April 26, 2024

RABBIT VALLEY TRAILHEAD IMPROVEMENTS

CED 2024.02

CE A438 – Senior Design

Presented by: Bayley Chevaviroj, Warren Garner, Jillian Holland & Charlene Pugay

EIB CONSULTANTS

OUTLINE

- Project Team
- Background
- Site Concept & Design
- Retaining Wall
- Drainage
- Project Outcomes

PROJECT TEAM

CLIENT
Katie Winter, P.E.

PROFESSIONAL MENTOR
Rys Miranda, P.E.

Alaska Division of Parks and Outdoor Recreation

FACULTY ADVISOR
Zhaohui (Joey) Yang, Ph.D

PROJECT MANAGER
Jillian Holland, E.I.T.

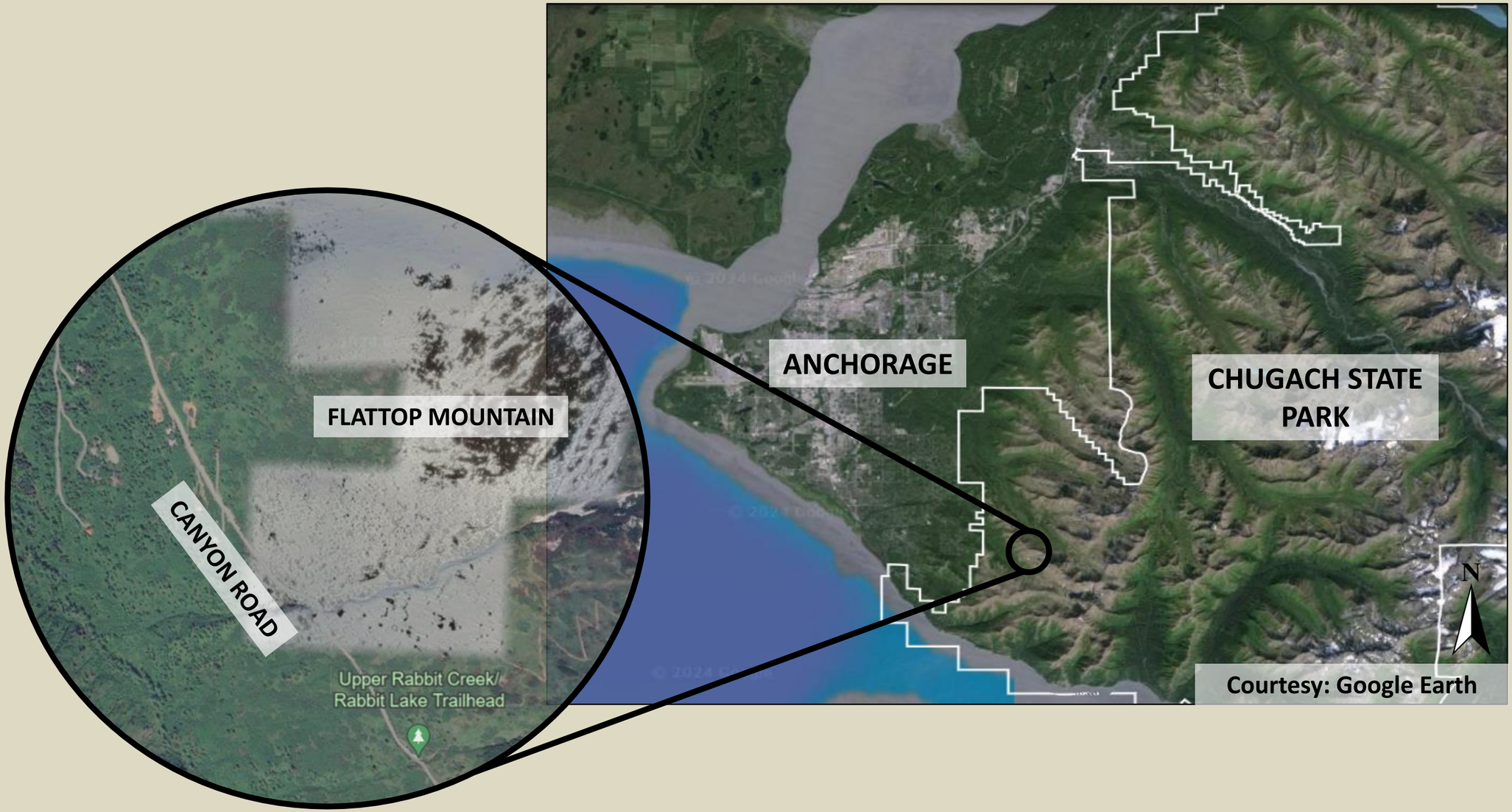
PROJECT ENGINEER
Charlene Pugay

GEOTECHNICAL ENGINEER
Warren Garner

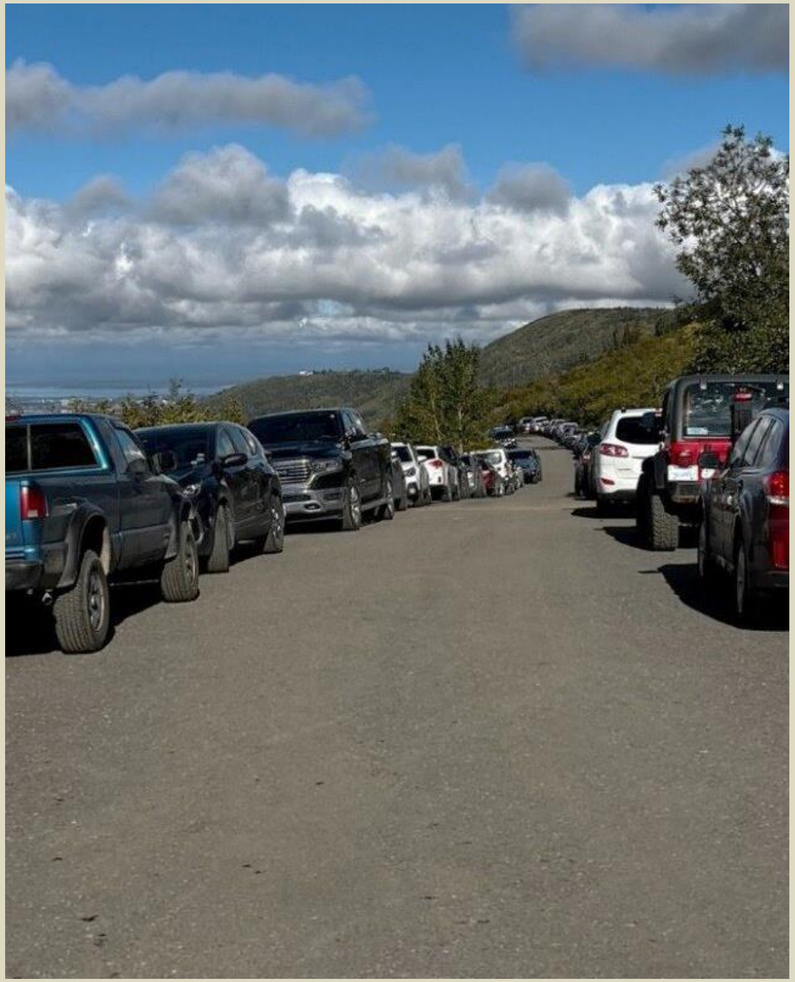
STRUCTURAL ENGINEER
Bayley Chevaviroj, E.I.T.

