposed construction that was provided to us and on the data obtained from our field and laboratory studies. Our recommendations are based on limited field and laboratory sampling and testing. Unexpected subsurface conditions encountered during construction may alter our recommendations. We should be contacted during construction to observe the exposed subsurface soil conditions to provide comments and verification of our recommendations.

The recommendations presented above are intended to be used only for this project site and the proposed construction which was provided to us. The recommendations presented above are not suitable for adjacent project sites, or for proposed construction that is different than that outlined for this study.

This report provides geotechnical engineering design parameters, but does not provide foundation design or design of structure components. The project architect, designer or structural engineer must be contacted to provide a design based on the information presented in this report.

This report does not provide an environmental assessment nor does it provide environmental recommendations such as those relating to Radon or mold considerations. If recommendation relative to these or other environmental topics are needed and environmental specialist should be contacted.

The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. In addition, changes in applicable or appropriate standards can occur, whether they result from legislation or the broadening of knowledge. Therefore, the recommendations presented in this report should not be relied upon after a period of two years from the issue date without our review.

We are available to review and tailor our recommendations as the project progresses and additional information which may influence our recommendations becomes available.

Please contact us if you have any questions, or if we may be of additional service.

Respectfully,
TRAUTNER GEOTECH

Tom R. Harrison, P.E.
Geotechnical Engineer

APPENDIX A

Field Study Results

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 7 feet
Location	: See Figure in Report

LOG OF BORING TB-1

Cascade Village Townhomes- South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	SANDY,SILTY LEAN CLAY WITH ORGANICS; soft to medium stiff, moist, dark brown.	CL					
3	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense, moist, brown.	GC			9/6 13/6		
7	SANDSTONE BOULDER OR FORMATION; very hard, dry, brown to gray.	SS					
	Practical auger drilling refusal on sandstone boulder or formation at 7 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 13 feet
Location	: See Figure in Report

LOG OF BORING TB-2

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–2	SANDY LEAN CLAY WITH ORGANICS; medium stiff, moist, dark brown.	CL			6/6		
2–3					10/6		
3–4	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense to dense to very dense, slightly moist to moist, brown.	GC					
4–5					9/6		
5–6					11/6		
6–7					12/6		
7–9							
9–10					25/6		
10–11					39/6		Very dense at 10 feet.
11–12					40/6		
12–13	FRACTURED SANDSTONE FORMATION; very hard, dry, brown.	SS					
13	Practical auger drilling refusal on sandstone formation at 13 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 10 feet
Location	: See Figure in Report

LOG OF BORING TB-3

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	SANDY LEAN CLAY WITH GRAVEL; few organics, stiff to very stiff, slightly moist, dark brown.	CL			12/6 16/6		
6	CLAYEY, SANDY GRAVEL WITH COBBLES; dense, slightly moist, brown.	GC					
8	FRACTURED SANDSTONE FORMATION; very hard, dry, tan to grey.	SS					
10	Practical auger drilling refusal on sandstone formation at 10 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Jacob Vaughn
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 21 feet
Location	: See Figure in Report

LOG OF BORING TB-4

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–3	SANDY SILTY LEAN CLAY WITH ORGANICS; few gravels, soft to medium stiff, moist, dark brown.	CL					
4–15	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense to dense, slightly moist, brown.	GC			4/6 9/6 6/6 14/6 12/6		intermittent CL seams from 6 feet to 11 feet. dense at 11.5 feet
15–20	FRACTURED SANDSTONE FORMATION; hard, dry, brown to grey.	SS					
20–21	SANDSTONE FORMATION; very hard, dry, brown to grey.	SS					
21	Practical auger drilling refusal on sandstone formation at 21 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 16.5 feet
Location	: See Figure in Report

LOG OF BORING TB-5

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–2	SANDY LEAN CLAY WITH ORGANICS; medium stiff, slightly moist, dark brown.	CL					
2–16	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense to dense, moist, brown.	GC					
16–17	Practical auger drilling refusal on sandstone formation or boulder at 16.5 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Jacob Vaughn
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/11/2024
Total Depth (approx.)	: 21 feet
Location	: See Figure in Report

LOG OF BORING TB-6

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–3	SANDY SILTY LEAN CLAY WITH ORGANICS; medium stiff, moist, dark brown.	CL					
4–18	CLAYEY, SANDY GRAVEL WITH COBBLES; dense to very dense, moist to slightly moist, brown.	GC			15/6 24/6		dense, slightly moist at 11 feet
18–20	FRACTURED SANDSTONE FORMATION; hard, dry, brown to grey.	SS					
21	Practical auger drilling refusal on sandstone formation at 20.5 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Jacob Vaughn
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/12/2024
Total Depth (approx.)	: 11 feet
Location	: See Figure in Report

LOG OF BORING TB-7

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	SANDY,SILTY LEAN CLAY WITH ORGANICS; few gravels, few cobbles, stiff to very stiff, moist, dark brown.	CL			7/6 9/6 7/6 8/6 8/6		
7	CLAYEY, SANDY GRAVEL;few cobbles, medium dense, moist, brown.	GC			8/6		
10	SANDSTONE BOULDER OR FORMATION; very hard, dry, brown.	SS			30/3 bounce		
11	Practical auger drilling refusal on sandstone boulder or formation at 11 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/12/2024
Total Depth (approx.)	: 34 feet
Location	: See Figure in Report

LOG OF BORING TB-8

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–1	SUSPECTED MAN PLACED FILL, SANDY LEAN CLAY WITH ORGANICS AND GRAVEL; soft, moist, dark brown.	CL					Rebar found in suspected man placed fill at .5 feet.
2–8	CLAYEY, SANDY GRAVEL WITH COBBLES;few boulders, medium dense to dense, moist, brown.	GC			18/6 16/6		Boring was offset by 2 feet to the north after refusal on boulder at 4 feet in first boring.
9–32	SANDY LEAN CLAY; few gravels, soft to medium stiff, moist to wet, dark brown.	CL			4/6 4/6 4/6 1/6 1/6 1/6	▽	Subsurface water measure at 18 feet after drilling. Wet and soft at 18 feet.
33	SHALE AND SANDSTONE FORMATION; hard, dry, tan.	SH-SS					
34	Bottom of boring at 34 feet in shale/sanstone formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Jacob Vaughn
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/12/2024
Total Depth (approx.)	: 31 feet
Location	: See Figure in Report

LOG OF BORING TB-9

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–10	SANDY LEAN CLAY WITH GRAVEL; few organics, medium stiff to stiff, moist to very moist, dark brown.	CL			7/6 7/6 2/6 2/6 2/6		Soft and very moist at 8 feet.
16						▽	Subsurface water measure at 16 feet after drilling.
20–30	CLAYEY, SANDY GRAVEL WITH COBBLES; loose to medium dense , wet, brown.	GC			3/6 5/6 7/6		
30–31	SANDSTONE FORMATION; hard, dry, tan.	SS					
31	Bottom of boring at 31 feet in sandstone formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/12/2024
Total Depth (approx.)	: 28 feet
Location	: See Figure in Report

LOG OF BORING TB-10

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–19	SANDY LEAN CLAY WITH ORGANICS; few gravels,very soft to stiff, moist to wet, dark brown to brown.	CL			5/6 7/6 W.O.H./6 2/12	▽	Stiff and brown at 3 feet. Very soft to soft and moist to very moist at 6 feet. W.O.H.= weight of hammer. Wet at 10 feet. Subsurface water measure at 10 feet after drilling.
20–26	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense , wet, brown.	GC					
27	SANDSTONE FORMATION; hard, dry, grey.	SS					
28	Bottom of boring at 28 feet in sandstone formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/12/2024
Total Depth (approx.)	: 29 feet
Location	: See Figure in Report

LOG OF BORING TB-11

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–21	ORGANIC LEAN CLAY; very soft, very moist to wet, dark brown to black.	OL			W.O.H./6 W.O.H./6	▽	Wetlands soil - Peat to 21.5 feet Subsurface water measure at 2 feet after drilling. W.O.H.= weight of hammer
22–25	CLAYEY, SANDY GRAVEL WITH COBBLES; medium dense, wet, brown to red.	GC					Possible Molas Formation
26–28	SHALE FORMATION; hard, wet, grey.	SH					
29–31	Bottom of boring at 29 feet in shale formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/13/2024
Total Depth (approx.)	: 23 feet
Location	: See Figure in Report

LOG OF BORING TB-12

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–8	ORGANIC LEAN CLAY; very soft, very moist to wet, dark brown.	OL			W.O.H./6 W.O.H./6	▽	Wetlands Soil - Peat to 8 feet Subsurface water measure at 2 feet after drilling. W.O.H.= weight of hammer
8–13	CLAYEY, SANDY GRAVEL WITH ORGANICS; few cobbles, loose, wet, brown.	GC					
13–21	WEATHERED LIMESTONE FORMATION; hard, wet, red to brown.	LS					
21–23	LIMESTONE FORMATION; very hard, dry, red.	LS					
23	Practical auger drilling refusal on limestone formation at 23 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/13/2024
Total Depth (approx.)	: 14 feet
Location	: See Figure in Report

LOG OF BORING TB-13

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	LEAN CLAY WITH ORGANICS; very soft, very moist to wet, dark brown.	CL					
1							
2						▽	Subsurface water measure at 2 feet after drilling.
3							
4					W.O.H./6 W.O.H./6		W.O.H.= weight of hammer
5	WEATHERED LIMESTONE FORMATION; hard, wet, red to brown.	LS					
6							
7							
8							
9	LIMESTONE FORMATION; very hard, dry, red.				15/6 19/6		
10					29/6		
11		LS					
12							
13							
14	Bottom of boring at 14 feet in limestone formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/13/2024
Total Depth (approx.)	: 12 feet
Location	: See Figure in Report

LOG OF BORING TB-14

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0	SANDY LEAN CLAY; medium stiff to stiff, moist, brown.	CL					
4	SANDY GRAVEL AND COBBLE; slightly clayey, dense, moist to very moist, red to brown.	GC			14/6 26/6		Possible weathered Molas formation.
12	Bottom of boring at 12 feet in limestone formation.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/13/2024
Total Depth (approx.)	: 14 feet
Location	: See Figure in Report

LOG OF BORING TB-15

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–4	LEAN CLAY WITH ORGANICS; soft, moistto very moist, dark brown.	CL			8/6 11/6		
4–12	CLAYEY, SANDY GRAVEL AND COBBLE; medium dense to dense, very moist, brown.	GC					
12–14	LIMESTONE FORMATION; hard, dry, red to brown.	LS					
14	Bottom of boring in limestone formation at 14 feet.						

TRAUTNER GEOTECH LLC

Field Engineer	: Tom Harrison
Hole Diameter	: 4" Solid
Drilling Method	: Continuous Flight Auger
Sampling Method	: Mod. California Sampler
Date Drilled	: 12/13/2024
Total Depth (approx.)	: 11 feet
Location	: See Figure in Report

LOG OF BORING TB-16

Cascade Village Townhomes-South
Durango, Colorado
Lauren Davis, AIA,AICP.
ldavis@ra-ae.com

58656 GE

Sample Type
- Mod. California Sampler
- Standard Split Spoon
- Bag Sample

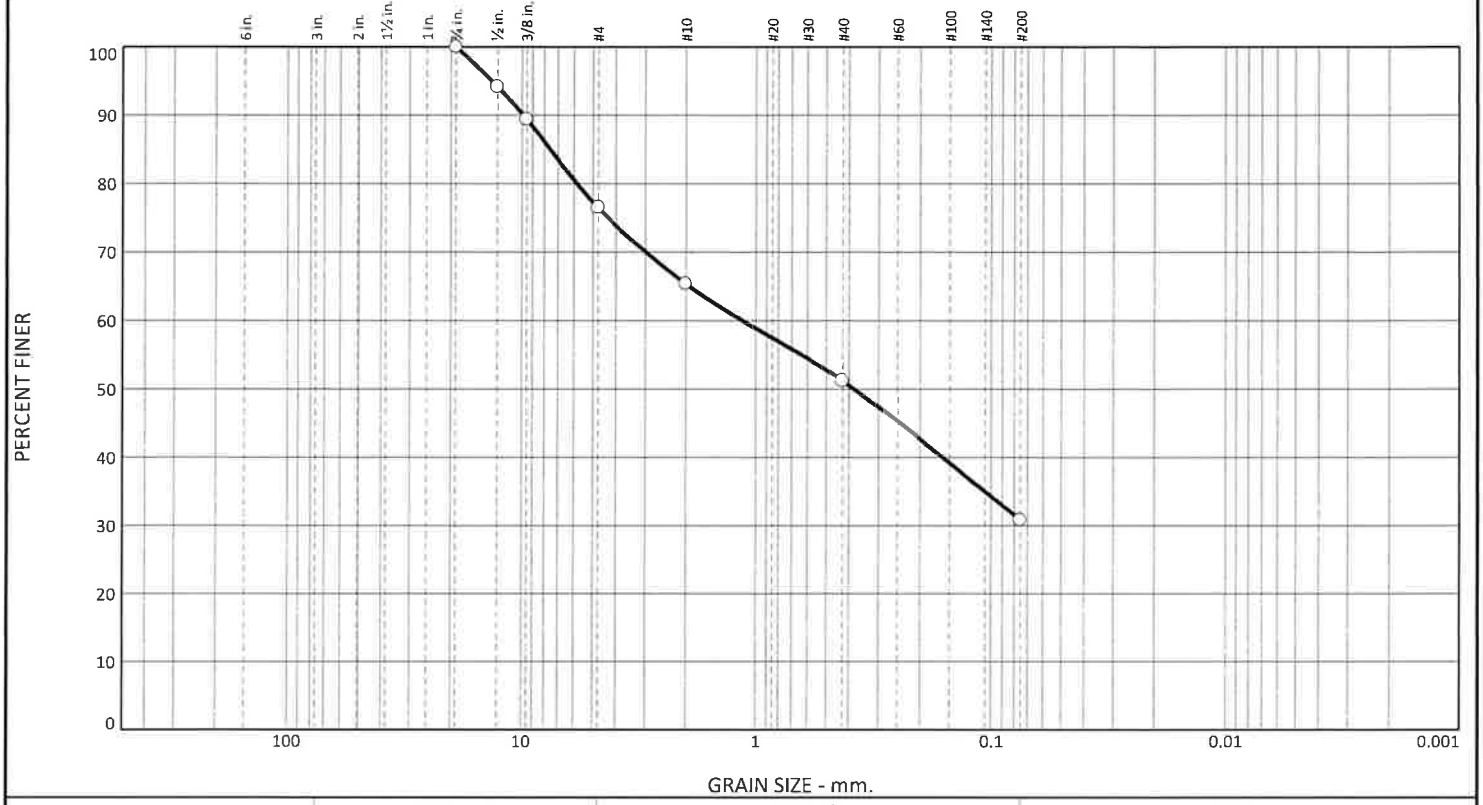
Water Level
- Water Level During Drilling
- Water Level After Drilling

