CITY OF MANZANITA

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ci.manzanita.or.us

COUNCIL REGULAR SESSION

Pine Grove Community Center
https://ci.manzanita.or.us

AGENDA UPDATED

February 5, 2025
06:00 PM Pacific Time

Council will hold this meeting at the Pine Grove Community Center

Video Information: The public may watch live on the

City's Website: ci.manzanita.or.us/broadcast
or by joining via Zoom:

https://us02web.zoom.us/j/85139416578?pwd=Fp2TUEdb5g9Vp4LZ50Fmx1btyEf4ik.1

Meeting ID: 851 3941 6578 Passcode: 010488
Call in number: +1 253 215 8782

If you would like to submit written testimony to the City Council on items included on the agenda, please send your comments to cityhall@ci.manzanita.or.us and indicate the agenda item and date of meeting.

Note: Agenda item times are estimates and are subject to change

1. **CALL TO ORDER** (6:00 p.m.)
    - **A.** Proclamation Honoring Dr. James Bond
      Tom Campbell, Councilor

2. **AUDIENCE PARTICIPATION**
   Comments must be limited to city business topics that are not on the agenda. A topic may not be discussed if the topic record has been closed. All remarks should be directed to the whole Council. The presiding officer may refuse to recognize speakers, limit the time permitted for comments, and ask groups to select a spokesperson. **Comments may also be submitted in writing before the meeting, by mail, e-mail (to cityhall@ci.manzanita.or.us), or in person to city staff**

3. **CONSENT AGENDA**
   Consent items are not discussed during the meeting; they are approved in one motion and any Council member may remove an item for separate consideration.
    - **A.** Approval of Minutes
        - a. January 08, 2025, Regular Session
        - b. January 15, 2025, Work Session
        - c. January 21, 2025, Budget Committee Work Session

B. Approval of Bills

4. **INFORMATION**
   A. City Manager Report
   Leila Aman, City Manager

5. **NEW BUSINESS**

   A. Appointment of Council President
   Kathryn Stock, Mayor

   B. Tillamook People's Utility District (TPUD) Update
   Todd Simmons, General Manager

   C. Findings for Exemption to Competitive Bidding Qualifications + Bid
   Leila Aman, City Manager

   D. Salary Schedule for Project Manager Position
   Leila Aman, City Manager

   E. Recognition of Service for Jim Dopp, Budget Committee
   Kathryn Stock, Mayor

   F. Budget Committee Appointments
   Jerry Spegman, Councilor

   G. 2023-2024 Audit Plan of Action
   Nina Crist, Accounting Manager

   H. Oregon Sanctuary Law
   Kathryn Stock, Mayor
   Mike Sims, Police Sergeant

6. **COUNCIL UPDATES**

7. **ADJOURN** (8:00 p.m.)

Meeting Accessibility Services and Americans with Disabilities Act (ADA) Notice

The city is committed to providing equal access to public meetings. To request listening and mobility assistance services contact the Office of the City Recorder at least 48 hours before the meeting by email at cityhall@ci.manzanita.or.us or phone at 503-812-2514. Staff will do their best to respond in a timely manner and to accommodate requests. Most Council meetings are broadcast live on the ci.manzanita.or.us/broadcast.

City of Manzanita

MEMORANDUM

To: City Council

From: Leila Aman, City Manager

Subject: **February 5, 2025, City Council Regular Session**

Date Written: January 31, 2025

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5. NEW BUSINESS

B. TILLAMOOK PEOPLE'S UTILITY DISTRICT (TPUD) UPDATE

Todd Simmons, General Manager will provide an update on future rates and resource adequacy in the Northwest.

C. FINDINGS FOR EXEMPTION TO COMPETITIVE BIDDING QUALIFICATIONS + BID

The City Manager is requesting Council, to act in its capacity as the local contract review board to review and adopt findings and a Resolution granting an exception from competitive bidding for the Classic Street Connection Project and to authorize the City Manager to issue a competitive Request for Proposals that considers both qualifications and bid price for the purpose of constructing the Classic Street Connection Project. The Findings included n the packet outline the background and justification for the exemption for Council consideration.

D. SALARY SCHEDULE FOR PROJECT MANAGEMENT POSITION

The City Manager is requesting approval of a new position of Project Manager to provide executive level support to the City Manager and for high level project management. If approved the City Manager will appoint the current Hatfield Fellow, Cody Aucoin to this position effective March 24, 2025. There is sufficient funding in the current budget to support this position. Council is asked to approve a Resolution approving the proposed salary schedule for the current fiscal year.

E. RECOGNITION OF SERVICE FOR JIM DOPP, BUDGET COMMITTEE

The City Council would like to acknowledge the contributions of Jim Dopp for his many years of service on the Budget Committee. Mr. Dopp served as the Chair of the Budget Committee for FY 24-25 and is retiring from the Budget Committee after his term ends March 1, 2025.

F. 2023-2024 AUDIT PLAN OF ACTION

The City is required to provide the state of Oregon with a Plan of Action for any significant deficiencies as a result of the Audit. The city received only one deficiency as it relates to the segregation of duties, which has been an on going issue for the city as a result of the small size of the staff. The Accounting Manager in collaboration with the city's Government Finance Advisor, Grand Peaks, is proposing specific steps to help address this long standing issue.

G. BUDGET COMMITTEE APPOINTMENTS

The Budget Committee Selection Committee was composed of Jerry Spegman, Joy Nord and Nina Crist. The BC received two applications from highly qualified candidates for the two open positions and interviewed both applicants. The committee is recommending to the Mayor the reappointment of Kit Keating, who has served one term on the Budget Committee and Shawn Koch to the second position on the Budget Committee. Both candidates are highly qualifies as indicated in their applications which are included in the packet. If approved by the Mayor council is asked to adopt a Resolution appointing Kit Keating and Shawn Koch to the Budget Committee.

H. OREGON SANCTUARY LAW

Sergeant Mike Sims will provide an overview of the Oregon Sanctuary Law and its applicability in Manzanita.

City of Manzanita

PROCLAMATION

WHEREAS, February is recognized as Black History Month, a national celebration of the contributions and cultural heritage of people of African descent in every part of the United States; and

WHEREAS, some of the first people of African descent to set foot in what would become the United States and State of Oregon did so in Nehalem Bay and Oregon's North Coast; and

WHEREAS, the Manzanita City Council recently learned that the first Black person elected to the office of Mayor in the State of Oregon was Dr. James Bond, who served two terms as Mayor of Manzanita from 1995-1998; and

WHEREAS, Dr. James Bond had also previously served as a Manzanita City Councilor; and

WHEREAS, the Manzanita City Council celebrates Dr. Bond's accomplishments and the many contributions Dr. Bond has made to our community and the nation; and

WHEREAS, Dr. Bond was a World War II veteran, and following three years of active duty earned a PhD from New York University in Psychology; and

WHEREAS, Dr. Bond had a distinguished professional career including serving as Chief Psychologist at Toledo State and Receiving Hospital; and

WHEREAS, in 1972 Dr. Bond was named President of California State University, Sacramento and served as the first African American President of predominantly white university; and

WHEREAS, Dr. Bond was appointed by President Jimmy Carter to serve as the nation's Director of the Selective Service System restoring the ability of the nation to meet emergency manpower needs during times of war with equity and justice replacing the draft system; and

WHEREAS, in addition to his distinguished career Dr. Bond had a wide range of talents and studied Opera in Florence, Italy, and was an accomplished singer throughout his life; and

WHEREAS, Dr. Bond spent his life serving his community and the nation; and

WHEREAS, Dr. Bond spent 15 years in service to the Manzanita community, making significant and lasting contributions; and

WHEREAS, today and everyday we celebrate African Americans, and encourage all people to recognize and confront systemic racism with fearlessness and determination to fight against racism and bigotry and improve the representation of Black people in all facets of our society.

NOW, THEREFORE, I, Kathryn Stock, Mayor of the City of Manzanita, a municipal corporation in the County of Tillamook, in the State of Oregon, do hereby proclaim February 1st – February 29th as Black History Month and call upon all residents, homeowners, and businesses to honor and celebrate the legacy of Dr. Bond and the lasting contributions he made to the Manzanita community and encourage all citizens of Manzanita to continue their efforts to create a world that is more just, equitable and prosperous for all.

IN WITNESS, WHEREOF, and with the consent of the City Council of the City of Manzanita, I have hereunto set my hand on this 5th day of February 2025.

____
Kathryn Stock, Mayor

ATTEST:

____
Leila Aman, City Manager / Recorder

CITY OF MANZANITA
JANUARY 8, 2025
CITY COUNCIL REGULAR SESSION

1. CALL TO ORDER: The meeting was called to order on January 8, 2025, at 6:08pm at the Pine Grove Community Center by Mayor Kathryn Stock.

Roll: Council members present: Kathryn Stock, Jerry Spegman, Brad Hart and Tom Campbell. Linda Kozlowski was absent and excused. Staff present: City Manager Leila Aman, Police Officer John Garcia, and Assistant City Recorder Nancy Jones. Staff Present via Zoom: Accounting Manager Nina Crist, Development Services Manager Scott Gebhart, and Hatfield Fellow Cody Aucoin. Panelist's present: Executive Director of Tillamook Coast Visitors Association Nan Devlin.

2. OATH OF OFFICE: City Manager Leila Aman

City Manager Leila Aman facilitated the oath of office for three council members that were recently elected to city council. Mayor Kathryn Stock, Councilor Jerry Spegman, and Councilor Tom Campbell.

3. AUDIENCE PARTICIPATION: There were 11 people in attendance, 9 attended via zoom, 27 attended via website. There were no public comments.

4. CONSENT AGENDA:

A. APPROVAL OF MINUTES –
   a. December 04, 2024, Regular Session
   b. December 11, 2024, Work Session

B. APPROVAL OF BILLS FOR PAYMENT

A motion was made by Hart, seconded by Spegman, to approve the consent agenda that included approval of the December 04, 2024, Regular Session Minutes; December 11, 2024, Work Session Minutes; Approved payment of bills and all subsequent bills subject to approval by the Mayor or Council President and City Manager; Motion passed unanimously.

5. INFORMATION:

A. City Manager Report - City Manager Leila Aman

- City Manager Leila Aman provided a follow-up to an inquiry by a resident at last month's council meeting about designating a truck route system. She stated that the city has taken this

suggestion into advisement but doesn't plan to proceed as this time. If the city decides to move forward in the future, a systemwide approach will need to be examined prior to making changes.
-Aman announced that business license renewals were due on December 31, 2024. Payment must be received by January 31, 2025, to avoid any late fees. For more information, please visit the City of Manzanita's website.
-Aman congratulated the Public Works Department and Sergeant Mike Sims for their response and cleanup effort of the winter storm in December.
-Aman communicated that the Comprehensive Plan Advisory Steering Committee (PASC) December meeting was canceled due to a power outage. This committee will be attending the Planning Commission meeting on Monday January 13th at 4pm. She said that the Planning Commission will start technical housing ordinance code work, and the Comprehensive Plan Advisory Steering Committee will start to focus on new chapters and visions of the comprehensive plan. She stated that the city is obligated to have the Ordinance adoption ready by the end of June.
-Aman provided an update to the City Hall project. The building has been wrapped, the roof is finished, windows have been installed, and the inside framing is almost complete. The mechanical, electrical and plumbing is currently underway. She said that Insulation and sheetrock are scheduled to begin in February and stated that the project remains on schedule and on budget.
-Aman reported that the Nehalem Bay State Park project has experienced a few issues that has slowed down the renovation schedule. They are aiming to re-open on July 1st, but reservations won't be available until the end of July at this time.
-Aman reported that the Classic Street project is close to thirty percent design. She said that the geo technical and survey work has been completed. The city is continuing toward final design and is expected to have the design completed by the end of February.
-Aman spoke about Ordinance 24-05 "Reducing the speed limit to 20 miles per hour in residence districts within the City of Manzanita". This Ordinance went into effect on December 6th, 2024. She stated that speeding infractions can now be issued citations since public works and public safety have completed installing the new speed and radar signs.
-Court has been cancelled for January.
-Aman provided an update on the letters that will be sent to the property owners that may be impacted by the FEMA coastal velocity flood zones.

6. NEW BUSINESS:

A. **Off Season Tourism Grants –** Executive Director of Tillamook Coast Visitors Association Nan Devlin

Executive Director of Tillamook Coast Visitors Association Nan Devlin spoke about the Off-Season Tourism Grants that support our local economy and businesses. She provided an overview of last year's grant appropriations and said the city allocated $20,000 from the Tourism Promotion Fund to support off-season tourism grants for the current fiscal year. The Tillamook Coast Visitors Association administered the grant program and accepted the applications on behalf of the city. Devlin announced that they received seven applications that total $13,225.00 in eligible requests and shared information about each application.

A motion was made by Hart to accept all seven applications as presented, totaling $13,225.00. Seconded by Spegman; Motion passed unanimously.

B. Process for Changing Vehicle Use on the Ocean Shore – Councilor Jerry Spegman

Councilor Jerry Spegman spoke about the process for changing the rule of allowing vehicle access on the Manzanita section of the beach. He reported that the Oregon State Parks and Recreation Department governs vehicle access on the beach and spoke about Manzanita's beach zone and boundaries. Vehicle use is prohibited on the beach except during the off season from October through April, 7am to 12pm (noon). He said it is the city's goal to prohibit vehicles from driving on the beach and announced that a Resolution from the governing body would need to be submitted to Oregon State Parks and Recreation to start the process of changing this rule. He introduced Resolution 25-01, shared the timeline, and said if the city's petition is accepted by Oregon State Parks and Recreation, a public hearing will be scheduled where testimony will be presented.

Allowed for public comment: There was one public comment

A motion was made by Campbell to accept Resolution 25-01 Requesting that the Oregon Parks and Recreation Commission Open Rulemaking on a Proposed Change to OAR 736-024-0015(b)(A) and (B). Seconded by Hart; Motion passed unanimously.

C. Memorandum of Understandings (MOU) for Easements Relating to Classic Street Connection Project – City Manager Leila Aman

City Manager Leila Aman spoke about the Memorandum of Understanding (MOU) for easements relating to the Classic Street Connection Project. She said that the Classic Street Cottages homeowner's association and Encore properties own property on the east side of Classic Street and that both entities will consider granting an easement to the city. She communicated that these two Memorandum of Understandings establish responsibilities and expectations that will lead to a formalized easement. She specified that the city plans to run a water line and a paved pathway on the east side of Classic Street and additional space may be required.

Allowed for public comment: There was one public comment

A motion was made by Hart to accept the Memorandum of Understandings (MOU) to be executed between the City of Manzanita and Encore Investments, and the City of Manzanita and Classic Street Cottages Homeowners Association. Seconded by Campbell; Motion passed unanimously.

D. Alternative Contracting Method for Construction of Classic Street Connection Project – City Manager Leila Aman

City Manager Leila Aman spoke about an alternative contracting method for construction of the Classic Street Connection Project. She stated that Oregon State rules require public works projects to accept the lowest bidding price from contractors. She introduced an alternative method that allows the city to consider the contractors' qualifications along with the bid price and said it would give the city flexibility over the bidding process to select not only the best price but the most qualified. She communicated that this project will be funded by the $2.79-million grant that the State of Oregon awarded the city.

Allowed for public comment: There was one public comment

There was a consensus from the city council to move forward with the alternative contracting method. Aman plans to present findings for adoption of the alternative method at a public hearing on February 5, 2025.

E. Appointment of Pro Tem Judge – City Manager Leila Aman

City Manager Leila Aman reported that the city council is responsible for appointing the city's municipal judge. She said that Larry Blake is the city's appointed municipal judge, however there is not an appointed judge pro tem to fill in if he is unavailable. Aman proposed selecting a pro tem municipal judge and recommended Jeanne Schuback who was recommended by Judge Blake.

A motion was made by Hart to accept Resolution 25-02 Appointing Jeanne Schuback as Manzanita Municipal Judge Pro Tem. Seconded by Campbell; Motion passed unanimously.

7. COUNCIL UPDATES:

Council members took turns sharing information and updates of what they were involved in for the month.

8. INFORMATION AND ADJOURN:

-The next Planning Commission meeting is scheduled for January 13, 2025, at 4pm.
-Manzanita Municipal Court has been cancelled for January 17, 2025.

Mayor Stock adjourned the meeting at 8:00PM.

MINUTES APPROVED THIS
5th Day of February, 2025

____
Kathryn Stock, Mayor

Attest:

____
Leila Aman, City Manager

CITY OF MANZANITA
JANUARY 15, 2025
CITY COUNCIL WORK SESSION

1. CALL MEETING TO ORDER: The meeting was called to order on January 15, 2025, at 2:00pm via Zoom by Mayor Kathryn Stock.

ROLL: Members present: Kathryn Stock, Linda Kozlowski, Jerry Spegman, Brad Hart, and Tom Campbell. Staff present: City Manager Leila Aman, Accounting Manager Nina Crist, Hatfield Fellow Cody Aucoin, and Assistant City Recorder Nancy Jones. Panelist present: Short-Term Rental Committee Chair Cheryl Ogburn, Short-Term Rental Committee Member Jo Newhouse, and Short-Term Rental Committee Member Michael Duncan.

2. Short-Term Rental Policy Discussion – Short-Term Rental Committee Chair Cheryl Ogburn & City Manager Leila Aman
Short-Term Rental Committee Member Jo Newhouse shared the Short-Term Rental Committee's mission statement and said it is the source for their suggestions and recommendations in today's presentation. She spoke about three different elements and shared the objective of each one. Growth Control- aims to manage short-term rentals citywide and is structured around objective considerations. Density Proximity- addresses individual neighborhoods and streets. Occupancy- addresses the number of occupants allowed in a single STR. She shared data gathered by the 2023 livability survey and explained the term "catchment", the area in neighborhoods in terms of one-hundred-foot radius.

Short-Term Rental Committee Chair Cheryl Ogburn spoke about short-term rental growth control. She provided an overview and presented three options for a citywide plan to manage rental growth. (A) Percentage Based Growth (modified status quo), seventeen and a half percent of total houses in the city. (B) Fixed License Ceiling would cap the number at two hundred and seventy-five licenses. (C) Incremental Growth allows for the number of licenses to increase by two per year.

Short-Term Rental Committee Member Michael Duncan presented a density/proximity measurement plan to measure short-term rental density in neighborhoods. He shared an overview, explained the high-occupancy home, shared comments from the 2023 livability survey, specified that proximity would be used as a measure of density, and presented two measurement options.

Short-Term Rental Committee Member Jo Newhouse spoke about short-term rental occupancy limits. She shared objectives and proposed to change the current occupancy number from two per bedroom plus four to two per bedroom plus two. She suggested that occupancy numbers would include adults and children, except for infants under the age of two. She specified that the maximum number of occupants should not exceed fourteen, regardless of the number of bedrooms.

5. Adjourn: Mayor Stock adjourned the meeting at 3:40pm.

MINUTES APPROVED THIS
5th Day of February 2025

____
Kathryn Stock, Mayor

Attest:

____
Leila Aman, City Manager

CITY OF MANZANITA

JANUARY 21, 2025
BUDGET COMMITTEE WORK SESSION

1. CALL MEETING TO ORDER: The meeting was called to order by Accounting Manager Nina Crist at 10:02am January 21, 2025, via Zoom.

ROLL: Members present: Kathryn Stock, Linda Kozlowski, Tom Campbell, Chip Greening, Kit Keating, Joy Nord, and Jeffrey Sonshine. Jerry Spegman, Brad Hart, and Jim Dopp were absent and excused. Staff Present: City Manager Leila Aman, Accounting Manager Nina Crist, Hatfield Fellow Cody Aucoin, and Assistant City Recorder Nancy Jones.

2. Accounting Manager Update: Accounting Manager Nina Crist provided an accounting department update, internal controls update and reported that she is currently focused on end of year and budget preparations. She provided an overview of the budget committee selection process and announced that applicants have been interviewed by the selection committee. There are two upcoming vacant seats and applicant recommendations will be presented to the city council at the February 5th meeting for approval. Crist provided information on a free budget law training course for budget committee members to attend. Mayor Kathryn Stock announced that this training is mandatory for all budget members this year. The budget training course dates are scheduled for March 20th, March 27, and April 3rd. These classes can be attended either online or in-person.

3. Approval of 2025 Budget Calendar: Accounting Manager Nina Crist asked for approval of this year's Budget Committee meeting calendar. There was a conflict with the selected date of April 29, 2025. There was a consensus of the budget committee to move the First Budget Committee meeting to April 30, 2025, and the Second Budget Committee meeting will be tentatively scheduled for May 1, 2025.

4. FY 2024/25 Second Quarter Financial Review: Accounting Manager Nina Crist presented the fiscal year 2024/2025 second quarter general financial review. She shared the amount of revenues received from collections and other agencies and explained the breakdown of each category. She shared the earned interest, a fund transfer review, and explained that most of the amount recorded for Planning Services, under Professional Services, is for the Comprehensive Plan update.

5. FY 2023/24 Audit Review: Accounting Manager Nina Crist provided an overview of the fiscal year 2023/2024 audit. She said the city had no audit adjustments, was compliant with budget and public contracting, and is working towards a downgrade of segregation of duties.

6. Review of Upcoming Budget Related Items: City Manager Leila Aman provided a brief summary of a supplemental budget to account for carryover spending from last fiscal year related to the City Hall Project. Aman also stated that two large scale projects are expected to come in this Fiscal Year and may also necessitate a supplemental budget for the Building Fund. Aman also spoke about the next pre-budget meeting and said it will consist of general economic projections, expected changes of resources and requirements, and an overall vision of goals. The emphasis will be on training the budget process, spending priorities, orientation of departments, review of the funds, and expectations. She said that this meeting will include more budget-specific items with no actual projections, as the city is unable to discuss specifics until the actual budget meeting process begins.

7. Budget Committee Premeeting Preview: Accounting Manager Nina Crist presented an overview of the next budget meeting. The Budget Pre-Meeting is scheduled for April 15, 2025, at 10am.

8. ADJOURNMENT: Accounting Manager Nina Crist adjourned at 11:08am

MINUTES APPROVED THIS
5th Day of February, 2025

Kathryn Stock, Mayor

Attest:

Leila Aman, City Manager

BILLS FOR APPROVAL OF PAYMENT

From 01/01/2025 - 01/31/2025

VENDOR	TOTAL	ADMIN	POLICE	BLDG	COURT	PARKS	CH EXP	ROADS	Visitors Center	WATER
3J (CITY PLANNER)	$15,337.75	$15,337.75								
911 SUPPLY (MTRLS & SUPP.)	$206.67	$206.67								
ALEXIN ANALYTICAL (STATE TESTING)	$625.00									$625.00
BEARING (ARCHITECT)	$5,310.00						$5,310.00			
BEN OLSON (ARBORIST)	$800.00							$800.00		
CAMTRONICS (MTRLS & SUPP.)	$462.50									$462.50
CASELLE (FIN. SOFTWARE)	$2,446.00	$1,861.15								$584.85
CHARTER (INTERNET)	$604.91	$219.98	$129.98						$124.97	$129.98
CITY OF NEH. (FINES & ASSMNTS)	$512.00				$512.00					
CITY OF WHLR. (FINES & ASSMNTS)	$797.00				$797.00					
CLASSIC HOA (LEGAL FEES)	$2,630.00							$1,588.68		$1,041.32
COVE BUILT (CMGC)	$328,807.74						$328,807.74			
DAN WEITZEL (STAFF REIMB.)	$76.64								$76.64	
DATA CENTER (MAILING SERVICE)	$2,360.97									$2,360.97
DBCS BLDG SURCHARGE)	$5,117.94			$5,117.94						
DMV (RECORDS REQ.)	$1.40				$1.40					

BILLS FOR APPROVAL OF PAYMENT

From 01/01/2025 - 01/31/2025

VENDOR	TOTAL	ADMIN	POLICE	BLDG	COURT	PARKS	CH EXP	ROADS	Visitors Center	WATER
DUJEA (MTRLS & SUPP.)	$38.95	$38.95								
EC COMPANY (ELECTRICIAN)	$465.00									$465.00
EVERGREEN (VEHICLE MAINT.)	$135.00			$135.00						
FASTENAL (MTRLS & SUPP.)	$665.02							$665.02		
HASCO (FUEL)	$1,672.85		$904.48	$167.11		$25.07		$125.33	$99.93	$350.93
KLOSH (OWNERS REP.)	$3,598.39						$3,598.39			
LB BUILDING SRVCS. (BLDG INSPECTOR)	$1,373.29			$1,373.29						
LOC (ADVERTISING)	$25.00									$25.00
MANZ. LUMBER (MTRLS & SUPP.)	$219.58							$166.80	$52.78	
MIKE SIMS (STAFF REIMB.)	$372.12		$372.12							
MILLER NASH (CITY ATTORNEY)	$28,532.00	$8,920.00						$4,380.05		$15,231.95
NAPA (VEHICLE MAINT. & SUPP.)	$6.99									$6.99
NEHALEM LUMBER (MTRLS & SUPP.)	$42.33							$42.33		
OMA (ANNUAL RENEWAL)	$110.00	$110.00								
ONE CALL (LOCATE FEES)	$58.11									$58.11
ONE ELEVEN (IT SERVICES)	$4,060.00	$4,060.00								

BILLS FOR APPROVAL OF PAYMENT

From 01/01/2025 - 01/31/2025

VENDOR	TOTAL	ADMIN	POLICE	BLDG	COURT	PARKS	CH EXP	ROADS	Visitors Center	WATER
ONE ELEVEN (EQUIPMENT)	$300.00						$300.00			
OR. BEST AUTO (VEHICLE PURCHASE)	$8,935.00									$8,935.00
OR. DEPT REV (FINES & ASSMNTS.)	$450.00				$450.00					
PACE (ENGINEER)	$126.00									$126.00
PACIFIC OFFICE (PSTG & COPIER)	$135.00	$101.25								$33.75
PORT OF TILL. BAY (EASEMENT)	$1,228.00									$1,228.00
PSU (CITY INTERN)	$13,360.00	$13,360.00								
PUBLIC SFTY (ANNUAL RENEWAL)	$240.00				$240.00					
RICHARD GRAVES (ENGINEER)	$3,850.00						$3,850.00			
RTI (PHONE SERVICE)	$493.38	$95.90	$95.89							$301.59
SHRED NW (SHREDDING SERVICE)	$190.00	$190.00								
SOPKO WELDING (WELDING SERVICES)	$1,649.69								$1,649.69	
STAPLES (OFFICE SUPPLIES)	$109.12	$109.12								
STATE OF WA. (RECORDS REQUEST)	$0.16				$0.16					
SUNSET CONST. (PARK REPAIR)	$4,424.44								$4,424.44	
SWEET SEPTIC (PORTABLE TOILETS)	$295.00								$295.00	

BILLS FOR APPROVAL OF PAYMENT

From 01/01/2025 - 01/31/2025

VENDOR	TOTAL	ADMIN	POLICE	BLDG	COURT	PARKS	CH EXP	ROADS	Visitors Center	WATER
TILL. CO. CREAMERY (MTRLS & SUPP.)	$298.00									$298.00
TILL. CO. PAYABLE (FINES & ASSMNTS.)	$129.00				$129.00					
TCVA (VC COORD.)	$3,523.51								$3,523.51	
TPUD (ELECTRICITY)	$4,110.26	$244.93	$307.84			$94.68		$609.00	$130.26	$2,723.55
US BANK (CITY VISA)	$4,894.64	$3,000.96	$695.75						$184.90	$1,013.03
VALVOLINE (VEHICLE MAINT.)	$60.98		$60.98							
VERIZON (TELEPHONE)	$1,273.90	$337.28	$343.44	$110.47					$111.64	$371.07
WALTER WEND. (CITY PLANNER)	$600.00	$600.00								
TOTALS	**$458,147.23**	**$48,793.94**	**$2,910.48**	**$6,903.81**	**$2,129.56**	**$119.75**	**$341,866.13**	**$8,377.21**	**$10,673.76**	**$36,372.59**

Pali Consulting

December 20, 2024

Windsor Engineers
27300 NE 10th Ave
Ridgefield, WA 98642

Report of Geotechnical Services
Manzanita – Classic Street and Necarney City Road,
Stormwater Improvements and Water Main Extension Project
Manzanita, Oregon
Project #074-24-015

1.0 INTRODUCTION

This report provides Pali Consulting Inc.'s (Pali Consulting's) geotechnical evaluation and recommendations for the Manzanita – Classic St Road and Necarney City Road Stormwater Improvements and Water Main Extension Project in Manzanita, Oregon. The Project consists of geotechnical design recommendations for water system improvements to Classic Street and Necarney City Road. Improvements will include installation of a water main line, stormwater facilities as necessary, pavement widening, and installation of a shared use path along Classic Street. The project area is shown on Figure 1.

Windsor Engineers requested that Pali Consulting provide geotechnical services for the project. Our scope of work included a review of existing information, site reconnaissance, subsurface explorations, geotechnical analyses, and design recommendations for the project. Our work was completed in general accordance with Task Order 09 of our master services agreement with Windsor Engineers, dated November 12, 2024, and subsequent modifications.

2.0 BACKGROUND REVIEW

2.1 PROJECT DESCRIPTION

The project includes installation of a water mainline and appurtenant facilities in an undeveloped area known as the Highlands. The water system improvements will allow development of the area and will connect existing branches of the City of Manzanita's water system.

The new water mainline will consist of 12-inch diameter HDPE pipe that will be installed with open trench and/or trenchless methods at depths of between 3 and 5 feet below ground surface (bgs) for much of the alignment. The current proposed alignment will follow existing roadways between the intersection of Classic Street and Laneda Avenue and the junction of Highlands Drive and Meadows Drive, then run overland to Necarney City Road, where it will tie in with existing water line near the junction of Necarney City Road and

Clipper Court. The approximate alignment is shown on Figure 1. Topography along the alignment is mostly flat to gently sloping where it traverses up and over the dune complex which forms the Highlands development area. However, steep slopes occur along a portion of the Classic Street segment of the project.

2.2 BACKGROUND INFORMATION

2.2.1 TOPOGRAPHY AND GEOMORPHIC FEATURES

We reviewed U.S. Geological Survey (USGS) topographic maps, satellite imagery, as well as LiDAR data downloaded from the Oregon Department of Geology and Mineral Industries' online mapping portal (DOGAMI, online mapping accessed November 2024), for analysis of topographic and geomorphic features in the project area along Classic Street and the Highlands area.

Classic Street mostly occupies a bench between terraces developed for housing and recreation, with a housing development above and a vacant lot adjoining a golf course below. The area is relatively low relief, with about 60 feet separating the highest and lowest points in the vicinity. The topography is highly altered by housing development, and little of the pre-development topography remains. The low relief hills are relict sand dunes, of which the general shape still remains.

2.2.2 GEOLOGIC, LANDSLIDE, AND SOILS MAPPING

The geology within the Project area is mapped by DOGAMI. The geology consists of ancient sand dunes which were deposited in the last several hundred thousand years and have since been stabilized by vegetation and development. These deposits are composed of eolian, or wind-deposited, fine sand.