EIB CONSULTANTS

PROJECT BACKGROUND - LOCATION



PROJECT BACKGROUND – EXISTING SITE CONDITIONS



Limited Parking

Drainage

No Turn-Around

Lacking Facilities

Photos courtesy of Alaska Division of Parks and Outdoor Recreation

PROJECT BACKGROUND – EXISTING SITE CONDITIONS

Limited Parking

Drainage

No Turn-Around

Lacking Facilities

Photos courtesy of Alaska Division of Parks and Outdoor Recreation

SITE LAYOUT

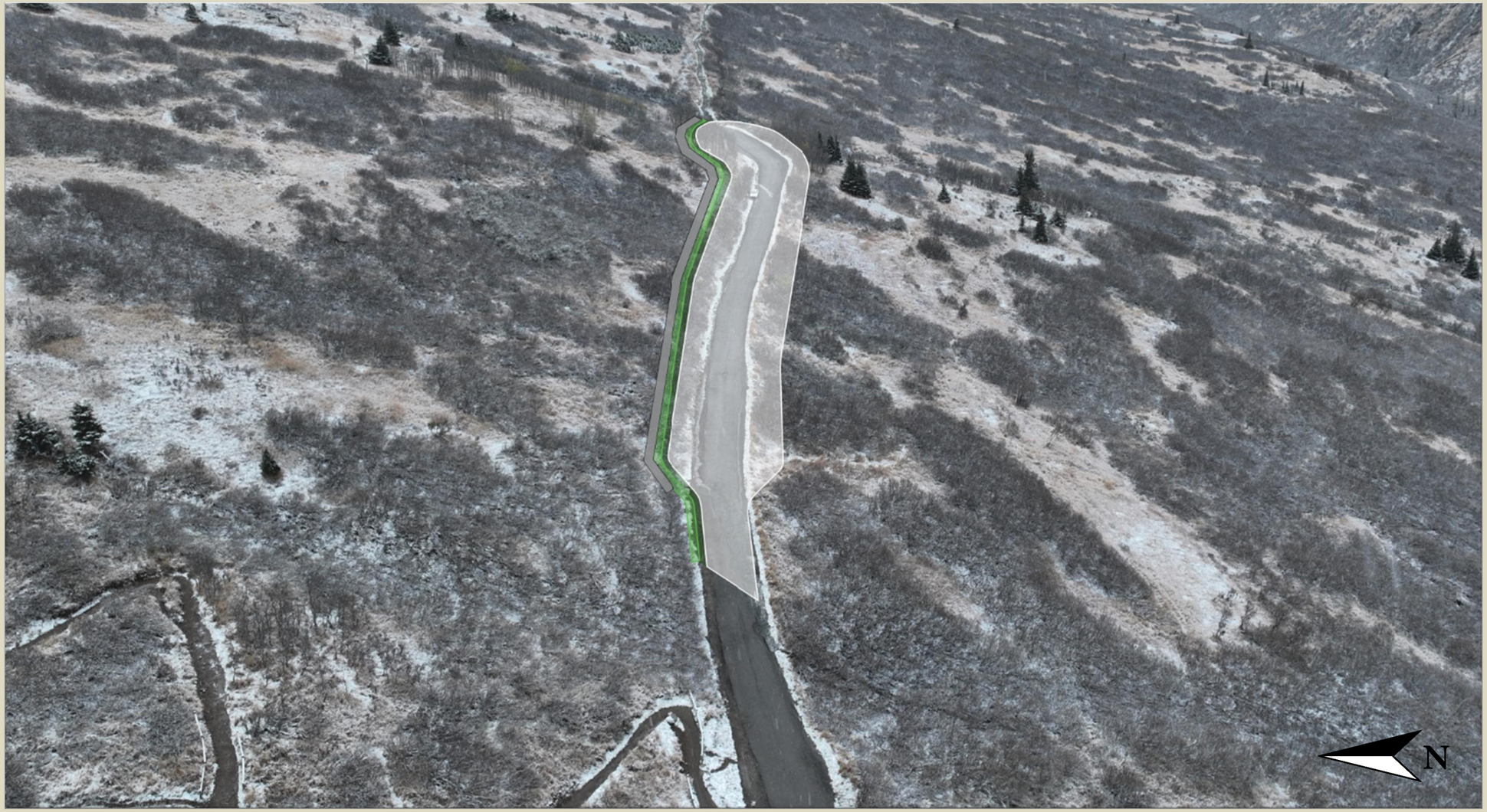
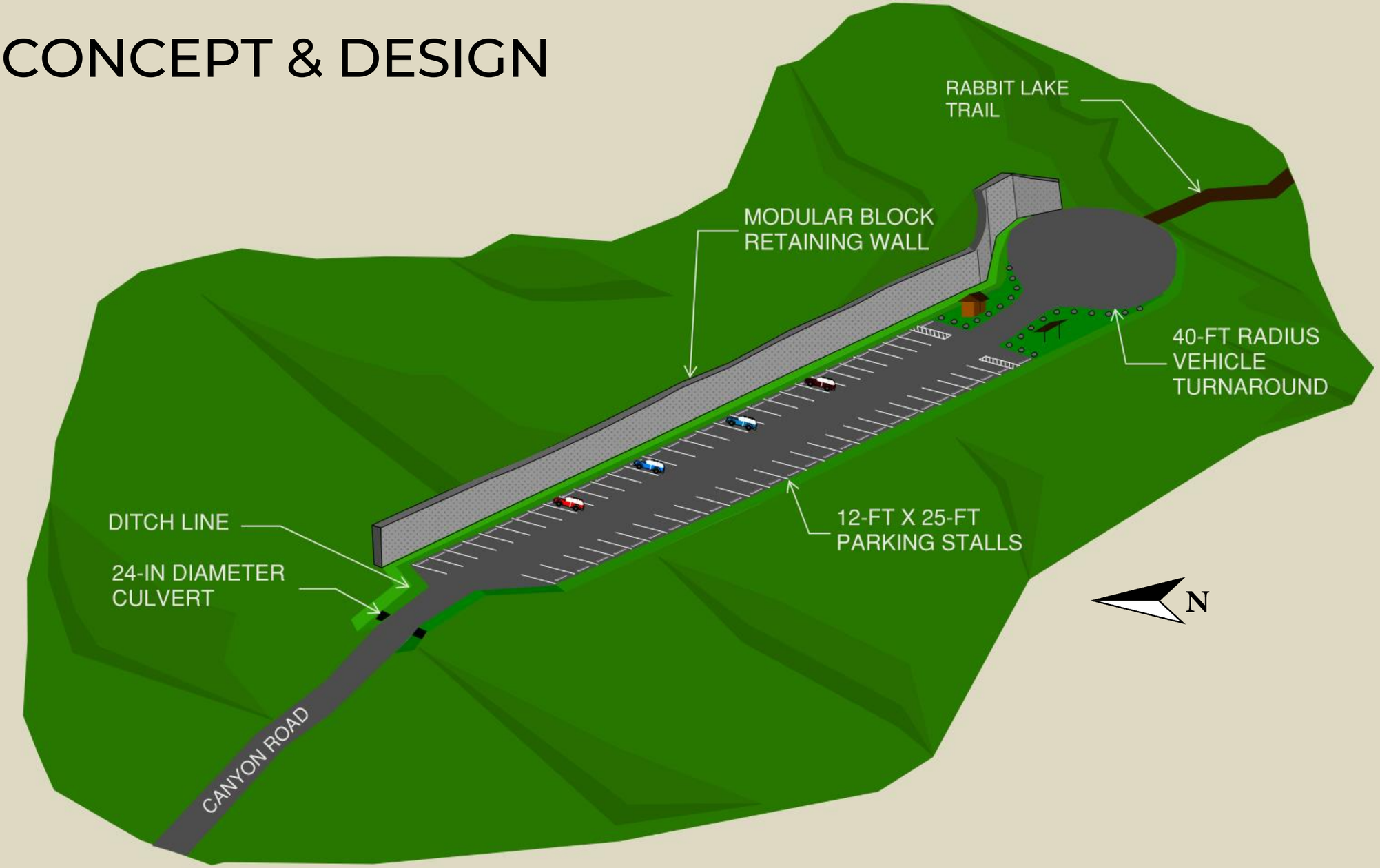
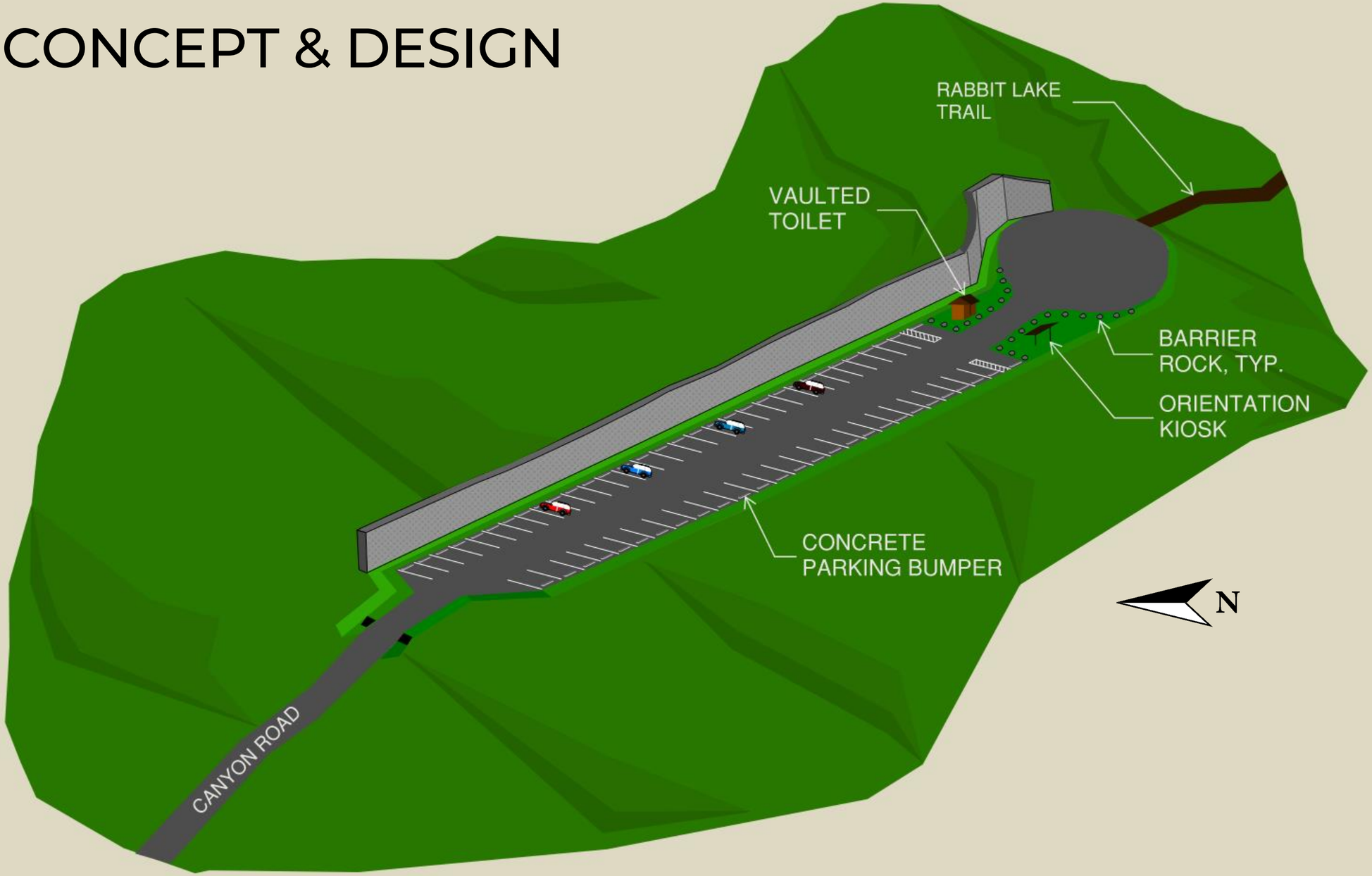