Depth in feet	DESCRIPTION	USCS	GRAPHIC	Samples	Blow Count	Water Level	REMARKS
0–4	LEAN CLAY WITH ORGANICS; slightly sandy, soft, very moist to wet, dark brown.	CL			3/6 2/6	▽	Subsurface water measure at 4 feet after drilling.
8–10	CLAYEY, SANDY GRAVEL AND COBBLE; medium dense, wet, brown.	GC			10/6 11/6 11/6		
10–11	LIMESTONE FORMATION; hard, dry, red to brown.	LS					
11	Bottom of boring in limestone formation at 11 feet.						

APPENDIX B

Laboratory Test Results

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.6	11.0	14.2	20.4	30.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	94.1		
3/8"	89.4		
#4	76.4		
#10	65.4		
#40	51.2		
#200	30.8		

* (no specification provided)

Soil Description

SC - clayey sand with gravel

Atterberg Limits

PL= 13 LL= 23 PI= 10

Coefficients

D_{90}= 9.8722 D_{85}= 7.5522 D_{60}= 1.1420
D_{50}= 0.3805 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Boring 2 **Depth:** 5' - 9'
Sample Number: 13335-F

Date: 12/13/2024

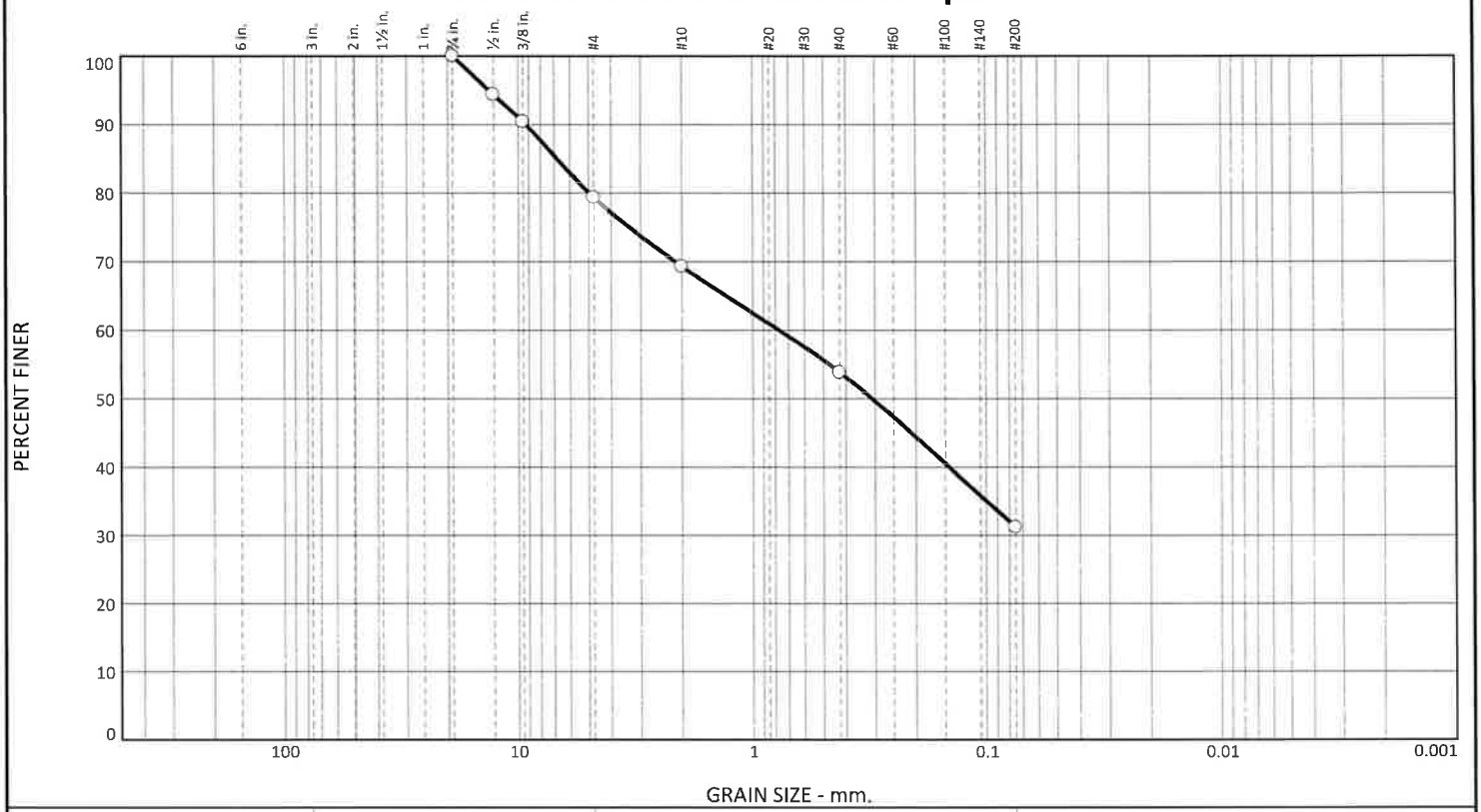
TRAUTNER GEOTECH LLC

Client: REYNOLDS ASH + ASSOCIATES
Project: Cascade Village Townhomes South

Project No: 58656GE **Figure** B.1

Tested By: N. Granda **Checked By:** J. Vaughn

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.7	10.0	15.5	22.6	31.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	94.3		
3/8"	90.4		
#4	79.3		
#10	69.3		
#40	53.8		
#200	31.2		

* (no specification provided)

Soil Description

SC - clayey sand with gravel

Atterberg Limits

PL= 14 LL= 22 PI= 8

Coefficients

D_{90}= 9.2634 D_{85}= 6.8118 D_{60}= 0.7699
D_{50}= 0.3090 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-4(0)

Remarks

Source of Sample: Test Boring 5 **Depth:** 3.5' - 8.5'
Sample Number: 13335-Q

Date: 12/13/2024

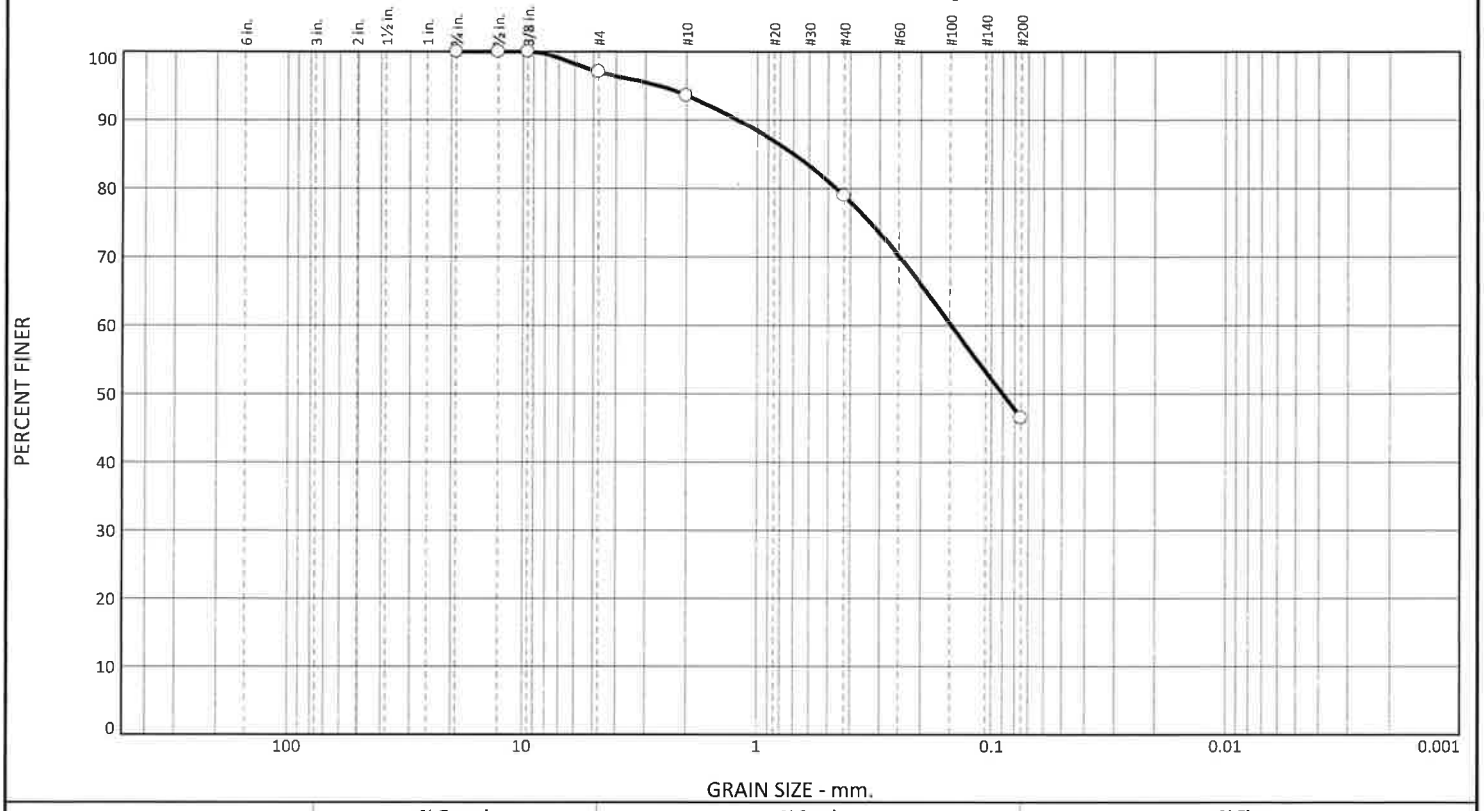
TRAUTNER GEOTECH LLC

Client: REYNOLDS ASH + ASSOCIATES
Project: Cascade Village Townhomes South

Project No: 58656GE **Figure** B.2

Tested By: N. Granda **Checked By:** J. Vaughn

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	3.4	14.7	32.4	46.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	100.0		
3/8"	100.0		
#4	97.0		
#10	93.6		
#40	78.9		
#200	46.5		

* (no specification provided)

Soil Description

SC - clayey sand

Atterberg Limits

PL= 19 LL= 32 PI= 13

Coefficients

D_{90}= 1.2149 D_{85}= 0.7007 D_{60}= 0.1485
D_{50}= 0.0901 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Source of Sample: Test Boring 9 **Depth:** 5' - 9'
Sample Number: 13335-GA