Landslide mapping from DOGAMI's SLIDO database maps one earth slide-rotational landslide about 450 feet west of Classic Street, outside of the project area. It is about 140 feet wide and is mapped with low confidence. No other information regarding the landslide is available.

Faults are mapped by the United States Geologic Survey (USGS) in their online Quaternary Faults and Folds Database (https://www.usgs.gov/tools/interactive-us-fault-map, accessed November 2024). The nearest mapped fault to the Project area is the Tillamook Bay fault zone, 9-10 miles south near Garibaldi. Little is known about this fault zone, but its geomorphology suggests that it is active, though at a low slip rate less than 0.2 mm/yr. Other nearby faults include unnamed faults offshore that are related to the Cascadia Subduction Zone plate boundary system, but little is known about these faults other than that they are likely active in the last 12,000 years with slip rates of 2.0-5.0 mm/yr.

Geologic hazards were reviewed using DOGAMI's Statewide Geohazards Viewer (HAZVU). Geologic hazards mapped along the alignment include landslides, earthquake shaking, liquefaction, coastal erosion, and tsunami inundation. Mapped landslide hazard is moderate to high along the length of Classic Street, where the steep sand cutbanks are susceptible to shallow landsliding. No hazard from deep-seated landsliding is mapped along Classic Street or in the Highlands area. DOGAMI assigns a 10-20% probability of damaging earthquake shaking in the next 50 years throughout Manzanita, including the Project area. A Cascadia Subduction Zone earthquake is expected to generate severe local shaking of 8 on the Modified Mercalli Scale, indicating widespread severe damage to structures. Earthquake shaking strong enough to be damaging would also produce liquefaction in areas of loose sediments saturated with water. The entirety of the Project area's susceptibility to liquefaction is rated as High. About half of Classic Street is within the evacuation zone for an expected Cascadia Subduction Zone tsunami, between approximately the intersections with Dorcas Ln. and Jackson Wy.

The area's soils are mapped by the Natural Resources Conservation Service (NRCS, Web Soil Survey accessed November 2024). The Project area is entirely underlain by the Netarts fine sandy loam, present on slopes of 5 to 30 percent. It is derived from eolian dune sands, and has a typical profile of slightly decomposed plant material from 0-2 inches depth, an A horizon of fine sandy loam from 2-5 inches, an E horizon of loamy fine sand from 5-9 inches, an AB horizon of loamy fine sand from 9-15 inches, a B horizon of fine sand from 15-54 inches, and a C horizon of fine sand from 54 to 67 inches depth. It is considered well-drained with infiltration rates of 1.98 – 5.95 inches/hr. The depth to both a restrictive feature and the water table is greater than 80 inches, according to NRCS.

2.2.3 LIDAR AND AERIAL IMAGERY REVIEW

LiDAR-generated bare earth hillshade mapping of the Project area was obtained from DOGAMI. Aerial photos from USGS Earth Explorer and Google Earth Pro for the years 1953, 1980, 1994, 2000, 2005, 2012 and 2021 were reviewed for evidence of instability or other changes. A discussion of the LiDAR imagery is provided below, and a summary of pertinent geomorphic and slope stability observations made from aerial imagery is given in Table 1.

Table 1 – Review of Aerial Imagery

Image Number	Date	Image Source	Notes
1	1953	USGS Earth Explorer	B/W photo shows that the area of Classic Street is forested and undeveloped, apart from the two blocks south of Laneda Ave. No signs of slope instability are interpreted.
2	1986	USGS Earth Explorer	False-color photo shows that Classic Street is still nonexistent south of Dorcas Ln. No signs of slope instability are interpreted.
3	1994	Google Earth	B/W photo shows Classic Street present as a narrow unpaved road. Grading for housing developments is in progress to the southwest and southeast. Highlands Dr. is not present, but the Highlands area is clear of timber. No signs of slope instability are interpreted.
4	Dec. 2005	Google Earth	Color photo shows Classic Street apparently paved. Terracing for adjacent housing developments appears complete. Highlands Dr. is not present. Large areas of bare sand are present, likely due to recent earthmoving activity. No signs of slope instability are interpreted.
5	2021	Google Earth	Color photo shows Project area much as it appears in 2024. All terrace grading adjacent Classic Street is complete, and the Highlands development is partly graded as well, though Highlands Dr. is only half constructed. No signs of slope instability are interpreted.
6	2024	Google Earth	Color photo shows Project area as it appears at present. No signs of slope instability are interpreted.

Notes:

1. B/W = black and white

In summary, the air photo record shows stable dune slopes and the time history of existing development. No indications of instability were interpreted in the air photos.

3.0 SITE CONDITIONS

3.1 SURFACE CONDITIONS

Classic Street is a narrow asphalt-paved road which is surrounded by development except for the central portion between Highlands Dr. and Dorcas Ln. where there are housing developments upslope (east) of the road and vacant land downslope (west) of the road alignment. Where not covered by landscaping soil or vegetation, fine sand is visible throughout the Project area. Vegetation is limited to blackberries, some shrubs, occasional conifer trees, and grasses. The nature of the sandy subsoil means that there are no areas of persistent ponding or standing water.

The Project area also includes Highlands Dr., a residential connector extending NE from Classic St, and Necarney City Road, a paved county road which extends roughly east-west through Manzanita, as well as the undeveloped area between these two roads. The area is dominated by rolling hills of sand covered with primarily grassy vegetation.

Pavement cracking is prevalent along Classic Street between Dorcas Avenue and Highlands Drive, where the road is built on a bench. Cracks are generally arcuate in shape, and areas of cracking are often noticeably subsided compared to surrounding pavement. Cracks range in width from hairline up to about ¾”, with slight vertical offset generally too small to be measured individually but add up to about two inches across the damaged zone in some cases. Areas of cracking are mostly restricted to the westernmost few feet of the roadway, though some areas extend to the approximate center of the current road alignment. These areas are between about 5 feet and about 70 feet long.

3.2 SUBSURFACE CONDITIONS

We completed eleven machine-drilled borings and four hand auger explorations within the project area. Machine-drilled borings are designated B-1 through B-11 and were completed to depths between 11.5 feet and 51.5 feet bgs. Borings were completed using hollow-stem auger methods, except for B-6 which used mud rotary methods. Hand auger explorations were completed to between 6 and 10 feet bgs and are designated HA-1 through HA-4. Additionally, we completed four drive probe soundings to evaluate subsurface conditions to a depth of 10 feet, designated DP-1 to DP-4. The approximate locations of our explorations are shown on Figure 2. Explorations were completed between November 12th and 15th, 2024. Descriptions and logs of our subsurface explorations are included in Appendix A.

Our site explorations generally encountered native eolian sands to 51.5 feet bgs, the maximum depth of exploration. The native sands were generally overlain by roadway gravels and variable depths of gravelly and sandy fill, or by a thin layer of organic material. We interpreted subsurface conditions at the boring locations shown on Figure 3. Our interpretation of subsurface conditions at each location are provided in Figures 4A through 4G. The geologic units we encountered are described in more detail below.

3.2.1 ROADWAY ASPHALT AND FILL

We encountered well-graded roadway gravel and/or sand fill in all of our borings. The gravel fill extended from the ground surface to variable depths of up to 2.5 feet bgs, but generally ranged in thickness from 0.5 to 2 feet. In all borings except B-1, B-2, and B-7, the gravel was overlain by 2 inches of asphaltic concrete (AC) pavement. The gravels generally contained clasts measuring ¾-inch to 2 inches in diameter with varying amounts of sand and silt. In some borings, sand fill was interpreted, but the similarity of the native and fill sand made distinguishing between the two uncertain.

No laboratory testing was completed on the Roadway Asphalt and Fill.

3.2.2 EOLIAN SANDS

Below the Roadway Asphalt and Gravels, we encountered orange to gray sands. These sands were poorly graded and fine-grained in size. They were generally uniform apart from color changes and occasional thin beds containing small amounts of organic material. The sand ranged from very loose to dense, with N-values of 2 to 65 bpf. Higher blow counts, those above about 25, often correlated with areas near the water table which we encountered at 38 feet bgs in Boring B-5.

Laboratory testing on samples of the eolian sands found moisture contents ranging from 1 to 25 percent. Most sands encountered were dry to moist, but samples retrieved during mud rotary drilling (Boring B-6) and/or recovered from below the water table were moist to wet, with measured moisture contents of up to 25 percent. Fines content tests measured 2 to 3 percent fines in three samples from B2 and B7. Two sieve gradation tests revealed that fine sand is the dominant grain size present, though the borings were dug through road gravels and samples contained gravel fractions of 5 – 42 percent (B-10 S1 and B-6 S1, respectively) in the upper 4 feet of the borings.

3.2.3 GROUNDWATER

We encountered groundwater in Boring B-5 at 38 feet bgs. We did not encounter groundwater in any of our other borings (depths of between 11.5 and 31.5 feet bgs). Groundwater could not be confirmed in Boring B-6 due to mud rotary drilling methods used, but is presumed to occur at a similar depth as B-5.

Although groundwater was encountered at the depth and location noted above, groundwater conditions vary temporally due to seasons, precipitation, development and other factors. Perched (transient) groundwater could be encountered anywhere within the project area during periods of heavy or prolonged precipitation.

4.0 EVALUATION

Our background review and subsurface explorations found the primary geotechnical factors affecting the project are the prevalence of loose dry eolian sand, the stability of site slopes along Classic Street, and seismic hazards overall. Based on our analysis, retaining walls will be needed to stabilize failing areas of the existing roadway and support the widened roadway sections. These key geotechnical factors affecting the project and geotechnical design of retaining walls are further evaluated in the following sections.

4.1 SLOPE STABILITY

We completed numerical slope stability analyses (SSA) representative sections of Classic Street where indications of road instability are visible (arcuate cracking as noted above) and significant grading is proposed. The locations of our SSA analyses are shown on Figure 2, as Sections A, C, and E. The SSA were completed using the two-dimensional commercial software SLIDE by RocScience. SLIDE uses two-dimensional limit equilibrium methods to analyze slope stability by determining a factory of safety (FS) against slope instability. The FS against slope instability can be generalized as the ratio of forces resisting slope movement (soil strength, soil mass, etc.) to forces driving slope movement (gravity, earth pressure, etc.). A FS equal to or less than 1 indicates a condition when the available soil shear resistance decreases below the shear stresses required to maintain stability of the slope and the slope will theoretically fail. FS above 1 indicates the slope is stable with increasing FS indicating increasing stability. The program also predicts the location and geometry of “critical slip surfaces.” Critical slip surfaces are the zones with the lowest FS. Our SSA was completed using the Spencer and Morgenstern-Price Methods, which both satisfy moment and force equilibrium. The lowest calculated FS from the two search methods identified above is reported.

4.1.1 CASES ANALYZED

The surface geometry of our models was developed from LiDAR data at three of our eleven boring locations: A-A' (B10), C-C' (B5), and E-E' (B11). The locations of the cross sections are illustrated on Figure 3. Our subsurface interpretations were based on the findings of our borings and laboratory testing at the cross sections analyzed. We estimated soil properties under existing static conditions by back-analysis at the analyzed locations. Back-analyzed conditions were developed by iteratively varying soil properties until achieving a FS of approximately 1.0 and failure surfaces similar to those observed in the field (the extent of pavement cracking). This method provides soil shear strength (average) in their current conditions to be used in analyses. Using these properties, we then analyzed the following scenarios under static and seismic conditions:

- Existing conditions,
- A single gravity wall, intended to model a concrete wall options.

A traffic surcharge modeled as 250 pounds per square feet (psf) across the full traffic lanes was included in all cases analyzed.

Our seismic analyses utilized a horizontal acceleration of 0.254g, based on a peak ground acceleration of 0.5081 for the 975-year event, per Section 4.2.2.

4.1.2 DESIGN PARAMETERS

Based on the back analysis described above and on laboratory testing completed for this project, we developed the soil properties for soil units used in the analyses, as summarized in Table 2.

Table 2 – Stability Soil Properties For All Cross Sections

Soil Unit Description	Material Color in SLIDE	Total Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Native sand, loose	🟨	110	26	0
Road Fill	🟩	120	40	0
Concrete Wall	⬛	150	-	-

4.1.3 STABILITY ANALYSES RESULTS

Results from our SSA are summarized in Tables 3a through 3c. Graphical results are included in Appendix B. For analysis of slope mitigation options, a global minimum FS of 1.25 was used under static loading conditions for roadway embankment sideslopes per ODOT GDM, Table 7.3. Under seismic conditions, a FS of 1.1 or above is the minimum required, but FS as low as 1.0 can be utilized if ground deformations are estimated and fall within acceptable values for the affected infrastructure (typically 1 to 2 inches) (ODOT GDM, Section 13.5.3.1).

Based on the results in Tables 3a through 3c, all stabilization options meet the design FS (are stable) under static conditions with an FS of 1.25 or greater. However, under seismic conditions, the stabilization methods do not achieve minimum FS with reasonable wall configurations.

Table 3a – Cross Section A-A’ Stability Factor of Safety Summary

Figure	Case	Global Minimum FS
B-1	A-A’ – Back Analysis – Static	1.00
B-2	A-A’ – Retaining Wall – Static	1.5
B-3	A-A’ – Retaining Wall – Seismic	0.75

Table 3b – Cross Section C-C’ Stability Factor of Safety Summary

Figure	Case	Global Minimum FS
B-4	C-C’ – Back Analysis – Static	1.00
B-5	C-C’ – Retaining Wall – Static	1.36
B-6	C-C’ – Retaining Wall – Seismic	0.69

Table 3c – Cross Section E-E’ Stability Factor of Safety Summary

Figure	Case	Global Minimum FS
B-7	E-E’ – Back Analysis – Static	1.00
B-8	E-E’ – Retaining Wall – Static	1.48
B-9	E-E’ – Retaining Wall – Seismic	0.90

At most cross-section locations, seismic FS are very low, even when the design static FS are met. We completed additional SSA under seismic conditions to determine mitigation measures that would result in stable conditions under seismic loads. We found that gravity and MSE wall options cannot be practically designed and constructed to result in stable conditions under seismic loading. To stabilize the roadway to meet seismic design FS, a substantial structure such as a tie-back H-pile wall would be required.

We also analyzed the stability of the cut upslope above Classic Street under seismic conditions. Our analysis shows that the slope east of Classic Street is prone to failure if not mitigated. Table 4 summarizes the results.

Table 4 – Global Stability FS Summary

Figure	Case	Global Minimum FS
6A	Cross Section A-A’ – Cut Slope Seismic	0.70
6C	Cross Section C-C’– Cut Slope Seismic	0.73
6E	Cross Section E-E’– Cut Slope Seismic	0.67

As noted in Table 4, the cutslope above the roadway is not stable under seismic conditions. Under the design seismic event the slope would be expected to fail above the road, and would likely deposit significant debris onto the roadway surface.

4.2 SEISMIC HAZARDS

The project site is in a seismically active area. In this section, we describe seismic sources at the site, identify the seismic site class, provide seismic response spectra, and outline our interpretation of other seismic hazards at the site.

4.2.1 SEISMIC SOURCES

The project site is in a seismically active area. The seismicity of the region is controlled by the Cascadia Subduction Zone (CSZ). Plate tectonics cause the oceanic Juan de Fuca Plate to subduct beneath the continental North American Plate. Three types of earthquakes are associated with subduction zones: interface, intraslab, and crustal earthquakes, as described below.

Interface Seismic Sources – Subduction zones are typically characterized by interactions between the oceanic Juan de Fuca Plate and the continental North American Plate. As the oceanic plate subducts beneath the continental plate, the two lock together. As they lock together, stresses build in the overlying continental plate. When the stresses become too large, the plate can rupture resulting in an interface earthquake. An example of an interface earthquake is the moment magnitude 9.0 (M9.0) event which occurred in 2011 in Tohoku, Japan. Interface earthquakes are some of the largest magnitude and most destructive earthquakes recorded across the globe.

Intraslab Seismic Sources – Intraslab earthquakes originate from a deeper zone of seismicity that is associated with bending and breaking of the subducting oceanic plate. Intraslab earthquakes occur at depths of 40 to 70 kilometers (km) and can produce earthquakes with magnitudes up to and greater than magnitude M7.0. An example of an intraslab earthquake is the 2001 M7.0 Nisqually earthquake which occurred in west-central Washington.

Crustal Sources – Shallow crustal faults are caused by cracking of the continental crust resulting from the stress that builds as the subduction zone plates remain locked together. Based on our review of available geologic maps (through DOGAMI HazVu), the closest mapped active fault to the site is approximately 10 miles to the south as described in section 2.2.2.

Details of these sources and their contribution to seismic hazard to the project site are provided below.

4.2.2 SEISMIC SHAKING

We evaluated potential seismic shaking at the site in accordance with the ODOT GDM and AASHTO based on seismic shaking having a 7 percent probability of exceedance in 75 years (975-year return period); this is the standard AASHTO seismic design criteria (AASHTO, 2020).

We evaluated potential seismic shaking at the site using the updated ODOT Seismic Hazard Maps which are based on the USGS 2014 seismic shaking maps (ODOT 2016). The expected peak ground acceleration (PGA) at the site for the "Life Safety" criteria (975-year return period motion) is approximately 0.4369g based on the ODOT, 2016 maps. This value represents the peak acceleration on bedrock beneath the site and does not account for ground motion amplification due to site-specific effects. The site-adjusted PGA

(As) is determined by applying a site class factor to the PGA noted above and is presented in Section 4.2.3. Refer to Section 4.2.4 below for a discussion of ground motion amplification.

Seismic sources contributing to the potential ground shaking above include shallow crustal faults, intraplate faults, and the CSZ megathrust interface fault. The data indicated that the "modal source" for shaking at the site under the 975-year design interval (Life Safety criteria) at all potential periods of interest (0.0 to 2.0 seconds) is a magnitude 9.1 earthquake epicentered at the CSZ approximately 32 km from the site. The modal source generally signifies the earthquake with the highest contribution to the site earthquake hazard, in this instance a rupture along the CSZ.

4.2.3 SEISMIC SITE CLASS

The "site class" is a classification used by the 2022 Oregon Structural Specialty Code (OSSC) to quantify ground motion amplification. The classification is based on the properties of the upper 100 feet of the soil and bedrock materials at a site.

The deepest exploration performed at the site was approximately 51.5 feet bgs. The SPT N-value obtained at the bottom of this exploration was extrapolated down to 100 feet in order to obtain a site class designation. The weighted average N-values in the upper 100 feet of this boring were 19 blows per foot (bpf). As a result, we consider **Site Class D** to be an appropriate designation for the project area.

However, we note this site class designation does not consider potential liquefaction of site soils, as discussed in Section 4.2.5.

4.2.4 DESIGN RESPONSE SPECTRUM

We obtained seismic design parameters for the 975-year AASHTO design event (AASHTO, 2020) at Latitude 45.715399 and Longitude -123.929722. The parameters provided in Table 1 were developed using the ODOT ARS Spreadsheet (ODOT, V.2014.16). The values provided in Table 5 are considered generally appropriate for AASHTO and ODOT code-based seismic design, except for liquefaction, as noted above.

Table 5 - Seismic Design Parameters for 975-year Event

Parameter	Value
Site Class	D
Mapped Spectral Response Acceleration (Short Period), S_s	0.9041
Mapped Spectral Response Acceleration (1-Second Period), S_1	0.3743
Peak Ground Acceleration Coefficient, F_{pga}	1.1631
Short Period Spectral Acceleration Coefficient, F_a	1.1383
Long Period Spectral Acceleration Coefficient, F_v	1.9257
A_s (F_{pga} x PGA)	0.5081
Spectral Response Acceleration (Short Period), S_{DS}	1.0292
Spectral Response Acceleration (1-Second Period), S_{D1}	0.7208
Peak Ground Acceleration (PGA)	0.4369

4.2.5 LIQUEFACTION HAZARDS

When cyclic loading occurs during an earthquake, the shaking can increase the pore pressure in some soils and cause liquefaction. The rapid increase in pore water pressure reduces the effective normal stress between individual soil particles, resulting in the sudden loss of shear strength in the soil. Granular soils (gravels and sands), which rely on interparticle friction for strength, are susceptible to liquefaction until the excess pore pressures can dissipate. Sand boils and flows observed at the ground surface after an earthquake are the result of excess pore pressures dissipating upwards, carrying soil particles with the draining water. In general, loose, saturated sand soils with low silt and clay contents are the most susceptible to liquefaction. Silty soils with low plasticity are moderately susceptible to liquefaction under relatively higher levels of ground shaking. For any soil type, the soil must be saturated for liquefaction to occur. Although the loose to medium dense sands at the site are subject to liquefaction where saturated, due to the depth of groundwater at the site (38 feet bgs, where encountered), the potential for soil liquefaction to affect the project area is very low.

4.2.6 OTHER SEISMIC HAZARDS

4.2.6.1 Surface Fault Rupture

As noted previously, the nearest mapped active fault is approximately 10 miles south of the project site. Therefore, we consider the hazard from ground surface rupture on mapped active faults to be relatively low. Unmapped or inactive faults may still exist that could increase the risk of ground fault rupture at the site.

4.2.6.2 Tsunami and Seiche

The proposed alignment is generally outside of the tsunami hazard area, but on its north end (from about the intersection of Classic St and Dorcas Ln to about the intersection of Classic St and Jackson Way) is within the local tsunami evacuation zone. As a result, tsunami hazards are likely to impact surface structures within the north end of the alignment if a tsunami occurs. The potential damage to buried structures, such as pipelines, is judged to remain low, however, as scour and erosion from tsunamis are not likely to reach them.

4.2.6.3 Seismic Subsidence or Uplift

Given the proximity of the site to the coastline, it is likely that the site will experience considerable coseismic subsidence associated with a rupture on the CSZ. Based on mapping by DOGAMI (Madin and Burns, 2013), between 3 and 4 feet of subsidence is anticipated following the design subduction zone earthquake. Generally, such subsidence is expected to be a widespread areal event which is not likely to have a significant effect on the alignment as differential displacement would be minimal.

4.2.6.4 Earthquake-Induced Landsliding

As described in Section 4.1.3 of this report, the steep slopes along Classic Sreet between Dorcas Lane and Highlands Drive will undergo earthquake-induced landsliding within this portion of the alignment. Outside of this area of steep slopes, the potential for earthquake-induced landsliding is low as slopes are generally flat.

4.2.6.5 Earthquake-Induced Settlement

It is well-known that seismically induced settlement of sand soils occur, even absent liquefaction (ODOT GDM, Section 13.5.4). We estimated sand settlement at the site and found that up to several inches of settlement is possible.

4.3 RETAINING WALLS

We evaluated gravity and mechanically stabilized earth (MSE) retaining walls to support the roadway along Classic Street. We first determined the seismic global stability of the wall under the 975-year earthquake per the ODOT GDM, 13.2.3 for "Highway Walls". We determined that the "No Analysis" option per AASHTO 11.5.4 is not applicable to this site, and we assumed the walls are not considered "Minor Walls". Using a seismic design FS of 1.0 per Section 4.1 of this report, we determined the embedment/dimensions of the walls required. The walls were then designed for internal stability using software provided by the block manufacturers:

- Ultrawall TM, by Ultrablock, Inc. for gravity wall design.
- TensarSoil by Tensar, Inc. for MSE wall design.

Minimum wall dimensions and design parameters for gravity and MSE walls are provided in Section 6.2 of this report.

4.4 INFILTRATION TESTING

We completed two infiltration tests, IT-1 and IT-2, on each side of the intersection of Classic and Necarney City Road. The tests were completed on November 14, 2024, at the approximate locations shown on Figure 2. The tests were completed in general accordance with the encased falling head test in general accordance with the US Bureau of Reclamation (USBOR), as described in Attachment A of this report. We measured the following results in our infiltration tests:

Table 6. Field-Measured Infiltration Rates

Test #	Unfactored Rate Max/Min (in/hr)	Notes
IT-1	52/39	West side of Classic St
IT-2	85/67	East side of Classic St

As indicated in Table 6, the measured field (unfactored) infiltration rate varies from 67 to 39 inches per hour with the slowest of the two measurements in IT-1 and IT-2 averaging 54 inches per hour. Given the depth of the water table in the area and consistent occurrence of sands within the area that are similar to those at the test locations, we anticipate an unfactored infiltration rate of 54 inches per hour is reasonable for the locations where testing was completed.

5.0 CONCLUSIONS

Based on our explorations, testing, and analyses, it is our opinion that the proposed project is feasible from a geotechnical perspective, provided the recommendations in this report are included in design and construction. We offer the following general summary of our conclusions:

- Soils at the site are loose sands within anticipated excavation depths.
- Groundwater is several tens of feet below ground surface and not anticipated to have an effect on the project.
- Pavement cracking along the edge of Classic Street is interpreted as due to ongoing creep of loose sands beneath the roadway.

- Retaining walls are recommended to stabilize the downslope edge of Classic Street. Final design of the walls will depend on final seismic design requirements, which are to be determined.
- The loose sand soils will not hold steep slope angles or have stable trench walls at any significant excavation depths. They will also be prone to raveling. Temporary and permanent excavations should consider the loose nature of the soils and take appropriate measures to protect structures and avoid excessive overexcavation.
- Excavations into steep slopes below the houses adjacent Classic Street should be avoided due to the potential for upslope raveling and damage to house foundations. If such excavations are planned, we should be contacted to provide recommendations and review grading plans.
- Additional measures to protect upslopes homes from construction-related damage should be considered, including a pre-construction survey and the use of non-vibratory compaction for roadway subgrades and base rock.
- The site is conducive to on-site stormwater infiltration per the recommendations in this report.
- Pavement design, based on the traffic data provided by the City, should follow the recommendations and design section in this report.
- On-site soils are suitable for use as structural fill.
- Subsurface conditions will make shallow trenchless methods difficult to complete, due to mud loss and heave at the surface. However, we understand that local contractors have been able to successfully advance utilities in the site soils with specific mud mixtures. Completion of trenchless utilities may require reliance on local contractors experienced in such soils.

Our geotechnical recommendations for the project, which address the above, are provided in the following sections.

6.0 RECOMMENDATIONS

Our Earthworks and Retaining Wall Recommendations for the project are provided in the following sections.

6.1 EARTHWORKS RECOMMENDATIONS

6.1.1 Site Preparation

Site preparation will depend on final selection of a pavement section. Where pavements remain in place, no significant site preparation is anticipated. However, where pavements are to be removed they should be removed to the full depth they occur. The underlying base rock can generally be left in place, unless removal is necessary to reach site grades, or the rock is contaminated. Removed AC and base rock can be stockpiled and re-used later as structural fill as described later in this report.

Where retaining walls are to be constructed, site preparation should also include clearing of trees, grubbing stumps and other vegetation, and stripping any organics and duff within structural and work areas. We estimate that stripping will generally be less than 6 inches deep. Cleared, stripped, and grubbed materials should be hauled off-site and properly disposed of.

Any utilities to be abandoned within the project area should be fully removed or grouted full if left in place. Areas disturbed by their removal should be repaired as recommended elsewhere in this report.

The exposed subgrade should be evaluated after site preparation activities are complete. Evaluation should be completed by proofrolling the subgrade with a fully-loaded dump truck or similar heavy rubber-tired construction equipment to identify remaining soft, loose or unsuitable areas. The proofroll should be conducted prior to placing any other fill. The proofrolling should be observed by a member of Pali Consulting's staff who should evaluate the suitability of the subgrade and identify any areas of yielding that are indicative of soft or loose soil. If soft or loose zones are identified during proofrolling, these areas should be excavated to the extent indicated by the engineer and replaced with structural fill.

6.1.2 Wet Weather Construction

The sandy soils at the site are not very susceptible to wet conditions, except during periods of high precipitation or when saturated.

However, it is good practice to schedule earthwork for drier summer months, if possible. If earthwork is scheduled for the wet season or significant precipitation occurs during construction, the contractor should be prepared to employ wet weather measures to minimize disturbance to the subgrade from construction traffic. Such measures might include:

- Constructing a temporary working pad of 12 to 24 inches or more of crushed rock over a geotextile fabric,
- Using tracked equipment and smooth-edge buckets to minimize subgrade disturbance,
- Covering soil stockpiles or subgrade areas with plastic to prevent erosion and saturation,
- Protecting footing subgrades with four or more inches of lightly compacted crushed rock.
- Other measures as needed to protect structural areas of the site and structural materials.

Bearing soils that are disturbed during construction should be recompacted in place, if practical, or removed and replaced with structural fill.

6.1.3 Excavation

Site soils within expected excavation depths will generally consist of loose sand that is dry to moist. It is our opinion that conventional earthmoving equipment in proper working condition should be capable of making project excavations in expected soil types. The earthwork contractor should be responsible to provide the equipment and procedures to excavate the site soils described in the exploration logs and text of this report.

6.1.4 Excavation Dewatering

Regional groundwater was encountered at over 30 feet deep, so is not expected to occur within anticipated excavation depths. During periods of high precipitation, perched groundwater may occur within planned excavation depths, but give the very uniform well-drained sandy soils at the site, such perched conditions are unlikely to be persistent for long periods of time. In addition to perched groundwater, surface water inflow to the excavations during the wet season could be problematic especially adjacent to areas where AC pavements remain. Provisions for temporary ground and surface water control should be the responsibility of the contractor to select the means and methods best suited to the schedule and their equipment.

6.1.5 Excavation Stability

Trench sidewalls throughout the project will be prone to raveling and collapse at all depths. We recommend that all excavations be shored or laid back. All trench excavations should be made in accordance with applicable Occupational Safety and Health Administration (OSHA) and state regulations. Site soils are expected to be OSHA Type C throughout the project area, but the soil type should be confirmed by a "competent person" under the direction of the contractor in the field based on actual conditions encountered.

Trenches should not be excavated adjacent the toe of any slope below a line projected from the toe of the slope at a 3H:1V gradient, unless evaluated by qualified personnel.

While this report describes certain approaches to excavation and shoring, the contractor should be responsible for selecting and designing the specific methods, monitoring the excavations for safety, and providing shoring required to protect personnel and adjacent structural elements.

6.1.6 Permanent Cut and Fill Slopes

Permanent cut slopes in the loose native aeolian sands should not exceed 3H:1V. Fill slopes can be constructed at maximum gradients of 2H:1V, if completed per Section 6.1.7 of this report. Slopes that will be maintained by mowing or adjacent to surface water should be 3H:1V or flatter. Footings, access roads and pavements should be located at least 5 feet horizontally from any slope face. If steeper slopes or closer setbacks are necessary, we should be contacted to provide additional recommendations, and additional explorations may be necessary.

Slopes should be planted with appropriate vegetation as soon as possible after grading to provide protection against erosion. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope.

6.1.7 Structural Fill and Backfill

All fill associated with roadways, retaining walls, and slopes over 5H:1V should be considered structural fill for this project.