Photo courtesy of Alaska Division of Parks and Outdoor Recreation

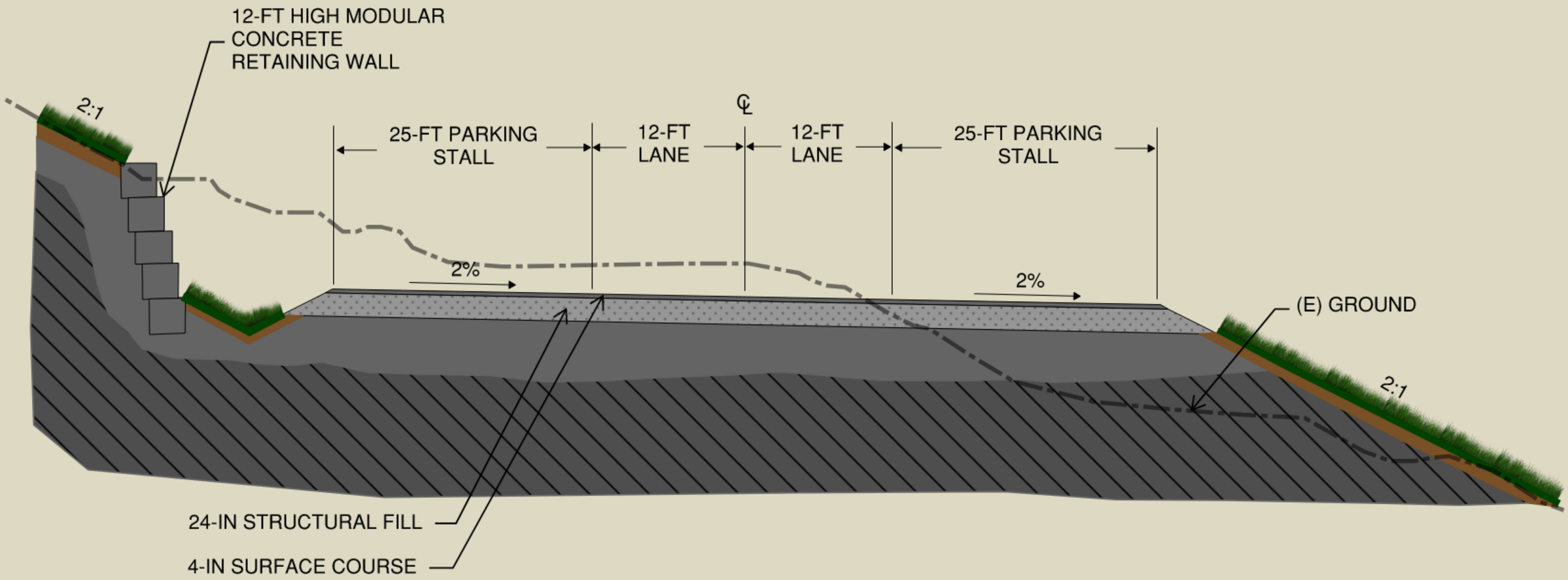
SITE CONCEPT & DESIGN



SITE CONCEPT & DESIGN



TYPICAL SECTION



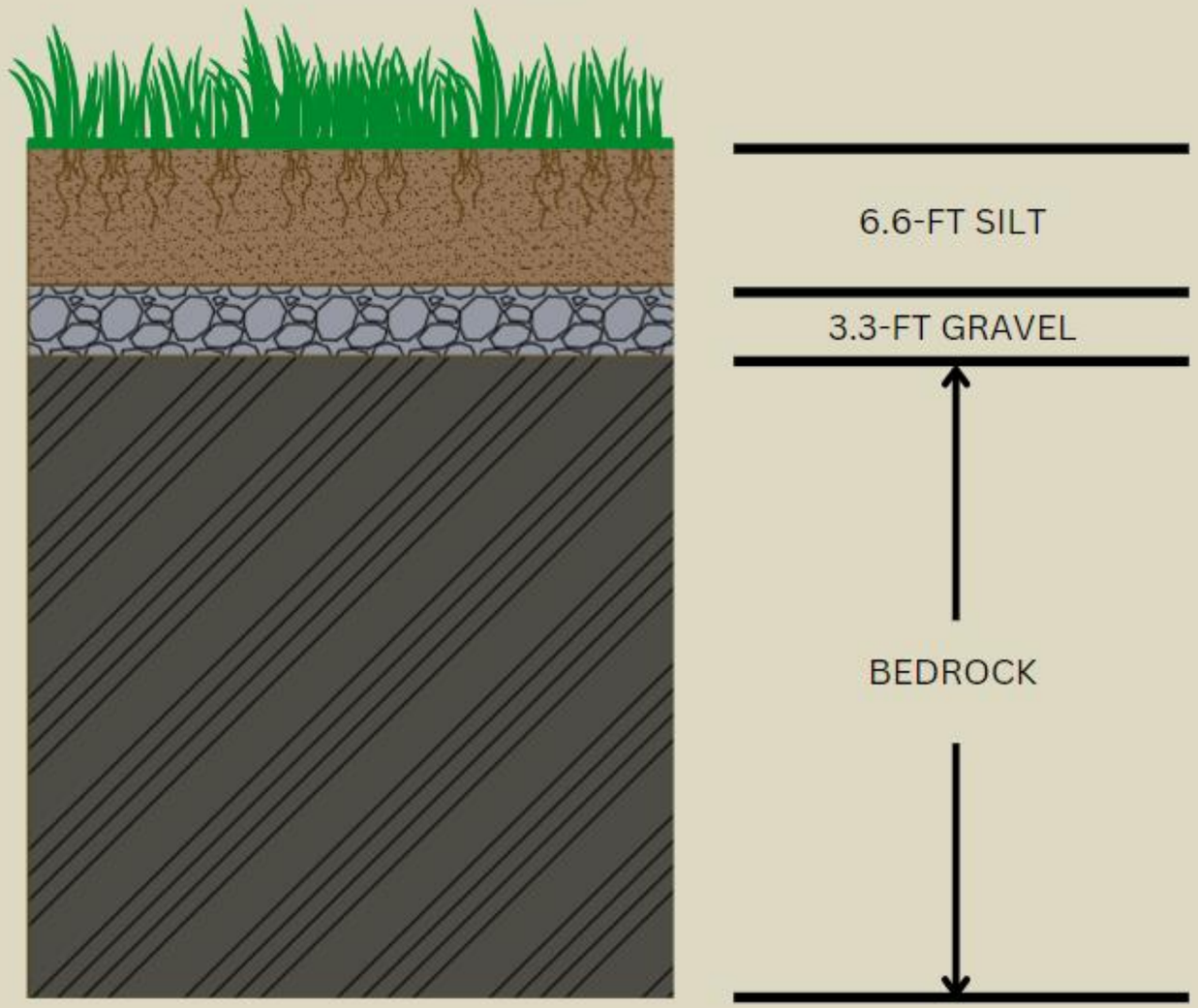
GEOTECHNICAL REPORT

Site Information

- Slopes: 10-70%
- Elevation: 1310-ft to 3940-ft
- Depth to Bedrock: > 6.6-ft