Date: 12/13/2024

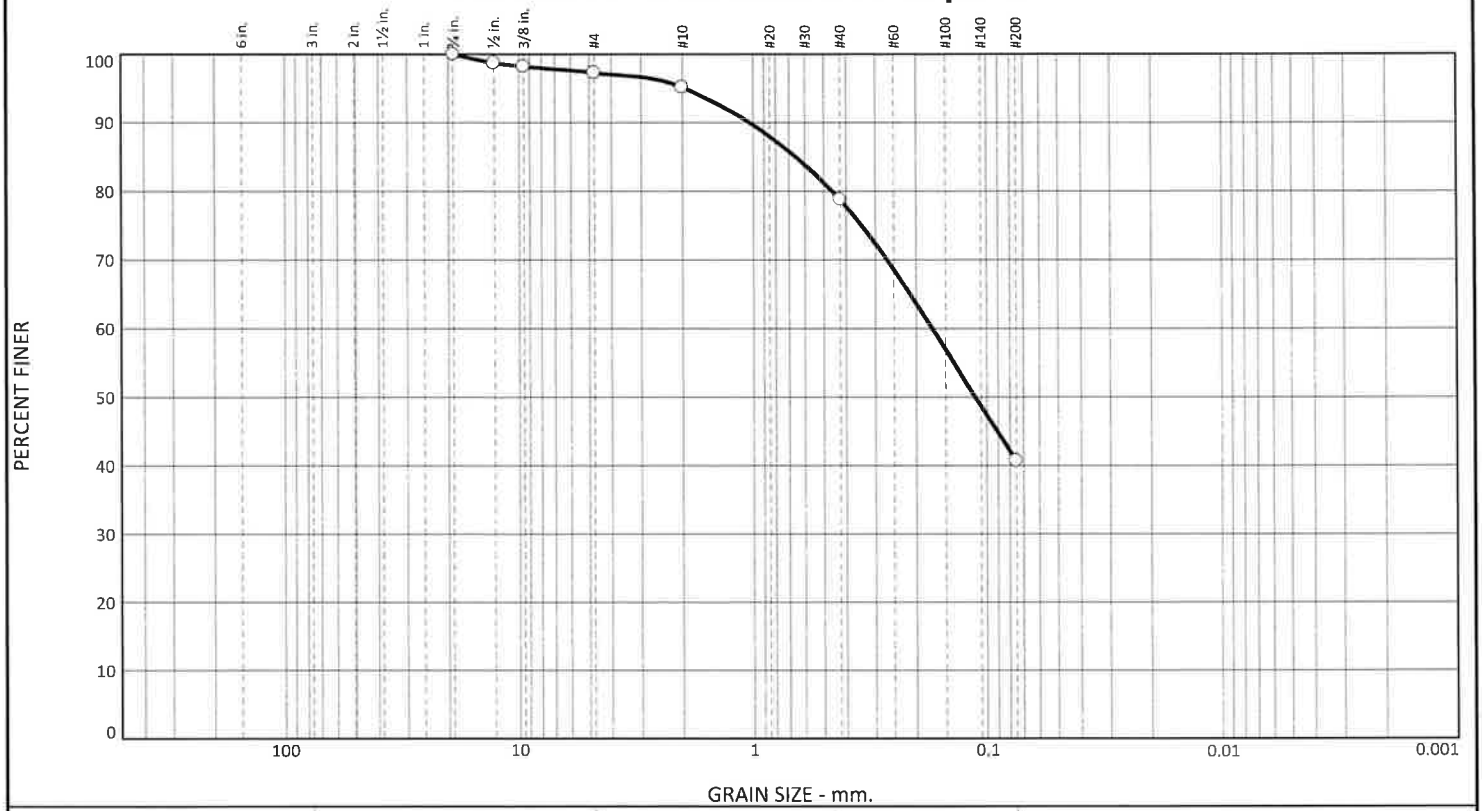
TRAUTNER GEOTECH LLC

Client: REYNOLDS ASH + ASSOCIATES
Project: Cascade Village Townhomes South

Project No: 58656GE **Figure** B.3

Tested By: N. Granda/N. Ellis **Checked By:** J. Vaughn

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	2.2	16.4	38.0	40.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.7		
3/8"	98.2		
#4	97.3		
#10	95.1		
#40	78.7		
#200	40.7		

* (no specification provided)

Soil Description

SC - clayey sand

Atterberg Limits

PL= 22 LL= 38 PI= 16

Coefficients

D_{90}= 1.0389 D_{85}= 0.6577 D_{60}= 0.1714
D_{50}= 0.1125 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-6(3)

Remarks

Source of Sample: Test Boring 10 **Depth:** 4.5' - 8.5'
Sample Number: 13335-JA

Date: 12/13/2024

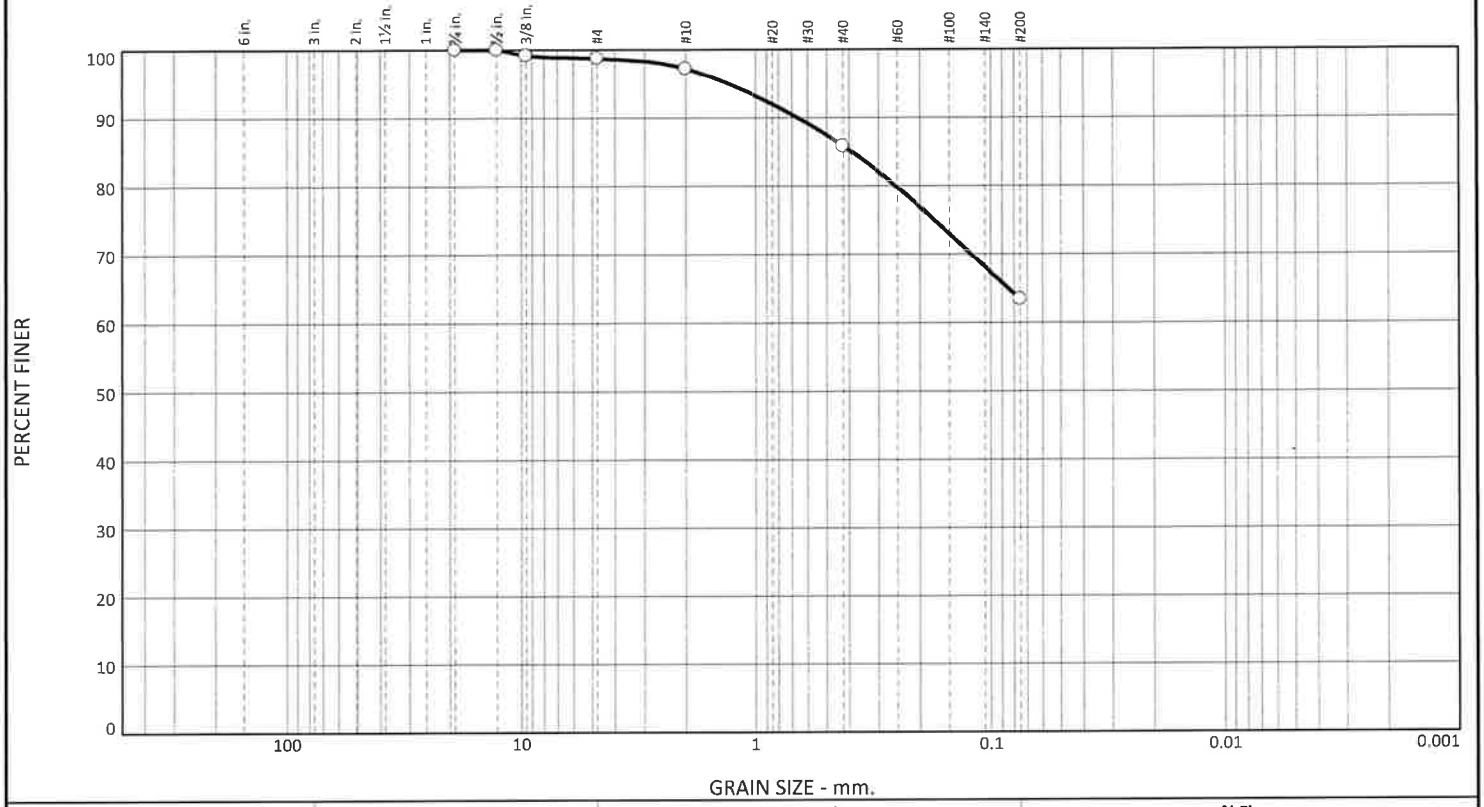
TRAUTNER GEOTECH LLC

Client: REYNOLDS ASH + ASSOCIATES
Project: Cascade Village Townhomes South

Project No: 58656GE **Figure** B.4

Tested By: N. Granda **Checked By:** J. Vaughn

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.3	1.5	11.3	22.5	63.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	100.0		
3/8"	99.2		
#4	98.7		
#10	97.2		
#40	85.9		
#200	63.4		

* (no specification provided)

Soil Description

CL - sandy lean clay

Atterberg Limits

PL= 20 LL= 42 PI= 22

Coefficients

D_{90}= 0.6618 D_{85}= 0.3907 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(12)

Remarks

Source of Sample: Test Boring 15 **Depth:** 0' - 3.5'
Sample Number: 13335-QA

Date: 12/13/2024

TRAUTNER GEOTECH LLC

Client: REYNOLDS ASH + ASSOCIATES
Project: Cascade Village Townhomes South

Project No: 58656GE **Figure** B.6

Tested By: N. Granda **Checked By:** J. Vaughn

TRAUTNER GEOTECH LLC
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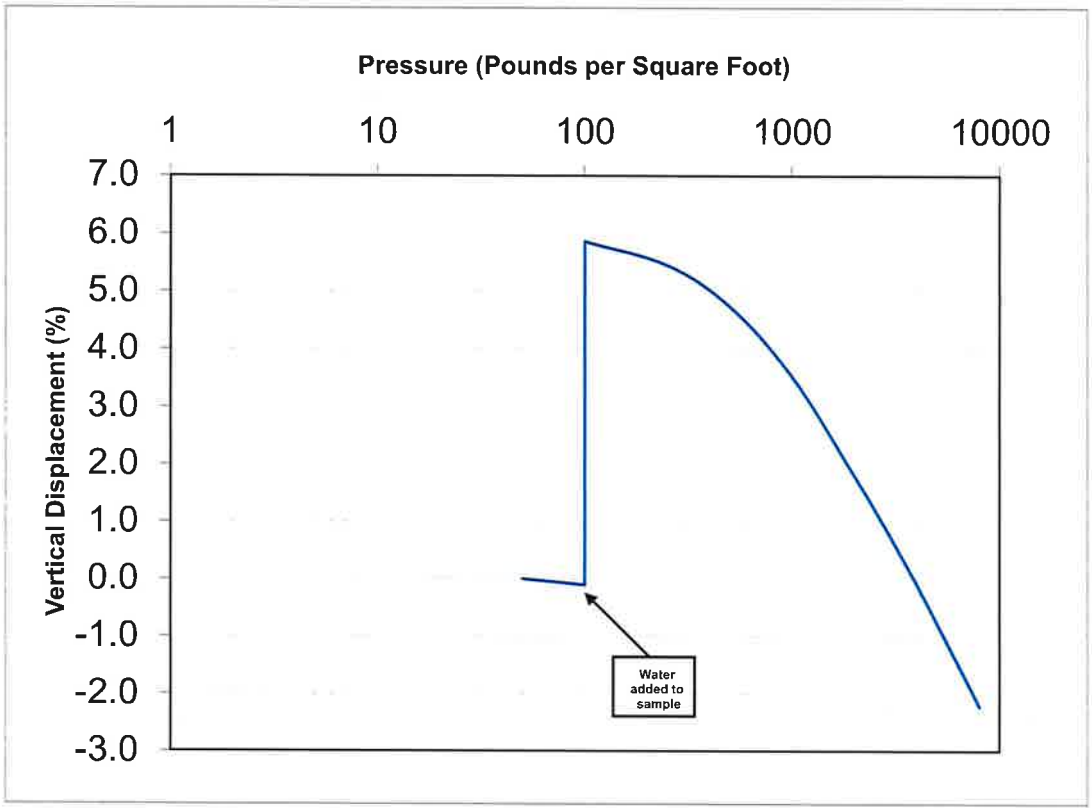
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



SUMMARY OF TEST RESULTS		
Sample Source:	TB-1 @ 3'	
Visual Soil Description:	CL	
Swell Potential (%)	6.0%	
Estimated Load-Back Swell Pressure (lb/ft^2):	4,000	
	Initial	**Final**
Moisture Content (%):	8.2	18.7
Dry Density (lb/ft^3):	112.7	114.5
Height (in.):	0.989	0.967
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	58656 GE
Sample ID:	13335-B
Figure:	B.8

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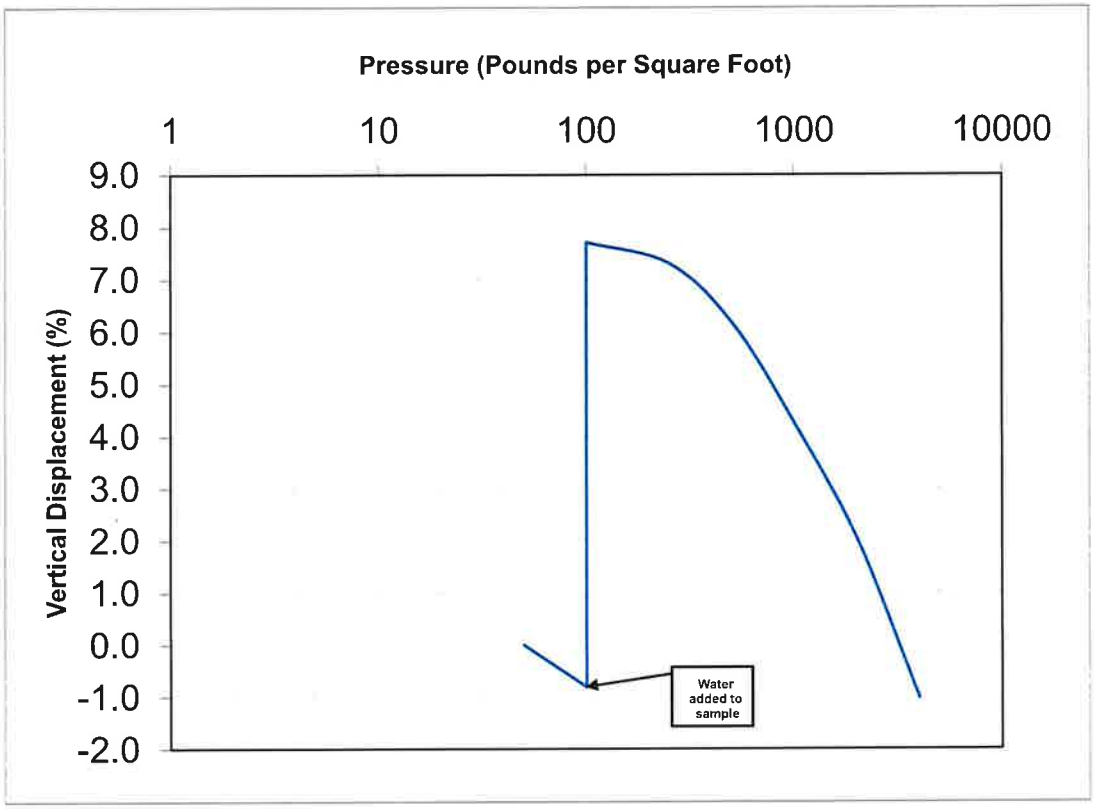
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