Structural fill soils should be free of debris, roots, organic matter, frozen soil, man-made contaminants, particles with greatest dimension exceeding 4 inches, and other deleterious materials. The suitability of soil for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines in the soil matrix increases, the soil becomes increasingly more sensitive to small changes in moisture content and achieving the required degree of compaction becomes more difficult or impossible.

Recommendations for suitable fill are provided in the following sections.

6.1.7.1 PIPE BEDDING AND PIPE ZONE MATERIAL

Utility trench backfill for pipe bedding and in the pipe zone should consist of well-graded granular material with a maximum particle size of 3/4-inch and less than 10 percent fines. The pipe bedding and pipe zone material should meet the pipe manufacturer's recommendations, as well, including placement of the bedding and pipe zone material so that the pipe is evenly supported and backfilled.

6.1.7.2 TRENCH BACKFILL

Backfill above the pipe zone should consist of materials suitable for the overlying use of the area. Our recommendations for backfill within and outside of roadway areas follow, separately:

6.1.7.2.1 BACKFILL IN ROADWAY AREAS

Within roadway areas we recommend that imported granular material be used as backfill. The material should be pit or quarry run rock, crushed rock, or crushed gravel and sand and should meet the specifications provided in the Oregon Department of Transportation (ODOT) Standard Specifications for Construction (SSC) 00330.14 – Selected Granular Backfill or SSC 00330.15 – Selected Stone Backfill. The imported granular material should also be angular, fairly-well graded between coarse and fine material, have less than 10 percent by dry weight passing the U.S. Standard No. 200 Sieve, and have at least two mechanically fractured faces. During dry weather, the fines content may be increased to a maximum of 20 percent.

6.1.7.2.2 BACKFILL IN NON-ROADWAY AREAS

Outside of roadway areas where no surcharge loads or traffic will occur, on-site granular material (sand) can be used provided the material meets the general requirements for structural fill. If the use of on-site soil as structural fill is problematic, imported granular material such as that specified for roadway areas or Imported Structural Fill can be used.

6.1.7.3 ROADWAY BASE ROCK

Imported granular material used as aggregate base (base rock) in roadway areas should be clean, crushed rock or crushed gravel and sand that is fairly-well graded between coarse and fine. The base aggregate should meet the specifications of SSC 00641 – Aggregate Subbase, Base, and Shoulder Base Aggregate, depending upon application, with the exception that the aggregate have less than 5 percent by dry weight passing a U.S. Standard No. 200 Sieve based on the minus 3/4-inch fraction and have at least two mechanically fractured faces. The aggregate base should have a maximum particle size of 1 to 1-1/2 inch, depending on future performance preference. Smaller aggregate material generally has more favorable drivability characteristics but shorter lifespan, while larger aggregates have the opposite characteristics where AC will not be placed over the base rock.

6.1.7.4 HAUL ROAD ROCK

If haul roads are constructed, rock to construct haul roads should consist of crushed rock that is well-graded between coarse and fine particle sizes, contains no unsuitable materials or particles larger than 4 inches, and has less than 5 percent by weight passing the U.S. Standard No. 200 sieve. It should be placed in a single lift, typically over a separation geotextile fabric, and compacted to a well-keyed state using a heavy non-vibratory roller.

6.1.7.5 IMPORTED SELECT STRUCTURAL FILL

Select imported granular material may be used as structural fill. The imported material should consist of pit or quarry run rock, crushed rock or crushed gravel and sand that is fairly well graded between coarse and fine sizes. It should have a maximum particle size of 4 inches and less than 5 percent passing the U.S. No. 200 Sieve. During dry weather, the fines content can be increased to a maximum of 12 percent.

The material should be placed and compacted in lifts with maximum uncompacted thicknesses and relative densities as recommended in the tables that follow.

6.1.7.6 CRUSHED ROCK FILL

Crushed rock fill for aggregate base located under footings or other structures, should consist of imported clean, durable, crushed angular rock. Such rock should be well-graded, have a maximum particle size of 1½ inch, and have less than 5 percent passing the U.S. No. 200 Sieve. The material should be placed and compacted in lifts with maximum uncompacted thicknesses and relative densities as recommended in the tables that follow.

6.1.7.7 DRAINAGE ROCK

Rock for drainage purposes should consist of open-graded crushed granular rock with a maximum particle size of 1 ½ -inch and less than 2 percent passing the U.S. No. 200 Sieve (washed analysis). The material should be free of organic matter and other deleterious materials. Crushed rock of ¾- to 1½- gradation drain rock is suitable for this purpose. The drain rock should be nominally compacted to a well-keyed state unless specified otherwise.

6.1.8 FILL PLACEMENT AND COMPACTION

Fill should be placed and compacted in accordance with the following guidelines.

- Place fill and backfill on a firm subgrade, in uniform horizontal lifts with a thickness appropriate for the material type and compaction equipment. Table 7 provides general guidance for lift thicknesses.
- Use appropriate operating procedures to attain uniform coverage of the area being compacted.
- Place fill at a moisture content within about 3 percent of optimum as determined in accordance with ASTM Test Method D 1557. Moisture condition fill to achieve uniform moisture content within the specified range before compacting. Compact fill to the percent of maximum dry densities as noted in Table 8.
- Do not place, spread, or compact fill soils during freezing or unfavorable weather conditions. Frozen or disturbed lifts should be removed or properly recompacted prior to placement of subsequent lifts of fill soil.

Table 7. Guidelines for Uncompacted Lift Thickness

Compaction Equipment	Guidelines for Uncompacted Lift Thickness (inches)		
	Native Soil	Granular and Crushed Rock (Maximum Particle Size < 1½”)	Crushed Rock (Maximum Particle Size > 1½“)
Plate Compactors and Jumping Jacks	4 – 8	4 – 8	Not Recommended
Rubber-Tire Equipment	6 – 8	10 – 12	6 – 8
Light Roller	8 – 10	10 – 12	8 – 10
Heavy Roller	10 – 12	12 – 18	12 – 16
Hoe Pack Equipment	12 – 16	18 – 24	12 – 16

Note:

1. The above table is based on our experience and is intended to serve as a guideline. The information provided in this table should not be included in the project specifications.

Table 8. Fill Compaction Criteria

Fill Type	Percent of Maximum Dry Density Determined in Accordance with ASTM D 1557		
	0 – 2 Feet Below Subgrade	>2 Feet Below Subgrade	Pipe Bedding and Pipe Zone
Pipe Bedding and Pipe Zone			90
Trench Roadway Backfill	95	92	----
Trench Non-roadway Backfill and Non-roadway Areas	88	88	----
Aggregate Base[1]	95	----	----
Nonstructural Zones	88	88	----

Notes:

1. Structural fill with more than 30 percent retained on the ¾-inch sieve should be compacted to a well-keyed dense state at near optimum moisture content and performance tested to evaluate compaction.

During structural fill placement and compaction, a sufficient number of in-place density tests should be completed by Pali Consulting to verify that the specified degree of compaction is being achieved.

6.1.9 Surface Drainage

Surface runoff in unpaved areas can be controlled during construction by planning and grading practices. Surface drainage should be planned to promote drainage away from open trenches and excavations, slopes, and roadways. Such measures should be completed daily at the end of each shift. Design and implementation of such measures should be the responsibility of the Contractor.

6.1.10 Trenchless Methods

Trenchless methods are expected to be an allowed option for the Contractor to use in addition to open cut. Given the shallow depth of the utilities and loose nature of the aeolian sands that cover the project area, trenchless methods could be subject to much mud loss and frac outs. However, we understand that local contractors have developed methods that work well in the materials at the site. If allowed for the project, we recommend the following related to the use of trenchless methods:

- The Contractor be responsible for the design of execution of trenchless construction methods.
- The Contractor submit a written plan of their proposed methods, including their experience in the area and with such methods, the equipment to be used, methods to prevent frac outs and contain drilling fluids if frac-outs occur, and measures to protect existing utilities from damage due to their methods.

6.2 Retaining Walls

Retaining walls are necessary to support the west side of Classic Street. Our SSA analysis found that either gravity walls or MSE walls are likely the most cost effective methods to stabilize the road edge under static conditions. Our recommendations for retaining walls are presented below, including gravity and MSE walls. We note that seismic design requirements were still being evaluated at the time this report is written, so wall recommendations may change.

6.2.1 CONCRETE GRAVITY WALLS

Concrete gravity walls constructed of Ecology Blocks©, or their equivalent, are suitable for the site. The walls should be designed per the manufacturer's recommendations and using the parameters in Table 9. These parameters are based on the following assumptions:

- The wall heights and embedments are per Figure 5 (in progress).
- The walls will not be restrained against rotation when the backfill is placed.
- The backfill is level and structural fill extends behind the walls for a minimum distance equal to the wall height.
- Backfill within 2 feet of walls consists of free-draining granular materials.
- Hydrostatic pressures do not develop, and drainage will be provided behind walls.

Traffic or other surcharge loads should be appropriately accounted for in wall design. The blocks should be placed on a pad consisting of a minimum of 12 inches of compacted crushed rock. Backfill should be placed and compacted as recommended for structural fill.

Table 9 – Retaining Wall Design Parameters for Gravity Walls

Parameter	Results/Units	Notes
At-rest earth pressure	60 pcf	Triangular load at 1/3H*
Seismic earth pressure increase	12.5H	Rectangular load at 1/2H
Active earth pressure	35 pcf	Triangular load at 1/3H
Passive earth pressure	See section 6.2.3.1.4	
Backfill soil density	105/125 pcf	Native Sand/Granular rock backfill
Downward drag coefficient	0.4	Based on 2/3 phi
Vehicle load on backfill	2 feet equivalent fill above grade	Where within a distance from the wall = wall height or less

*H = wall height

6.2.1 MSE WALLS

MSE walls are a suitable wall type, particularly well-suited to fill applications where required excavation volumes are minimal. MSE walls should be designed for minimum internal FS of 1.5 against sliding and pullout of reinforcing elements and 2.0 against overturning. Global slope stability should be per Section 4.1. To satisfy global stability, embedment (buried depth of basal reinforcement layer at wall face) for walls above descending slopes should be H/5, where H is the wall height. A minimum embedment of 2 feet should be required. Passive pressures in front of the wall should be assumed zero for design purposes. To satisfy global stability requirements, the reinforcing elements should have minimum lengths of 75 percent of the wall height. Wall sections greater than 2½ feet in height or subject to surcharge loads (such as from slopes or traffic) should include reinforcing elements.

Many MSE walls are available as proprietary wall systems. If proprietary wall systems are used, the wall supplier is responsible to design the wall for adequate internal stability, i.e., pullout and yield of reinforcing elements and overturning. However, we recommend that proprietary wall system designs be reviewed by Pali Consulting to verify that design is consistent with material properties recommendations of this report.

We recommend the design parameters summarized in Table 9 for use in design of MSE walls. In some cases, these values are more conservative than our laboratory test results. This is to account for local variations that could have a significant effect on the walls.

Table 10. Recommended Design Parameters for Reinforced Soil Walls

Soil Properties	BACKFILL SOIL Compacted Structural Fill[1]	RETAINED SOIL Native	FOUNDATION BEARING SOIL Native
Unit Weight (pcf)	125	105	105
Friction Angle (degrees)	34	26	26
Cohesion (psf)	0	0	0
Allowable Bearing Pressure (psf)	N/A	N/A	1,500

Note:

1. Backfill soils should be properly compacted, imported granular soils, as described above in *Section 6.1*.

These parameters are based on the following assumptions:

- The walls are less than or equal to 10 feet high.
- The backfill is level and extends behind the walls for a minimum distance equal to the wall height.
- The backfill within 2 feet of walls consists of free-draining granular materials.
- Hydrostatic pressures do not develop, and drainage will be provided behind walls.

Walls subjected to the influence of surcharge loads (for example, traffic loading) should be designed for the additional horizontal pressure using an appropriate design method. Where large surcharge loads such as from heavy trucks, cranes, or other construction equipment, are anticipated in close proximity to the retaining wall, the wall should also be designed to accommodate the specific additional lateral pressures resulting from these concentrated loads once these loads are known.

We recommend providing a drainage system consisting of a properly sized, perforated pipe (minimum 4-inch diameter) placed behind the walls and embedded in the granular backfill. The top of the pipe should be below the adjacent ground surface. The pipe should be sloped to drain to a suitable surface outlet.

7.0 PAVEMENT RECOMMENDATIONS

Pavement design was completed using the AASHTO Guide for the Design of Pavement Structures (AASHTO, 1993), with the assumption that site development occurs during a period of dry weather, and that site and subgrade preparation are completed in accordance with the recommendations of this report. If these or any other assumptions in the following sections are inaccurate, please contact our office so that updated recommendations can be developed.

7.1 Assumptions and Design Parameters

We made the following assumptions regarding the design of the pavement:

- The subgrade will consist of suitable sand fill or native sand that has been compacted to at least 92 percent of the maximum dry density per ASTM D-1557, and proofrolled as noted in Section 6.1.1 of this report.
- Equivalent single-axle loads (ESALs) were estimated using traffic studies completed by Mackenzie at the intersections of Classic Street with Laneda Street and Dorcas Lane. Traffic counts were only completed for two 2-hour peak periods at the respective intersections and included all traffic, buses and heavy trucks. Traffic on Classic Street at Laneda and Dorcas converted to daily (24-hour) counts are summarized below. The traffic counts were the maximum of the sum of Left, Right and Thru traffic through the intersections on Classic Street.
    - Classic @ Dorcas: 1326 cars, 120 trucks
    - Classic @ Laneda: 1152 cars, 24 trucks
- A 20-year design life was computed with equivalent single-axle loads (ESALs) and heavy truck traffic, from the above traffic which results in the following ESAL’s:
    - Classic Avenue at Dorcas 2.358 x 10^6 ESAL’s
    - Classic Avenue at Laneda 4.94 x 10^5 ESAL’s

- A California Bearing Ratio (CBR) of 5 for recompacted fine sand soil subgrade that has been prepared in conformance with the recommendations of this report.
- Initial and terminal serviceability indices of 4.2 and 2.5, respectively.
- Reliability and standard deviation of 85 percent and 0.45, respectively.
- Structural coefficients of 0.42 and 0.14 for the flexible asphalt and base rock layers, respectively.

Significant construction traffic should not be allowed on new pavements. If construction traffic is to be allowed on new pavements, an allowance for additional traffic will need to be made in the design pavement section.

As discussed elsewhere in this report, the near-surface site soils are fine sands that may be difficult to properly compact during periods of wet weather. Therefore, alternatives, such as thickened rock sections may be needed if construction will occur during wet weather. Thickened rock sections are described in the following section of this report.

7.2 Pavement Sections

Where the soil subgrade has been prepared as described in Section 6.1, and above, the pavement sections shown in Table 11 may be utilized.

Table 11. Pavement Sections with Compacted Subgrade

Pavement Designation	AC (inches)	Aggregate Base (inches)
Classic Street at Dorcas	4.0	14
Classic Street Laneda	4.0	8.0

If compaction of the subgrade cannot be attained during periods of wet weather, the aggregate base thicknesses listed in Table 10 can be increased by 6 inches to account for the decreased subgrade modulus. The subgrade should be at least medium dense and approved by Pali Consulting before placing the base rock.

7.3 Pavement Materials

AC pavements should consist of Level 2, 12.5-mm, dense hot mixed asphalt concrete according to OSS 00744 – Minor Hot Mixed Asphalt Concrete Pavement. The asphalt cement binder should be PG 64-22 Performance Grade Asphalt Cement. The AC should be placed in two lifts with a minimum lift thickness of 2 inches. The AC should be compacted to 91 percent of Rice Density of the mix, as determined in accordance with ASTM D 2041.

Imported granular material used as base aggregate (base rock) should meet the criteria specified in Section 6.1.7.3 of this report. The base aggregate should be compacted to not less than 95 percent of the maximum dry density as determined by ASTM D 1557.

7.4 Pavement Construction

Construction should be completed in general accordance with the Oregon Department of Transportation (ODOT) Standard Specifications for Construction (SSC) and the recommendations in *Section 6.0*. Construction traffic should not be allowed on new pavements. If construction traffic is to be allowed on newly constructed pavements, an allowance for additional traffic will need to be made in the design pavement section.

8.0 LIMITATIONS

Our evaluation was based on surface reconnaissance and limited subsurface explorations. Our report is intended to evaluate geotechnical conditions within the project area and make recommendations for design of the project. However, all development on slopes involves risks, only part of which can be mitigated through qualified geotechnical evaluation and practices. Favorable performance of slopes in the near term does not imply a certainty of long-term performance, especially under conditions of adverse weather or seismic activity.

The conclusions and recommendations contained within this report are professional opinions based on our evaluation of limited information and should not be construed as a warranty of slope performance. Soil conditions can differ during different seasons, from earth processes, storms, or other factors that occur after our work has been completed. Although we evaluated areas of anticipated instability, some locations may have been overlooked. If additional unstable areas are encountered, site conditions change, or significant time passes after our work is completed, we should be given an opportunity to review our work and provide additional input if we believe it to be warranted.

Within the limitations of scope, schedule, and budget, our services were executed in accordance with the standard of care in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

9.0 REFERENCES

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10.0 CLOSING

We appreciate this opportunity to submit this report. If we may provide any additional information or clarification, please contact us.

Sincerely,

PALI CONSULTING INC.

TIMOTHY W. BLACKWOOD, PE, GE, CEG
President/Principal Engineer

Attachments:

- Figures 1 through 5
- Appendix A – Site Explorations and Laboratory Testing
- Appendix B – Slope Stability Analysis

DocID: 074-24-015GeotechnicalReportDraft.docx

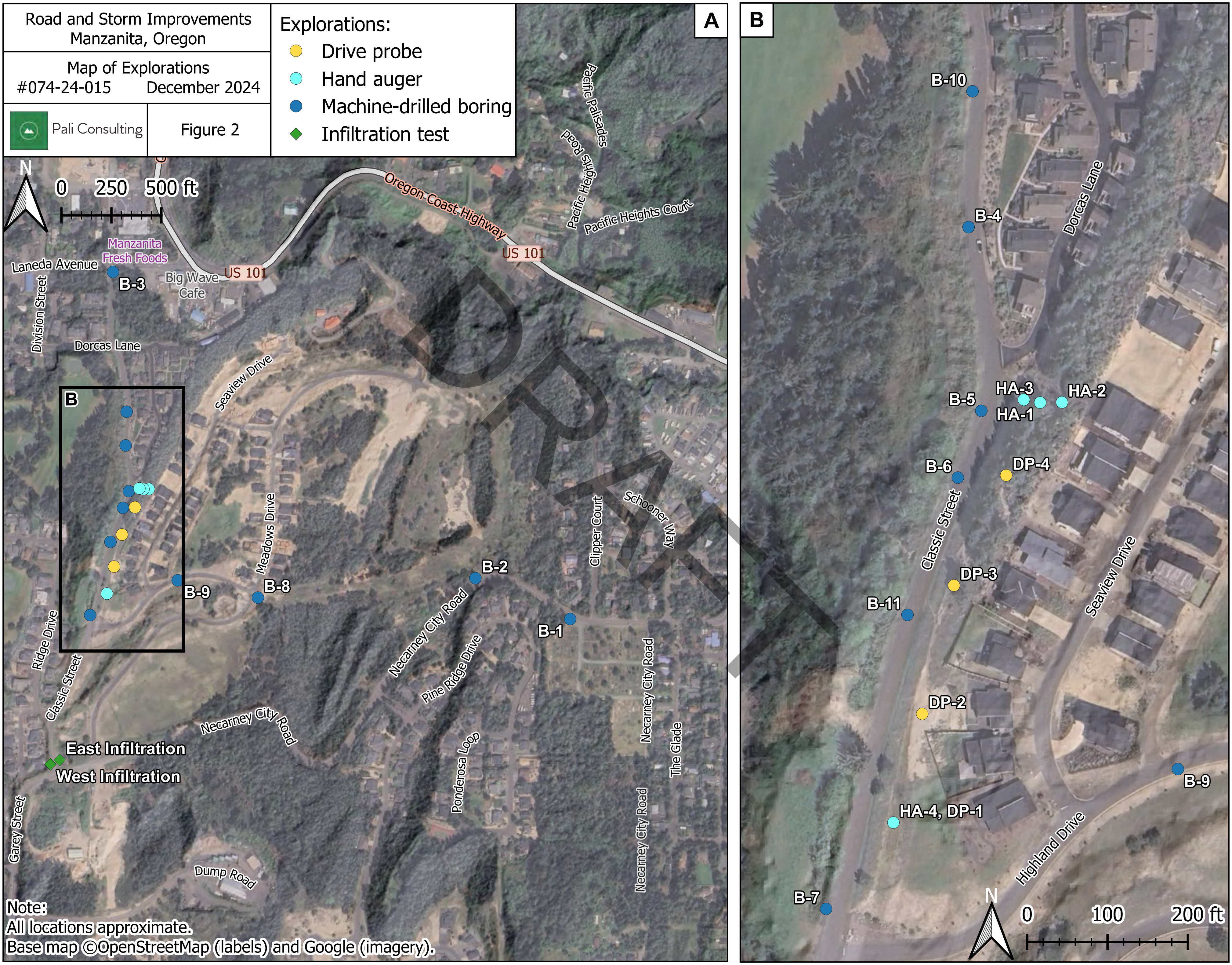
Road and Storm Improvements
Manzanita, Oregon

Vicinity Map
#074-24-015 December 2024

Pali Consulting

Figure 1

Note:
All locations approximate.
Base map ©Google (imagery),
Open Street Map (labels)


Road and Storm Improvements
Manzanita, Oregon

Map of Explorations
#074-24-015 December 2024

Pali Consulting

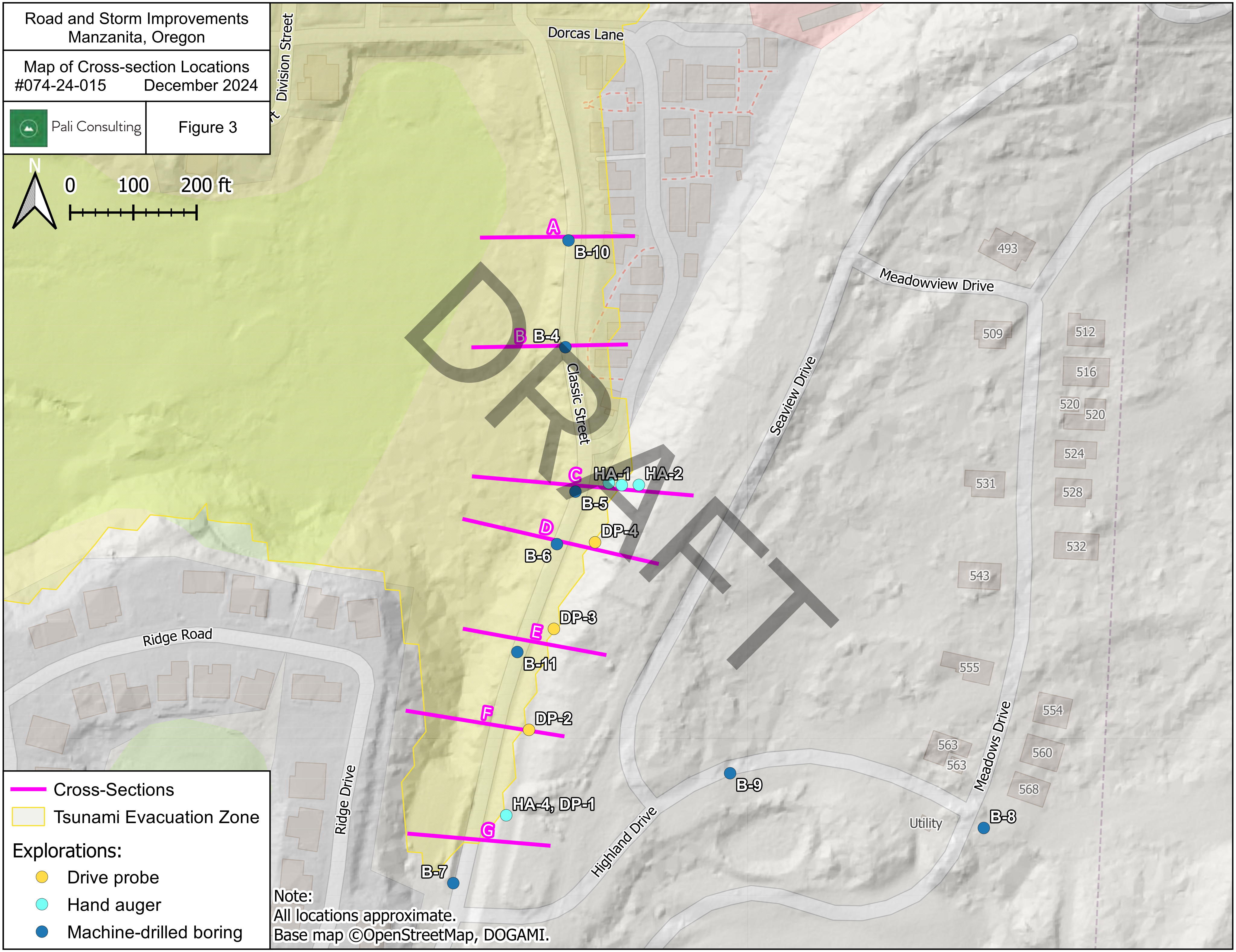
Figure 2

Road and Storm Improvements
Manzanita, Oregon

Map of Cross-section Locations
#074-24-015 December 2024

Pali Consulting

Figure 3



Note:
All locations approximate.
Base map ©OpenStreetMap, DOGAMI.

Road and Storm Improvements
Manzanita, OR

Cross-Section A-A’
#074-24-015 December 2024

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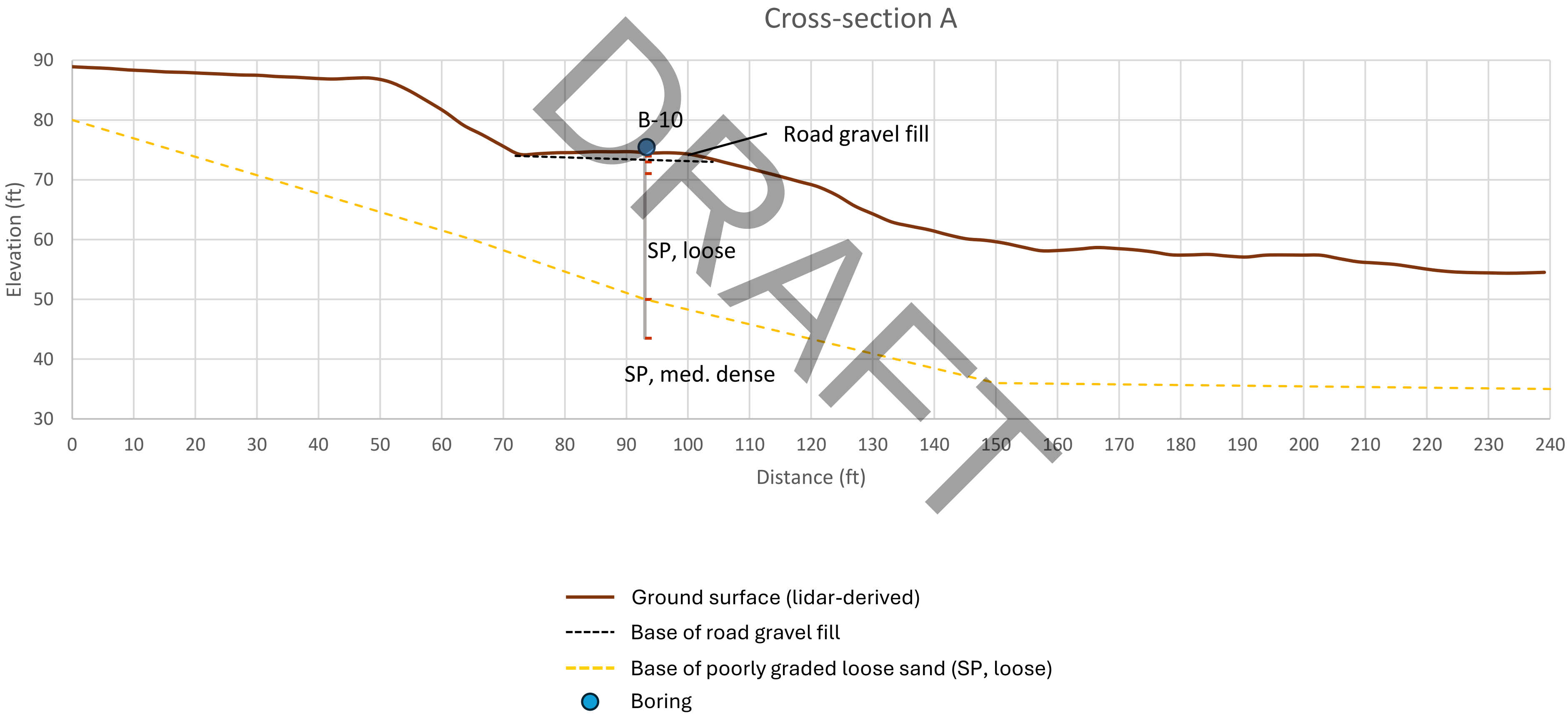
Figure 4A