- Water Table Depth: > 6.6-ft

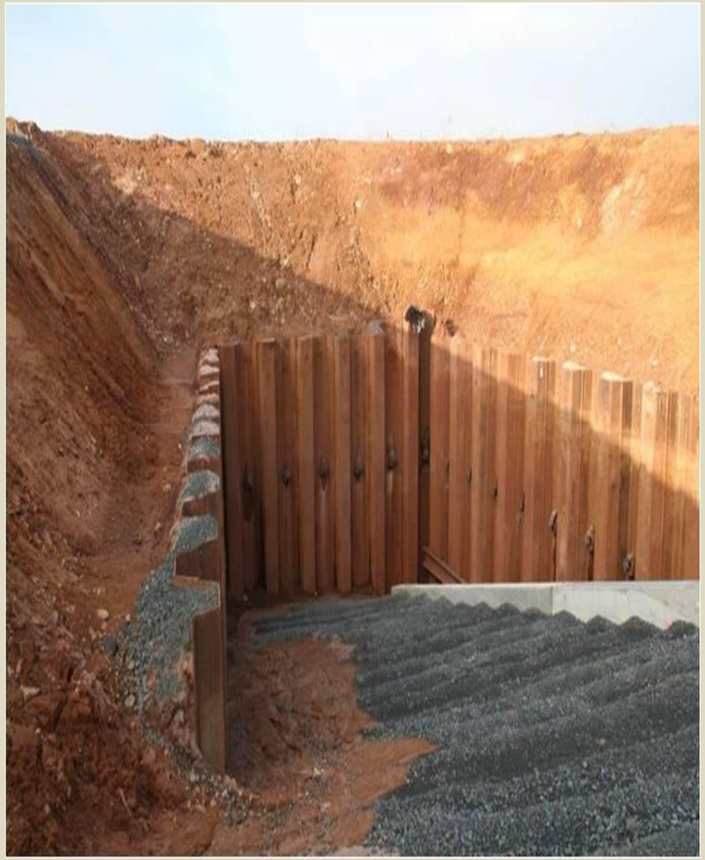
Soil Classification

- AASHTO: A-8-2 (Silty and Clayey)



RETAINING WALL ALTERNATIVES

Sheet Pile



BIMARC

Cast-in-Place

Marino Engineering Associates, Inc.

Modular Block

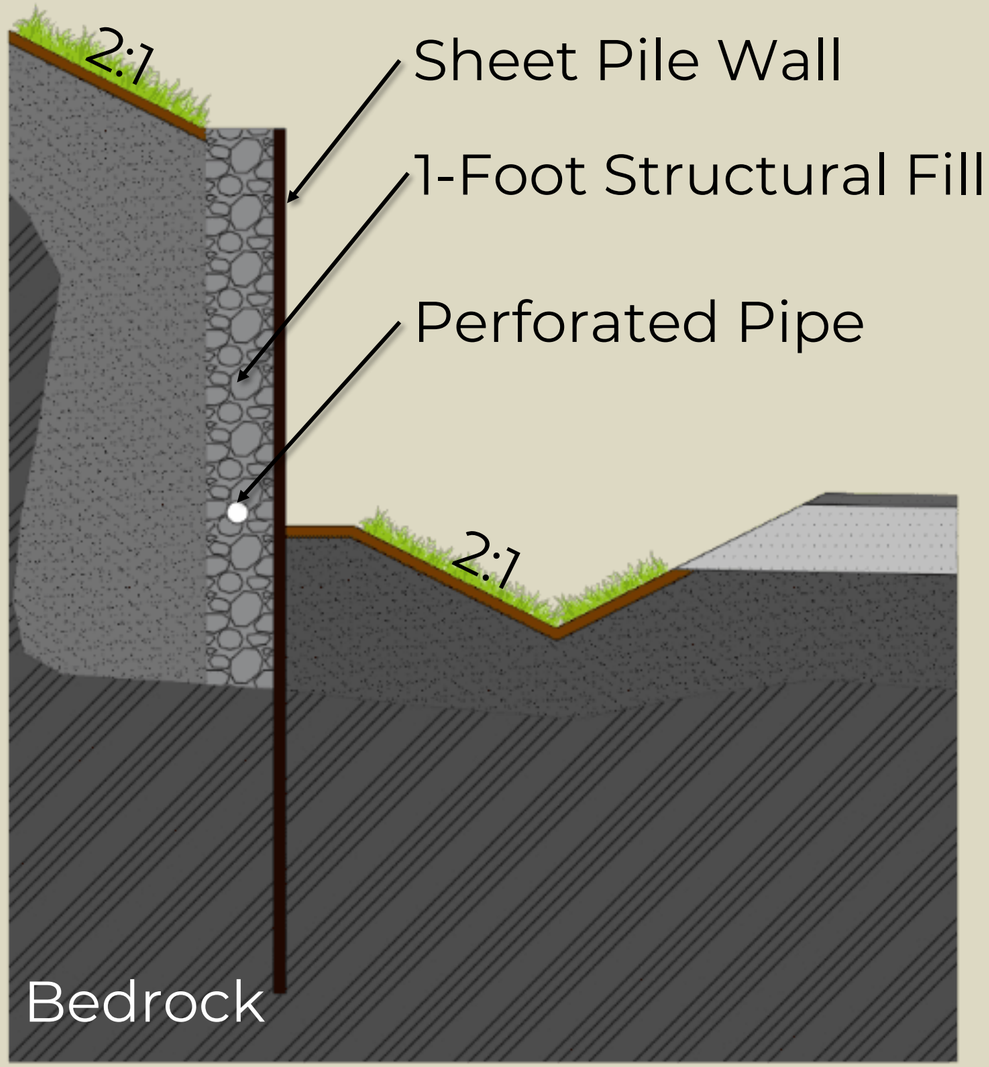
RETAINING WALL ALTERNATIVES – SHEET PILE