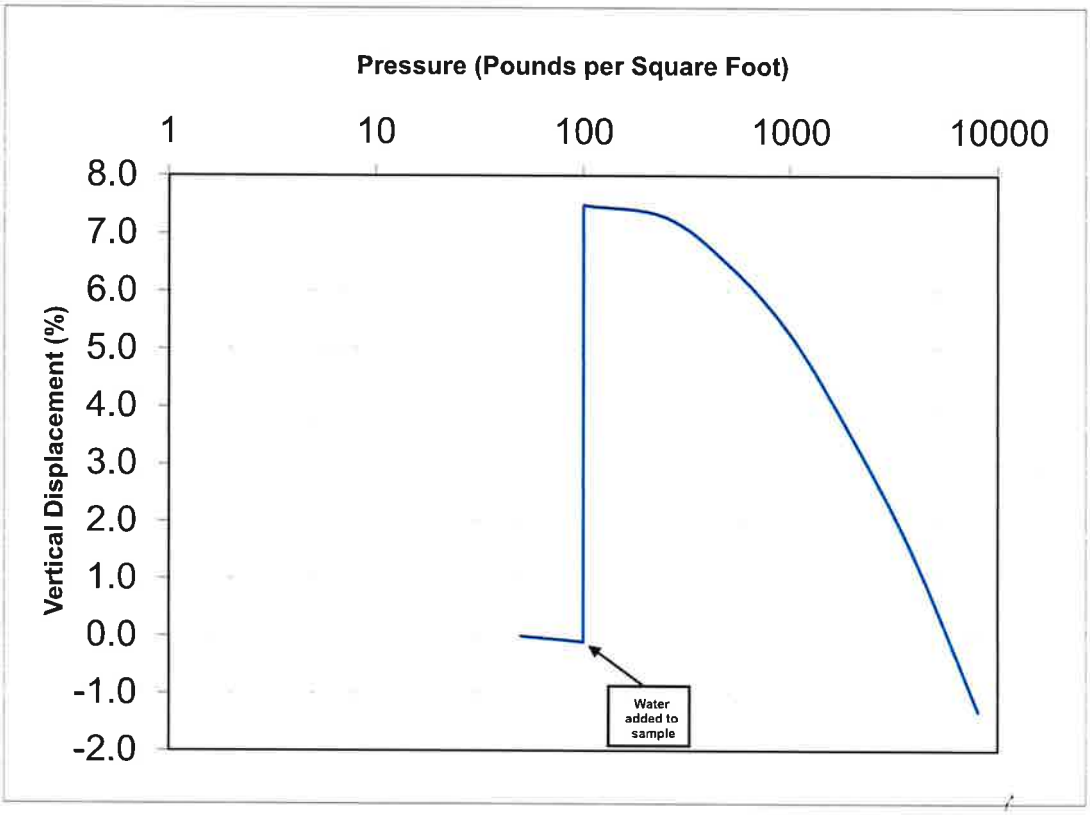
SUMMARY OF TEST RESULTS		
Sample Source:	TB-2 @ 2'	
Visual Soil Description:	CL-ML	
Swell Potential (%)	8.5%	
Estimated Load-Back Swell Pressure (lb/ft^2):	3,370	
	Initial	**Final**
Moisture Content (%):	12.9	34.9
Dry Density (lb/ft^3):	86.8	87.3
Height (in.):	0.985	0.975
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	58656 GE
Sample ID:	13335-D
Figure:	B.9

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



SUMMARY OF TEST RESULTS		
Sample Source:	TB-3 @ 3.5	
Visual Soil Description:	CL	
Swell Potential (%)	7.6%	
Estimated Load-Back Swell Pressure (lb/ft^2):	5,000	
	Initial	**Final**
Moisture Content (%):	10.0	19.2
Dry Density (lb/ft^3):	112.8	114.3
Height (in.):	0.988	0.975
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	58656 GE
Sample ID:	13335-I
Figure:	B.10

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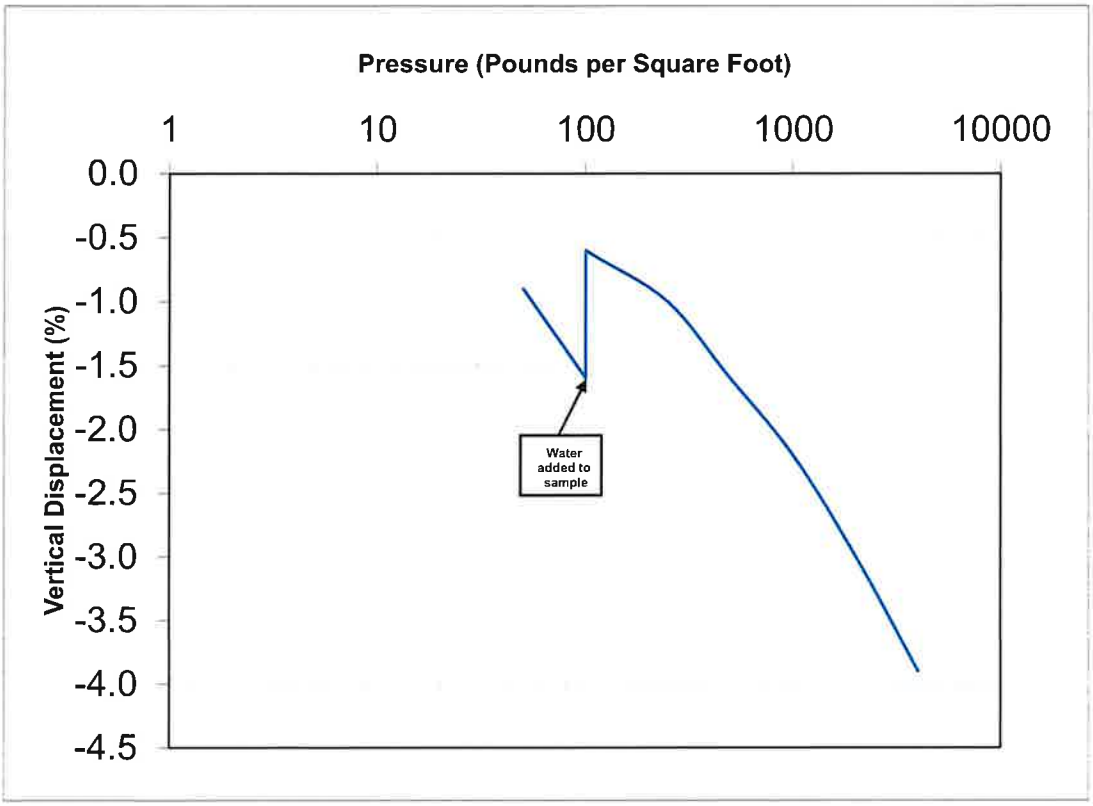
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST

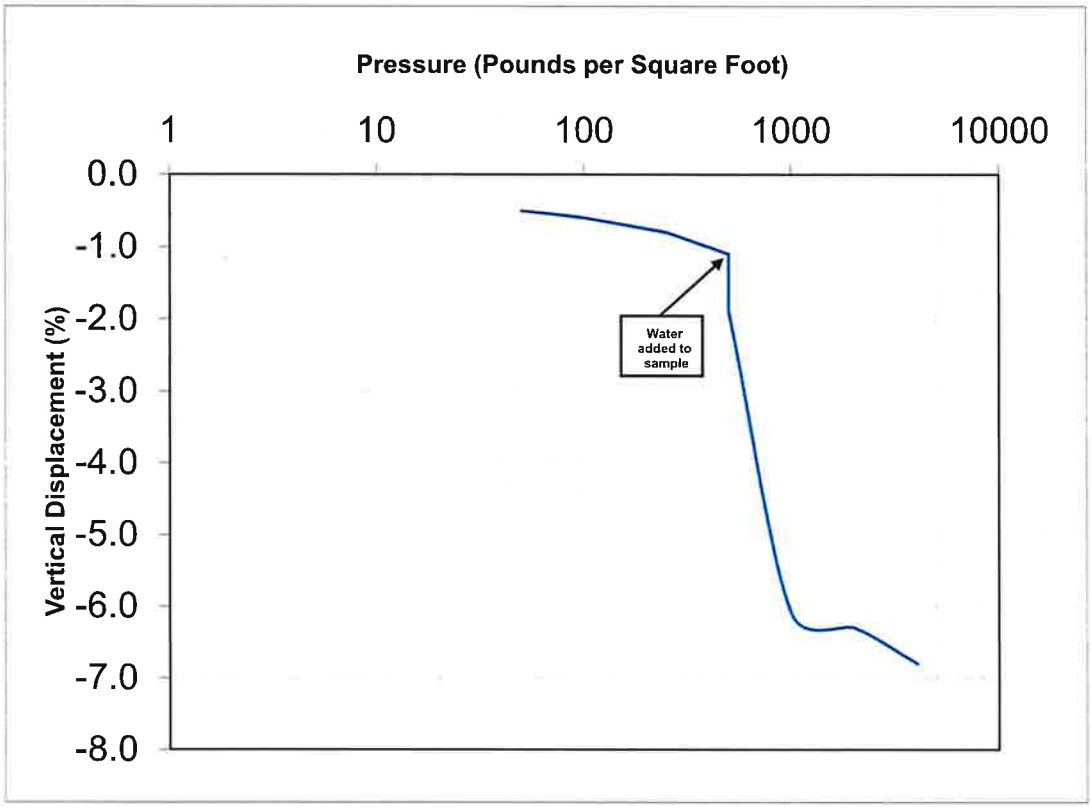


SUMMARY OF TEST RESULTS		
Sample Source:	TB-4 @ 4'	
Visual Soil Description:	GC	
Swell Potential (%)	1.0%	
Estimated Load-Back Swell Pressure (lb/ft^2):	640	
	Initial	Final
Moisture Content (%):	11.1	17.4
Dry Density (lb/ft^3):	118.6	117.8
Height (in.):	1.000	0.961
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-L
Figure:	B.11

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST

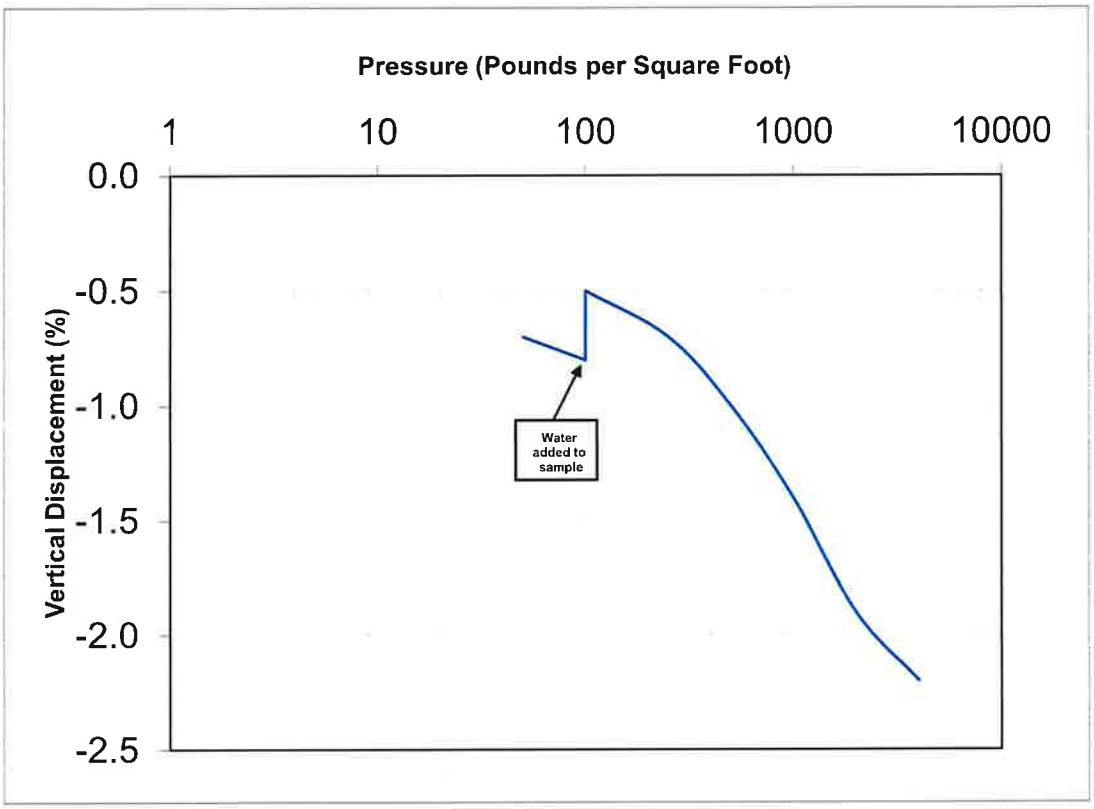


SUMMARY OF TEST RESULTS		
Sample Source:	TB-6 @ 8.5'	
Visual Soil Description:	GC	
Swell Potential (%)	-0.8%	
Estimated Load-Back Swell Pressure (lb/ft^2):	0	
	Initial	**Final**
Moisture Content (%):	6.4	7.1
Dry Density (lb/ft^3):	140.7	151.0
Height (in.):	1.000	0.932
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-T
Figure:	B.12