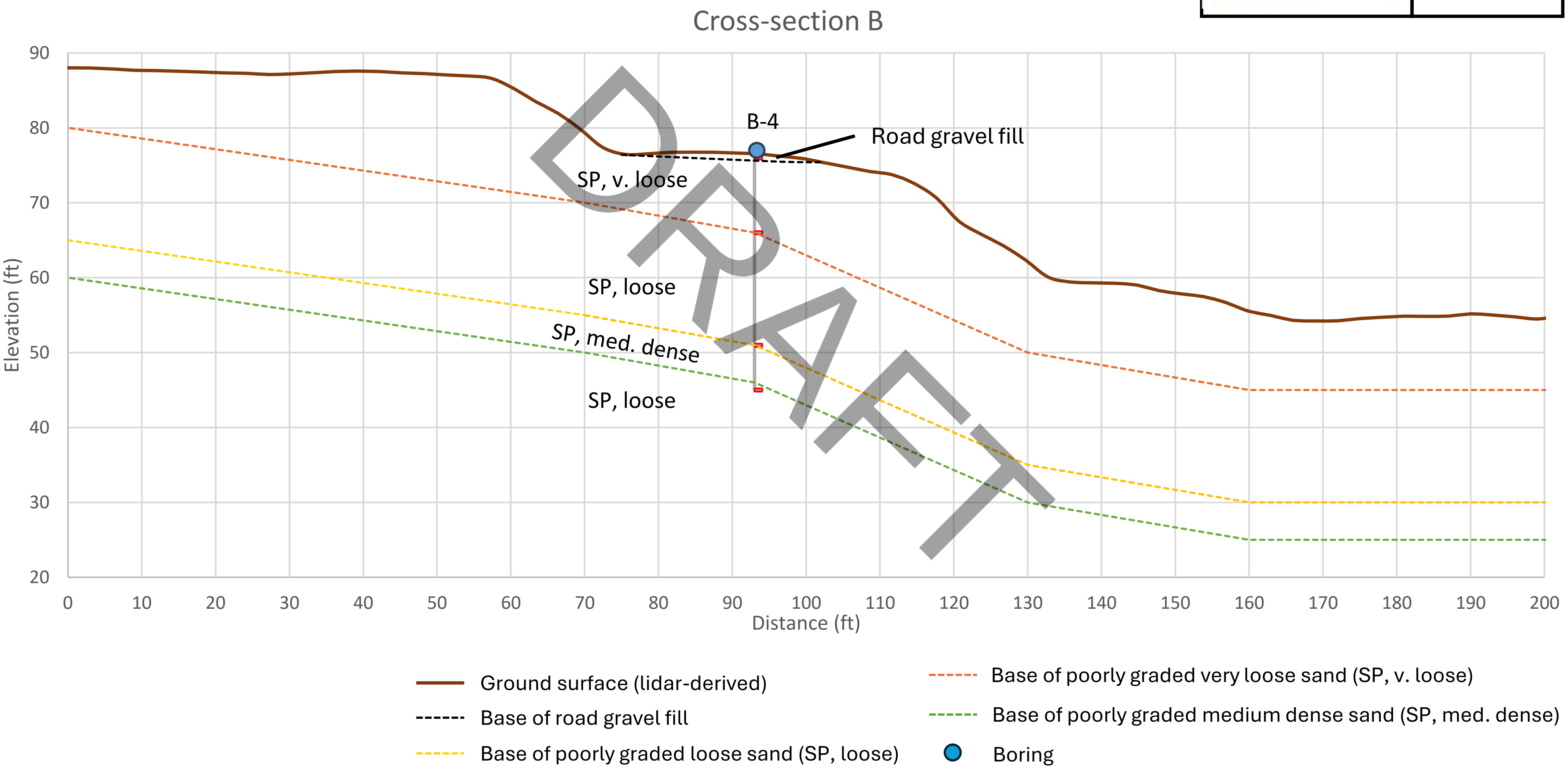
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section B-B’
#074-24-015 December 2024

Pali Consulting

Figure 4B



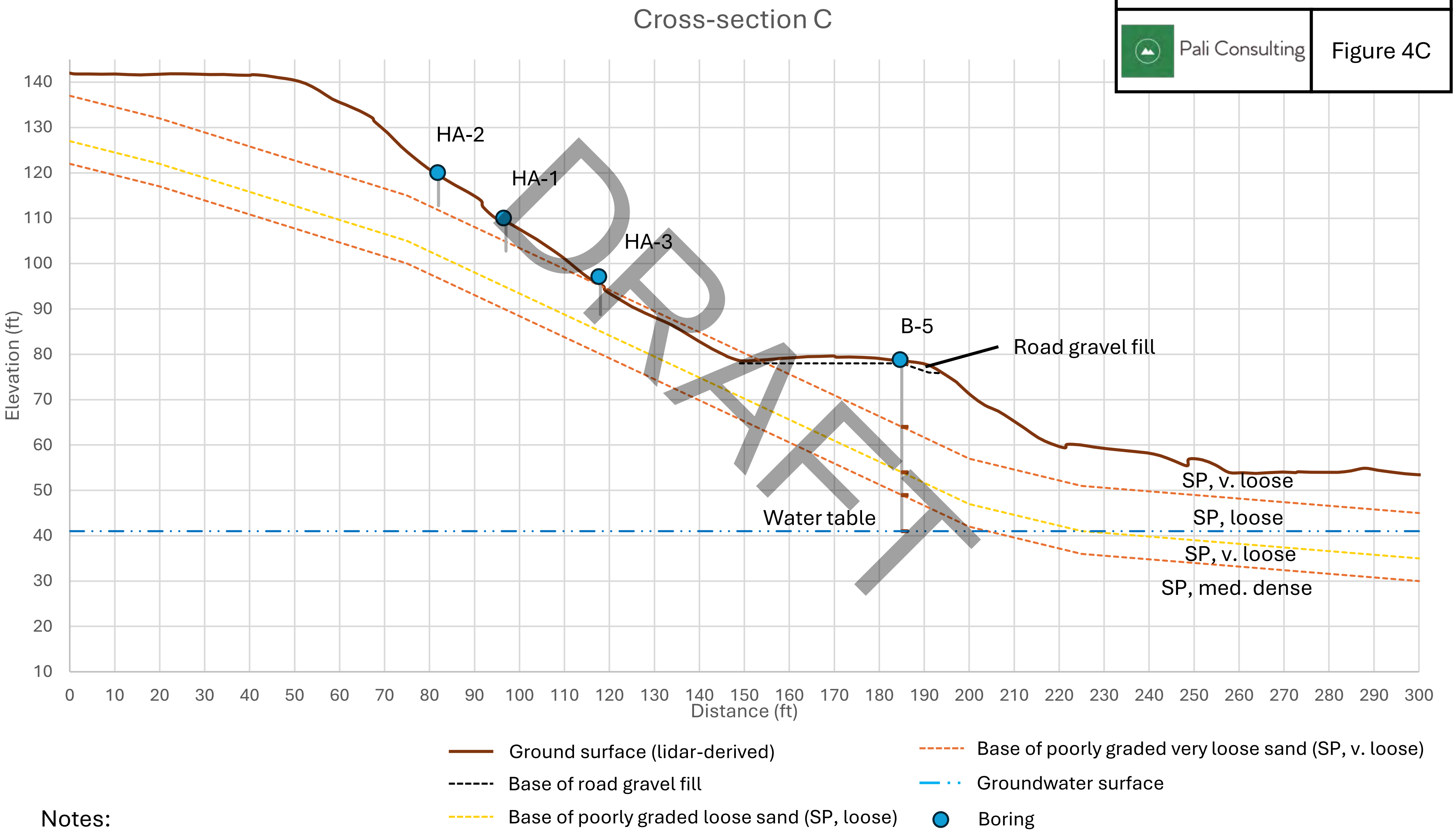
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section C-C’
#074-24-015 December 2024

Pali Consulting

Figure 4C



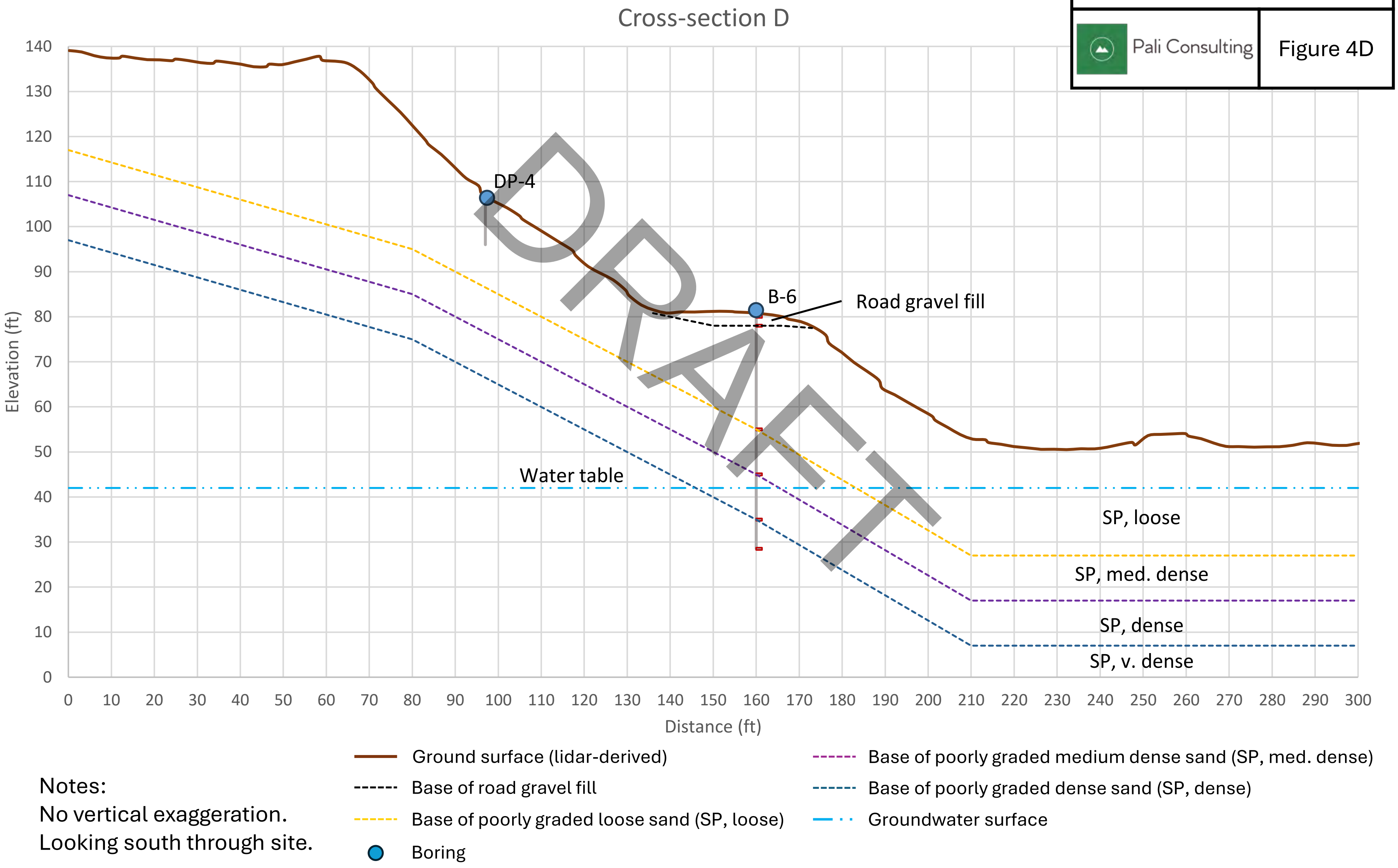
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section D-D’
#074-24-015 December 2024

Pali Consulting

Figure 4D



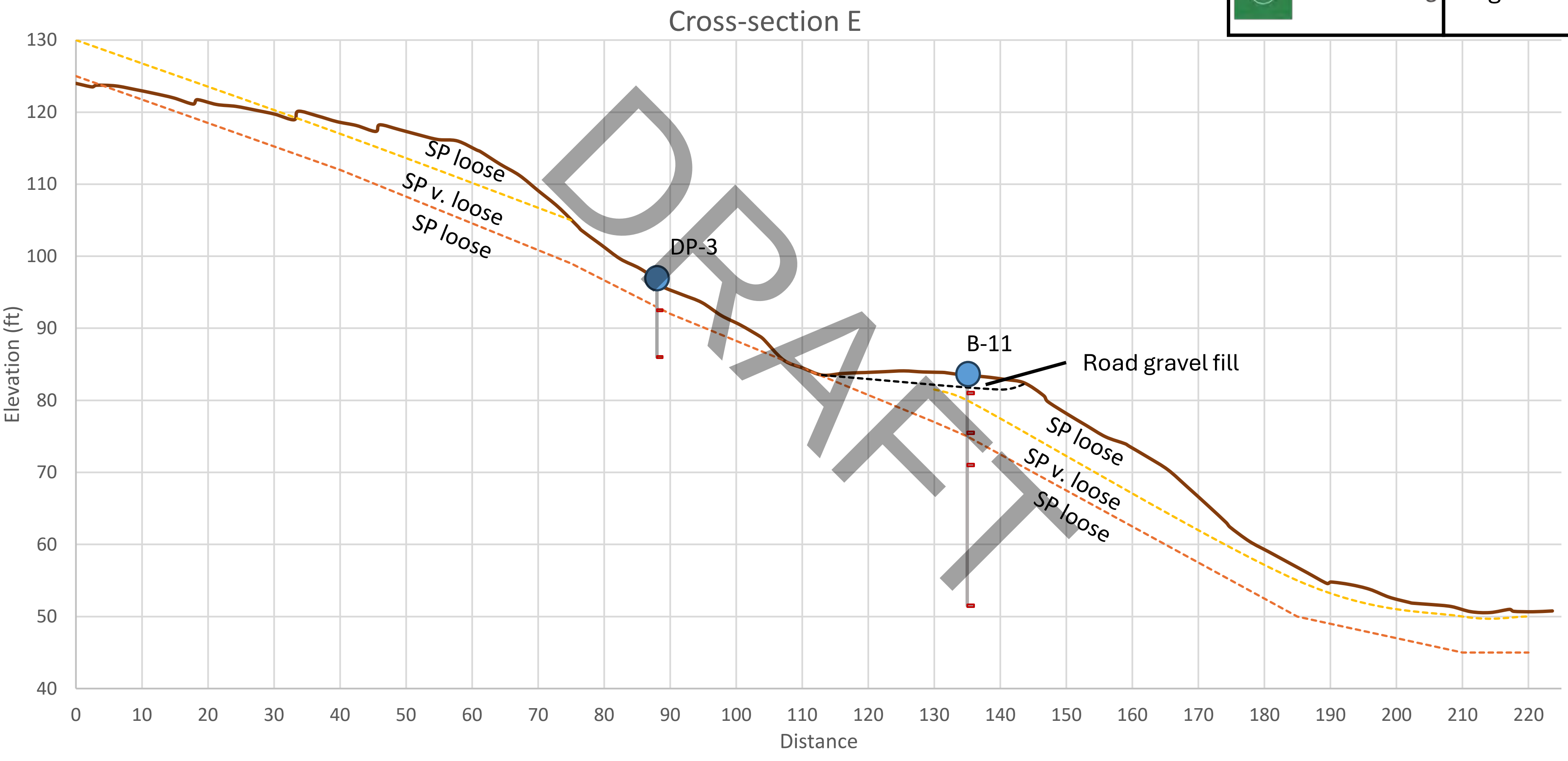
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section E-E’
#074-24-015 December 2024

Pali Consulting

Figure 4E



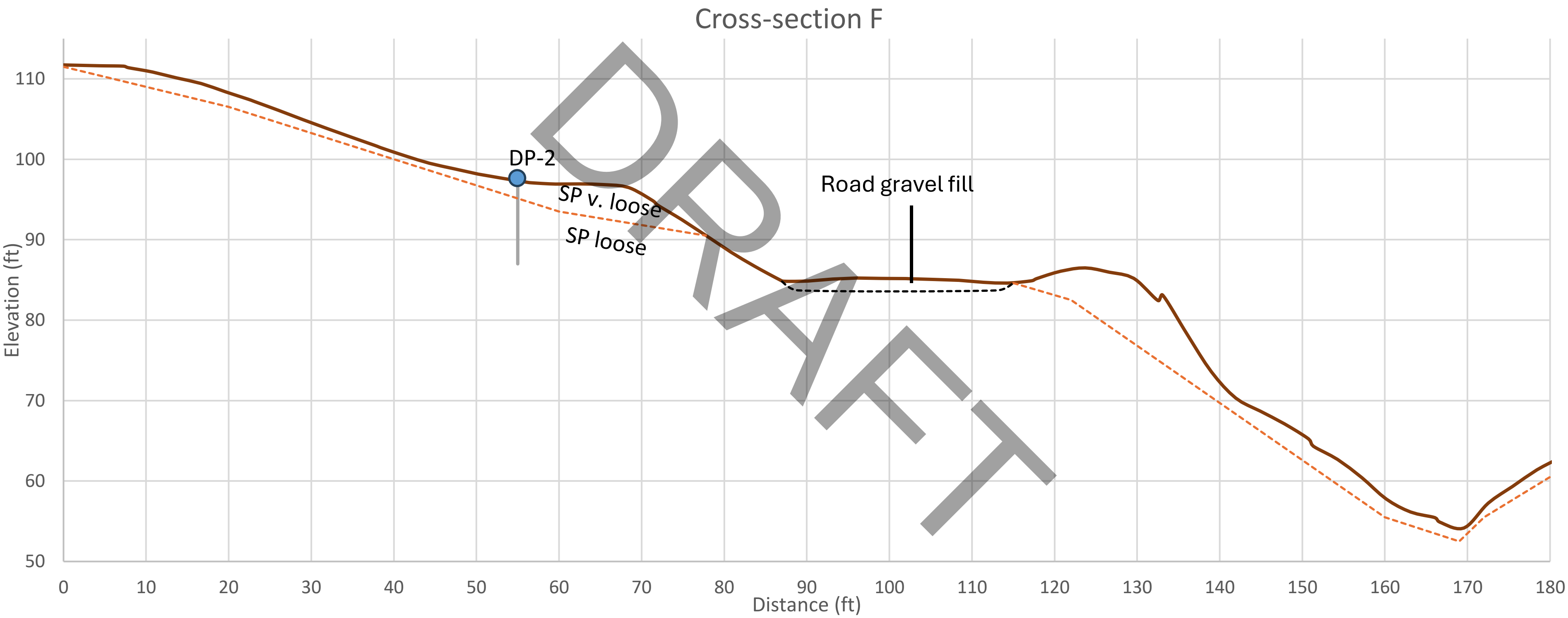
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section F-F’
#074-24-015 November 2024

Pali Consulting

Figure 4F



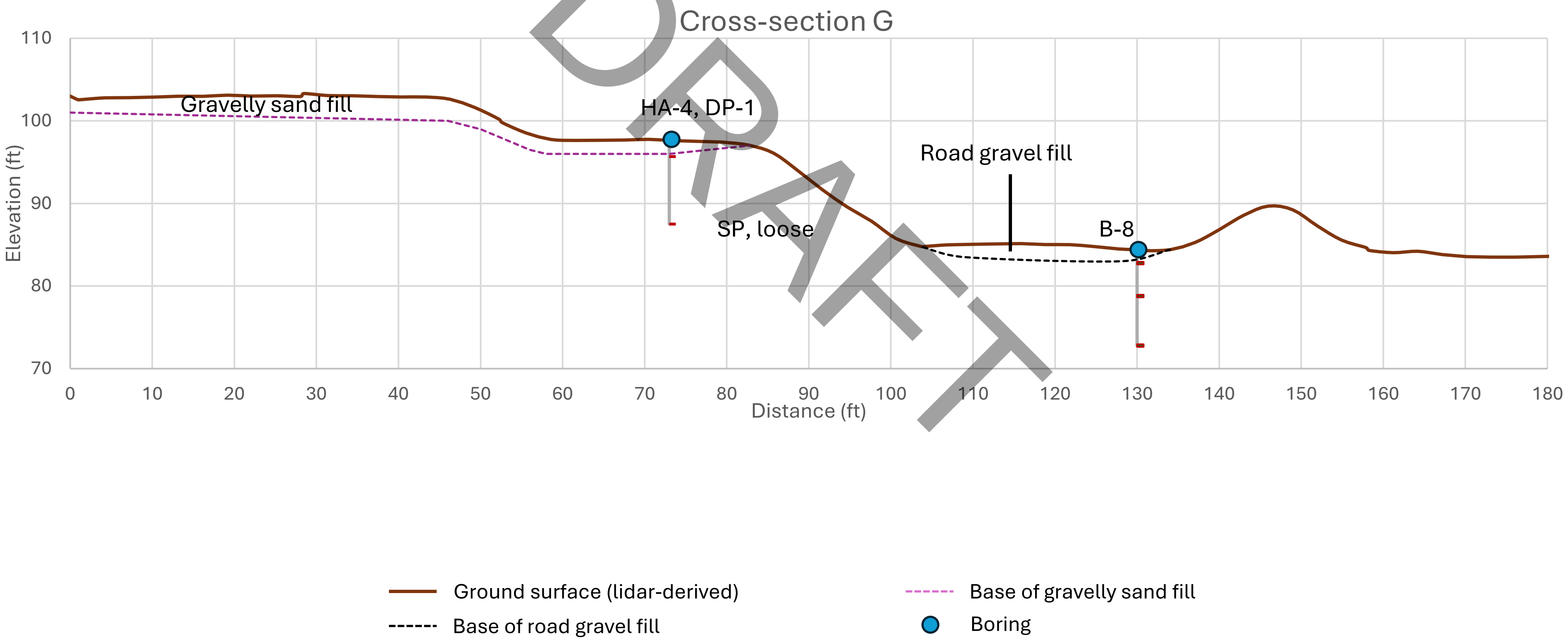
Notes:
No vertical exaggeration.
Looking south through site.

Road and Storm Improvements
Manzanita, OR

Cross-Section G-G’
#074-24-015 December 2024

Pali Consulting

Figure 4G



Notes:
No vertical exaggeration.
Looking south through site.

APPENDIX A -
FIELD EXPLORATIONS AND LABORATORY TESTING

FIELD EXPLORATIONS

GENERAL

We evaluated subsurface conditions in the Project area by completing eleven machine-drilled borings, four hand augers, and four drive probe soundings from November 12-15, 2024. Machine-drilled borings were completed using a track-mounted drill rig operated by Western States Soil Conservation, Inc. Hollow stem auger methods were used on all borings except B-6, which used mud rotary methods. The locations of the explorations are shown on Figure 2 of the report and were estimated based on field measurements.

The field explorations were coordinated by a geologist on our staff, who classified the various soil units encountered, obtained representative soil samples for geotechnical testing, and maintained a detailed log of each boring. Exploration logs are included in this Appendix.

SAMPLING AND LOGGING

The exploration logs within this Appendix show our interpretation of the drilling, sampling, and testing data. They indicate the depth where the soils change. Note that the change may be gradual. In the field, we classified the samples taken from the explorations according to the methods presented on the *Key to Exploration Logs* in this Appendix. The key also provides a legend explaining the symbols and abbreviations used in the logs.

Materials encountered in the explorations were classified in the field in general accordance with American Society for Testing and Materials (ASTM) International Standard Practice D 2488 “Standard Practice for the Classification of Soils (Visual-Manual Procedure).” Soil classifications and sampling intervals are shown in the exploration logs in this Appendix.

Soil samples were obtained from the borings using an SPT sampler completed in general conformance with ASTM Test Method D 1586 “Standard Method for Penetration Test and Split-Barrel Sampling of Soils.” The sampler was driven with a 140-pound cathead operated hammer falling 30 inches. The N-value, or number of blows required to drive the sampler 1 foot or as otherwise indicated into the soils, is shown adjacent to the sample symbols on the boring logs. Disturbed samples were obtained from the sampler for subsequent classification and testing. Undisturbed samples were also obtained from the borings using a Shelby tube sampler in general accordance with ASTM D1587.

INFILTRATION TESTING

We conducted infiltration tests at the intersection of Classic Street and Necarney City Road, as shown on report Figure 2. The test consisted of an encased falling head test in general accordance with US Bureau of Reclamation methods, as briefly described below.

- Hand auger borings were advanced at the test locations to approximate depths of 2.5 to 3.5 feet bgs.
- 4-inch diameter pipe was seated into the bottom of the hole by driving it carefully with a small sledge hammer to create a plug of soil at the base of the pipe.
- The pipe was filled with water to the top and the time for it to infiltrate fully into the ground measured to determine an infiltration rate.
- Two tests were conducted at each location and the data recorded.

The results of the infiltration testing are provided in our report.

LABORATORY TESTING

GENERAL

Soil samples obtained from the explorations were evaluated to confirm or modify field classifications, as well as to evaluate their engineering properties. Representative samples were selected for laboratory testing. The tests were performed in general accordance with the test methods of the ASTM or other applicable procedures. Test results are indicated on the boring logs and as described below.

SOIL CLASSIFICATIONS

Soil samples obtained from the explorations were visually classified in the field and in our geotechnical laboratory based on the USCS and ASTM classification methods. ASTM Test Method D2488 was used to classify soils using visual and manual methods. ASTM Test Method D2487 was used to classify soils based on laboratory test results.

LABORATORY TESTING

Moisture Content

Moisture contents of samples were obtained in general accordance with ASTM Test Method D 2216. The results of the moisture content tests completed on samples from the explorations are presented on the exploration logs included in this Appendix.

Soil Density

The density of undisturbed soil samples were obtained in general accordance with ASTM Test Method D 7263. The results of the density tests are presented on the exploration logs included in this Appendix.

Fines Content Analyses

Fines content analyses were performed to determine the percent of soils finer than the U.S. No. 200 Sieve, the boundary between coarse- and fine-grained soils. The tests were performed in general accordance with ASTM Test Method D 1140. The test results are indicated on the exploration logs included in this Appendix.

Direct Shear

Direct shear testing was performed by Northwest Testing, Inc on a select undisturbed sample from Boring B-6 in general accordance with ASTM test method D3080. The test results are included in this Appendix.

Sieve Analyses

Sieve analysis tests were performed on select samples to determine the quantitative distribution of particle sizes in the original sample. The tests were performed in general accordance with ASTM D 6913-04. The test results are indicated in the table below.

Table A-1

Exploration	Depth (feet)	% Gravel	% Sand	% Silt/Clay
B-7	2.5	6	84	11
TP-4	2	42	51	7

KEY TO EXPLORATION LOGS

Pali Consulting

4891 Willamette Falls Drive, Suite 1
West Linn, Oregon 97068
www.pali-consulting.com

SOILS CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL - SAND - MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVELS - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL- SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SITLY SANDS, SAND - SILT MIXTURES
			SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT-HUMUS, SWAMP SOILS WITH HIGH-ORGANIC CONTENTS

Note: Multiple symbols are used to indicate borderline or dual soil classifications

SYMBOLS LETTER	DESCRIPTIONS
CC	CEMENT CONCRETE
AC	ASPHALT CONCRETE
TS	TOPSOIL/SOD FOREST DUFF

Stratigraphic Contact

——	Distinct contact between soil strata or geologic units
-----	Gradual or approximate change between soil strata or geological units

Moisture Modifiers

Dry -	Absence of moisture, dusty, dry to the touch
Moist -	Damp, but no visible water
Wet -	Visible free water or saturated, usually soil is obtained from below the water table

Seepage Modifiers

None	
Slow -	< 1 gpm
Moderate -	1- 3 gpm
Heavy -	> 3 gpm

Caving Modifiers

None	
Minor -	isolated
Moderate -	frequent
Severe -	general

Minor Constituents

Trace:	< 5% (silt/clay)
Occasional:	< 15% (sand/gravel)
With:	5-15% (silt/clay) in sand or gravel
	15-30% (sand/gravel) in silt or clay

Sampler Symbol Descriptions

◫	Core
☒	Standard Penetration Test (SPT)
◧	Shelby tube
☰	Piston
◇	Bulk or grab

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg Limits
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis

Laboratory / Field Tests

DD	Dry density
OC	Organic content
PP	Pocket penetrometer
SA	Sieve analysis
TV	Torvane shear
MC	Moisture Content

Blowcount (N) is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted) per ASTM D-1586. See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

(2.4-inch) sampler N approximately corrected to equivalent SPT N by 50% reduction in N - modified California.

Note: Refer to the report text and exploration logs for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the exploration locations at the time the explorations were made. The logs are not warranted to be representative of the subsurface conditions at other locations or times.

File: C:\Users\Tech\Pali Consulting Dropbox\1-Projects\Active-Projects\074-24-015ManzanitaRoad&StormImprovements\Analysis\Logs\ManzanitaBorings2024.log Date: 12/20/2024

Pali Consulting

B-1

Road and Stormwater Improvements
Manzanita, Oregon

Pali Consulting

Project: Necarney City Road	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 80'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		GW	2 inches AC pavement		
									SP	Well-graded ROADWAY GRAVEL (Fill)		
						GWT not encountered				Loose, moist, brown, poorly-graded fine SAND		
S1	☒	100		2-3-4	7							
							5					
S2	☒	100		2-3-2	5						4	
S3	☒	100		2-3-3	6							
							10					
S4	☒	100		2-3-5	8						6	
										Boring completed at 11.5 ft bgs		
							15					
							20					
							25					
							30					

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Pali Consulting

B-2

Road and Stormwater Improvements
Manzanita, Oregon

Project: Necarney City Road	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 95'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
						GWT not encountered	0	**GW**	Well-graded ROADWAY GRAVEL (Fill)		
								SP			
S1	☒	100		2-4-5	9				Loose, moist, brown, poorly-graded fine SAND with trace fines	4	
							5		Grades to no fines		
S2	☒	100		1-2-2	4					4	%F=2
S3	☒	100		1-2-2	4					4	
							10				
S4	☒	100		1-2-3	5						
									Boring completed at 11.5 ft bgs		
							15				
							20				
							25				
							30				

Pali Consulting

B-3

Road and Stormwater Improvements

Manzanita, Oregon

Pali Consulting

Project: Necarney City Road	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 90'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
							0		**GW** 2 inches AC pavement Well-graded ROADWAY GRAVEL (Fill)		
									SP		
S1	☒	100		1-3-3	6	GWT not encountered			Loose, dry, yellow, poorly-graded fine SAND with trace angular gravel (Fill?)	3	
							5		Loose, dry, yellow, poorly-graded fine SAND without gravel (Native?)		
S2	☒	100							Grades to gray		No SPT count
S3	☒	100		3-4-3	7					1	
							10				
S4	☒	100		3-4-7	11				Grades to medium dense		
									Boring completed at 11.5 ft bgs		
							15				
							20				
							25				
							30				

Pali Consulting

B-4

Road and Stormwater Improvements
Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 75'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
						GWT not encountered	0		GW	2 inches AC pavement		
									SP	Well-graded ROADWAY GRAVEL (Fill)		
										Loose, moist, gray, poorly-graded fine SAND		
S1	☒	75		2-4-4	8							
							5			Grades to very loose, brown		
S2	☒	100		2-2-1	3						9	
S3	☒	100		1-1-2	3							
							10					
S4	☒	100		1-2-3	5					Grades to loose	5	
							15					
S5	☒	100		2-3-4	7							
							20			Grades to gray		
S6	☒	100		3-3-4	7						5	
							25			Grades to medium dense		
S7	☒	100		4-5-6	11							
							30			Grades to loose		
S8	☒	100		2-3-3	6						4	
										Boring completed at 31.5 ft bgs.		