Material Considerations

- Shallow Bedrock
- Corrosion

Construction Considerations

- Staging Area
- Installation Equipment



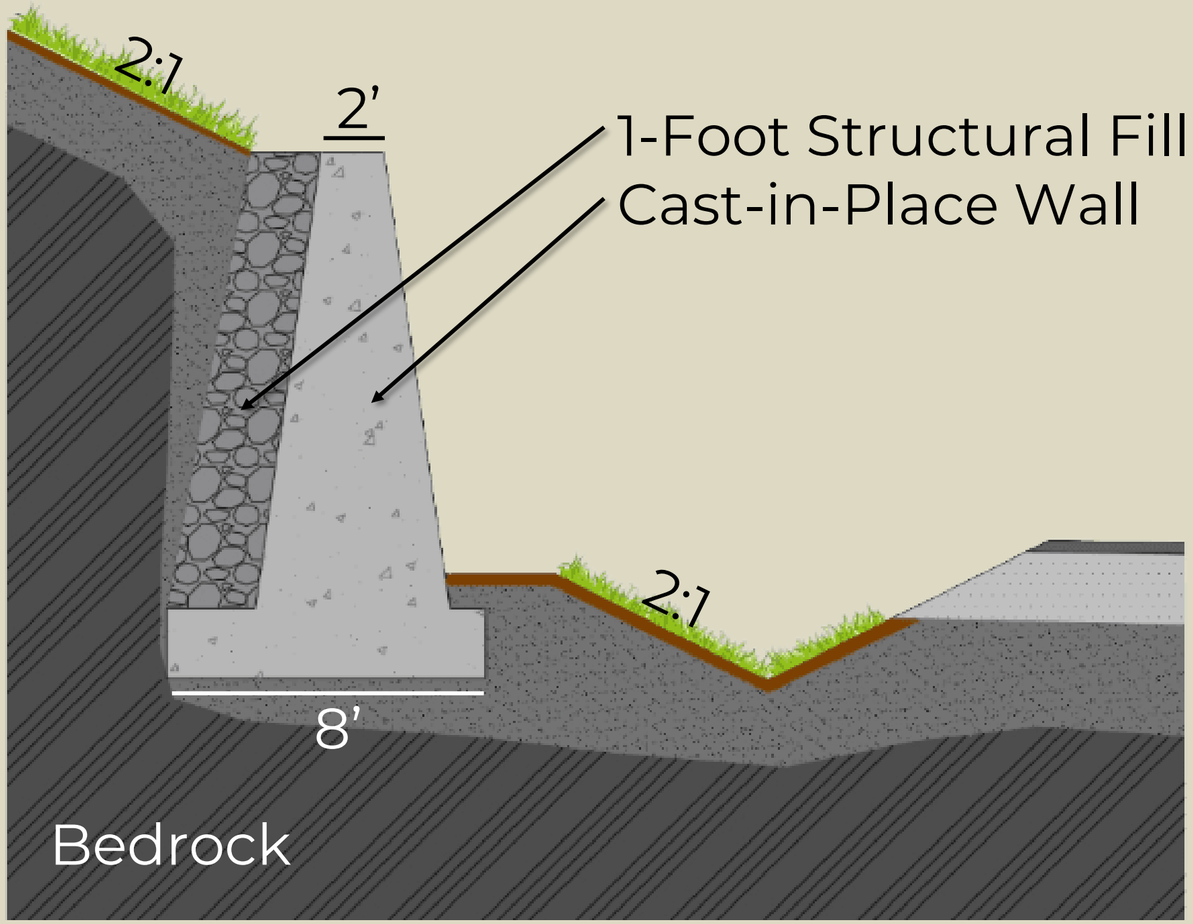
RETAINING WALL ALTERNATIVES – CAST-IN-PLACE

Design

- Base of 8-ft
- 4-ft Embedment
- Weep Holes

Construction Considerations

- Maintenance
- Forms



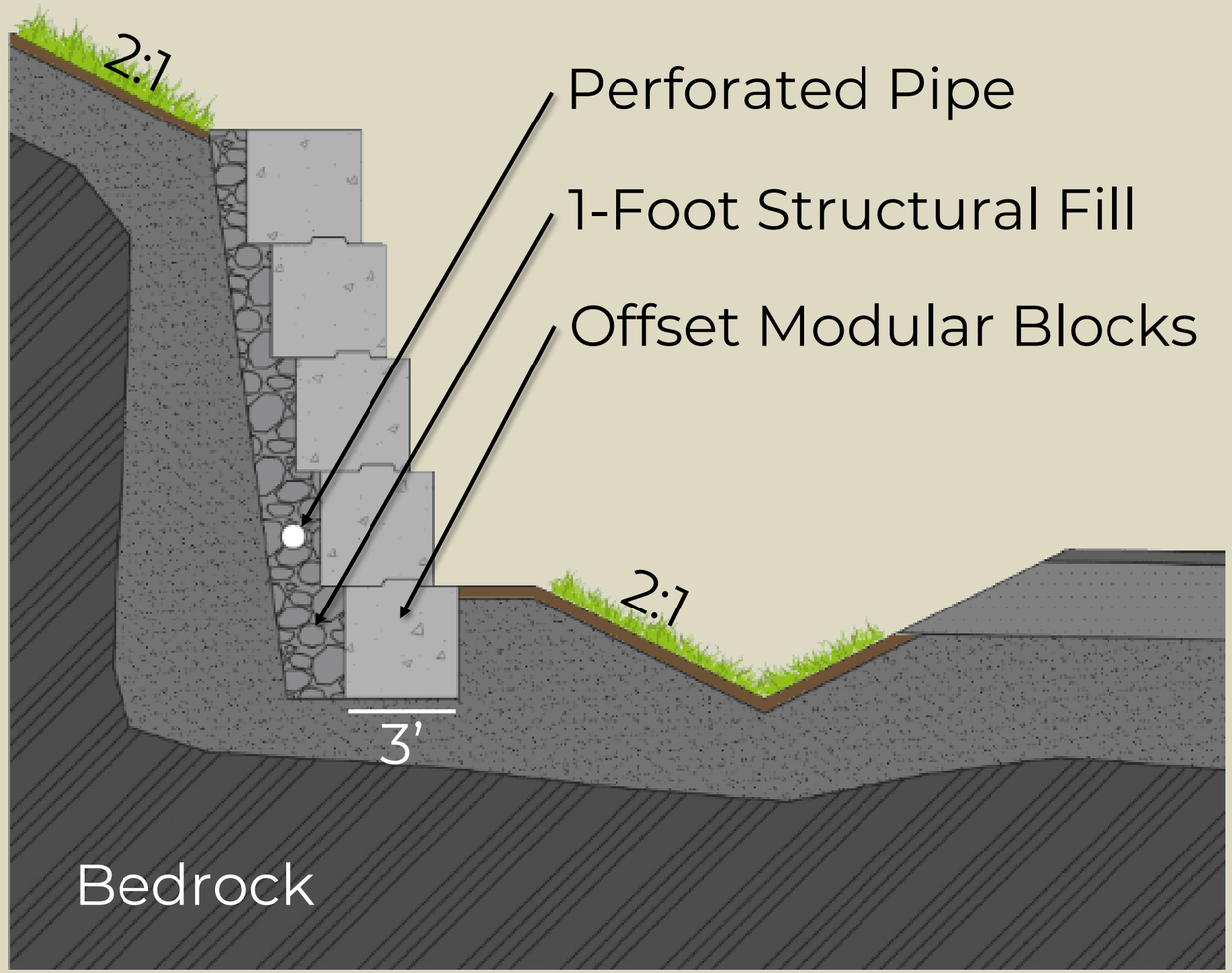
RETAINING WALL ALTERNATIVES – MODULAR BLOCKS

Design