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST

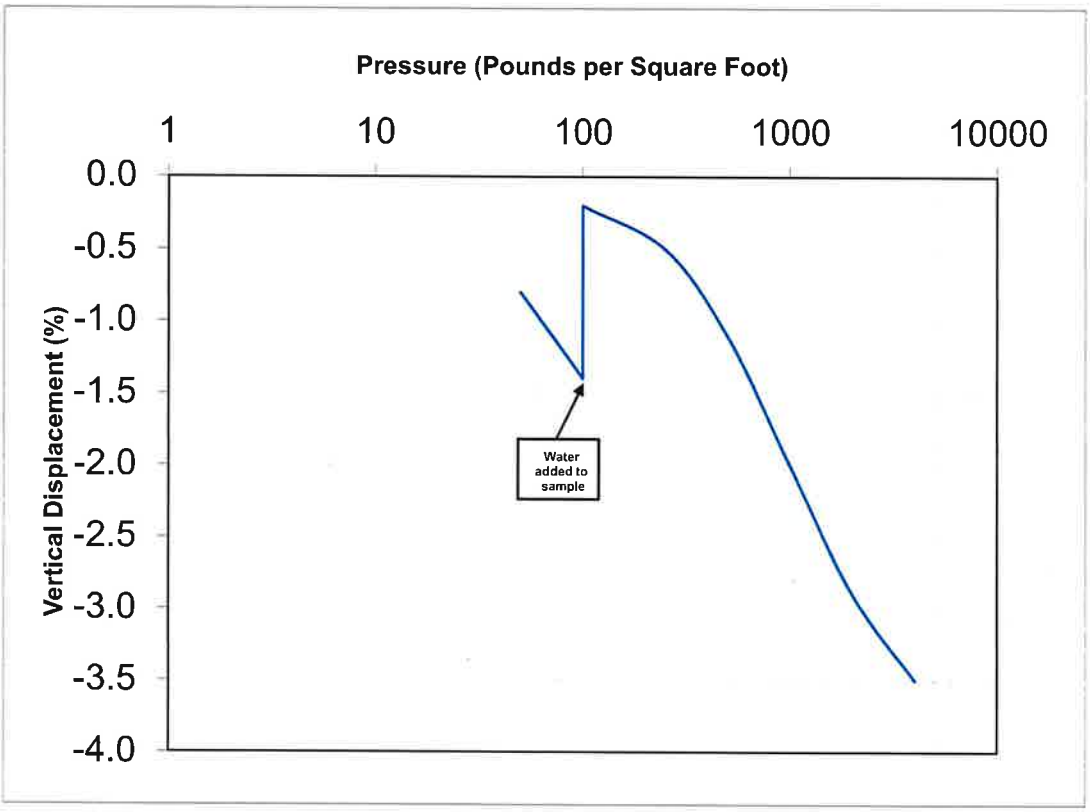


SUMMARY OF TEST RESULTS		
Sample Source:	TB-7 @ 2'	
Visual Soil Description:	SC	
Swell Potential (%)	0.3%	
Estimated Load-Back Swell Pressure (lb/ft^2):	350	
	Initial	Final
Moisture Content (%):	12.7	10.7
Dry Density (lb/ft^3):	125.7	132.9
Height (in.):	1.000	0.978
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-U
Figure:	B.13

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST

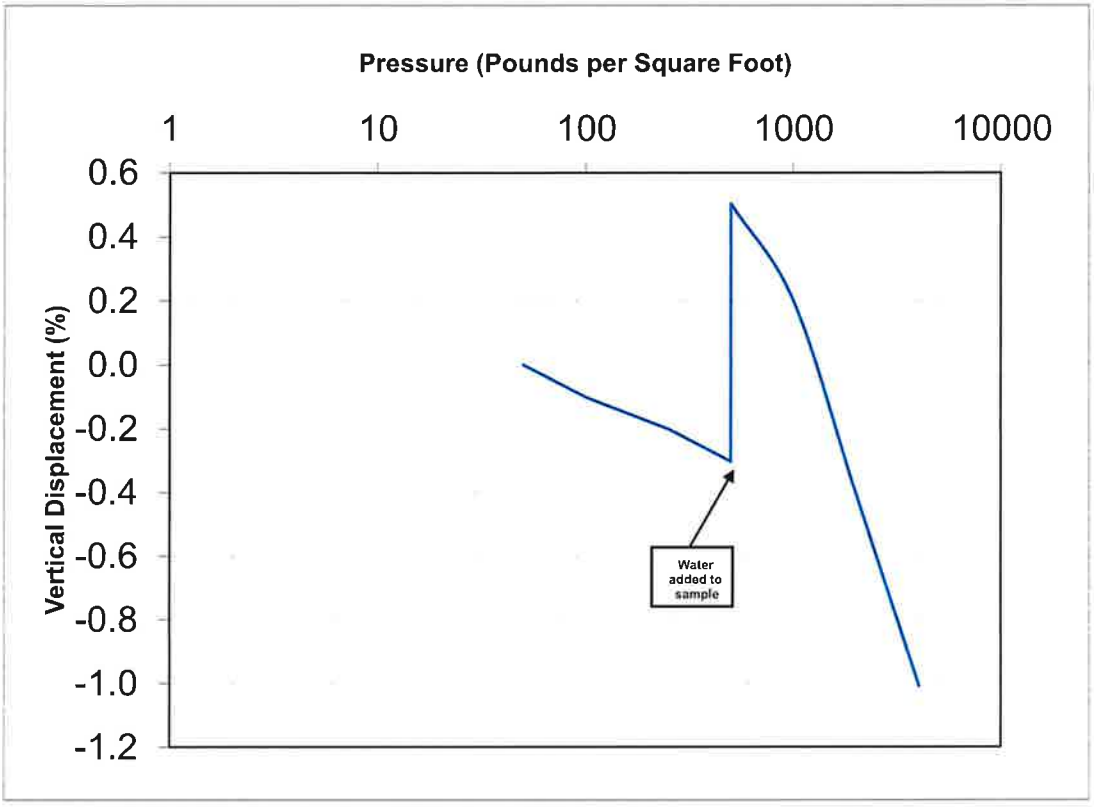


SUMMARY OF TEST RESULTS		
Sample Source:	TB-8 @ 3.5'	
Visual Soil Description:	GC	
Swell Potential (%)	1.2%	
Estimated Load-Back Swell Pressure (lb/ft^2):	720	
	Initial	Final
Moisture Content (%):	5.4	13.3
Dry Density (lb/ft^3):	128.6	129.8
Height (in.):	1.000	0.965
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-Z
Figure:	B.14

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



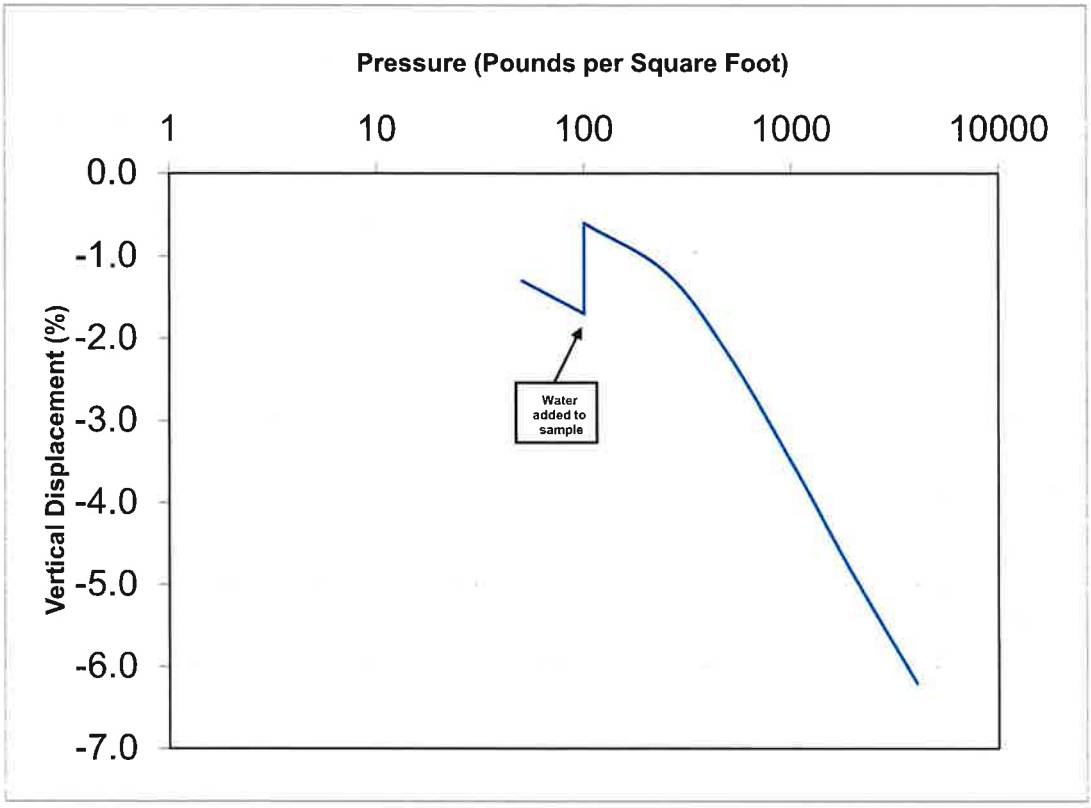
SUMMARY OF TEST RESULTS		
Sample Source:	TB-9 @ 3.5	
Visual Soil Description:	SC	
Swell Potential (%)	0.8%	
Estimated Load-Back Swell Pressure (lb/ft²):	1,860	
	Initial	**Final**
Moisture Content (%):	7.8	14.4
Dry Density (lb/ft³):	119.8	120.7
Height (in.):	0.992	0.982
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	58656 GE
Sample ID:	13335-FA
Figure:	B.15

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

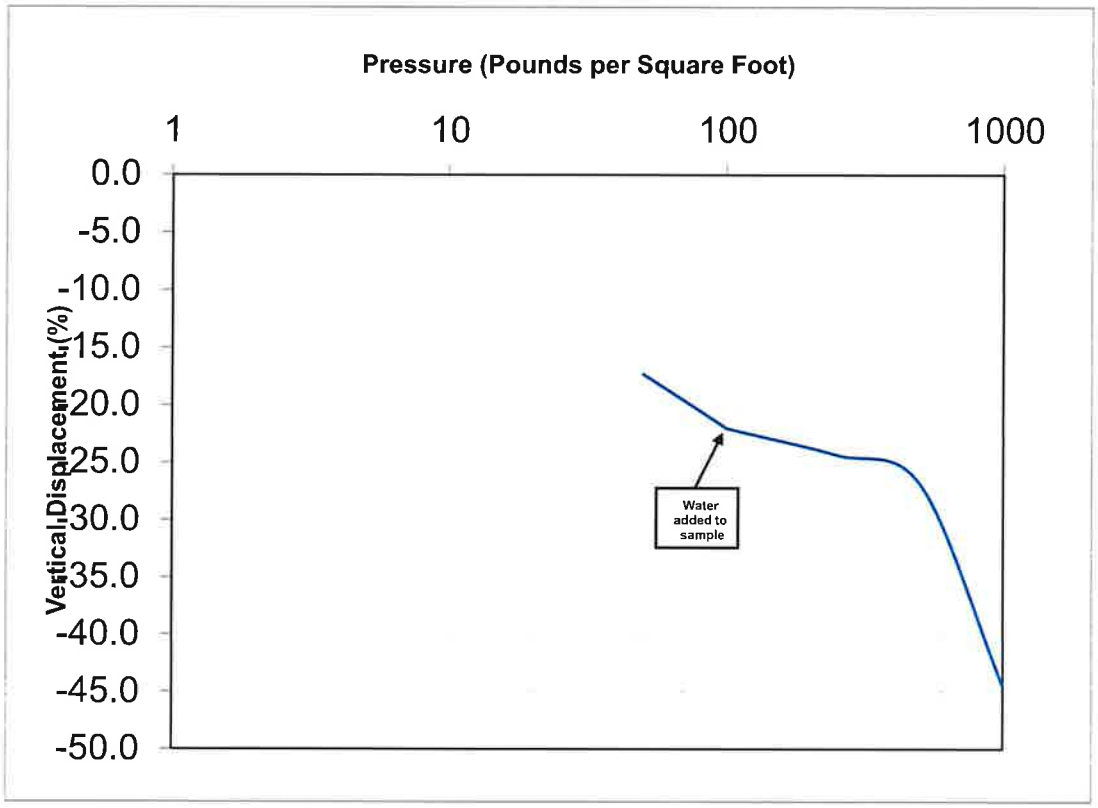
SWELL - CONSOLIDATION TEST



SUMMARY OF TEST RESULTS		
Sample Source:	TB-10 @ 3.5'	
Visual Soil Description:	SC	
Swell Potential (%)	1.1%	
Estimated Load-Back Swell Pressure (lb/ft^2):	360	
	Initial	**Final**
Moisture Content (%):	10.7	19.8
Dry Density (lb/ft^3):	111.0	116.6
Height (in.):	1.000	0.938
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-IA
Figure:	B.16