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Pali Consulting

B-5

Road and Stormwater Improvements
Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 80'
Diameter: 6" Water Table: 38'	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		GW	2 inches AC pavement		
									SP	Well-graded ROADWAY GRAVEL (Fill)		
S1	■	100										
S2	☒	100		1-1-1	2					Very loose, dry, gray, poorly-graded fine SAND		
							5					
S3	☒	100		2-2-2	4						4	
S4	☒	100		1-1-1	2							
							10					
S5	☒	100		0-1-1	2						6	
							15			Grades to loose		
S6	☒	100		1-2-3	5							
							20					
S7	☒	100		1-2-4	6						2	
							25			Grades to very loose, moist		
S8	☒	100		0-1-1	2							
							30			Grades to medium dense		
S9	☒	100		9-14-13	27						6	

Pali Consulting

B-5

Road and Stormwater Improvements
Manzanita, Oregon

Pali Consulting

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/12/2024
Drilling Method: Hollow Stem Auger	Elevation: 80'
Diameter: 6" Water Table: 38'	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
S10	☒	100		5-9-8	17		35	▒		13	
						▼		▒			
S11	☒	100		2-4-7	11		40	▒	Grades to wet	26	
									Boring completed at 43 ft bgs.		
							45				
							50				
							55				
							60				
							65				

Pali Consulting

B-6

Road and Stormwater Improvements

Manzanita, Oregon

Pali Consulting

Project: Classic Street
Driller: Western States Soil Conservation
Proj No. 074-24-015
Date: 11/14/2024
Drilling Method: Mud Rotary
Elevation: 80'
Diameter: 6"
Water Table: Could not determine
Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		**GW**	2 inches AC pavement		
										Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	33		2-2-2	4	GWT not encountered			**SP-GP**	Loose, wet, brown, fine gravelly SAND (Fill)		SA
							5		**SP**			
S2	☒	33		2-3-3	6					Loose, wet, brown, poorly-graded fine SAND with trace gravel (Native)		Gravel likely sloughed from top of boring
S3	☒	33		2-2-2	4					Grades to moist	18	
							10					
S4	■	100										
S5	☒	33		3-2-3	5							
							15					
S6	☒	33		2-3-4	7						24	
							20					
S7	■	8										
S8	☒	33		4-5-5	10					Grades to wet	23	
							25					
S9	☒	33		4-6-8	14					Grades to medium dense		
							30					
S10	☒	33		6-9-12	21							

Date: 12/20/2024

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PLATE **A-6**

Pali Consulting

B-6

Road and Stormwater Improvements
Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/14/2024
Drilling Method: Mud Rotary	Elevation: 80'
Diameter: 6" / Water Table: Could not determine	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
							35	▨	Grades to dense		
S11	☒	33		9-18-20	38			▨		18	
							40	▨			
S12	☒	33		14-20-25	45			▨			
							45	▨	Grades to very dense		
S13	☒	100		20-25-40	65			▨		21	
							50	▨			
S14	☒	100		15-25-31	56			▨			
									Boring completed at 51.5 ft bgs.		
							55				
							60				
							65				

Pali Consulting

B-7

Road and Stormwater Improvements

Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/13/2024
Drilling Method: Hollow Stem Auger	Elevation: 85'
Diameter: 6" / Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		**GW**	2 inches AC pavement		
									SP	Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	100		1-3-3	6	GWT not encountered				Loose, damp, brown, poorly-graded fine SAND with trace angular gravel (Fill)		
							5			Loose, damp, brown, poorly-graded fine SAND without gravel (Native)		
S2	☒	100		1-1-1	2					Grades to very loose	10	%F=2
S3	☒	100		0-1-1	2						14	%F=3
							10					
S4	☒	100		1-1-1	2						5	
										Boring completed at 11.5 ft bgs.		
							15					
							20					
							25					
							30					

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Pali Consulting

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Road and Stormwater Improvements

Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/13/2024
Drilling Method: Hollow Stem Auger	Elevation: 90'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
						GWT not encountered	0	GW	2 inches AC pavement Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	100		6-7-9	16			SP	Medium dense, moist, brown, poorly-graded fine SAND with trace organics	4	
S2	☒	100		4-4-4	8		5		Grades to loose gray with orange mottling and no organics		
S3	☒	100		1-1-1	2				Grades to very loose, brown, with thin beds containing trace organics	4	
S4	☒	100		1-2-2	4		10		Grades to loose with no organics		
									Boring completed at 11.5 ft bgs.		
							15				
							20				
							25				
							30				

Pali Consulting

B-9

Road and Stormwater Improvements

Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/13/2024
Drilling Method: Hollow Stem Auger	Elevation: 100'
Diameter: 6" Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		**GW**	2 inches AC pavement		
						GWT not encountered			**SP**	Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	100		6-13-15	28					Medium dense, dry, brown, poorly-graded fine SAND	4	
							5					
S2	☒	100		5-13-17	30							
S3	☒	100		6-13-15	28							
							10			Grades to orange		
S4	☒	100		5-7-8	15					Grades to gray	4	
										Boring completed at 11.5 ft bgs.		
							15					
							20					
							25					
							30					

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Pali Consulting

B-10

Road and Stormwater Improvements

Manzanita, Oregon

Pali Consulting

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/13/2024
Drilling Method: Hollow Stem Auger	Elevation: 75'
Diameter: 6" / Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log	Materials Description	Moisture (%)	Remarks
						GWT not encountered	0	GW	2 inches AC pavement		
								SP	Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	100		3-4-5	9				Loose, moist, brown, poorly-graded fine SAND with trace angular gravel (Fill)	9	SA
							5		Loose, moist, brown, poorly-graded fine SAND without gravel (Native)		
S2	☒	100		4-4-4	8				Grades to gray	4	
S3	☒	100		2-2-2	4				Grades to brown		
							10				
S4	☒	100		1-2-3	5					4	
S5	◧	100									
							15				
S6	☒	100		2-4-6	10						
							20				
S7	◧	100								13	DD = 98.7 PCF
							25		Grades to medium dense and gray		
S8	☒	100		5-6-7	13						
							30				
S9	☒	100		4-6-7	13					4	
									Boring completed at 31.5 ft bgs.		

Pali Consulting

B-11

Road and Stormwater Improvements

Manzanita, Oregon

Project: Classic Street	Driller: Western States Soil Conservation
Proj No. 074-24-015	Date: 11/14/2024
Drilling Method: Hollow Stem Auger	Elevation: 80'
Diameter: 6" — Water Table: Not encountered	Logged by: A. Dunning

Sample No.	Sample Type	Recovery (%)	RQD (%)	Blow Count per 6 inches	Blows/Foot (N)	Water Table	Depth (ft BGS)	Graphic Log		Materials Description	Moisture (%)	Remarks
							0		**GW**	2 inches AC pavement Well-graded ROADWAY GRAVEL (Fill)		
S1	☒	100		4-5-5	10	GWT not encountered			**SP**	Loose, moist, brown, poorly-graded fine SAND		
							5					
S2	☒	100		2-3-3	6							
S3	☒	100		1-1-1	2				**SP**	Grades to very loose		
							10					
S4	▮	100										
S5	☒	100		2-2-3	5				**SP**	Grades to loose		
							15					
S6	☒	100		2-2-3	5							
							20					
S7	▮	100									10	DD = 99 PCF
S8	☒	100										No SPT count
							25					
S9	☒	100		2-3-4	7							
							30					
S10	☒	100		3-5-5	10							
										Boring completed at 31.5 ft bgs.		

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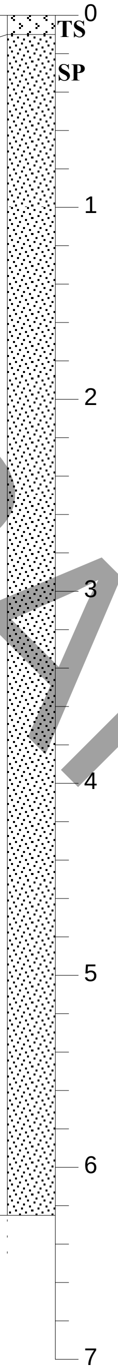
HA-1

Classic St., Manzanita
074-24-015

Drill Rig: Hand auger
Sampling: Grab
Logged By: A. Dunning
Total Depth: 6.25 ft
Groundwater: Not encountered

Date Started: 11/14/24
Date Completed: 11/14/24
Elevation: 100'
Coordinates: N 45.7161
W 123.9291



Description	Graphic Log	Depth	Sample Type	SPT N-Value	MC (%)	Remarks
Top Soil with organics and sand	TS	0	GWT not encountered			
Loose, mosit, orange, poorly-graded fine SAND with organics and roots	SP		◇		6	S1
			◇			S2
Grades to brown without organics						
			◇		6	S3
			◇			S4
Boring completed at 6.25 ft bgs.						

Pali Consulting

HA-2

Classic St., Manzanita
074-24-015

Drill Rig: Hand auger
Sampling: Grab
Logged By: A. Dunning
Total Depth: 6.25
Groundwater: Not encountered

Date Started: 11/15/2024
Date Completed: 11/15/2024
Elevation: 120'
Coordinates: N 45.7162 N
W 123.9289

Description	Graphic Log	Depth	Sample Type	SPT N-Value	MC (%)	Remarks
Top Soil with organics and sand	TS	0	GWT not encountered			
Loose, moist, brown, poorly-graded fine SAND with trace organics and roots	SP	1	◇			S1
		2				
		3	◇		6	S2
Grades to no organics or roots		4				
		5				
		6	◇			S3
Boring completed at 6.25 ft bgs.		7				

Pali Consulting

Plate A-13

HA-3

Classic St., Manzanita
074-24-015

Drill Rig: Hand auger
Sampling: Grab
Logged By: A. Dunning
Total Depth: 6.25
Groundwater: Not encountered

Date Started: 11/15/2024
Date Completed: 11/15/2024
Elevation: 90'
Coordinates: N 45.7162
W 123.9291

Description	Graphic Log	Depth	Sample Type	SPT N-Value	MC (%)	Remarks
Top Soil with organics and sand	TS	0				
Loose, moist, brown, poorly-graded fine SAND with trace organics and roots Grades to no organics or roots	SP	1	GWT not encountered			
			◇			S1
		2				
			◇		5	S2
		3				
		4				
			◇			S3
		5				
		6	◇		8	S4
Boring completed at 6.25 ft bgs.		7				

Pali Consulting

HA-4

Classic St., Manzanita
074-24-015

Drill Rig: Hand auger
Sampling: Grab
Logged By: A. Dunning
Total Depth: 10.25
Groundwater: Not encountered

Date Started: 11/15/2024
Date Completed: 11/15/2024
Elevation: 97'
Coordinates: N 45.7143
W 123.9298

Description	Graphic Log	Depth	Sample Type	SPT N-Value	MC (%)	Remarks
Top Soil	TS	0				
Loose, moist, brown, poorly-graded fine silty SAND with organics and roots	ML-SP		◇ GWT not encountered			S1
Loose, moist, brown poorly-graded fine SAND with occasional angular gravel 1"-3"	SP	1				
Grades to no gravel						
		2	◇		7	S2
		3				
		4				
		5	◇			S3
		6				
		7				

File: C:\Users\Tech\Pali Consulting Dropbox\1-Projects\Active-Projects\074-WindsorEngineers\074-24-015ManzanitaRoad&StormImprovements\Analysis\Logs\ManzanitaHA1-3.log Date: 12/20/2024

Pali Consulting

File: C:\Users\Tech\Pali Consulting Dropbox\1-Projects\Active-Projects\074-WindsorEngineers\074-24-015ManzanitaRoad&StormImprovements\Analysis\Logs\ManzanitaHA1-3.log Date: 12/20/2024

HA-4

Classic St., Manzanita
074-24-015

Drill Rig: Hand auger
Sampling: Grab
Logged By: A. Dunning
Total Depth: 10.25
Groundwater: Not encountered

Date Started: 11/15/2024
Date Completed: 11/15/2024
Elevation: 97'
Coordinates: N 45.7143
W 123.9298

Description	Graphic Log	Depth	Sample Type	SPT N-Value	MC (%)	Remarks
Loose, moist, brown poorly-graded fine SAND with occasional angular gravel 1"-3"	SP	7				
			◇		7	S4
		8				
			◇		7	S5
		9				
		10	◇			S6
Boring completed at depth of 10.25 ft bgs.						
		11				
		12				
		13				
		14				

Pali Consulting

Plate A-15

Northwest Testing, Inc.
An RMA Company
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 | fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Tim Blackwood, PE, GE, CEG Pali Consulting, Inc. 1120 SW Fifth Avenue, Suite 1302 Portland, Oregon 97204	**Date:** **Lab No.:**	12/16/2024 24-788
Project:	Manzanita	**Project No.:**	00-223425-1
Report of:	Direct shear testing of soil.		

Sample Identification

As requested, NTI provided direct shear testing of soil on a tube sample delivered to our laboratory by a Pali Consulting, Inc. representative on December 4, 2024. Testing was performed in general accordance with the standard indicated. Our laboratory test results are summarized on the following table and pages.

Laboratory Testing

Sample ID: B-12, S-4 @ 10.0 Ft.

Direct Shear Test of Soils Under Consolidated Drained Conditions – Sample Data (ASTM D3080)

Test	500psf Normal Load Initial Conditions	1500psf Normal Load Initial Conditions	2500psf Normal Load Initial Conditions
Moisture Content, (%)	9.3	9.3	9.3
Dry Unit Weight, (pcf)	91.7	97.2	89.6
Peak Shear Strength, (psf)	437	919	1739

Note: Displacement rate used during testing, 0.025 inches/min.

Attachments: Laboratory Test Results – Direct Shear

Copies: (1) Addressee
(1) Joshua Robles, Pali Consulting, Inc.

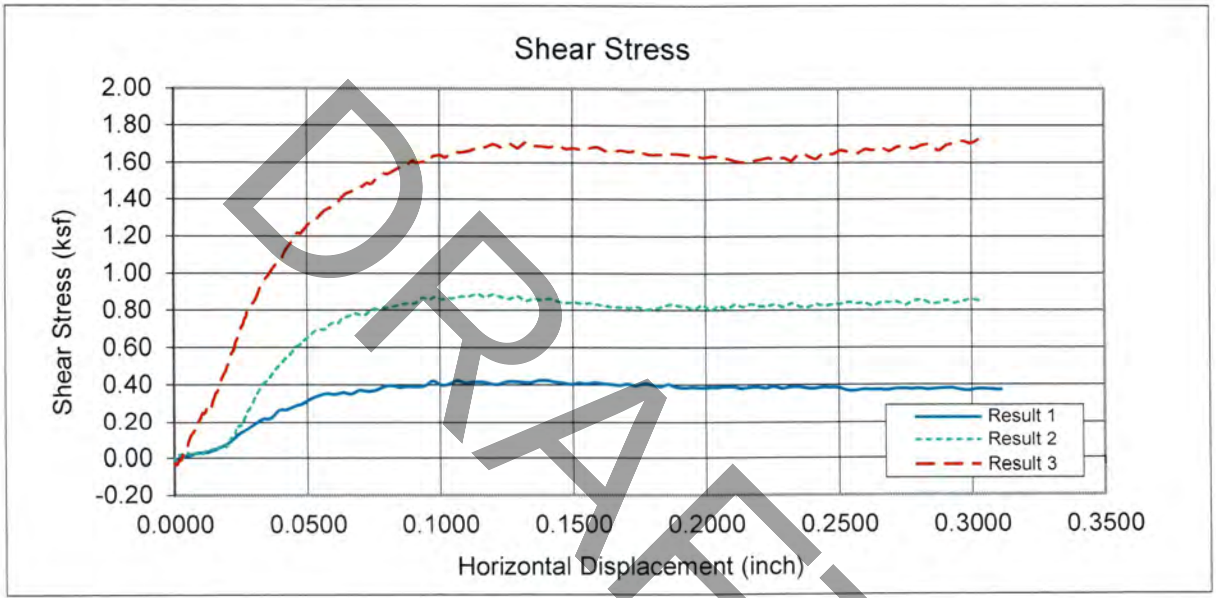
Northwest Testing, Inc.
An RMA Company

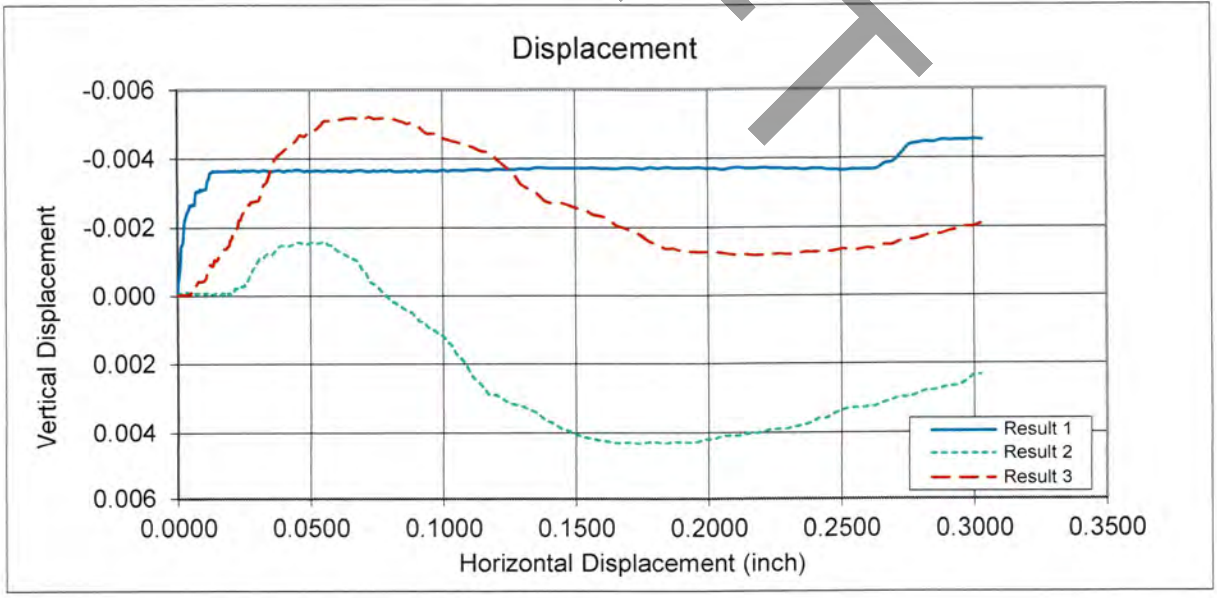
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Tim Blackwood, PE, GE, CEG Pali Consulting, Inc. 1120 SW Fifth Avenue, Suite 1302 Portland, Oregon 97204	**Date:**	12/16/2024
		Lab No.:	24-788
Project:	Manzanita	**Project No.:**	00-223425-1

Sample ID: B-12, S-4 @ 10.0 Ft.





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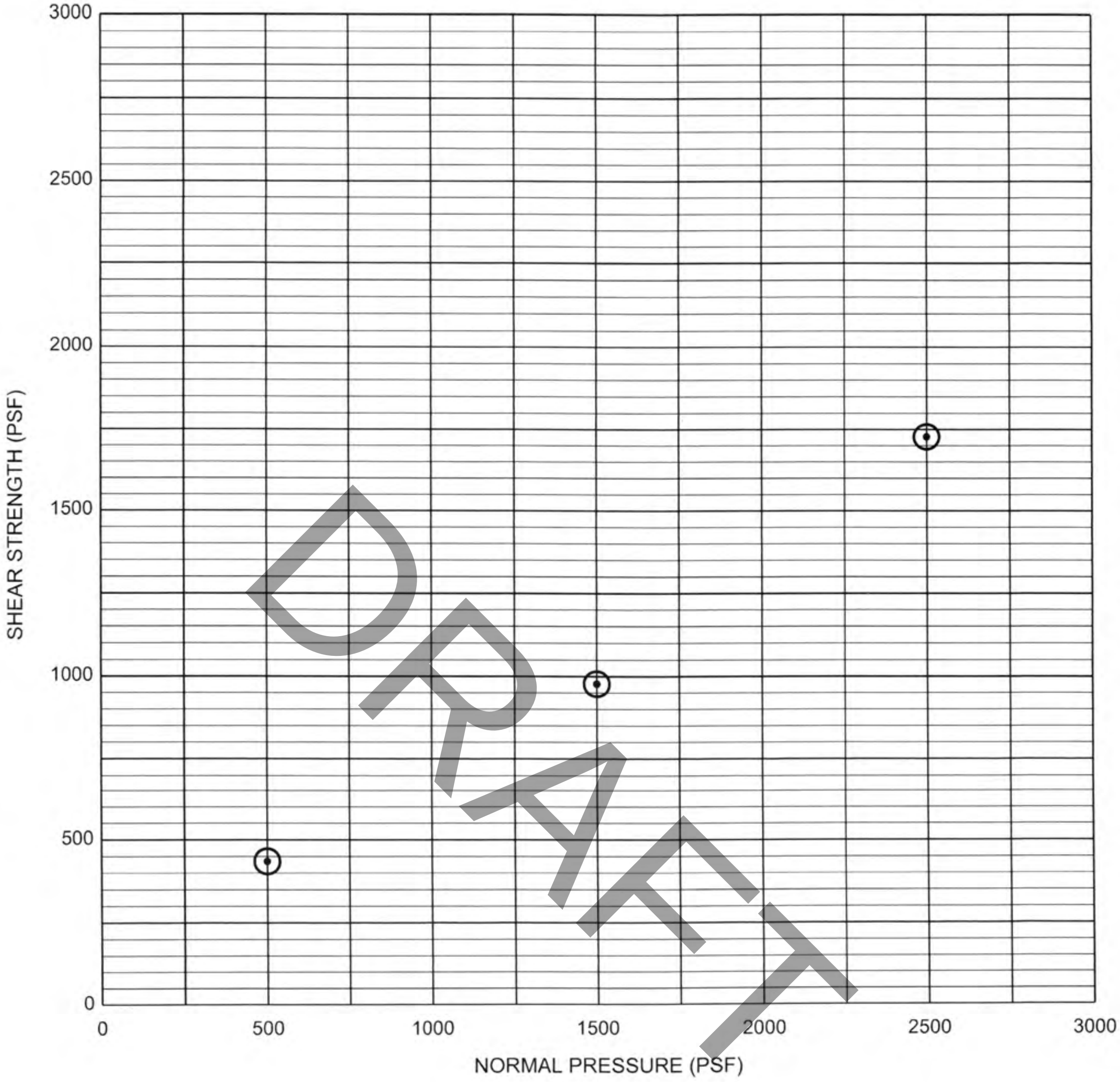
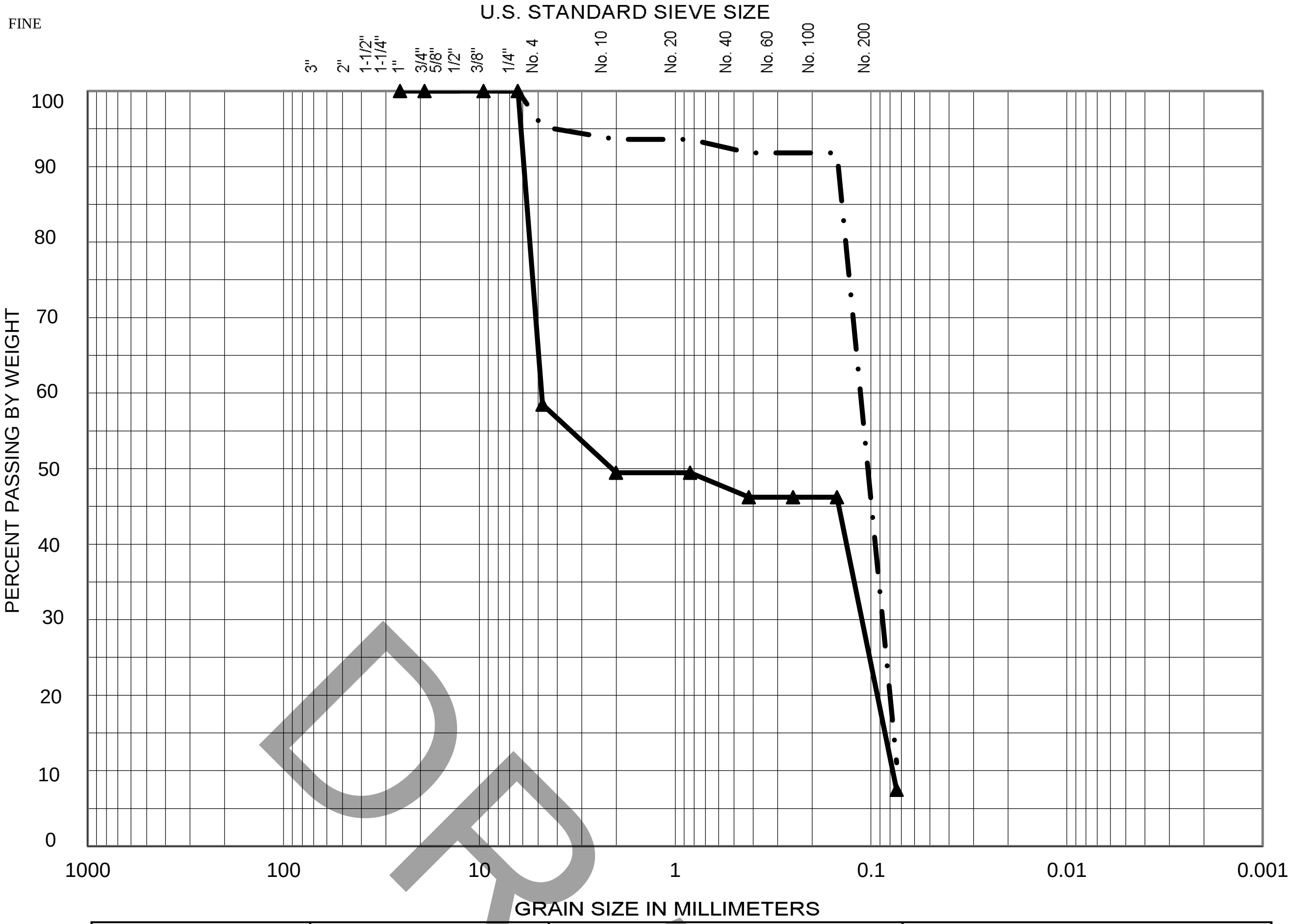
SHEET 2 of 3 REVIEWED BY: Mitchell Guha



SYMBOL	SAMPLE LOCATION	COHESION (psf)	FRICTION ANGLE	REMARKS
	B-12, S-4 @ 10.0 FT.	--	--	SATURATED; UNDISTURBED

DIRECT SHEAR TEST RESULTS - ASTM D3080

PROJECT NO. 00-223425-1	MANZANITA PALI CONSULTING, INC.	LAB NO. 24-778



COBBLES	GRAVEL		SAND			FINES - SILT and CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring and Sample No.	As Rec'd Water Content, %	C_u	C_c	USC	Description
— · —	**B10 ; S1 @ 2.5ft**	9	1.7	0.8	SP	Gravelly fine sand
——	**B6 ; S1 @ 2.5ft**	0	61.5	0.0	SP-GP	Gravelly fine sand

Boring and Sample No.	**Soil / Aggregate Composition in Percent**			
	Gravel	**Sand**	**Fines**	**Total**
B10 ; S1 @ 2.5ft	**5**	**84**	**11**	**100**
B6 ; S1 @ 2.5ft	**42**	**51**	**7**	**100**

Test Method: ASTM C136			
Project	Manzanita Road and Storm Improvements	**Date Tested**	11/21/2024
File No.	074-24-015	**Tested By**	AD
Lab ID No.	NA	**Checked By**	TB

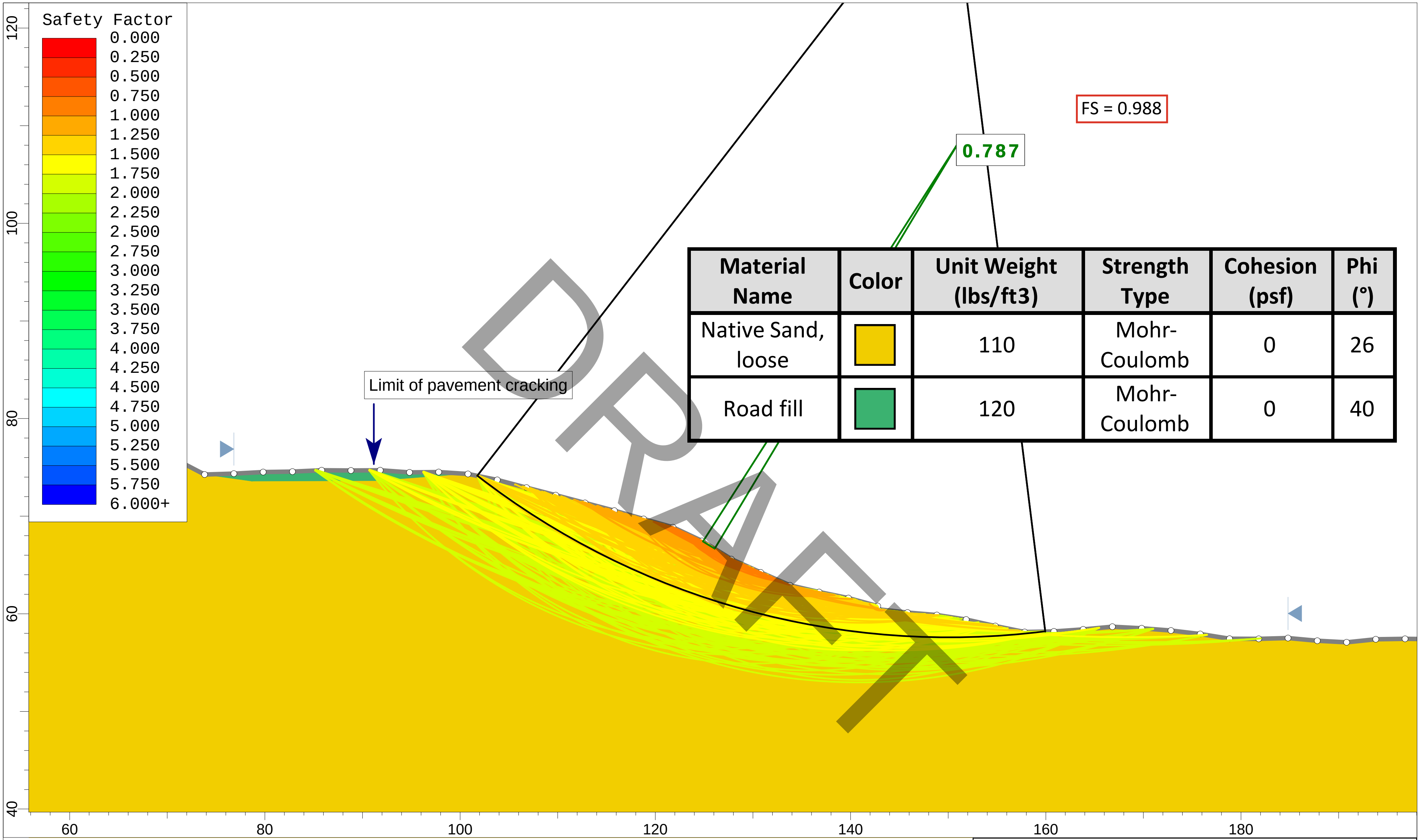
NOTE: Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations or generated by separate operations or processes.