- Stack of 5 Blocks High
- Perforated Pipe
- Aesthetic

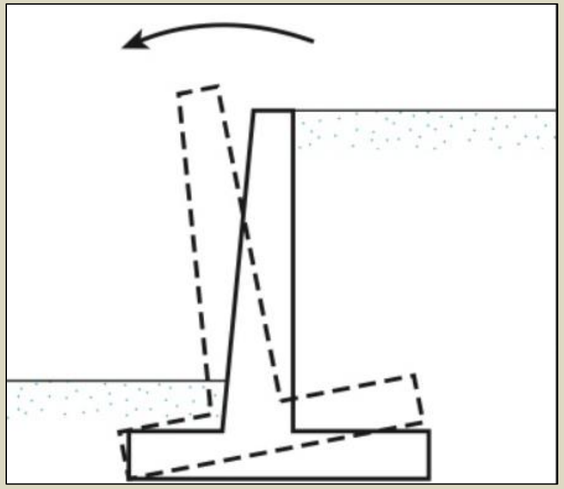
Construction Considerations

- Easy To Construct
- Easy To Maintain

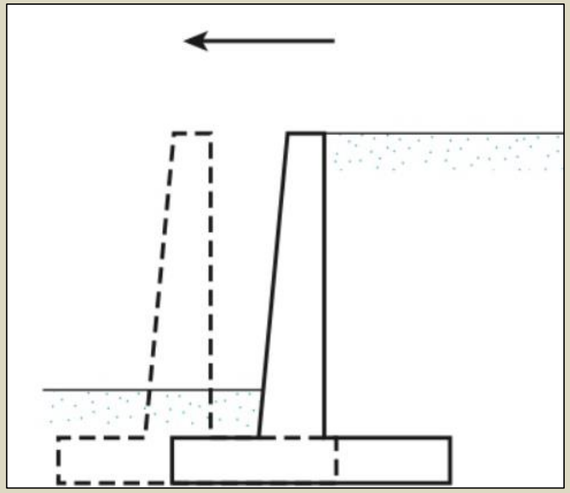


RETAINING WALL CALCULATIONS

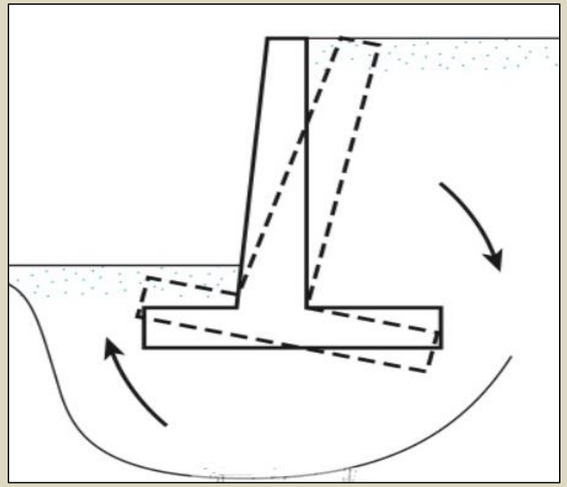
Failure Modes



OVERTURNING



SLIDING



BEARING CAPACITY

Figures courtesy of Principles of Foundation Engineering Eighth Edition by Braja M. Das