SWELL - CONSOLIDATION TEST

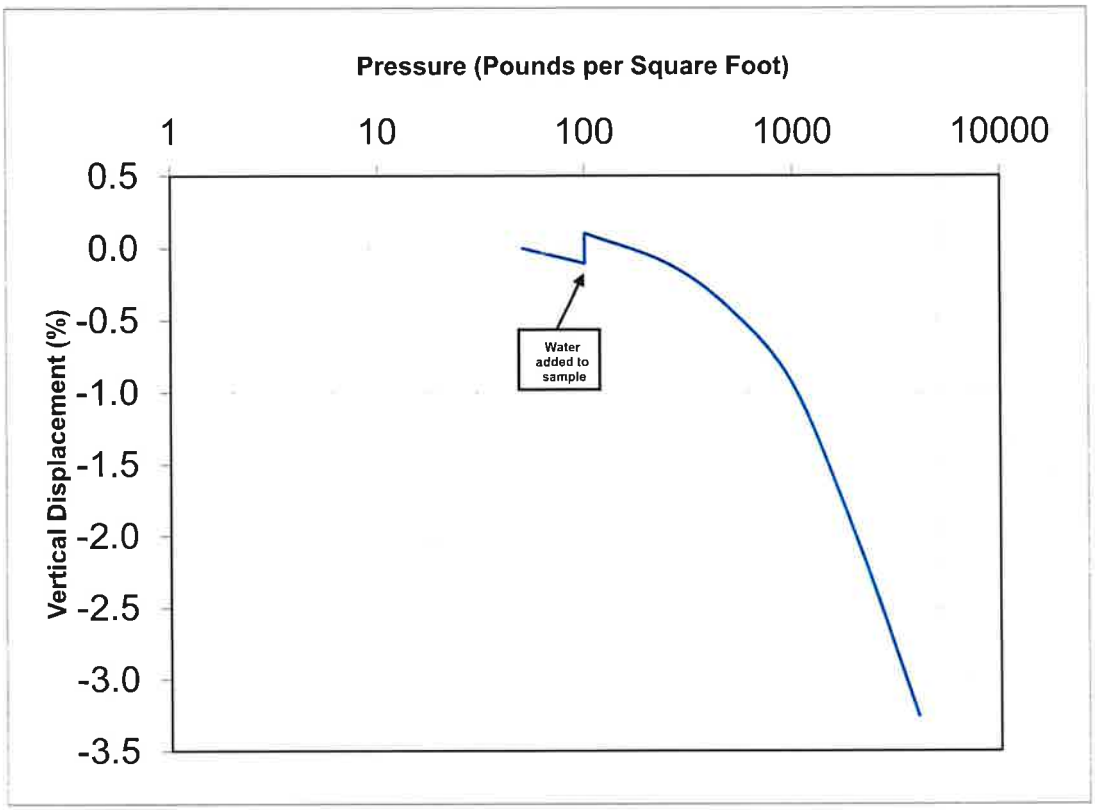


SUMMARY OF TEST RESULTS		
Sample Source:	TB-11 @ 4'	
Visual Soil Description:	OL	
Swell Potential (%)	0.0%	
Estimated Load-Back Swell Pressure (lb/ft^2):	0	
	Initial	**Final**
Moisture Content (%):	831.2	457.1
Dry Density (lb/ft^3):	7.0	13.0
Height (in.):	1.000	0.555
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-Z
Figure:	B.17

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



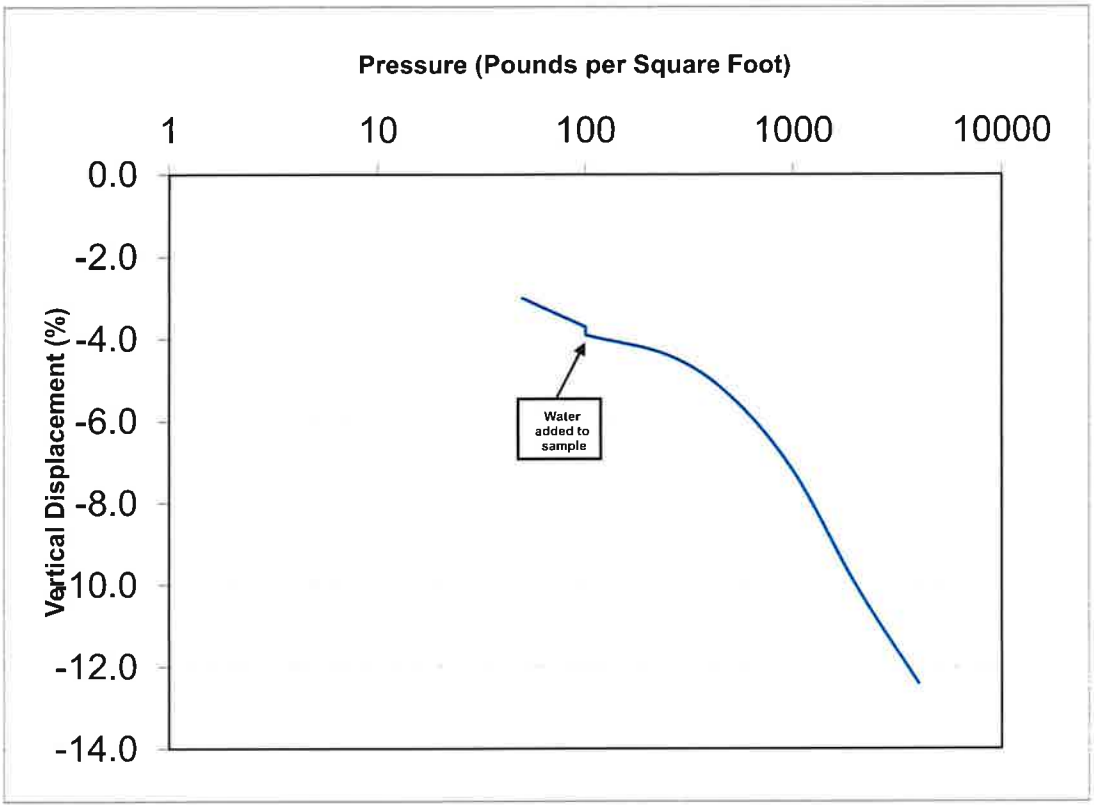
SUMMARY OF TEST RESULTS		
Sample Source:	TB-14 @ 3.5'	
Visual Soil Description:	SC	
Swell Potential (%)	0.2%	
Estimated Load-Back Swell Pressure (lb/ft^2):	270	
	Initial	Final
Moisture Content (%):	5.3	13.0
Dry Density (lb/ft^3):	127.0	130.4
Height (in.):	0.952	0.921
Diameter (in.):	1.94	1.94

Note: Remolded Sample; Molded from the portion of sample passing a #10 sieve. Consolidated under 500 PSF prior to initiating load sequence and wetting. Initial values represent the conditions under 50 PSF following the pre-consolidation under 500 PSF.

Project Number:	58656 GE
Sample ID:	13335-OA
Figure:	B.19

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST

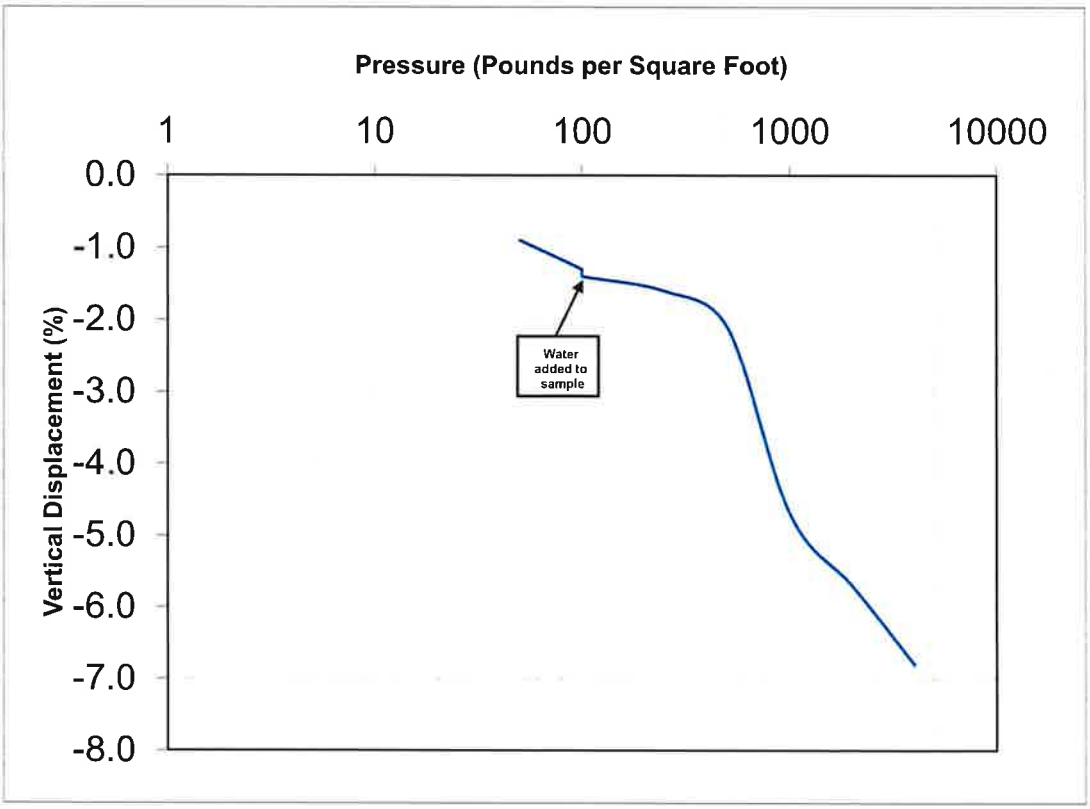


SUMMARY OF TEST RESULTS		
Sample Source:	TB-15 @ 3.5'	
Visual Soil Description:	CL	
Swell Potential (%)	-0.2%	
Estimated Load-Back Swell Pressure (lb/ft^2):	0	
	Initial	**Final**
Moisture Content (%):	23.4	23.0
Dry Density (lb/ft^3):	103.2	113.4
Height (in.):	1.000	0.876
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-RA
Figure:	B.20

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

SWELL - CONSOLIDATION TEST



SUMMARY OF TEST RESULTS		
Sample Source:	TB-16 @ 3.5'	
Visual Soil Description:	SC	
Swell Potential (%)	-0.1%	
Estimated Load-Back Swell Pressure (lb/ft^2):	0	
	Initial	Final
Moisture Content (%):	26.0	22.7
Dry Density (lb/ft^3):	99.3	106.6
Height (in.):	1.000	0.932
Diameter (in.):	1.94	1.94

Project Number:	58656 GE
Sample ID:	13335-TA
Figure:	B.21

TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

Residual Direct Shear Test Results:

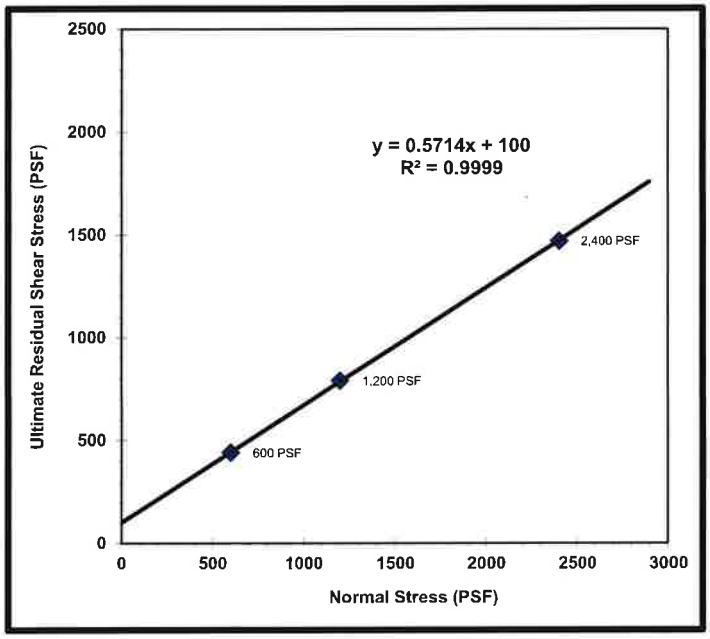
Project: Cascade Village Townhomes-South

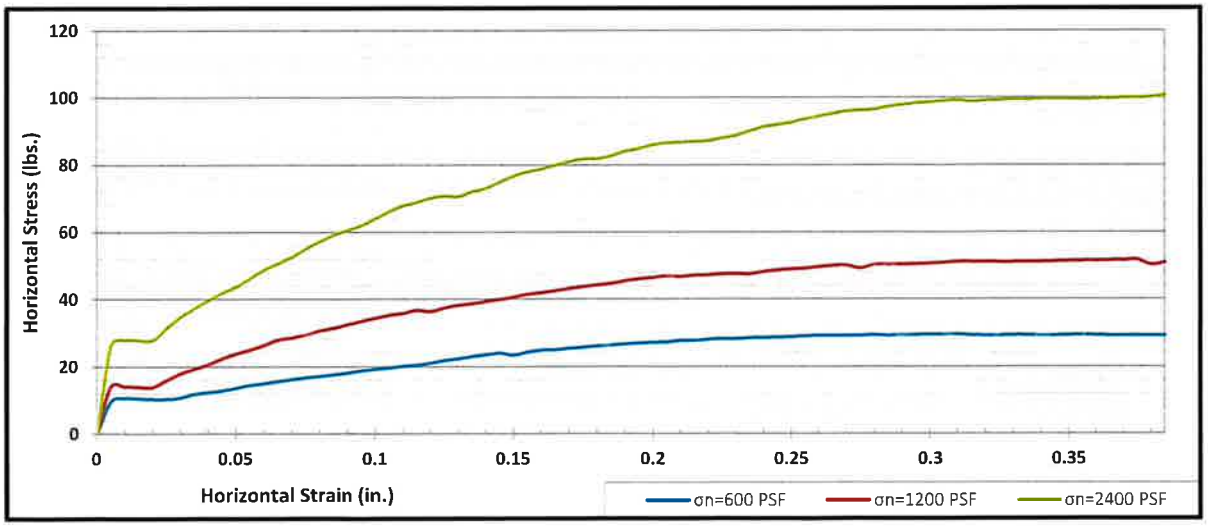
Project Number:	58656 GE	**Sample Source:**	TB-4 5'-9'
Laboratory Sample ID:	13335-M	**Visual Soil Description:**	SC
Sample Date:	12/13/2024	**Type of Specimen:**	Remolded Square Shear Box
Test Date:	12/23/2024	Diameter:	2.5 in
Technician:	G. Jadrych	Height:	1.0 in