Pali Consulting

Boring B-6, B-10 Grain Size Analysis

Plate A-16

APPENDIX B -
SLOPE STABILITY ANALYSIS



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40

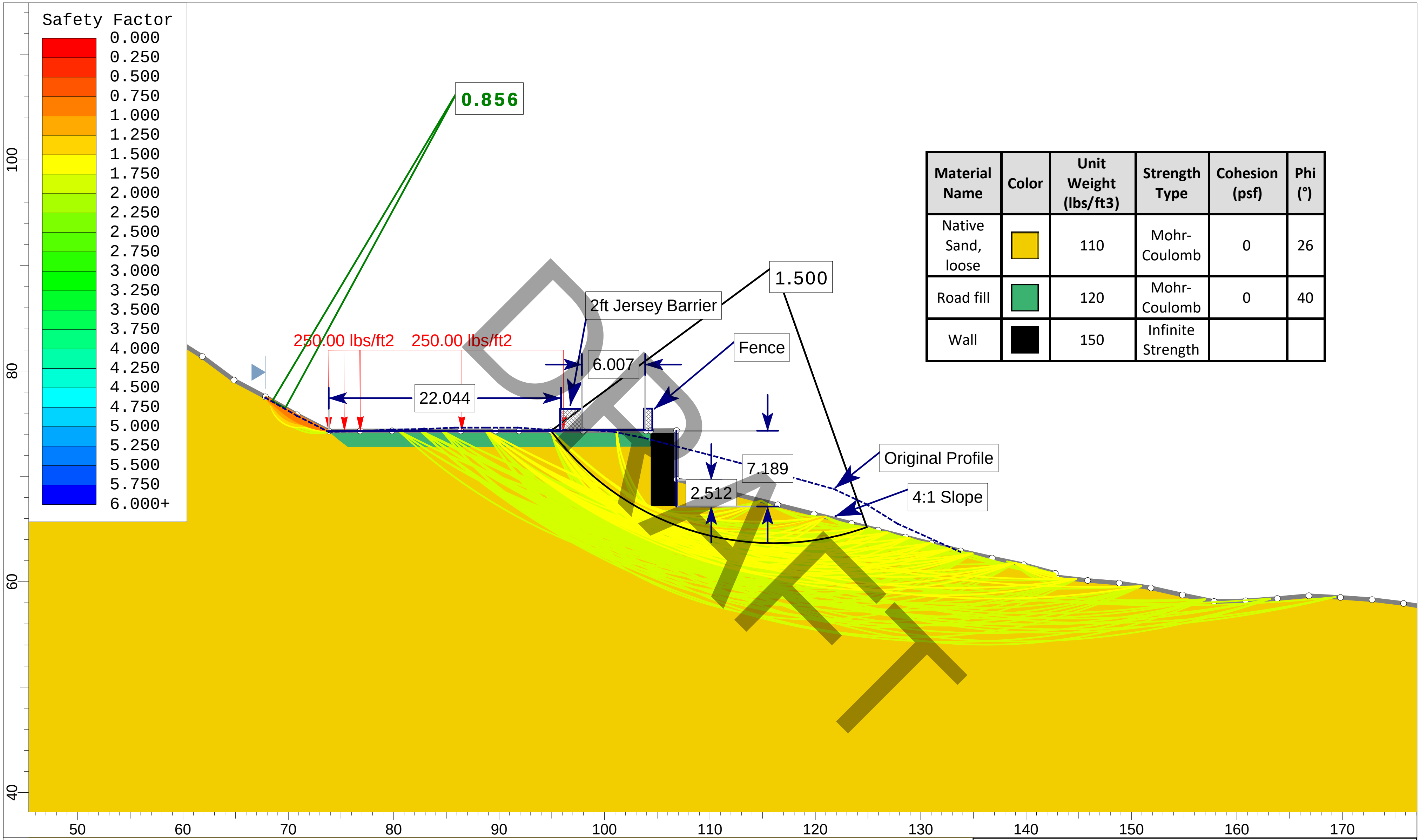
Manzanita Road & Storm Improvement
Slope Stability Analysis

Cross Section A: Original

Project #: 074-24-015
12/17/2024

Pali Consulting

Figure 1A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40
Wall	⬛	150	Infinite Strength		

Manzanita Road & Storm Improvement

Slope Stability Analysis

Cross Section A: Single Wall Option

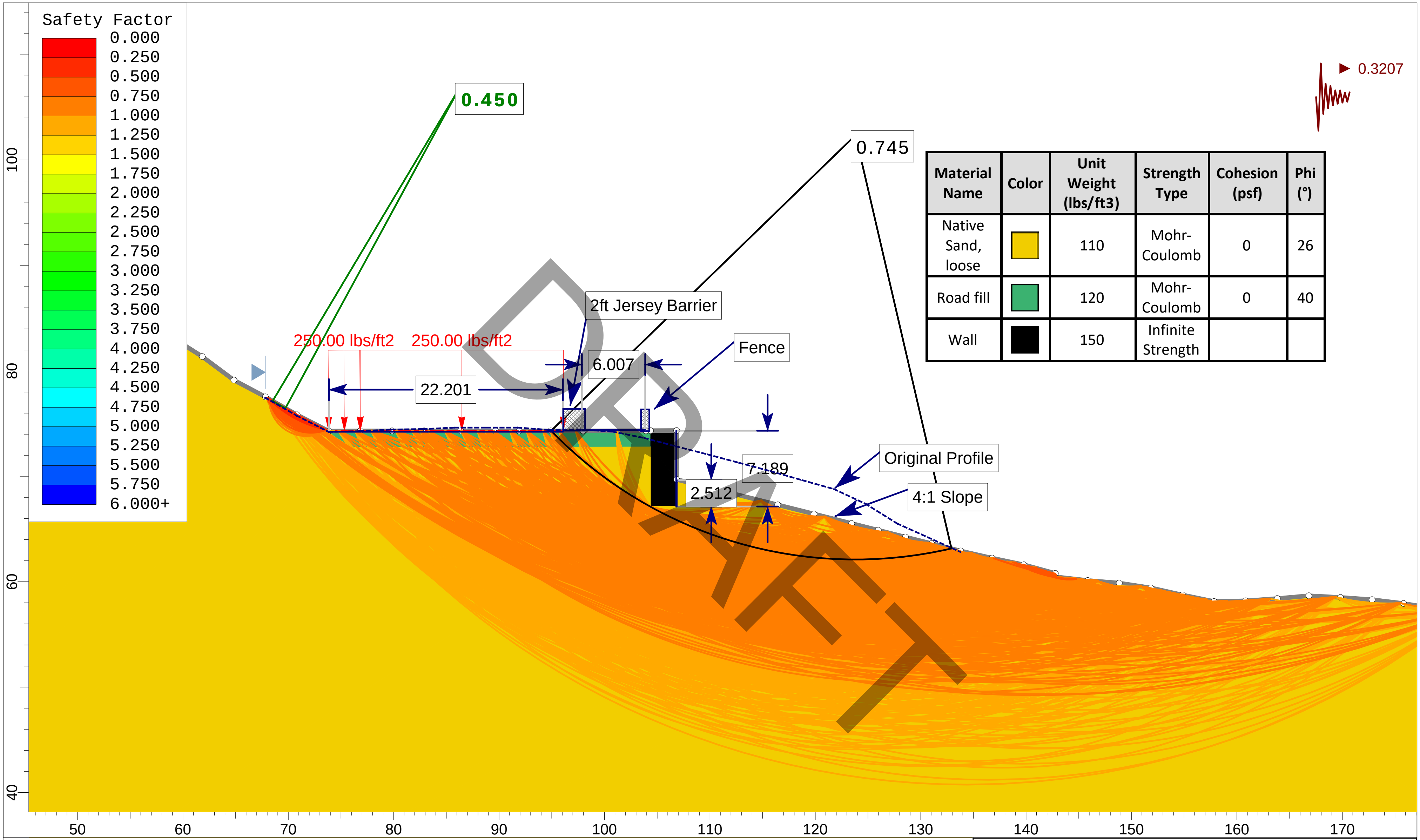
Static

Project #: 074-24-015

12/17/2024

Pali Consulting

Figure 2A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40
Wall	⬛	150	Infinite Strength		

Manzanita Road & Storm Improvement

Slope Stability Analysis

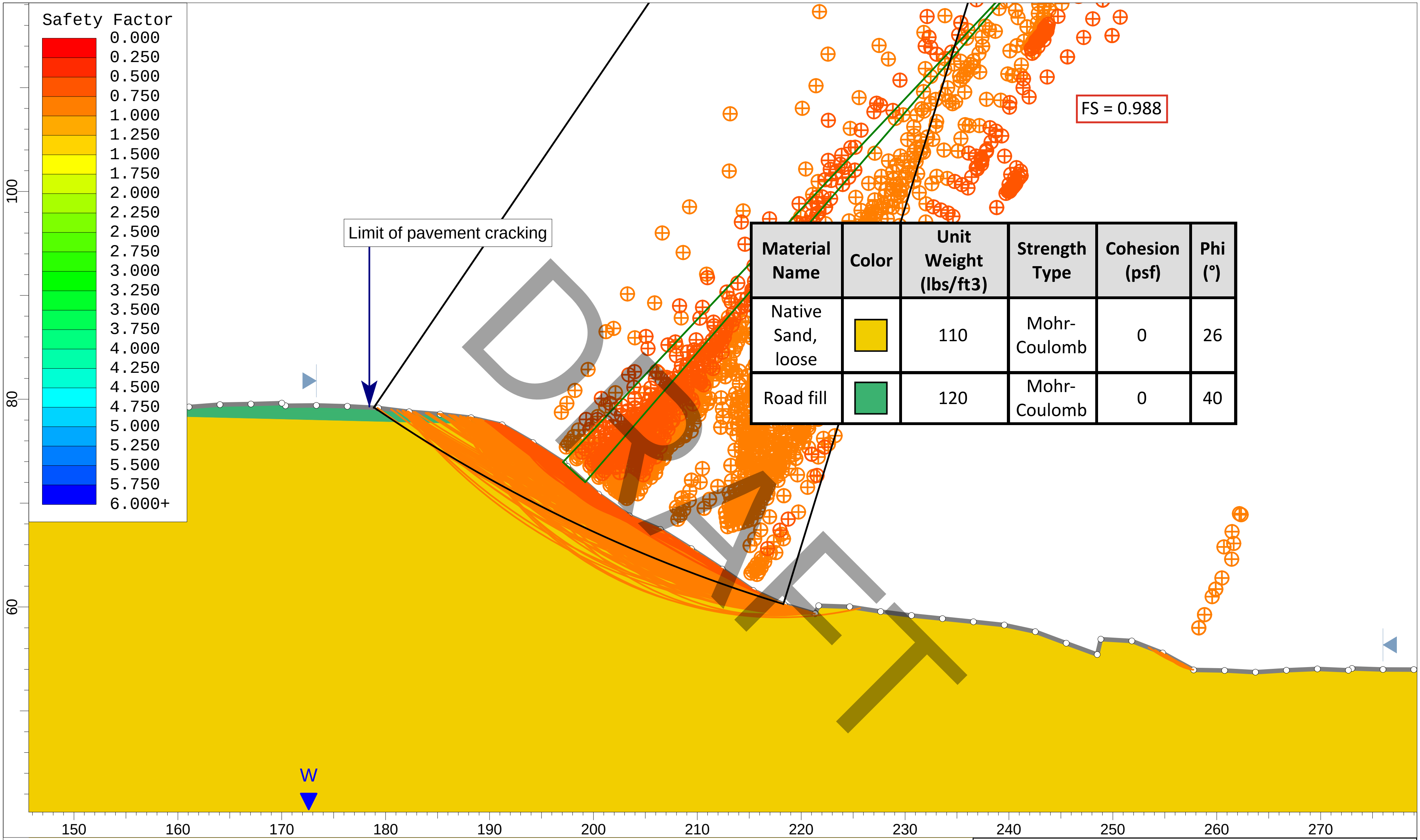
Cross Section A: Single Wall Option

Seismic: 975 Yr

Project #: 074-24-015 12/17/2024

Pali Consulting

Figure 3A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40

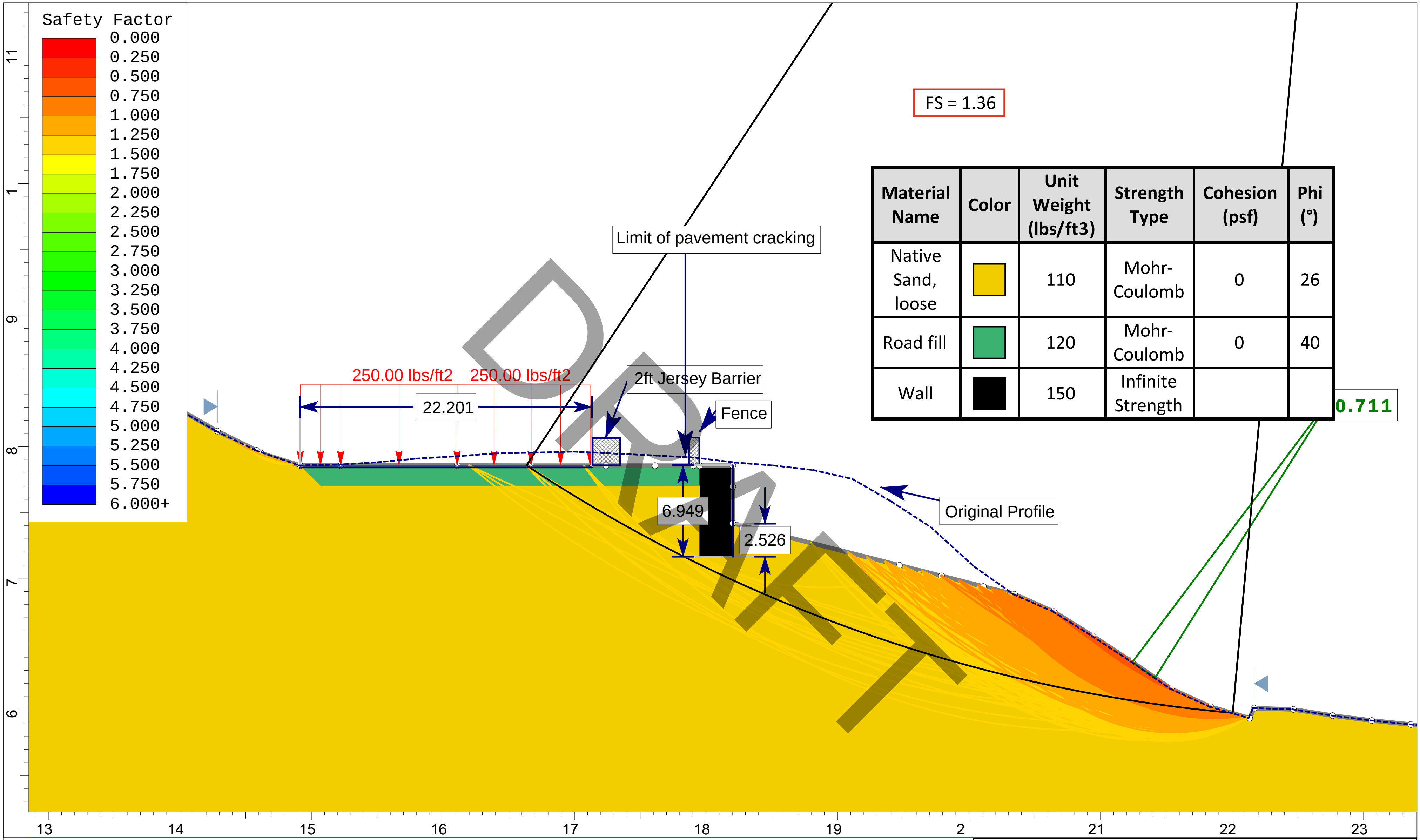
Manzanita Road & Storm Improvement
Slope Stability Analysis

Cross Section C: Original

Project #: 074-24-015
12/17/2024

Pali Consulting

Figure 4A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40
Wall	■	150	Infinite Strength		

Manzanita Road & Storm Improvement
Slope Stability Analysis

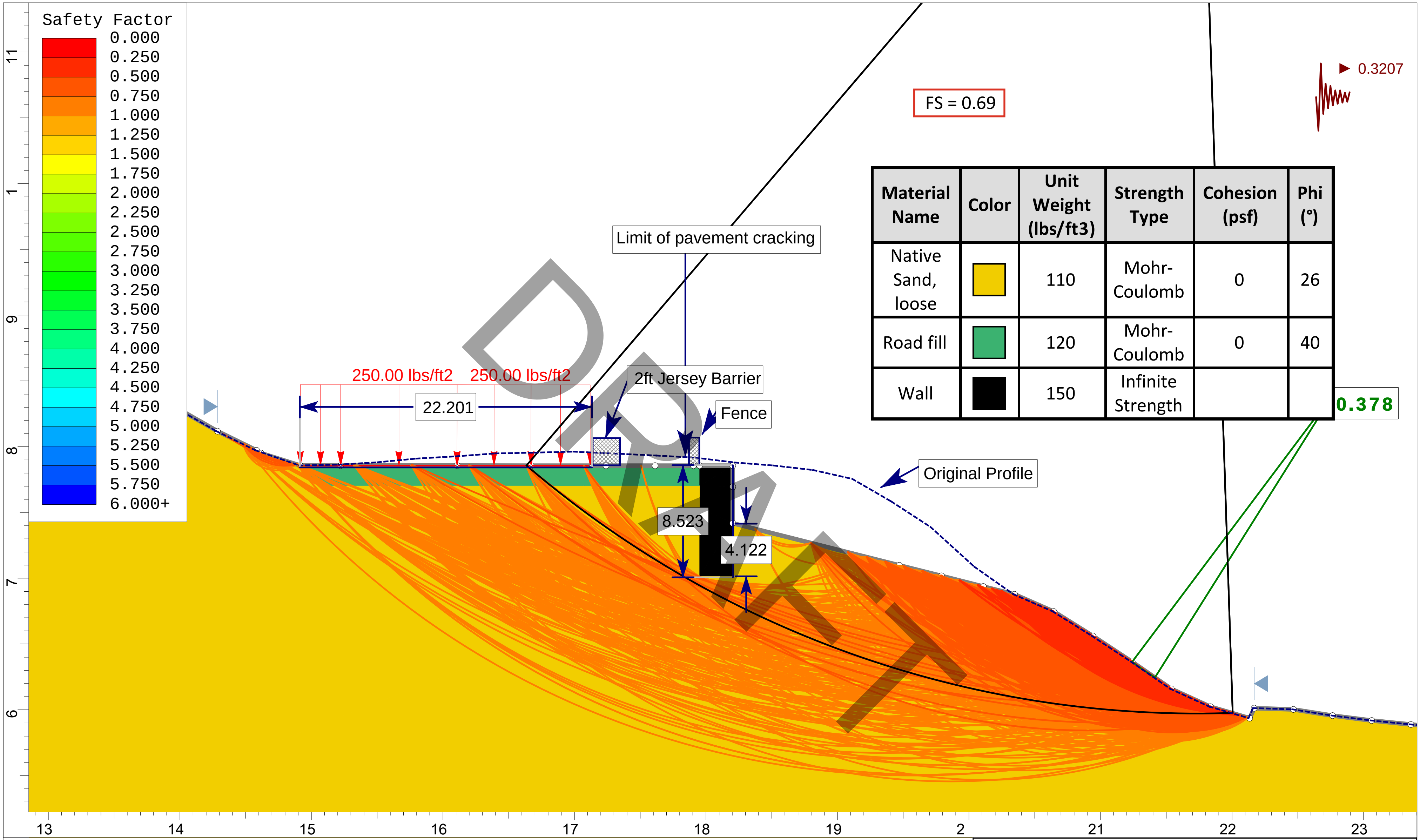
Cross Section C: Single Wall Option

Static

Project #: 074-24-015
12/17/2024

Pali Consulting

Figure 5A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	120	Mohr-Coulomb	0	40
Wall	⬛	150	Infinite Strength		

Manzanita Road & Storm Improvement
Slope Stability Analysis

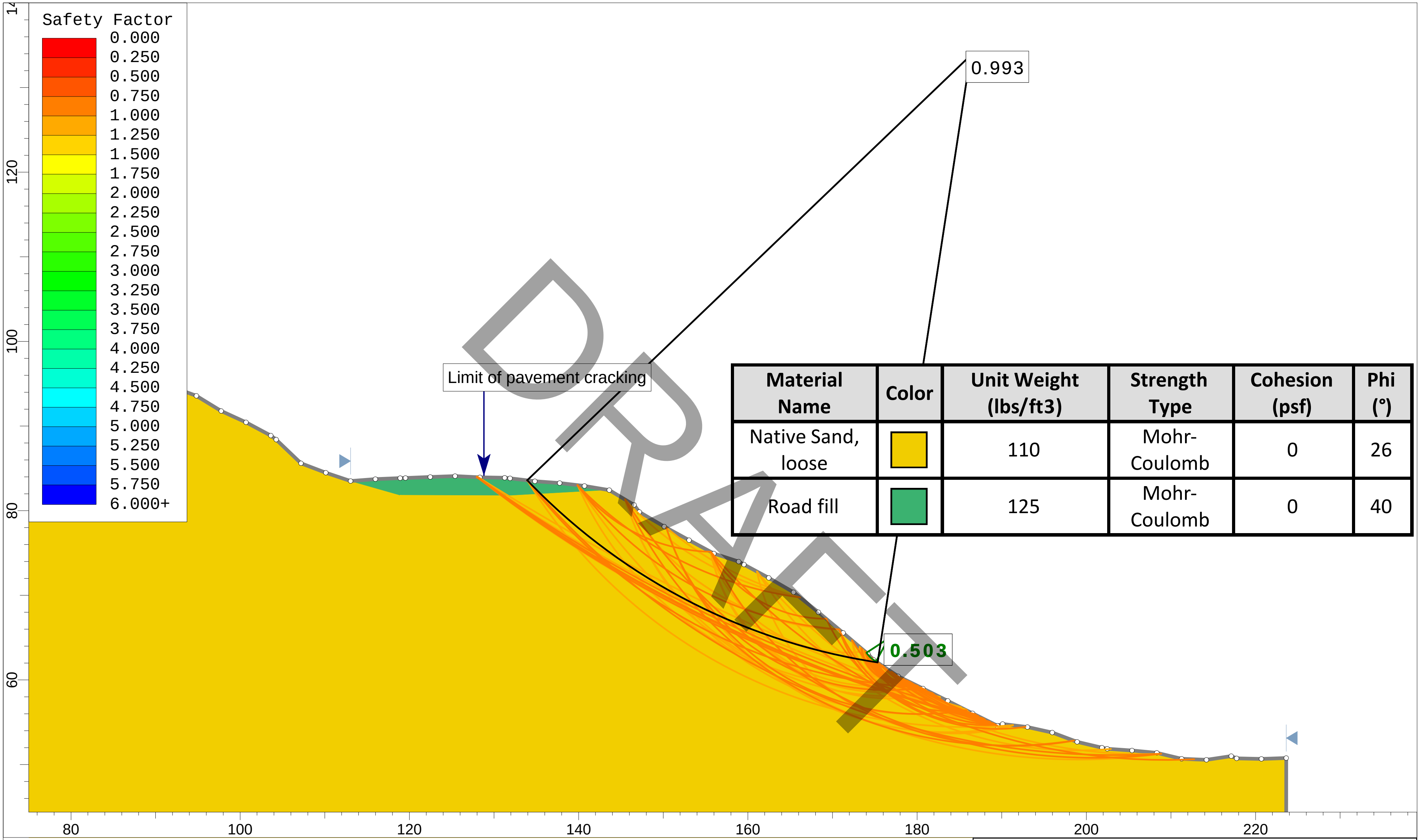
Cross Section C: Single Wall Option

Seismic: 975 Yr

Project #: 074-24-015
12/17/2024

Pali Consulting

Figure 6A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	125	Mohr-Coulomb	0	40

Manzanita Road & Storm Improvement

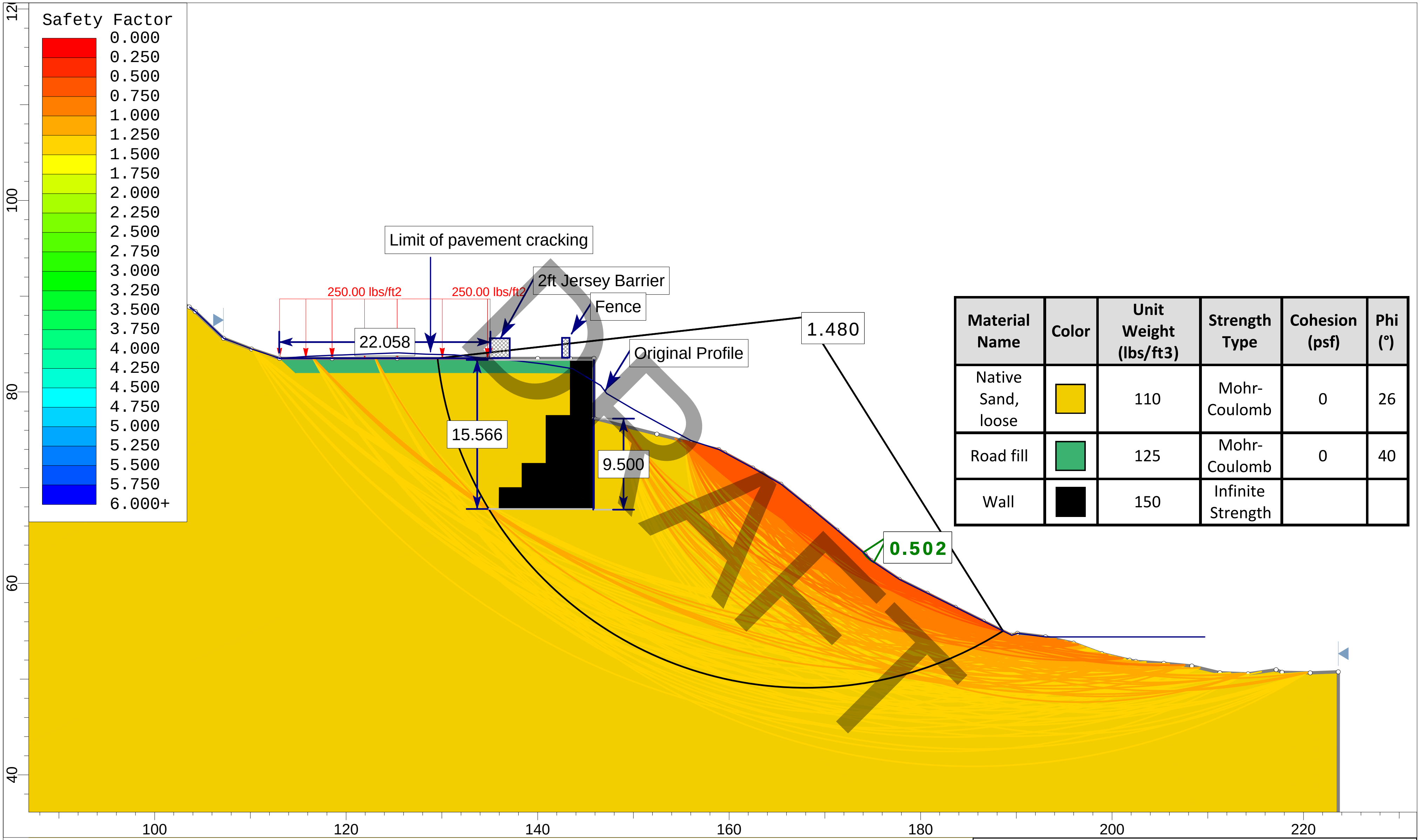
Slope Stability Analysis

Cross Section E: Original

Project #: 074-24-015
12/17/2024

Pali Consulting

Figure 7A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	125	Mohr-Coulomb	0	40
Wall	⬛	150	Infinite Strength		

Manzanita Road & Storm Improvement

Slope Stability Analysis

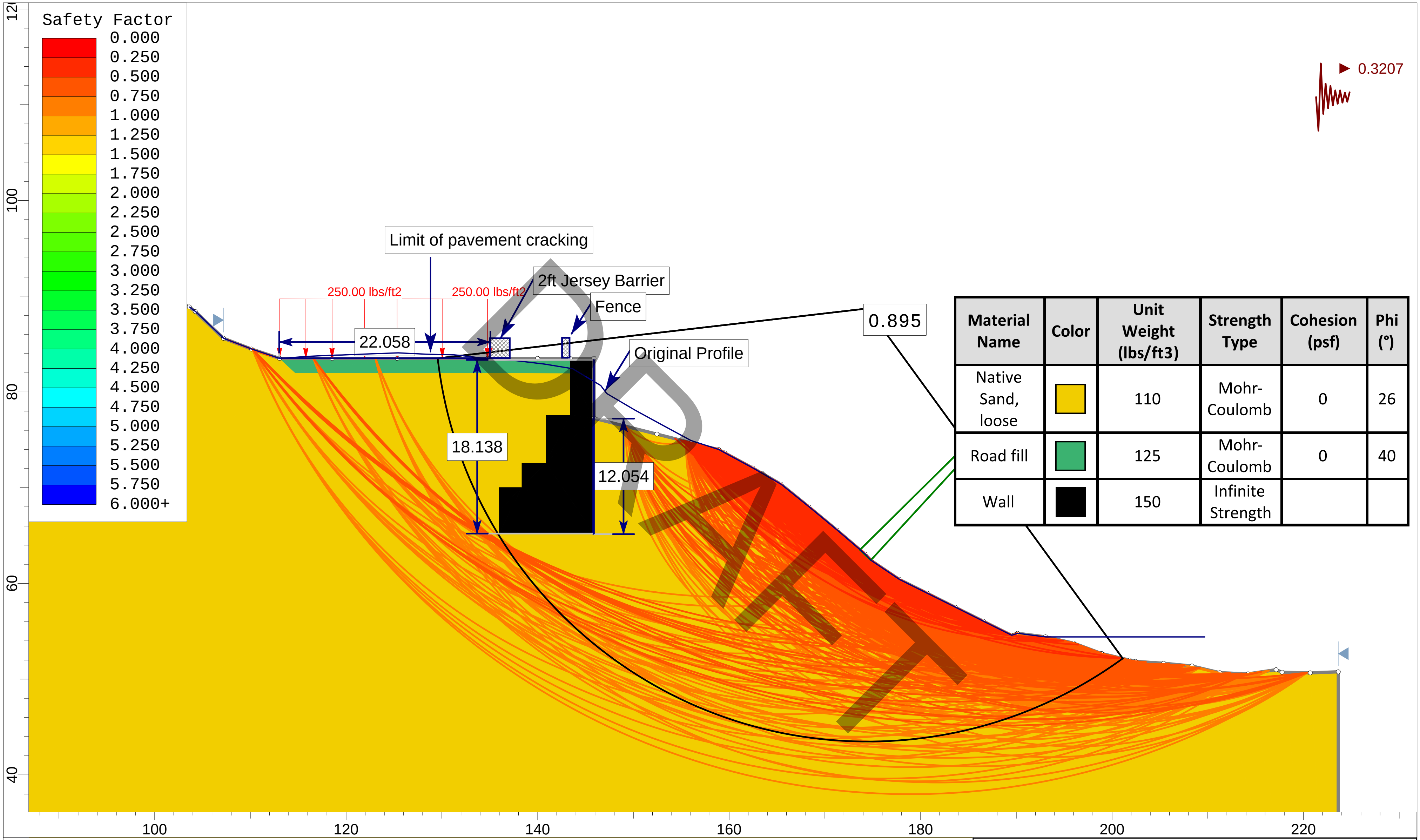
Cross Section E: Single Wall Option

Static

Project #: 074-24-015 12/17/2024

Pali Consulting

Figure 8A



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Native Sand, loose	🟨	110	Mohr-Coulomb	0	26
Road fill	🟩	125	Mohr-Coulomb	0	40
Wall	⬛	150	Infinite Strength		

Manzanita Road & Storm Improvement
Slope Stability Analysis

Cross Section E: Single Wall Option

Seismic: 975 Yr

Project #: 074-24-015 12/17/2024

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Figure 9A

Carlson Geotechnical
A division of Carlson Testing, Inc.
Phone: (503) 601-8250
www.carlsontesting.com

Bend Office **(541) 330-9155**
Eugene Office **(541) 345-0289**
Salem Office **(503) 589-1252**
Tigard Office **(503) 684-3460**

Report of
Limited Geotechnical Investigation
Classic Street Improvements
Classic Street
Manzanita, Oregon

CGT Project Number G2406158

Prepared for

City of Manzanita
Dan Weitzel, Public Works Director
1090 Oak Street
Manzanita, Oregon 97130

August 16, 2024

Carlson Geotechnical
A division of Carlson Testing, Inc.
Phone: (503) 601-8250
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August 16, 2024

City of Manzanita
Dan Weitzel, Public Works Director
1090 Oak Street
Manzanita, Oregon 97130

Report of
Limited Geotechnical Investigation
Classic Street Improvements
Classic Street
Manzanita, Oregon

CGT Project Number G2406158

Dear Dan Weitzel:

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our limited geotechnical investigation for the proposed improvements to Classic Street. The subject roadway is located between Dorcas Lane and Necarney City Road in Manzanita, Oregon. We performed our work in general accordance with CGT Proposal GP24-125, dated May 9, 2024. Written authorization for our services was received on June 10, 2024.