DRAINAGE - CALCULATIONS

Design Considerations

- Graded at 2%
- Drainage Area: 45 acres
- Design Storm: 10-year, 24-hour

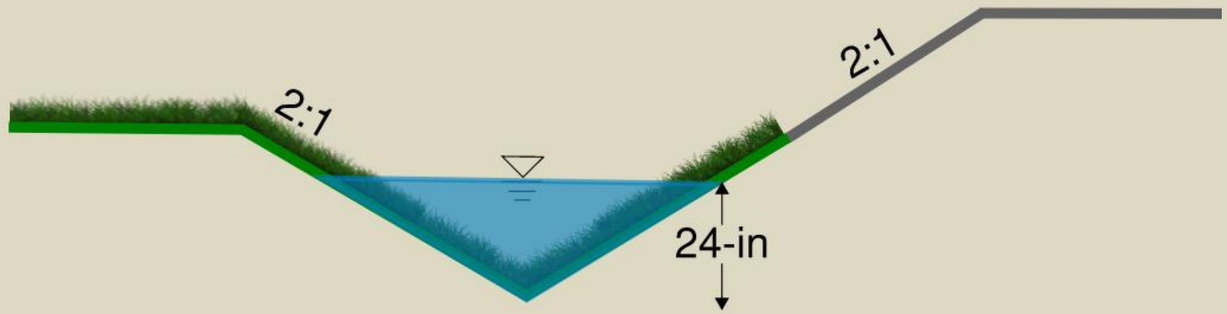
Rational Method

- Peak Runoff Pre-Construction: 9.9 cfs
- Peak Runoff Post-Construction: 10.1 cfs

Photo courtesy of Alaska Division of Parks and Outdoor Recreation

DRAINAGE – DITCHES

- Lined with dense grass
- Channel slope – 5% average
- Side slopes – 2 : 1
- Normal depth – 24-inch
- Ditch depth – 36-inch



DRAINAGE – CULVERT

- Corrugated High-Density Polyethylene
- 24-inch diameter
- 12-inch depth of cover

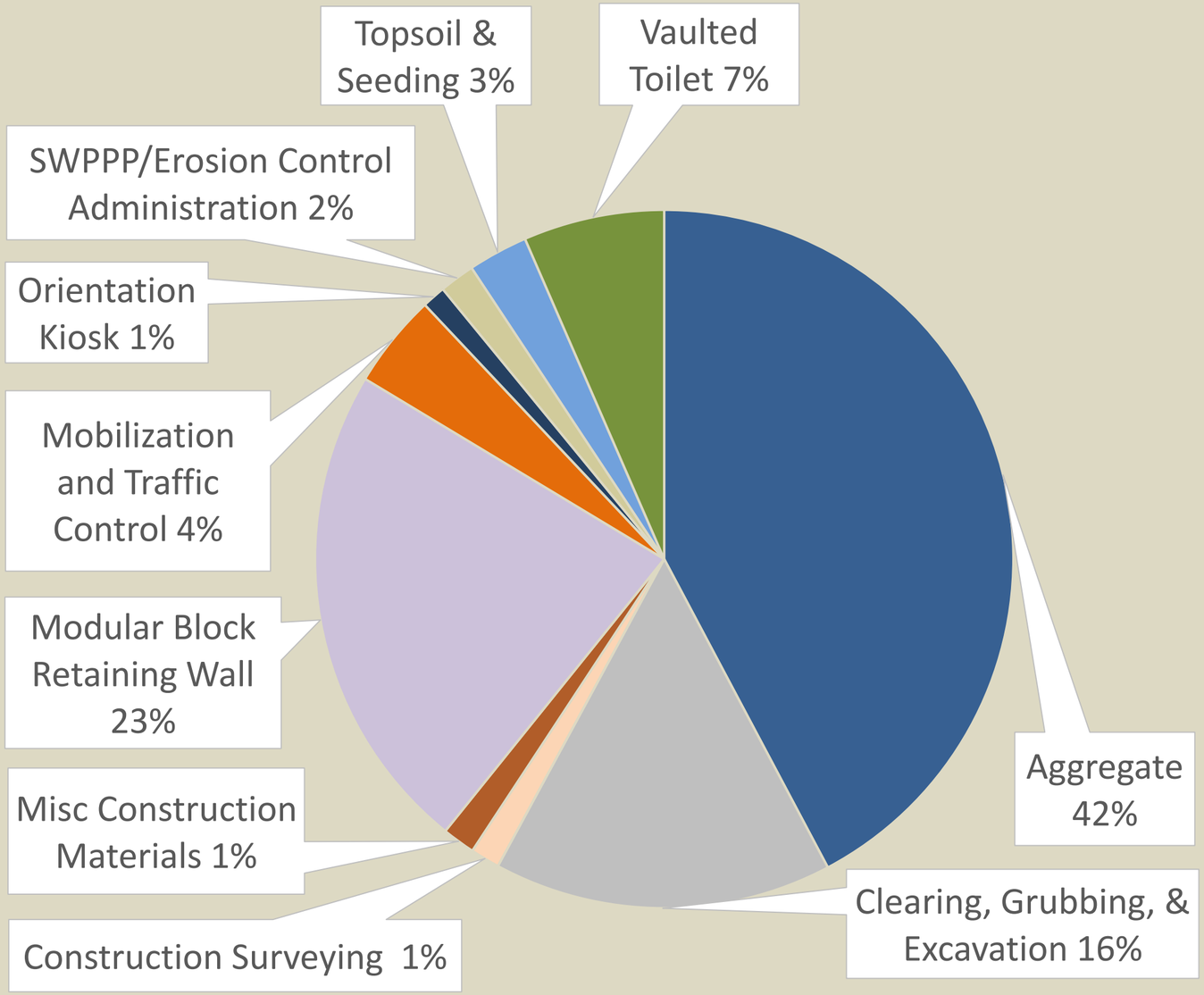
THE PROJECT BY THE NUMBERS

Engineer's Estimate

Cost of construction for the recommended modular block retaining wall and all other design features.

Project Cost

$1,835,500



PROJECT OUTCOMES

- Time management
- How to work as a team
- Communication with professionals
- Improved public speaking
- Application of class topics

THANK YOU

Project Contact:

Jillian Holland

Student Project Manager

jgholland@alaska.edu