Residual Direct Shear Test Results:			
Normal Stress, σ_n (PSF):	2400	1200	600
Ultimate Shear Stress, τ_{ult} (PSF):	1470	790	440

Summary of Sample Data:	
Initial Moisture Content (%):	9.2
Intial Dry Density (PCF):	104.0
Final Moisture Content (%):	21.2
Final Dry Density (PCF):	93.9

ESTIMATED STRENGTH PARAMETERS	
Angle of Internal Friction, ϕ (°):	**30**
Cohesion (PSF):	**100**
Horizontal Displacement (in.)	**0.1**





TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

Residual Direct Shear Test Results:

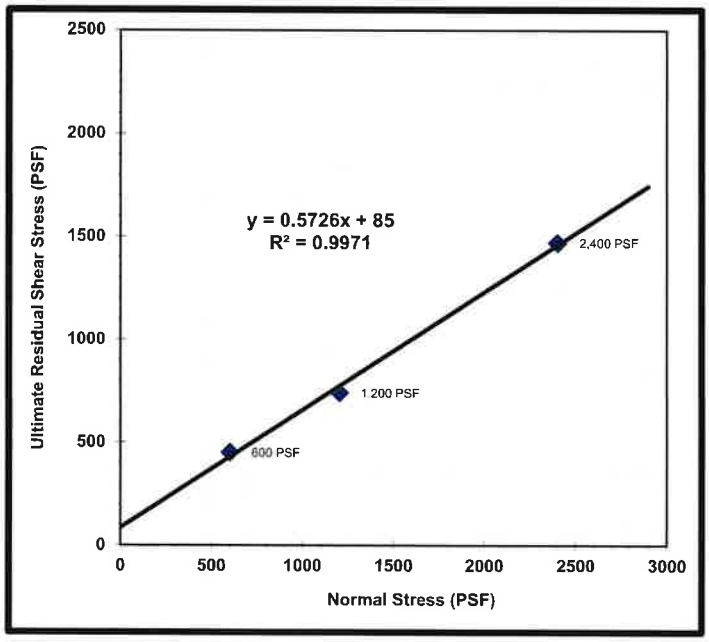
Project: Cascade Village Townhomes- South

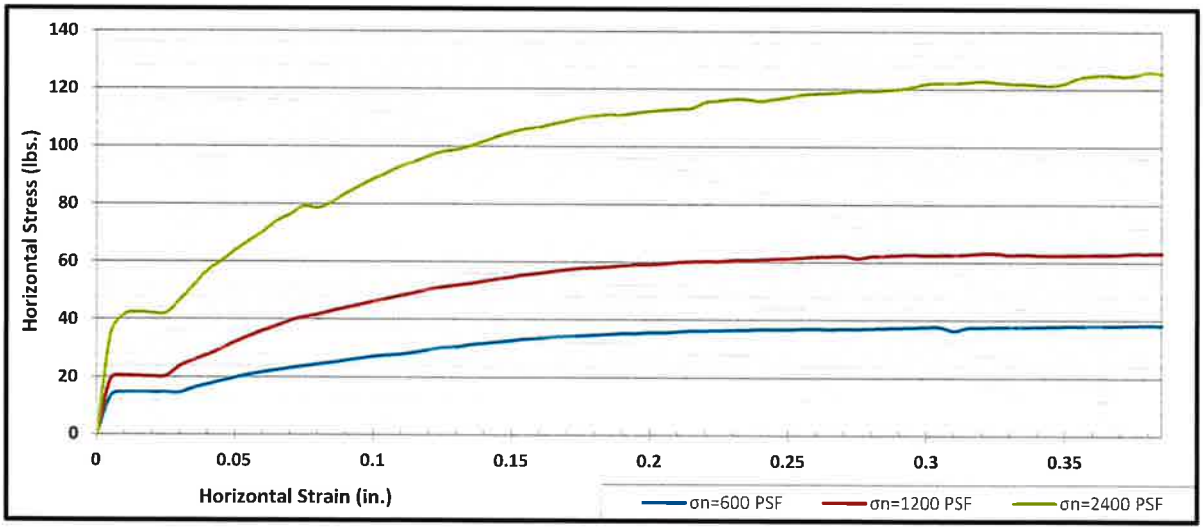
Project Number:	58656 GE	**Sample Source:**	TB-8 14'-19'
Laboratory Sample ID:	13335-DA	**Visual Soil Description:**	CL with sand
Sample Date:	12/13/2024	**Type of Specimen:**	Remolded Square Shear Box
Test Date:	12/16/2024	Diameter:	2.5 in
Technician:	G. Jadrych/ N. Granda	Height:	1.0 in

Residual Direct Shear Test Results:			
Normal Stress, σ_n (PSF):	2400	1200	600
Ultimate Shear Stress, τ_{ult} (PSF):	1470	740	450

Summary of Sample Data:	
Initial Moisture Content (%):	8.3
Intial Dry Density (PCF):	131.6
Final Moisture Content (%):	14.5
Final Dry Density (PCF):	124.8

ESTIMATED STRENGTH PARAMETERS	
Angle of Internal Friction, ϕ (°):	**30**
Cohesion (PSF):	**85**
Horizontal Displacement (in.)	**0.05**





TRAUTNER GEOTECH LLC
GEOTECHNICAL ENGINEERING, MATERIAL TESTING
AND ENGINEERING GEOLOGY

California Bearing Ratio Test Results

ASTM D-1883

Project Name: Cascade South
Project Number: 58656-GE
Sample I.D.: 13335-XA
Sample Date: 1/3/2025
Technician: G. Jadrych

Sample Source: Combined from all borings
Sample Description: Bulk Subgrade

Proctor Method: D 1557 method A
Proctor Maximum Dry Density: 122.4 PCF
Optimum Moisure Content: 11.2 %

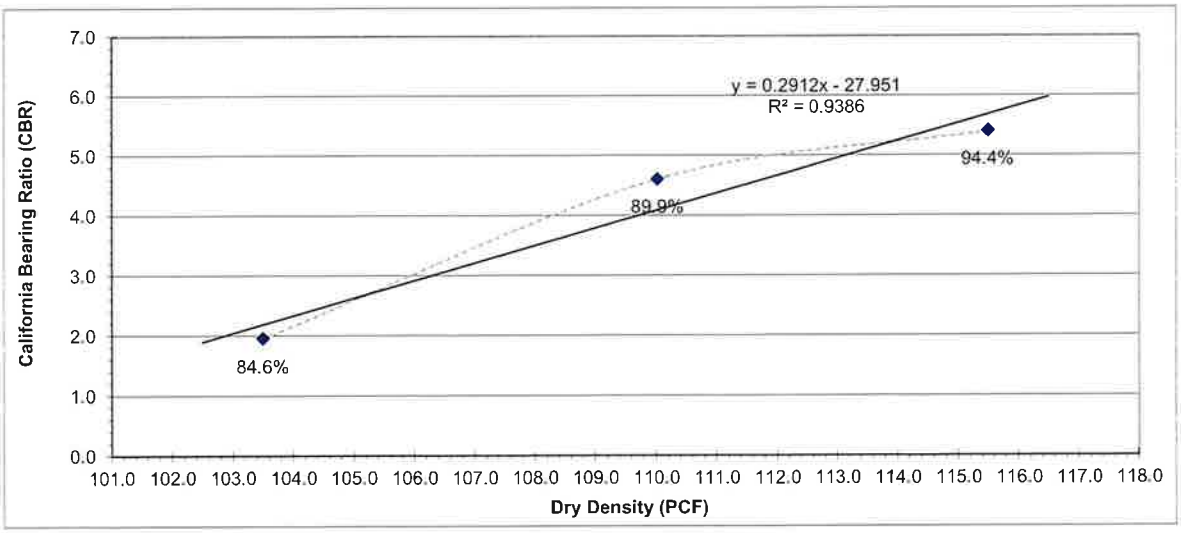
Start Soak: 12/30/2024
End Soak: 1/3/2025
Surcharge During Soak: 15 Lbs

Pre-Soak:

Dry Density (PCF)	Moisture Content (%)	Relative Compaction
103.5	10.4	84.6%
110.0	10.9	89.9%
115.5	11.2	94.4%

Post-Soak:

Dry Density (PCF)	Moisture Content of Top One (1) Inch (%)	Swell (%)	CBR (0.100" penetration)
97.5	25.5	3.2	2.0
103.3	22.8	3.3	4.6
108.8	20.9	2.6	5.4



California Bearing Ratio @ 90% of Proctor Density: 4.1

649 Tech Center Drive Suite A • Durango, CO 81301 • 970/259-5095 • Fax 970/382-2515

155917
Page 1 of 2
SAN JUAN COUNTY, COLORADO
LADONNA L. JARAMILLO, RECORDER
05-15-2025 02:31 PM Recording Fee $18.00
No Doc Fee

WHEN RECORDED RETURN TO:
Amy Rhyne
PO Box 34781
Charlotte, NC 28234

CORRECTION BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to Cascade Meadows, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

See Exhibit A attached hereto and incorporated herein.

This deed corrects the name of the county and legal description of the real property identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155841 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 12th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/2027

Exhibit A - TRACT A-1

A parcel of land being a portion of that tract of land as shown on the Cascade Village Results of Survey plat, deposited in the Office of the San Juan County Clerk and Recorder under Reception No. 141, San Juan County, Colorado, and a portion of Tract A-1 of the Cascade Village Amended Master Plan recorded under Reception No. 137955, said parcel being more particularly described as follows:

Beginning at the CS1/16 Corner of Section 13, Township 39 North, Range 9 West, N.M.P.M.,

Thence S 89°18'44" W, along the south line of the NE1/4SW1/4 of said Section 13 a distance of 1327.94 feet to the SW1/16 Corner of Section 13, , Township 39 North, Range 9 West, N.M.P.M.;

Thence N 00°21'14" W, along the west line of the NE1/4SW1/4 of said Section 13, a distance of 1321.26 feet to the CW1/16 of said Section 13, Township 39 North, Range 9 West, N.M.P.M.;

Thence N 00°25'55" W, along the west line of the SE1/4NW1/4 of said Section 13, a distance of 2327.94 feet;

Thence East, along the south line of Cascade Village Phase 1, recorded in said Clerk and Recorder in Book 222 and on Pages 125, 126, and 27, a distance of 246.74 feet;

Thence S 15°00'00" E, along the west line of said Cascade Village Phase 1, a distance of 531.77 feet to the north line of the Twilight Meadow Subdivision Phase II at Cascade Village Final Plat, recorded in said Clerk and Recorder, Reception No. 140023;

Thence N 89°59'18" W, along said north line, a distance of 16.73 feet;

Thence S 13°30'56" E, along the west line of said the Twilight Meadow Subdivision Phase II and the west line of the Resubdivision of the Twilight Meadow Subdivision at Cascade Village recorded in said Clerk anc Recorder, Reception No. 136239, a distance of 951.46 feet;

Thence S 89°03'40" E, along the south line of said Resubdivision of the Twilight Meadow Subdivision at Cascade Village, a distance of 360.48 feet, to a point on the easterly line of said Tract A-1 of the Cascade Village Amended Master Plan recorded under Reception No. 137955;

Thence S 07°33'00" E, along said easterly line of said Tract A-1, a distance of 699.29 feet to a point also being on the centerline of an aqueduct easement (twenty-five (25) feet on the westerly side and forty (40) feet on the easterly side) recorded in said San Juan County Clerk and Recorder in Book 222 on Page 101;

Thence S 10°14'00" E, along said easterly line of Tract A-1 and said centerline aqueduct,easement, a distance of 123.00 feet;

Thence S 32°49'00" E, along said easterly line of Tract A-1 and said centerline aqueduct easement, a distance of 454.00 feet;

Thence N 89°39'51" E, along said easterly line of Tract A-1 and departing said aqueduct easement, a distance of 68.32 feet to a point on the east line of the NE1/4SW1/4 of Section 13, Township 39 North, Range 9 West, N.M.P.M.;

Thence S 00°20'09" E, along said east line of the NE1/4SW1/4 of Section 13, a distance of 688.29 feet to the point of beginning;

Contains 66.450 acres, more or less.

Name and Address of Person Creating Newly Created Legal Description (§38-35-106.5, C.R.S.): Robert L. Trudeaux, P.L.S. of Goff Engineering & Surveying, Inc., PO Box 97, Durango CO 81302.

155918
Page 1 of 3
SAN JUAN COUNTY, COLORADO
LADONNA L. JARAMILLO, RECORDER
05-15-2025 02:31 PM Recording Fee $23.00
No Doc Fee

WHEN RECORDED RETURN TO:
Amy Rhyne
PO Box 34781
Charlotte, NC 28234

CORRECTION BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to Cascade Hospitality, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

See Exhibit A attached hereto and incorporated herein.