We appreciate the opportunity to work with you on this project. Please contact us at (503) 601-8250 if you have any questions regarding this report.

Respectfully Submitted,
CARLSON GEOTECHNICAL

M. David Irish, CESCL
Geotechnical Project Manager
dirish@carlsontesting.com

Brad M. Wilcox, P.E., G.E.
Principal Geotechnical Engineer
bwilcox@carlsontesting.com

Doc ID: \\geosrv\public\GEOTECH\PROJECTS\2024 Projects\G2406158 - Classic Street Improvements\G2406158 - GEO\008 - Deliverables\Report\G2406158 Limited Geotechnical Investigation.docx

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our limited geotechnical investigation for the proposed improvements to Classic Street. The subject roadway is located between Dorcas Lane and Necarney City Road in Manzanita, Oregon, as shown on the attached Site Location, Figure 1.

1.1 Project Information

CGT developed an understanding of the proposed project based on our correspondence with the City of Manzanita and project documents provided to us. The documents provided included an aerial image showing the proposed boring locations, and a site schematic plan, dated March 24, 2024. Based on our review, we understand the project will include improvements to the existing Classic Street. The improvements will take place over an approximate 2,220-foot long stretch of the roadway, effectively spanning between Dorcas Lane and Necarney City Road. The improvements are anticipated to include, but not limited, to widening of the roadway, installation of underground utilities, installation of sidewalks, installation of site retaining wall(s), and other features. Design of the roadway improvements will rest with others.

Although no grading plans have been provided, we anticipate permanent grade changes at the site will be minimal, with maximum cuts and fills on the order of 2 feet in depth.

Although no stormwater plans have been provided, we anticipate stormwater collected from new impervious areas of the site will be collected and routed to the nearest storm drain or other suitable discharge point(s) approved by Tillamook County.

1.2 Scope of Services

Our scope of work included the following:

- Contact the Oregon Utilities Notification Center to mark the locations of public utilities within a 20-foot radius of our explorations at the site.
- Explore subsurface conditions within the roadway (Classic Street) by advancing six drilled borings and six dynamic cone penetrometer (DCP) tests to depths of up to about 11½ feet below pavement surface (bps). Details of the subsurface investigation are presented in Appendix A. Results of the DCP tests are presented in Appendix B.
- Classify the soils encountered in the explorations in general accordance with ASTM D2488 (Visual-Manual Procedure).
- Provide a technical narrative describing surface and subsurface deposits, and local geology of the site, based on the results of our explorations and published geologic mapping.
- Provide geotechnical recommendations for site preparation and earthwork.
- Perform a structural capacity evaluation of the existing pavement structure within the referenced roadway in general accordance with Sections 5.3 and 5.4 of the 1993 AASHTO Pavement Design Manual.
- Provide geotechnical engineering recommendations for use in design and construction of site retaining walls and pavements.
- Provide this written limited geotechnical report summarizing the results of the field investigation and recommendations for the project.

This report is considered “limited” as this assignment did not include an evaluation of seismic/geologic hazards at the site.

2.0 SITE DESCRIPTION

2.1 Site Geology

Based on available geologic mapping of the area[1], the site is underlain by Holocene age, beach and dune deposits (Qb). This unit consists primarily of unconsolidated, moderately well sorted, fine- to medium-grained beach sand. The area is also composed of cross-bedded, fine-grained sand deposited through active and inactive dune ridges. The beach and dune deposits are occasionally interbedded with fluvial and lacustrine mud and sand deposits found inland from the dune ridges, as well as locally found basalt gravel and boulder debris deposited from erosion of rocky headlands.

2.2 Site Surface Conditions

The subject portion of Classic Street is a two-lane, asphalt-paved roadway that generally runs north to south. Classic Street spans approximately 2,220 feet and connects Dorcas Lane and Necarney City Road. The road is located within a relatively level to gently sloping area and provides vehicular access to both established residential properties and unestablished residential properties (i.e., portions of subdivisions yet to be fully built out). Residential streets that intersect with Classic Street include Ridge Drive, Highlands Drive, and Jackson Way.

In terms of topography adjacent to the street, the northern 950 feet (approximate) of the street was flanked by a descending vegetated slope exhibiting gradients of about 2H:1V (horizontal:vertical) to 1½H:1V. The central portion of the street (between the south end of Jackson Way and spanning about 450 feet) was flanked by a vegetated/forested ascending slope exhibiting gradients of up to about 1½H:1V. The remaining street areas were generally flanked by level to gentle side slopes.

Site layout and surface conditions at the time of our field investigation are shown on the attached Site Plan (Figure 2) and Site Photographs (Figure 3).

2.3 Subsurface Conditions

2.3.1 <u>Subsurface Investigation & Laboratory Testing</u>

Our subsurface investigation consisted of six drilled borings (B-1 through B-6) completed on July 8, 2014. The approximate exploration locations are shown on the Site Plan, attached as Figure 2. In summary, the borings were advanced to depths of about 11½ feet bps. Details regarding the subsurface investigation, logs of the explorations, and results of laboratory testing are presented in Appendix A. Subsurface conditions encountered during our investigation are summarized below.

2.3.2 <u>Subsurface Materials</u>

Logs of the explorations are presented in Appendix A. The following describes each of the subsurface materials encountered at the site.

---

[1] **Wells, R.E., Snavely, P.D., MacLeod, N.S., Kelly, M.M., and Parker, M.J., 1994,** Geologic map of the Tillamook Highlands, northwest Oregon Coast Range (Tillamook, Nehalem, Enright, Timber, Fairdale, and Blaine 15 minute quadrangles)**: U.S. Geological Survey, Open-File Report OF-94-21, scale 1:62,500**.

Asphalt Concrete Pavement

Asphalt concrete (AC) pavement was encountered at the surface of each boring and was about 2 to 3 inches thick.

Undocumented Poorly Graded Gravel Fill (GP Fill)

Undocumented poorly graded gravel fill (aggregate base rock) was encountered below the AC pavement in each boring. Undocumented fill refers to materials placed without (available) records of subgrade conditions or evaluation of compaction. The poorly graded gravel fill was typically brown, dry, angular, up to about ¾-inch in diameter, and contained no to trace low plasticity fines. The gravel fill extended to depths of about 1⅓ to 3 feet bps.

Elastic Silt (MH)

Underlying the gravel fill in boring B-6 was native elastic silt. This soil was typically stiff, brown, moist, exhibited medium plasticity, and contained trace fine-grained sand. This soil extended to a depth of about 5½ feet bgs in that boring.

Silty Sand (SM)

Underlying the gravel fill in borings B-2, B-3, and B-5, was native, silty sand. This soil was typically loose to medium dense, tan, moist, fine- to medium-grained, and contained varying amounts of low to medium plasticity silt. This soil extended to depths of about 5 feet bps in those borings.

Poorly Graded Sand (SP)

Underlying the gravel fill in borings B-1 and B-4, the silty sand in borings B-2, B-3 and B-5, and the elastic silt in boring B-6, was native, poorly graded sand. This soil was typically loose to medium dense, tan, moist to wet, fine- to medium-grained, and contained no to trace low plasticity silt. This soil extended to the full depths explored in the borings, about 11½ feet bps.

2.3.3 Groundwater

Groundwater was encountered at a depth of about 10 feet bgs in boring B-1 advanced on July 8, 2024. Groundwater was not encountered within the remaining borings, B-2 through B-6, advanced on that day. To determine approximate regional groundwater levels in the area, we researched well logs available on the Oregon Water Resources Department (OWRD)[2] website for wells located within Section 29, Township 03 North, Range 10 West, Willamette Meridian. Our review indicated that groundwater levels in the area generally ranged from about 50 to 59 feet bgs. It should be noted groundwater levels vary with local topography. In addition, the groundwater levels reported on the OWRD logs often reflect the purpose of the well, so water well logs may only report deeper, confined groundwater, while geotechnical or environmental borings will often report any groundwater encountered, including shallow, unconfined groundwater. Therefore, the levels reported on the OWRD well logs referenced above are considered generally indicative of local water levels and may not reflect actual groundwater levels at the project site. We anticipate that groundwater levels will fluctuate due to seasonal and annual variations in precipitation, changes in site utilization, or other factors. Additionally, the native elastic silt (MH) is conducive to formation of perched groundwater.

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[2] Oregon Water Resources Department, 2024. Well Log Records, *accessed June 2024,* from OWRD web site: http://apps.wrd.state.or.us/apps/gw/well_log/.

3.0 PAVEMENT STRUCTURAL CAPACITY EVALUATION

CGT performed a pavement structural capacity evaluation within the subject portion of Classic Street to determine whether structural enhancement (e.g. an overlay) was appropriate to help meet design vehicular traffic loading over a design period of 20 years and maintain a minimum standard level of serviceability. The results of the evaluation are presented in the attached Appendix C.

4.0 CONCLUSIONS

4.1 Overview

As indicated in the attached Appendix C, our analyses indicate the existing pavement structure within the subject portion of Classic Street exhibited a modest structural deficiency for the modeled vehicular traffic over a 20-year design period. As evidenced during our visual condition survey, we observed localized areas exhibiting fatigue cracking, longitudinal cracking, transverse cracking, and other distress within the existing AC pavement. Three pavement areas within the north portion of the street exhibited localized subsidence (slumping); additional discussion of those areas is presented in Section 4.2 above.

We conclude the existing AC pavement is approaching the end of its intended service life and improvements are warranted to maintain desired minimum level of serviceability over the indicated design period (20 years). Three options may be considered for improving Classic Street, as follows:

- **Option 1 – Repair Surface Deficiencies & Install Overlay:** This option would include repairing/treating surface deficiencies (e.g. fatigue cracking, longitudinal cracks, etc.) within the existing pavement structure and installing an overlay. Based on our analyses and factoring in best practices for placing AC pavement, we recommend the overlay be a minimum of 1½ inches thick. If overlaying is considered, we recommend the project civil engineer be consulted to review impacts to stormwater management, as well as review grade changes with respect to existing nearby features (public streets, sidewalks, curbs, etc.). Geotechnical recommendations for placement of a pavement overlay within the subject roadway, if considered, are presented in Section 6.1 of this report.
- **Option 2 – Full Removal & Replacement (R&R):** This option would include removing the existing AC pavement and installation of a new AC pavement section. Recommendations for this approach are presented in Section 6.2 of this report.
- **Option 3 – Full Depth Reclamation (FDR):** This option would include pulverizing the existing AC, blending it with the underlying aggregate base in-situ, compacting the materials to serve as aggregate base, and placing a new AC section. If this is considered, we recommend the project civil engineer be consulted to review impacts to stormwater management, as well as review inherent grade changes with respect to existing nearby features (public streets, sidewalks, curbs, etc.). Recommendations for this approach are presented in Section 6.3 of this report.

Other options typically pursued in pavement rehabilitation, including "grind and inlay" and surface treatments (e.g. slurry seals, chip seals, etc.), are not recommended for Classic Street. The grind and inlay technique is not recommended due to the relatively thin (predominantly 2 inches thick) existing pavement section. Surface treatments are not recommended due to the structural deficiency identified in our analyses.

4.2 Pavement Areas Exhibiting Subsidence

As indicated above and shown on the attached Site Plan, Figure 2, we observed three areas exhibiting subsidence (slumping) within the north portion of the street alignment. Each area was located along the west margin of the road and relatively close to a relatively steep, descending slope. The cause(s) of the subsidence was not unequivocally determined, but may be due to one, or a combination of, the following factors: (1) long-term (gradual) downslope movement (creep) of the near surface slope materials and (2) long-term consolidation (settlement) from transient (vehicular) loads of the subgrade materials directly below the pavement materials. Mitigation of these areas is recommended to provide assurance of long-term performance of the pavement structure. The following options are presented for consideration:

- **Installation of Retaining Wall(s):** This option would include installation of engineered retaining wall(s) at the top, or at some point within, the descending slope directly west of those slumping areas. Recognizing the relatively steep slopes, we recommend consideration be made to utilize pile-supported walls (e.g., sheet pile walls, soldier pile walls, etc.). Once the retaining wall(s) have been installed, the affected pavements should be removed and soft/loose subgrade soils (if present) should be over-excavated and replaced with structural fill. Geotechnical (soil) parameters for use in design of pile-supported walls are presented in Section 7.2 of this report.
- **Buttressing Slopes:** This option would include buttressing the descending slope (west of street) by adding new fill in a controlled (engineered) manner and achieve a maximum gradient of 2H:1V. This would invariably include removal of existing trees and vegetation on the slope and near its toe, and extending the slope outward (beyond its current footprint) to achieve that gradient. Keying and benching of the existing slope is recommended prior to placement of new structural fill. If considered, we recommend this approach be reviewed by the project civil engineer to review whether special considerations[3] are applicable for this construction.
- **Realignment of Street Segment:** This option would include realigning this segment of the street towards the east to achieve a greater setback from the descending slope. If considered, we recommend this approach be reviewed by the project civil engineer to review whether special considerations[4] are applicable to allow for this construction.

5.0 RECOMMENDATIONS: SITE WORK

The recommendations presented in this report are based on the information provided to us, results of our field investigation and analyses, laboratory data, and professional judgment. CGT has observed only a small portion of the pertinent subsurface conditions. The recommendations are based on the assumptions that the subsurface conditions do not deviate appreciably from those found during the field investigation. CGT should be consulted for further recommendations if the design of the proposed development changes and/or variations or undesirable geotechnical conditions are encountered during site development.

5.1 Site Preparation

The following recommendations are presented in the event the existing pavement structure is removed in its entirety (R&R) and/or the project includes widening the existing roadway beyond its current footprint.

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[3] Review of the extent of the public right of way and impacts to neighboring properties (to the west) would need to be evaluated.

[4] Review of the extent of the public right of way and impacts to neighboring properties (to the east) would need to be evaluated.

5.1.1 Stripping

Stripping activities associated with site preparation should be minimal at this site. Where slated for removal, existing asphalt concrete (AC) pavement, surface vegetation, and rooted soils should be removed from within, and for a minimum 3-foot margin around (where feasible), planned new pavements and retaining walls. Stripped AC should be transported off site for disposal, or stockpiled for later use as structural fill on the project site as described in Section 5.4.1 of this report. Stripped rooted soils should be transported off site for disposal, or stockpiled for later use as landscaping fill on the site.

5.1.2 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath the new pavements, retaining walls, and hardscaping features should be completely removed or grouted full. Soft, loose, or otherwise unsuitable soils encountered in utility trench excavations should be removed and replaced with structural fill in conformance with Section 5.4 this report. Buried structures (i.e. footings, foundation walls, retaining walls, slabs-on-grade, tanks, etc.), if encountered during site development, should be completely removed and replaced with structural fill in conformance with Section 5.4 of this report.

5.1.3 Roadway Subgrade Preparation

5.1.3.1 Dry Weather Construction

After site preparation as recommended above, but prior to placement of structural fill and/or aggregate base, the geotechnical engineer or his representative should observe a proof roll test of the exposed subgrade soils in order to identify areas of excessive yielding. Proof rolling of subgrade soils is typically conducted during dry weather conditions using a fully-loaded, 10- to 12-cubic-yard, tandem-axle, tire-mounted, dump truck or equivalent weighted water truck. Areas that appear too soft and wet to support proof rolling equipment should be prepared in general accordance with the recommendations for wet weather construction presented in Section 5.3 of this report. If areas of soft soil or excessive yielding are identified, the affected material should be over-excavated to firm, stable subgrade, and replaced with imported granular structural fill in conformance with Section 5.4.2 of this report.

5.1.3.2 Wet Weather Construction

Preparation of pavement subgrade soils during wet weather should be in conformance with Section 5.3 of this report. As indicated therein, a granular sub-base and geotextile separation fabric may be required in wet conditions in order to support construction traffic and protect the subgrade. Cement amendment may also be considered to help stabilize subgrade soils during wet weather.

5.1.4 Erosion Control

Erosion and sedimentation control measures should be employed in accordance with applicable City, County, and State regulations.

5.2 Temporary Excavations

5.2.1 Overview

Conventional earthmoving equipment in proper working condition should be capable of making necessary excavations for the anticipated site cuts as described earlier in this report. All excavations should be in accordance with applicable OSHA and state regulations. It is the contractor's responsibility to select the excavation methods, to monitor site excavations for safety, and to provide any shoring required to protect personnel and adjacent improvements. A “competent person,” as defined by OR-OSHA, should be on-site during construction in accordance with regulations presented by OR-OSHA. CGT’s current role on the project does not include review or oversight of excavation safety.

5.2.2 OSHA Soil Type

For use in the planning and construction of temporary excavations up to 10 feet in depth, an OSHA soil type “C” should be used for the granular soils (GP Fill, SM, SP) encountered in the borings. Similarly, an OSHA soil type “A” may be used for the native elastic silt (MH) encountered in boring B-6.

5.2.3 Utility Trenches

Caving is anticipated in excavations extending more than a few feet below the ground surface, particularly in areas underlain by relatively clean loose sand (SP). If seepage undermines the stability of the trench, or if caving of the sidewalls is observed during excavation, the sidewalls should be flattened or shored. Depending on the time of year trench excavations occur, trench dewatering may be required in order to maintain dry working conditions. If groundwater is encountered, we recommend placing trench stabilization material at the base of the excavations. Trench stabilization material should be in conformance with Section 5.4.3 of this report.

5.2.4 Excavations Near Foundations

Excavations near footings should not extend within a 1 horizontal to 1 vertical (1H:1V) plane projected out and down from the outside, bottom edge of the footings. In the event excavation needs to extend below the referenced plane, temporary shoring of the excavation and/or underpinning of the subject footing may be required. The geotechnical engineer should be consulted to review proposed excavation plans for this design case to provide specific recommendations.

5.3 Wet Weather Considerations

For planning purposes, the wet season should be considered to extend from late September to late June. It is our experience that dry weather working conditions should prevail between early July and mid-September. Notwithstanding the above, soil conditions should be evaluated in the field by the geotechnical engineer or their representative at the initial stage of site preparation to determine whether the recommendations within this section should be incorporated into construction.

5.3.1 Overview

Due to their fines content, the on-site near-surface silty soils (SM, MH) are susceptible to disturbance during wet weather. Trafficability of these soils may be difficult, and significant damage to subgrade soils could occur, if earthwork is undertaken without proper precautions at times when the exposed soils are more than a few percentage points above optimum moisture content. For wet weather construction, site preparation activities may need to be accomplished using track-mounted equipment, loading removed material onto trucks supported on granular haul roads, or other methods to limit soil disturbance. The geotechnical engineer’s representative should evaluate the subgrade during excavation by probing rather than proof rolling. Soils that have been disturbed during site preparation activities, or soft or loose areas identified during probing, should be over-excavated to firm, unyielding subgrade, and replaced with imported granular structural fill in conformance with Section 5.4.2.

5.3.2 Geotextile Separation Fabric

We recommend a geotextile separation fabric be placed to serve as a barrier between the prepared subgrade and granular fill/base rock in areas of repeated or heavy construction traffic. The geotextile fabric should meet the requirements presented in the current Oregon Department of Transportation (ODOT) Standard Specification for Construction (ODOT SSC), Section 02320.

5.3.3 Granular Working Surfaces (Haul Roads & Staging Areas)

Haul roads subjected to repeated heavy, tire-mounted, construction traffic (e.g. dump trucks, concrete trucks, etc.) will require a minimum of 18 inches of imported granular material. For light staging areas, 12 inches of imported granular material is typically sufficient. Additional granular material, cement amendment, or geo-grid reinforcement may be recommended based on site conditions and/or loading at the time of construction. The imported granular material should be in conformance with Section 5.4.2 and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. The prepared subgrade should be covered with geotextile fabric (Section 5.3.2) prior to placement of the imported granular material. The imported granular material should be placed in a single lift (up to 24 inches deep) and compacted using a smooth-drum, non-vibratory roller until well-keyed.

5.3.4 Cement Amendment

It is sometimes less costly to amend near-surface, moisture-sensitive, fine-grained soils with Portland cement than to remove and replace those soils with imported granular material. Successful use of soil cement amendment depends on use of correct techniques and equipment, soil moisture content, and the amount of cement added to the subgrade (mix design). We anticipate the on-site native silty and sandy soils (SM, SP, MH) are conducive for cement amendment due to their generally low plasticity and experience with similar soils.

The recommended percentage of cement is based on soil moisture contents at the time the work is performed. Based on our experience, 3 percent cement by weight of dry soil can generally be used when the soil moisture content does not exceed approximately 20 percent. If the soil moisture content is in the range of 25 to 35 percent, 4 to 6 percent by weight of dry soil is recommended. Similarly, if the soil moisture content is in the range of 35 to 45 percent, 7 to 8 percent by weight of dry soil is recommended. It is difficult to accurately predict field performance due to the variability in soil response to cement amendment. The amount of cement added to the soil may need to be adjusted based on field observations and performance.

If cement amendment is considered, we recommend additional sampling, laboratory testing, and a mix design be performed to determine the level of improvement in engineering properties (strength, stiffness) of the on-site soils when blended with Portland cement. We recommend project scheduling allow for a minimum of 4 weeks for this testing and design to be completed, prior to initiating cement amendment.

5.3.5 Footing Subgrade Protection

A minimum of 3 inches of imported granular material (crushed rock) is recommended to protect fine-grained (silty) footing subgrades from foot traffic during inclement weather. The imported granular material should be in conformance with Section 5.4.2. The maximum particle size should be limited to 1 inch. The imported granular material should be placed in one lift over the prepared, undisturbed subgrade, and compacted using non-vibratory equipment until well keyed.

Surface water should not be allowed to collect in footing excavations. The excavations should be draped and/or provided with sumps to preclude water accumulation during inclement weather.

5.4 Structural Fill

The geotechnical engineer should be provided the opportunity to review all materials considered for use as structural fill (prior to placement). Samples of the proposed fill materials should be submitted to the geotechnical engineer a minimum of 5 business days prior their use on site[5]. The geotechnical engineer or their representative should be contacted to evaluate compaction of structural fill as the material is being placed. Evaluation of compaction may take the form of in-place density tests and/or proof roll tests with suitable equipment. Structural fill should be evaluated at intervals not exceeding every 2 vertical feet as the fill is being placed. The following table presents recommended guidelines for frequency of density testing (where practical) of various fill designations.

Table 1 Guidelines for Frequency of Density Testing of Structural Fill Materials

Fill Designation	Recommended Frequency of Density Tests[1]	
	Maximum Depth Interval	Area-Wide
General Structural Fill (Mass Grading)	Test every 1 vertical foot	At least one density test per every 100 feet of roadway
Utility Trench Backfill	Test every 2 vertical feet	At least one density test per 100 feet of trench line
Pavement Base Rock	Test at surface of section	At least one density test per every 100 feet of roadway

[1] Or as specified by the City of Manzanita, where applicable.

5.4.1 On-Site Soils – General Use

5.4.1.1 Asphalt Concrete Debris

Debris resulting from the demolition of existing pavements can be re-used as structural fill if processed/crushed into material that is fairly well graded between coarse and fine. The processed/crushed concrete should contain no organic matter, debris, or particles larger than 4 inches in diameter. Moisture conditioning (wetting) should be expected in order to achieve adequate compaction. When used as structural fill, this material should be placed and compacted in general accordance with Section 5.4.2.

5.4.1.2 Poorly Graded Gravel Fill (GP Fill), Poorly Graded Sand (SP)

Re-use of the on-site, relatively clean, poorly graded gravel fill and relatively clean sand as structural fill is feasible, provided these materials are kept clean of organics, debris, and particles larger than 4 inches in diameter. If reused as structural fill, these materials should be prepared in general accordance with Section 5.4.2.

5.4.1.3 Elastic Silt (MH), Silty Sand (SM)

Re-use of these soils as structural fill may be difficult because they are sensitive to small changes in moisture content and are difficult, if not impossible, to adequately compact during wet weather. We anticipate the moisture content of these soils will be higher than the optimum moisture content for satisfactory compaction. Therefore, moisture conditioning (drying) should be expected in order to achieve adequate compaction. If used as structural fill, these soils should be free of organic matter, debris, and particles larger than 4 inches. When used as structural fill, these soils should be placed in lifts with a maximum pre-compaction thickness of about 8 inches at moisture contents within –1 and +3 percent of optimum, and

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[5] Laboratory testing for moisture density relationship (Proctor) is required. Tests for gradation may be required.

compacted to not less than 92 percent of the material's maximum dry density, as determined in general accordance with AASHTO T180 (Modified Proctor).

If the on-site materials cannot be properly moisture-conditioned and/or processed, we recommend using imported granular material for structural fill.

5.4.2 Imported Granular Structural Fill – General Use

Imported granular structural fill should consist of angular pit or quarry run rock, crushed rock, or crushed gravel that is fairly well graded between coarse and fine particle sizes. The granular fill should contain no organic matter, debris, or particles larger than 4 inches, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. For fine-grading purposes, the maximum particle size should be limited to 1½ inches. The percentage of fines can be increased to 12 percent of the material passing the U.S. Standard No. 200 Sieve if placed during dry weather, and provided the fill material is moisture-conditioned, as necessary, for proper compaction. Imported granular fill material should be placed in lifts with a maximum thickness of about 12 inches, and compacted to not less than 95 percent of the material's maximum dry density as determined in general accordance with AASHTO T180 (Modified Proctor). Proper moisture conditioning and the use of vibratory equipment will facilitate compaction of these materials.

Granular fill materials with high percentages of particle sizes in excess of 1½ inches are considered non-moisture-density testable materials. As an alternative to conventional density testing, compaction of these materials should be evaluated by proof roll test observation (deflection tests), where accepted by the geotechnical engineer.

5.4.3 Trench Base Stabilization Material

If groundwater is present at the base of utility excavations, trench base stabilization material should be placed. Trench base stabilization material should consist of a minimum of 1 foot of well-graded granular material with a maximum particle size of 4 inches and less than 5 percent material passing the U.S. Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material, placed in one lift, and compacted until well-keyed.

5.4.4 Trench Backfill Material

Trench backfill for the utility pipe base and pipe zone should consist of granular material as recommended by the utility pipe manufacturer. Trench backfill above the pipe zone should consist of well-graded granular material containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 8 percent material passing the U.S. Standard No. 200 Sieve. As a guideline, trench backfill should be placed in maximum 12-inch-thick lifts. The earthwork contractor may elect to use alternative lift thicknesses based on their experience with specific equipment and fill material conditions during construction in order to achieve the required compaction. The following table presents recommended relative compaction percentages for utility trench backfill.

Table 2 Utility Trench Backfill Compaction Recommendations

Backfill Zone	Recommended Minimum Relative Compaction	
	Structural Areas^{1,2}	Landscaping Areas
Pipe Base and Within Pipe Zone	90% AASHTO T180 or pipe manufacturer's recommendation	85% AASHTO T180 or pipe manufacturer's recommendation
Above Pipe Zone	92% AASHTO T180	88% AASHTO T180
Within 3 Feet of Design Subgrade	95% AASHTO T180	90% AASHTO T180

[1] Includes proposed pavements, structural fill areas, hardscaping, etc.

[2] Or as specified by the local jurisdiction where located in the public right of way.

5.4.5 Controlled Low-Strength Material (CLSM)

CLSM is a self-compacting, cementitious material that is typically considered when backfilling localized areas. CLSM is sometimes referred to as "controlled density fill" or CDF. Due to its flowable characteristics, CLSM typically can be placed in restricted-access excavations where placing and compacting fill is difficult. If chosen for use at this site, we recommend the CLSM be in conformance with Section 00442 of the most recent, ODOT SSC. The geotechnical engineer's representative should observe placement of the CLSM and obtain samples for compression testing in accordance with ASTM D4832. As a guideline, for each day's placement, two compressive strength specimens from the same CLSM sample should be tested. The results of the two individual compressive strength tests should be averaged to obtain the reported 28-day compressive strength. If CLSM is considered for use on this site, please contact the geotechnical engineer for site-specific and application-specific recommendations.

5.5 Permanent Slopes

5.5.1 Overview

Permanent cut or fill slopes constructed at the site, if any, should be graded at 2H:1V or flatter. Constructed slopes should be overbuilt by a few feet depending on their size and gradient so that they can be properly compacted prior to being cut to final grade. The surface of all slopes should be protected from erosion by seeding, sodding, or other acceptable means. Adjacent on-site and off-site structures should be located at least 5 feet from the top of slopes.

5.5.2 Placement of Fill on Slopes

New fill should be placed and compacted against horizontal surfaces. Where slopes exceed 5H:1V, the slopes should be keyed and benched prior to structural fill placement in general accordance with the attached Fill Slope Detail, Figure 4. If subdrains are needed on benches, subject to the review of the geotechnical representative, they should be placed as shown on the attached Fill Slope Detail. In order to achieve well-compacted slope faces, slopes should be overbuilt by a few feet and then trimmed back to proposed final grades. The geotechnical engineer or their representative should observe the benches, keyways, and associated subdrains, if needed, prior to placement of structural fill.