This deed corrects the name of the county and legal description of the real property identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155843 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 12th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/2027

Exhibit A

TRACT B-1

A parcel of land being a portion of that tract of land as shown on the Cascade Village Results of Survey plat, deposited in the Office of the San Juan County Clerk and Recorder under Reception No. 141, San Juan County, Colorado, and Tract B-1 of the Cascade Village Amended Master Plan recorded under Reception No. 137955, said parcel being more particularly described as follows:

Beginning at a point on the east line of the NE1/4SW1/4 of Section 13, Township 39 North, Range 9 West, N.M.P.M., from which the CS1/16 Corner of Section 13 bears S 00°20'09" E, a distance of 688.29 feet;

Thence S 89°39'51" W, along the south line of said Tract B-1 of the Cascade Village Amended Master Plan recorded under Reception No. 137955, a distance of 68.32 feet, to a point on the westerly line of said Tract B-1 and the centerline of an aqueduct easement (twenty-five (25) feet on the westerly side and forty (40) feet on the easterly side) recorded in said San Juan County Clerk and Recorder in Book 222 on Page 101;

Thence N 32°49'00" W, along said westerly line of Tract B-1 and said centerline aqueduct easement, a distance of 454.00 feet;

Thence N 10°14'00" W, along said westerly line of Tract B-1 and said centerline aqueduct easement, a distance of 123.00 feet;

Thence N 07°33'00" W, along said westerly line of Tract B-1 and said centerline aqueduct easement, a distance of 699.29 feet;

Thence N 05°26'23" E, along said westerly line of Tract B-1 and departing said centerline aqueduct easement, a distance of 306.18 feet to the southerly line of the First Amendment of the Resubdivision of the Twilight Meadow Subdivision at Cascade Village, recorded in said Clerk and Recorder, Reception No. 136848;

Thence N 05°26'23" E, along said southerly line, a distance of 70.51 feet;

Thence S 76°00'00" E, along said southerly line, a distance of 144.57 feet;

Thence along said southerly line, along a non-tangent curve to the right with a delta angle of 64°53'40" and a radius of 69.05 feet, a distance of 78.21 feet, the long chord bears S 43°33'10" E, a distance of 74.09 feet;

Thence along said southerly line, along a non-tangent curve to the right with a delta angle of 62°26'57" and a radius of 20.00 feet, a distance of 21.80 feet, the long chord bears S 20°07'08" W, a distance of 20.74 feet;

Thence along said southerly line, along a non-tangent curve to the left with a delta angle of 68°03'01" and a radius of 35.00 feet, a distance of 41.57 feet, the long chord bears S 17°19'06" W, a distance of 39.17 feet;

Thence S 76°38'11" W, along said southerly line, a distance of 13.85 feet;

Thence S 09°40'48" W, along said southerly line, a distance of 76.62 feet;

Thence S 19°09'25" E, along said southerly line, a distance of 205.18 feet;

Thence N 85°00'00" E, along said southerly line, a distance of 172.74 feet a point on the east line of the SE1/4NW1/4 of Section 13, Township 39 North, Range 9 West, N.M.P.M.,

Thence S 00°19'52" E, along said east line of the SE1/4NW1/4 of Section 13, a distance of 535.81 feet to the C1/4 Corner,

Thence S 00°20'09" E, along said NE1/4SW1/4 of Section 13, a distance of 531.60 feet to the point of beginning.

Contains 10.480 acres, more or less.

Name and Address of Person Creating Newly Created Legal Description (§38-35-106.5, C.R.S.) Robert L. Trudeaux, P.L.S. of Goff Engineering & Surveying, Inc., PO Box 97, Durango CO 81302.

155919
Page 1 of 2
SAN JUAN COUNTY, COLORADO
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Charlotte, NC 28234

CORRECTION DEED BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to Camp Meadows, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

See Exhibit A attached hereto and incorporated herein.

This deed corrects the name of the county identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155839 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 12th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/2027

Exhibit A

TRACT G

A parcel of land being a portion of Parcel IV, a 17.879-acre tract as shown on the Cascade Vi lage Results of Survey plat, deposited in the Office of the San Juan County Clerk and Recorder under Rece ɔt on No. 141, San Juan County, Colorado, also commonly known as Tract G of the Cascade Village Amended Master Plan recorded under Reception No. 137955, and being more particularly described as follows:

Beginning at a point on the westerly right-of-way line of State Highway 550, from which the CS1/16 Corner of Section 12, Township 39 North, Range 9 West, N.M.P.M., bears S 89°39'58" W, a distance of 205.51 feet;

Thence S 33°55'00" E, a distance of 209.37 feet;

Thence along the arc of a non-tangent curve to the left with a delta angle of 8°03'24" and a radius of 1020.91 feet, a distance of 143.56 feet, the long chord bears S 37°56'42" E, a distance of 143.44 feet;

Thence S 00°05'44" W, a distance of 206.62 feet;

Thence S 89°51'32" W, a distance of 506.23 feet to the easterly right-of-way line of State Hig ɴway 550;

Thence N 20°46'08" W, along said easterly right-of-way line of State Highway 550, a distance of 13.74 feet;

Thence N 24°39'08" W, along said easterly right-of-way of State Highway 550, a distance of 99 01 feet;

Thence N 26°32'08" W, along said easterly right-of-way of State Highway 550, a distance of 70.63 feet;

Thence N 25°52'08" W, along said easterly right-of-way of State Highway 550, a distance of 99.91 feet;

Thence N 10°22'08" W, along said easterly right-of-way of State Highway 550, a distance o: 49.95 feet;

Thence N 02°39'08" W, along said easterly right-of-way of State Highway 550, a distance of 46.96 feet;

Thence N 07°04'12" E, along said easterly right-of-way of State Highway 550, a distance of 46.64 feet;

Thence N 89°39'58" E, departing said easterly right-of-way line of State Highway 550, a d stance of 462.76 feet to the point of beginning.

Contains 6.350 acres, more or less.

155920
Page 1 of 3
SAN JUAN COUNTY, COLORADO
LADONNA L. JARAMILLO, RECORDER
05-15-2025 02:31 PM Recording Fee $23.00
No Doc Fee

WHEN RECORDED RETURN TO:
Amy Rhyne
PO Box 34781
Charlotte, NC 28234

CORRECTION BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to Cascade Highlands I, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

Any and all development rights of Grantor in the common interest community known as Cascade Village, including but not limited to:

1. Development rights described in that certain Quit Claim Deed recorded on July 9, 2012 at Reception No.148558. Said Quit Claim Deed contains a reference to Article No. 1.27 and Special Rights of Mill Creek in the declaration recorded at Reception No. 145763 which declaration has since been amended and restated in its entirety and replaced and superseded by the terms and conditions of that Amended and Restated Master Declaration of Cascade Village recorded on October 2, 2015 at Reception No. 1501929 (the "Master Declaration"); and

2. Any and all development rights as described in the Master Declaration, including but not limited to, all development rights in Unbuilt Units, Tracts, and the Original Tract (consisting of the Grizzly Tract and the Vermillion Tract) more particularly described in Article 13 of the Master Declaration and as set forth on Exhibit A attached hereto and incorporated herein; and

3. Any and all Tract Rights of a Tract Owner to develop and install improvements on a Tract as more particularly described in Article 14 of the Master Declaration.

This deed corrects the name of the county identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155842 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 19th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/202

EXHIBIT A

Legal Description of Original Tracts as set forth in the Master Declaration

Grizzly Tract
Tract "A":
Beginning at a point from which the Northwest corner of said Cascade Village Phase 1bears North 32°11'06" West, a distance of 493.21 feet;
Thence North 68°30'00" East, a distance of 40 feet; Thence South 21°30'00" East, a distance of288 feet;
Thence South 68°30'00" West, a distance of 40 feet;
Thence North 21°30'00" East, a distance of288 feet to the point of beginning;

Vermillion Tract
Tract "AA":
Beginning at a point from which the Northwest comer of said Cascade Village Phase 1 bears North 49°03'02" West, a distance of 169.58 feet;
Thence North 67°00'00" East, a distance of 40 feet; Thence South 23°00'00" East, a distance of 288 feet;
Thence South 67°00'00" West, a distance of 40 feet;
Thence North 23"00'00" East, a distance of288 feet to the point of beginning.

155921
Page 1 of 2
SAN JUAN COUNTY, COLORADO
LADONNA L. JARAMILLO, RECORDER
05-15-2025 02:31 PM Recording Fee $18.00
No Doc Fee

WHEN RECORDED RETURN TO:
Amy Rhyne
PO Box 34781
Charlotte, NC 28234

CORRECTION BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to 550 Estates, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

See Exhibit A attached hereto and incorporated herein.

This deed corrects the name of the county identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155840 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 12th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/2027

Exhibit A

TRACT E

A parcel of land being a portion of Parcel IV, a 17.879-acre tract as shown on the Cascade Village Results of Survey plat, deposited in the Office of the San Jaun County Clerk and Recorder under Reception No. 141, San Juan Colorado, Colorado, also commonly known as Tract E of the Cascade Village Amended Master Plan recorded under Reception No. 137955, and being more particularly described as follows:

Beginning at a point from which the CS1/16 Corner of Section 12, Township 39 North, Range 9 West, N.M.P.M., bears N 00°05'44" E, a distance of 926.23 feet;

Thence S 00°05'44" W, a distance of 410.61 feet to the computed position of the S1/4 Corner of Section 12, Township 39 North, Range 9 West, N.M.P.M.;

Thence S 89°54'04" W, along the south line of the SE1/4SW1/4 of said Section 12, a distance of 399.24 feet to the easterly right-of-way line of State Highway 550;

Thence continuing along said easterly right-of-way line of State Highway 550, along a non-tangent curve to the right with a delta angle of 6°39'08" and a radius of 2763.38 feet, a distance of 320.83 feet, the long chord bears N 10°14'42" W, a distance of 320.65 feet;

Thence continuing along said easterly right-of-way line of State Highway 550, N 20°32'19" W, a distance of 103.18 feet;

Thence N 89°54'04" E, departing said easterly right of way line of State Highway 550, a distance of 399.24 feet to the point of beginning;

Contains 4.630 acres, more or less.

155922
Page 1 of 2
SAN JUAN COUNTY, COLORADO
LADONNA L. JARAMILLO, RECORDER
05-15-2025 02:31 PM Recording Fee $18.00
No Doc Fee

WHEN RECORDED RETURN TO:
Amy Rhyne
PO Box 34781
Charlotte, NC 28234

CORRECTION BARGAIN AND SALE DEED

This Deed is made this 12th day of May, 2025, between Morehead Property One, LLC, a North Carolina limited liability company having an address of 1355 Greenwood Cliff Suite 150, Charlotte, NC 28204 ("Grantor") for the consideration of ten dollars, ($10.00), in hand paid, hereby sells and conveys to East Cascade Commercial, LLC, a Colorado limited liability company having a mailing address of PO Box 34781, Charlotte, NC 28234 ("Grantee"), the real property together with improvements, if any, situate and lying and being in the County of San Juan, State of Colorado described as follows:

See Exhibit A attached hereto and incorporated herein.

This deed corrects the name of the county identified in that certain Bargain and Sale Deed recorded on March 20, 2025 at Reception No. 155838 in the office of the clerk and recorder of San Juan County, Colorado.

With all appurtenances hereunto belonging.

IN WITNESS WHEREOF, the Grantor has executed this deed on the date set forth above.

GRANTOR:

Morehead Property One, LLC,
a North Carolina limited liability company

By: Charles Lindsey McAlpine, Manager

STATE OF COLORADO)
)ss.
COUNTY OF LA PLATA)

The foregoing instrument was acknowledged before me this 12th day of May 2025, by Charles Lindsey McAlpine, Manager of Morehead Property One, LLC, a North Carolina limited liability company.

Notary Public
My Commission expires: December 27, 2027

SARAH R VOGEL
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20074046267
MY COMMISSION EXPIRES 12/27/2027

Exhibit A

TRACT C

A parcel of land being a portion of Parcel IV, a 17.879-acre tract as shown on the Cascade Village Results of Survey plat, deposited in the Office of the San Juan County Clerk and Recorder under Reception No. 141, San Juan County, Colorado, also commonly known as Tract C of the Cascade Village Amended Master Plan recorded under Reception No. 137955, and being more particularly described as follows:

Beginning at the computed position of the S1/4 Corner of Section 12, Township 39 North, Range 9 West, N.M.P.M., from which the 128.04 foot Witness Corner to the said S1/4 Corner of Section 12 bears S 89°27'20" W, a distance of 128.04 feet;

Thence S 00°19'52" E, along the east line of the NE1/4NW1/4 of Section 13, Township 39 North, Range 9 West, N.M.P.M., a distance of 1033.25 feet to the easterly right-of-way line of State Highway 550;

Thence N 19°07'44" W, along said easterly right-of-way line of State Highway 550, a distance of 811.80 feet;

Thence N 02°37'43" W, along said easterly right-of-way line of State Highway 550, a distance of 116.75 feet;

Thence along said easterly right-of-way line of State Highway 550, along a non-tangent curve to the right with a delta angle of 3°10'00" and a radius of 2763.38 feet, a distance of 152.72 feet, the long chord bears N 15°09'15" W, a distance of 152.70 feet;

Thence N 89°34'46" E, departing said easterly right-of-way line of State Highway 550, a distance of 305.33 feet to the point of beginning.

Contains 3.480 acres, more or less.