5.6 Additional Considerations

5.6.1 Drainage

Subsurface drains should be connected to the nearest storm drain or other suitable discharge point. Surface water from paved surfaces and open spaces should be collected and routed to a suitable discharge point. Surface water should not be directed into retaining wall drains or onto site slopes.

5.6.2 Expansive Potential

The near surface native soils consist of moderate plasticity elastic silt (MH) and sandy soils (SM, SP). Based on our experience with similar soils in the vicinity of the site, these soils are not considered to be susceptible to appreciable movements from changes in moisture content. Accordingly, no special considerations are required to mitigate expansive potential of the near surface soils at the site.

6.0 RECOMMENDATIONS: NEW PAVEMENTS

6.1 Option 1 – Pavement Overlay

6.1.1 Treatment of Surface Deficiencies

6.1.1.1 Overview

The long-term performance of repairs to surface deficiencies in asphalt pavement is highly dependent on the quality of workmanship. Accordingly, we recommend an experienced, qualified asphalt contractor be retained to repair deficiencies. The contractor is encouraged to follow repair guidelines and procedures presented in the most recent, ODOT Standard Specifications for Construction (ODOT SSC) and the most recent, “Asphalt in Pavement Maintenance” manual developed by the Asphalt Institute (AI). Other resources may be utilized for review of repair procedures. Subject to review of the pavement engineer, the contractor retained for the repair work may present alternative methods than those indicated below.

6.1.1.2 Fatigue Cracking

We recommend areas exhibiting moderate to severe fatigue (alligator) cracking be repaired as a “deep patch”. Sawcutting and removal of existing pavement should extend at least 1-foot into good pavement outside the cracked area. We recommend this form of pavement repair be in conformance with Section 00748 of the most recent, ODOT SSC. If encountered, soft, loose, or otherwise unsuitable subgrade materials should be removed to expose suitably firm subgrade, and brought back to grade with imported granular structural fill in conformance with Section 5.4.2 of this report. For planning purposes, we recommend a minimum 6 inches of subgrade over-excavation be performed at each deep patch location. We recommend geotextile separation fabric be placed between the prepared subgrade and granular backfill. The fabric should be in conformance with Section 02320 of the most recent, ODOT SSC.

6.1.1.3 Linear Cracking

For areas exhibiting linear (longitudinal and transverse) cracking, we recommend that all cracks exceeding ¼-inch in width be cleaned and sealed with rubber or other elastomeric modified asphalt in conformance with Section 00746 of the most recent, ODOT SSC.

6.1.2 Overlay

The following is recommended for overlay surface preparation and construction:

- The subject portion of Classic Street that exhibits surface deficiencies should be repaired in conformance with the recommendations presented in Section 6.1.1 above.
- Once repair of surface deficiencies is complete, the surface that is to be overlaid should be thoroughly cleaned. Compressed air should be used for cleaning to remove all loose matter.
- A tack coat should be applied to the cleaned pavement surface in conformance with Section 00730 of ODOT SSC.
- The recommended minimum 1½-inch thick overlay section should be placed on the tack coated surface in conformance with the project civil plans. The AC pavement should consist of Level 2, ½-inch, dense-graded AC in conformance with the most recent ODOT SSC, or as specified by the City of Manzanita (City). Minimum lift thickness of AC pavement should be 1½ inches, or as specified by City. Maximum lift thickness of AC pavement should be in conformance with Section 00748 of the most recent ODOT SSC, or as specified by City. AC pavement should be compacted to at least 91 percent of the material's theoretical maximum density as determined in general accordance with ASTM D2041 (Rice Specific Gravity), or as specified by the City.

6.2 Option 2 – Full Removal & Replacement

6.2.1 Subgrade Preparation

Pavement subgrade preparation should be in conformance with Section 5.1.3 of this report. Pavement subgrade surfaces should be crowned (or sloped) for proper drainage in accordance with specifications provided by the project civil engineer.

6.2.2 Input Parameters

Design of the asphalt concrete (AC) pavement section presented below were based on the parameters presented in the following table, the American Association of State Highway and Transportation Officials (AASHTO) 1993 "Design of Pavement Structures" manual, and pavement design manuals presented by APAO and ODOT[6]. If any of the items listed need revision, please contact us and we will reassess the provided design sections.

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[6] Oregon Department of Transportation (ODOT) Pavement Design Guide, January 2019.

Table 3 Input Parameters Used in AC Pavement Design

Parameter	Value	Parameter		Value
Pavement Design Life (years)[1]	20	Resilient Modulus	Aggregate Base (ksi) [2]	20
Growth Rate (%)	0		Subgrade (ksi)[3]	8.2
Initial Serviceability[2]	4.2	Structural Coefficient	Asphalt[2]	0.42
Terminal Serviceability[2]	2.5		Aggregate Base[2]	0.10
Standard Deviation[2]	0.49	Vehicle Traffic[4]	APAO Level III (Moderate) (high end of this traffic level)	100,000 ESAL
Reliability[2] (%)	85			
Drainage Coefficient – Asphalt, Base, Subgrade[2]	1.0			

[1] Value based on AASHTO and APAO guidelines for most pavements of this type.

[2] Value based on guidelines presented by the referenced ODOT design manual for asphalt concrete pavements.

[3] Values based on DCP testing (summarized in Appendix B) and consideration for seasonal variations.

[4] ESAL = Total 18-Kip equivalent single axle load. Refer to Appendix C for additional discussion of value used for design.

6.2.3 Recommended Minimum Sections

The following table presents the minimum AC pavement section for the ESAL value indicated in the preceding table, based on the referenced AASHTO procedures.

Table 4 Minimum AC Pavement Section – Full Removal & Replacement

Material	APAO Traffic Loading Level III
Asphalt Pavement (inches)	4
Crushed Aggregate Base (inches)[1]	8
Subgrade Soils	Prepared in conformance with Section 5.1.3 of this report.

[1] Where present, the existing gravel fill may be suitable for use as crushed aggregate base below new pavements at the site, provided it is kept clean of fines and other deleterious materials during construction and exhibits proper gradation and other characteristics preferred for pavement aggregate base. Geotechnical observation, sampling, and laboratory testing of the gravel fill may be recommended following stripping of the existing AC pavement to confirm the existing material(s) exhibit those desirable characteristics.

6.2.4 AC Pavement Materials

We recommend pavement aggregate base consist of dense-graded aggregate in conformance with Section 02630.10 of the most recent ODOT SSC, with the following additional considerations. We recommend the material consist of crushed rock or gravel, have a maximum particle size of 1½ inches, and have less than 10 percent material passing the U.S. Standard No. 200 Sieve[7]. Aggregate base should be compacted to not less than 95 percent of the material's maximum dry density as determined in general accordance with AASHTO T180 (Modified Proctor), or as specified by City of Manzanita.

We recommend asphalt pavement consist of Level 2, ½-inch, dense-graded AC in conformance with the most recent ODOT SSC. Asphalt pavement should be compacted to at least 91 percent of the material's theoretical maximum density as determined in general accordance with ASTM D2041 (Rice Specific Gravity), or as specified by City of Manzanita.

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[7] The recommendation to limit fines (e.g. silt or clay) within the base rock is intended to assist with moisture-conditioning and facilitating compaction of the layer, particularly if site work takes place during the traditional wet season in this region.

6.3 Option 3 – Full Depth Reclamation

6.3.1 Overview

Full depth reclamation (FDR) consists of reclaiming the pavement and aggregate base by mechanically breaking up the existing AC section and mixing that material with the underlying aggregate base. The reclaimed material is pulverized in-place to a specified gradation and compaction to serve as granular base for the new pavement. This new base course shall be mixed, proportioned, placed, and compacted in accordance with Section 6.3.4.1 of this report, or as specified by City of Manzanita

6.3.2 Input Parameters

Design of the AC pavement sections presented below were based on the parameters presented in the following table, the AASHTO 1993 “Design of Pavement Structures” manual, and pavement design manuals presented by APAO and ODOT. If any of the items listed need revision, please contact us and we will reassess the provided design sections.

Table 5 Input Parameters Used in AC Pavement Design

Parameter	Value	Parameter		Value
Pavement Design Life (years)[1]	20	Resilient Modulus	Reclaimed Agg. Base (ksi) [4]	15
Growth Rate (%)	0		Subgrade (ksi)[3]	8.2
Initial Serviceability[2]	4.2	Structural Coefficient	Asphalt[2]	0.42
Terminal Serviceability[2]	2.5		Reclaimed Agg. Base (ksi)[4]	0.08
Standard Deviation[2]	0.49	Vehicle Traffic[5]	APAO Level III (Moderate) (high end of this traffic level)	100,000 ESAL
Reliability[2] (%)	85			
Drainage Coefficient – Asphalt, Base, Subgrade[2]	1.0			

[1] Value based on AASHTO and APAO guidelines for most pavements of this type.

[2] Value based on guidelines presented by the referenced ODOT design manual for asphalt concrete pavements.

[3] Values based on DCP testing (summarized in Appendix B) and consideration for seasonal variations.

[4] Value based on examination of the existing aggregate base at boring locations.

[5] ESAL = Total 18-Kip equivalent single axle load. Refer to Appendix C for additional discussion of value used for design.

6.3.3 Recommended Minimum Section

The following table presents the minimum AC pavement section for the ESAL value indicated in the preceding table, based on the referenced AASHTO procedures.

Table 6 Minimum AC Pavement Sections – FDR

Material	APAO Traffic Loading Level III
Asphalt Pavement (inches)	4½
Reclaimed Base Material (inches)[1]	7

[1] Pulverized AC blended with underlying aggregate base. Prepared in general accordance with Section 6.3.4.1 below.

6.3.4 Pavement Materials

6.3.4.1 Reclaimed Base Material

The following is recommended for preparation of reclaimed pavement material:

- *Gradation:* Reclaimed material shall be pulverized to a maximum particle size of 3 inches in diameter, and have 100 percent and 95 to 100 percent of the material passing the U.S. Standard 3-inch and 1½-inch sieves, respectively. The processed reclaimed base material should contain no organic matter or debris, and have less than 10 percent material passing the U.S. Standard No. 200 Sieve.
- *Mix Design:* The mixed design is an approximation of existing site conditions and may be adjusted at the direction of the Project Engineer. The mixed design shall be as follows:
    - Minimum depth: 12 inches
    - Materials: Existing 2 inches of AC pavement and 10 inches of granular base
    - Density: Maximum dry density and optimum moisture content to be determined in accordance with AASHTO T180 (Modified Proctor).
- *Compaction:* The reclaimed material shall be moisture conditioned at or near optimum moisture content and compacted in accordance with Section 5.4.2 of this report (at least 95% AASHTO T180), or visual equivalent based on deflection (proof roll) testing per ODOT test method TM 158.

6.3.4.2 AC Pavement

We recommend asphalt pavement consist of Level 2, ½-inch, dense-graded AC in conformance with the most recent ODOT SSC. Asphalt pavement should be compacted to at least 91 percent of the material's theoretical maximum density as determined in general accordance with ASTM D2041 (Rice Specific Gravity), or as specified by City of Manzanita.

7.0 RECOMMENDATIONS: NEW RETAINING WALLS

As indicated above, we understand that site improvements will likely include construction of new retaining walls at the site. The location(s), type(s), and height(s) of the retaining walls are not known at this time. The following recommendations are presented for *preliminary* planning and design of new retaining walls at the site, including conventional cast-in-place (CIP) cantilevered retaining walls and pile-supported retaining walls (e.g. sheet pile walls, soldier pile walls, etc.). The geotechnical engineer or his representative should be contacted to provide supplemental recommendations for use in design and construction once the location(s), type(s), and height(s) of site retaining walls are known.

7.1 Option 1 – Conventional CIP Cantilevered Retaining Walls

7.1.1 Footings

7.1.1.1 Subgrade Preparation

Satisfactory subgrade support for retaining wall footings can be obtained from:

- The native sandy soils (SM, SP) provided the material is compacted using suitable equipment (e.g. vibratory hoe-pack compactor, vibrating plate compactor, etc.) until achieving a well-keyed (dense) condition. The geotechnical engineer or his representative should witness application of compaction effort to confirm suitable conditions.
- The native, medium stiff to better elastic silt (MH), or new structural fill that is properly placed and compacted on this material during construction.

The geotechnical engineer's representative should be contacted to observe subgrade conditions prior to placement of forms, reinforcement steel, or granular backfill (if required). If soft, loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by the geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill in conformance with Section 5.4.2. The maximum particle size of over-excavation backfill should be limited to 1½ inches. All granular pads for footings should be constructed a minimum of 6 inches wider on each side of the footing for every vertical foot of over-excavation.

7.1.1.2 Minimum Footing Width & Embedment

We recommend continuous wall footings have a minimum width of 18 inches. All footings should be founded at least 18 inches below the lowest, permanent adjacent grade to develop lateral capacity and for frost protection.

7.1.1.3 Horizontal Setback from Descending Slopes

Foundations constructed within or near descending slopes exhibiting gradients up to 2H:1V (horizontal:vertical) should be setback a minimum of 5 feet from the slope surface. Foundations constructed within or near descending slopes exhibiting gradients between 2H:1V and 1½H:1V should be setback a minimum of 8 feet from the slope surface. These distances should be measured between the face of the slope and the bottom, outside edge of the respective foundation. Organic topsoil and loose surface soils (if present) should not be included when determining this distance. The geotechnical engineer or his representative should be contacted to observe foundation subgrade conditions and confirm this recommended minimum setback is achieved.

7.1.1.4 Bearing Pressure & Settlement

Footings founded as recommended above should be proportioned for a maximum allowable soil bearing pressure of 2,000 pounds per square foot (psf). This bearing pressure is a net bearing pressure, applies to the total of dead and long-term live loads, and may be increased by one-third when considering seismic or wind loads. For foundations founded as recommended above, total settlement of foundations is anticipated to be less than 1 inch. If an increased allowable soil bearing pressure is desired, the geotechnical engineer should be consulted.

7.1.1.5 Lateral Capacity

A maximum passive (equivalent fluid) earth pressure of 150 pounds per cubic foot (pcf) is recommended for design of footings cast neat into excavations in suitable native soil or confined by granular structural fill that is properly placed and compacted during construction. The recommended earth pressure was computed using a factor of safety of 1½, which is appropriate due to the amount of movement required to develop full passive resistance. In order to develop the above capacity, the following should be understood:

1. Concrete must be poured neat in excavations or the foundations must be backfilled with imported granular structural fill,
2. The adjacent grade must be level,
3. The static ground water level must remain below the base of the footings throughout the year.
4. Adjacent floor slabs, pavements, or the upper 12-inch-depth of adjacent, unpaved areas should not be considered when calculating passive resistance.

An ultimate coefficient of friction equal to 0.35 may be used when calculating resistance to sliding for footings founded on the native soils described above. An ultimate coefficient of friction equal to 0.45 may be used when calculating resistance to sliding for footings founded on a minimum of 6 inches of imported granular structural fill (crushed rock) that is properly placed and compacted during construction.

7.1.2 Wall Drains

We recommend placing retaining wall drains at the base elevation of the heel of retaining wall footings. Retaining wall drains should consist of a minimum 4-inch-diameter, perforated, HDPE (High Density Polyethylene) drainpipe wrapped with a non-woven geotextile filter fabric. The drains should be backfilled with a minimum of 2 cubic feet of open graded drain rock per lineal foot of pipe. The drain rock should be encased in a geotextile fabric in order to provide separation from the surrounding soils. Retaining wall drains should be positively sloped and should outlet to a suitable discharge point. The geotechnical engineer's representative should be contacted to observe the drains prior to backfilling. Roof or area drains should not be tied into retaining wall drains.

7.1.3 Wall Backfill

Retaining walls should be backfilled with imported granular structural fill in conformance with Section 5.4.2 and contain less than 5 percent passing the U.S. Standard No. 200 Sieve. The backfill should be compacted to a minimum of 90 percent of the material's maximum dry density as determined in general accordance with AASHTO T180 (Modified Proctor). When placing fill behind walls, care must be taken to minimize undue lateral loads on the walls. Heavy compaction equipment should be kept at least "H" feet from the back of the walls, where "H" is the height of the wall. Light mechanical or hand tamping equipment should be used for compaction of backfill materials within "H" feet of the back of the walls.

7.1.4 Design Parameters & Limitations

For rigid retaining walls founded, backfilled, and drained as recommended above, the following table presents parameters recommended for design.

Table 7 Design Parameters for Rigid Retaining Walls

Retaining Wall Condition	Modeled Backfill Condition	Static Equivalent Fluid Pressure (S_A)[1]	Seismic Equivalent Fluid Pressure (S_{AE})[1,2]	Surcharge from Uniform Load, q, Acting on Backfill Behind Retaining Wall
Not Restrained from Rotation	Level (i=0)	28 pcf	42 pcf	0.22*q
Restrained from Rotation	Level (i=0)	50 pcf	63 pcf	0.38*q

[1] Refer to the attached Figure 5 for a graphical representation of static and seismic loading conditions. Seismic resultant force acts at 0.6H above the base of the wall.

[2] Seismic (dynamic) lateral loads were computed using the Mononobe-Okabe Equation as presented in the 1997 Federal Highway Administration (FHWA) design manual. Static and seismic equivalent fluid pressures are not additive.

The above design recommendations are based on the assumptions that:

- The walls consist of concrete cantilevered retaining walls ($\beta = 0$ and $\delta = 24$ degrees, see Figure 5).
- The walls are 10 feet or less in height.
- The backfill is drained and consists of imported granular structural fill ($\phi = 38$ degrees).
- No point, line, or strip load surcharges are imposed behind the walls.

- The grade behind the wall is level, or sloping down and away from the wall, for a distance of 10 feet or more from the wall.
- The grade in front of the walls is level or ascending for a distance of at least 5 feet from the wall.

Re-evaluation of our recommendations will be required if the retaining wall design criteria for the project vary from these assumptions.

7.1.5 Surcharge Loads

Where present, surcharges from adjacent site features (i.e. buildings, slabs, pavements, etc.) should be evaluated in design of retaining walls at the site. Methods for calculating lateral pressures on rigid retaining walls from strip, line, and vertical point loads are presented on the attached Figure 6.

7.2 Option 2 - Pile-Supported Retaining Walls

The following recommendations are presented for use in *preliminary* design of pile-supported retaining walls, including, but not limited to, sheet pile walls and soldier pile walls. Site subsurface conditions are conducive for installation of driven pile-supported walls, or placing steel piles in pre-drilled holes, if warranted[8]. The geotechnical engineer should be contacted to review the selected wall system(s) once plans have been prepared to capture the proposed location(s), height(s), and backfill considerations for those walls.

7.2.1 LPILE Parameters

We anticipate retaining wall design will be performed (by others) using commercially available, industry-standard software (such as LPILE™). We have provided recommended values for soil parameters for use in design using this method of analysis in the following table.

---

[8] Placing piles in pre-drilled holes may be advisable in the event the piles are to be installed on a relatively steep slope (due to vibration effects associated with pile driving) and/or in relative close proximity to existing residential structures (due to vibration effects and noise typically associated with pile driving).

Table 8 Recommended LPile™ Design Parameters

Layer	Depth (feet)	Description	IGM	LPile Soil Type	γ' (pcf)	Soil Properties						
						ϕ' (deg.)	c' (psf)	$S_{u(ave)}$ (psf)	K_p	k (pci)	ε_{50}	E_s (ksf)
1	0 to 2	Existing Fill Materials (neglect)	1	Sand (Reese)	130	0.01	0	0	0.01	0.01	--	0.1
2	2 to 15+	Loose to Med. Dense Sandy Soils (SM, SP)	1	Sand (Reese)	120	34	0	0	3.5	50	---	70

Notes: Variable Descriptions and Source Information

Depth	The depths listed in this table are with respect to the existing ground surface at the project site and based on subsurface conditions encountered in borings B-1 and B-2. *Please refer to approved building plans (by others) for the location of the dredge line in front of each shoring wall.*
IGM	Idealized geomaterial. Layers were defined as idealized geomaterials in accordance with FHWA –NHI-10-016 (FHWA, 2010). A numbering system was used to represent the IGM in the table as follows: 1= Cohesionless Soil. 2= Cohesive Soil. 3= Rock. 4= Cohesive IGM.
LPile	LPILE soil model assigned consistent with idealized soil models in LPile 2016.9.09.
γ'	Effective unit weight. Values presented based on previous laboratory testing and local experience with similar soil types.
ϕ'	Internal angle of friction. Values presented are based Equation 3-8 (FHWA, 2010) and experience with similar soils in this region.
c'	Effective cohesion. All soils are modeled as cohesionless.
$S_{u(ave)}$	Averaged undrained shear strength of cohesive layer. All soils are modeled as cohesionless.
K_p	Passive lateral earth pressure coefficient, based on Equation 13-10 (FHWA, 2010).
k	P-y modulus. Values presented based on “Soil Modulus Parameter k Value” tables (for sands) in the Help Menu of LPILE 2016.9.09.
ε_{50}	Strain Factor for cohesive soils. All soils are modeled as cohesionless.
E_s	Young’s modulus for soil (E_s). Value presented based on Table 3-6 (FHWA, 2010) – SPT correlations (for cohesionless soils) and the average value within the soil profile.

We recommend a geotechnical plans review of the drilled pier design be performed to confirm the recommendations presented within this section are implemented as intended.

7.2.2 Retained Soils

The following table presents soil strength parameters recommended for modeling the retained soils behind the pile-supported retaining walls (i.e., above the dredge line). The parameters presented therein were based on the results of the laboratory testing performed on selected samples, published correlations with SPT N-values, and experience with similar soils.

Table 9 Soil Parameters Recommended for Retained Soils (Above Dredge Line)

Parameter[1]	Subsurface Material[2]	
	Existing Fill Materials (GP Fill)	Loose to Med. Dense Native Sandy Soils (SM, SP)
Effective Unit Weight, γ'	130 pcf	120 pcf
Internal Angle of Friction, ϕ'	38°	34°
Effective Cohesion, c’	0 psf	0 psf
Ultimate Coefficient of Active Pressure, K_a	0.24	0.28
Ultimate Coefficient of At Rest Pressure, K_o	0.38	0.44

[1] If additional soil parameters are required for design, the geotechnical engineer should be consulted.

[2] Refer to the attached boring logs (Appendix C) for layer thicknesses across the site.

7.2.3 Surcharges (if present)

Where present, surcharges from adjacent site features (i.e. buildings, slabs, pavements, etc.) should be evaluated in design of retaining walls at the site. Where uniform (area-wide) load(s) are present behind the walls (i.e., at the ground surface), we recommend the lateral pressure(s) be modeled as a rectangular distribution behind the wall and assigned equal to q * 0.30, where q is equal to the surcharge load in units of psf. This assumes the soldier piles are allowed to rotate some at the top, allowing for development of active pressures. Methods for calculating lateral pressures retaining walls from strip, line, and vertical point loads are presented on the attached Figure 6. Surcharge pressures, if present, should be added to those associated with lateral earth pressures calculated from the earthen soils behind the walls using the principle of superposition.

8.0 RECOMMENDED ADDITIONAL SERVICES

8.1 Design Review

Geotechnical design review is of paramount importance. We recommend the geotechnical design review take place prior to releasing bid packets to contractors.

8.2 Observation of Construction

Satisfactory earthwork, foundation, retaining wall, and pavement performance depends to a large degree on the quality of construction. Sufficient observation of the contractor’s activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. Subsurface conditions observed during construction should be compared with those encountered during subsurface explorations, and recognition of changed conditions often requires experience. We recommend that qualified personnel visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those observed to date and anticipated in this report. We recommend the geotechnical engineer or their representative attend a pre-construction meeting coordinated by the contractor and/or developer. The project geotechnical engineer or their representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site stripping and demolition
- Subgrade preparation for structural fills, retaining walls, and pavements
- Compaction of structural fill and utility trench backfill
- Compaction of base rock for pavements
- Compaction of asphalt concrete for pavements

It is imperative that the owner and/or contractor request earthwork observations and testing at a frequency sufficient to allow the geotechnical engineer to provide a final letter of compliance for the earthwork activities.

9.0 LIMITATIONS

At our client’s request, the scope of our evaluation was limited to the scope of services described in this report. Other geotechnical considerations described in the 2022 Oregon Structural Specialty Code (OSSC) have not been addressed. Accordingly, this evaluation must be considered “limited.” A more comprehensive evaluation may be completed if requested by our client, for an additional fee. Such evaluation would include, but not be limited to assessment of seismic/geologic hazards at the site, recommendations for seismic design criteria, and other geotechnical considerations. The responsibility for determining the sufficiency of our evaluation to meet the project needs rests solely with the owner and not with CGT. Please contact us if additional evaluation is desired.

We have prepared this report for use by the City of Manzanita and other members of the design and construction team for the proposed development. The opinions and recommendations contained within this report are forwarded to assist in the planning and design process and are not intended to be, nor should they be construed as, a warranty of subsurface conditions.

We have made observations based on our explorations that indicate the soil conditions at only those specific locations and only to the depths penetrated. These observations do not necessarily reflect soil types, strata thickness, or water level variations that may exist between or away from our explorations. If subsurface conditions vary from those encountered in our site explorations, CGT should be alerted to the change in conditions so that we may provide additional geotechnical recommendations, if necessary. Observation by experienced geotechnical personnel should be considered an integral part of the construction process.

The owner/developer is responsible for ensuring that the project designers and contractors implement our recommendations. When the design has been finalized, prior to releasing bid packets to contractors, we recommend that the design drawings and specifications be reviewed by our firm to see that our recommendations have been interpreted and implemented as intended. If design changes are made, we request that we be retained to review our conclusions and recommendations and to provide a written modification or verification. Design review and construction phase testing and observation services are beyond the scope of our current assignment, but will be provided for an additional fee.

The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor’s methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Geotechnical engineering and the geologic sciences are characterized by a degree of uncertainty. Professional judgments presented in this report are based on our understanding of the proposed construction, familiarity with similar projects in the area, and on general experience. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with the generally accepted practices in this area at the time this report was prepared; no warranty, expressed or implied, is made. This report is subject to review and should not be relied upon after a period of three years.

CLASSIC STREET IMPROVEMENTS - MANZANITA, OREGON
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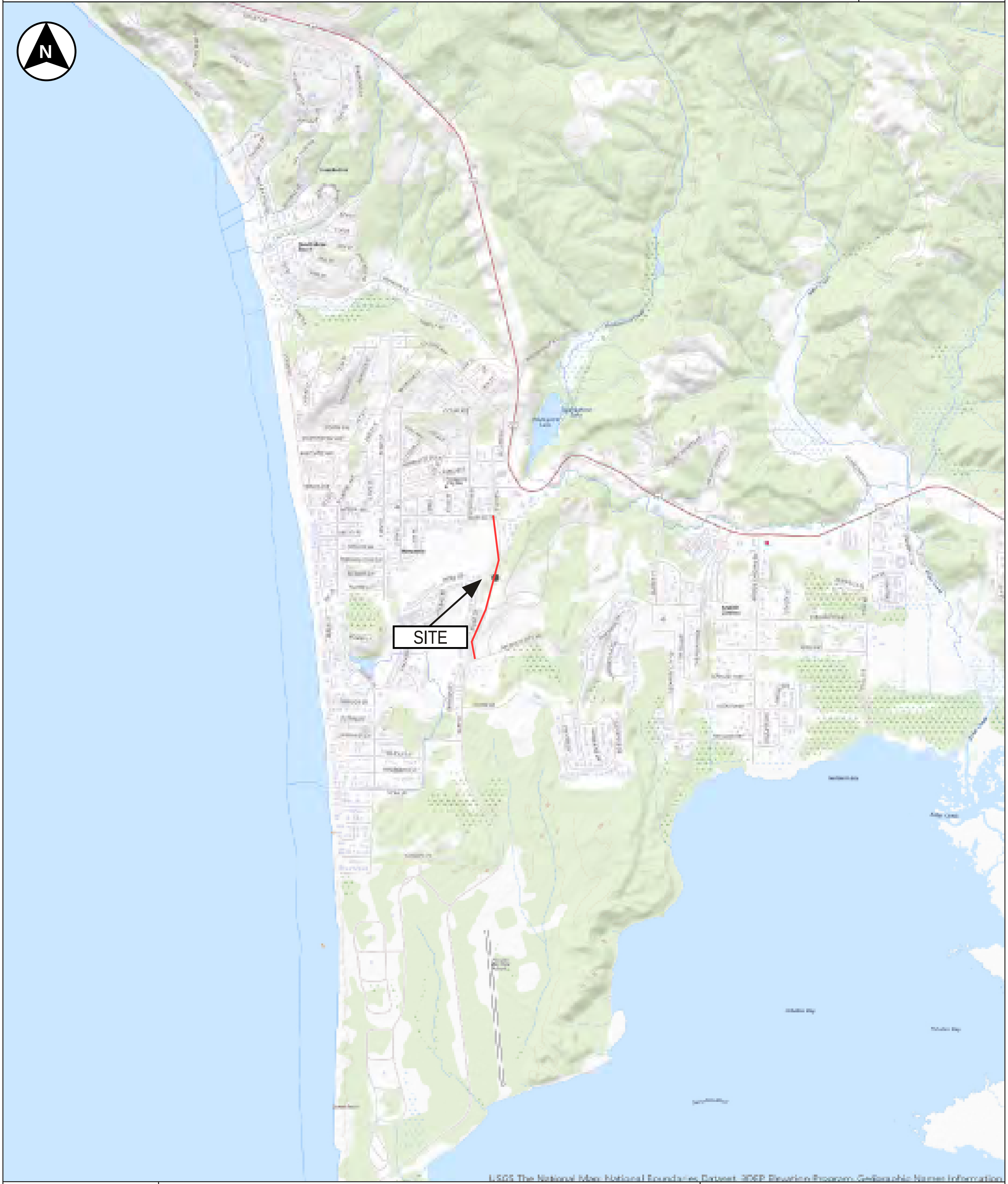
FIGURE 1

Site Location



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GEOTECHNICAL
503-601-8250
Drafted by: MDI

USGS Topographic base map created with The National Map, 2024, at https://viewer.nationalmap.gov/advanced-viewer/

Township 3 North, Range 10 West, Section 29, Willamette Meridian

Latitude: 45.71563° North
Longitude: 123.929562° West

1 Inch = 2,000 feet
0 2000 4000

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FIGURE 2

Site Plan

LEGEND

B-1/ DCP-1 ◐ Drilled boring & dynamic cone penetrometer test.

◁ 1 Orientation of site photographs shown on Figure 3.

🟥 Approximate pavement area exhibiting uneven conditions along outer (west) portion. See Appendix C for additional discussion.

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Drafted by: EEH/bmw

NOTES: Drawing based on observations made while on site. 2023 aerial image from ArcGIS (www.arcgis.com). All locations are approximate.

1 Inch = 250 Feet

0 250 500

FIGURE 3

Site Photographs

Photograph 1

Photograph 2

Photograph 3

Photograph 4

See Figure 2 for approximate photograph locations and directions. Photographs were taken at the time of our fieldwork.

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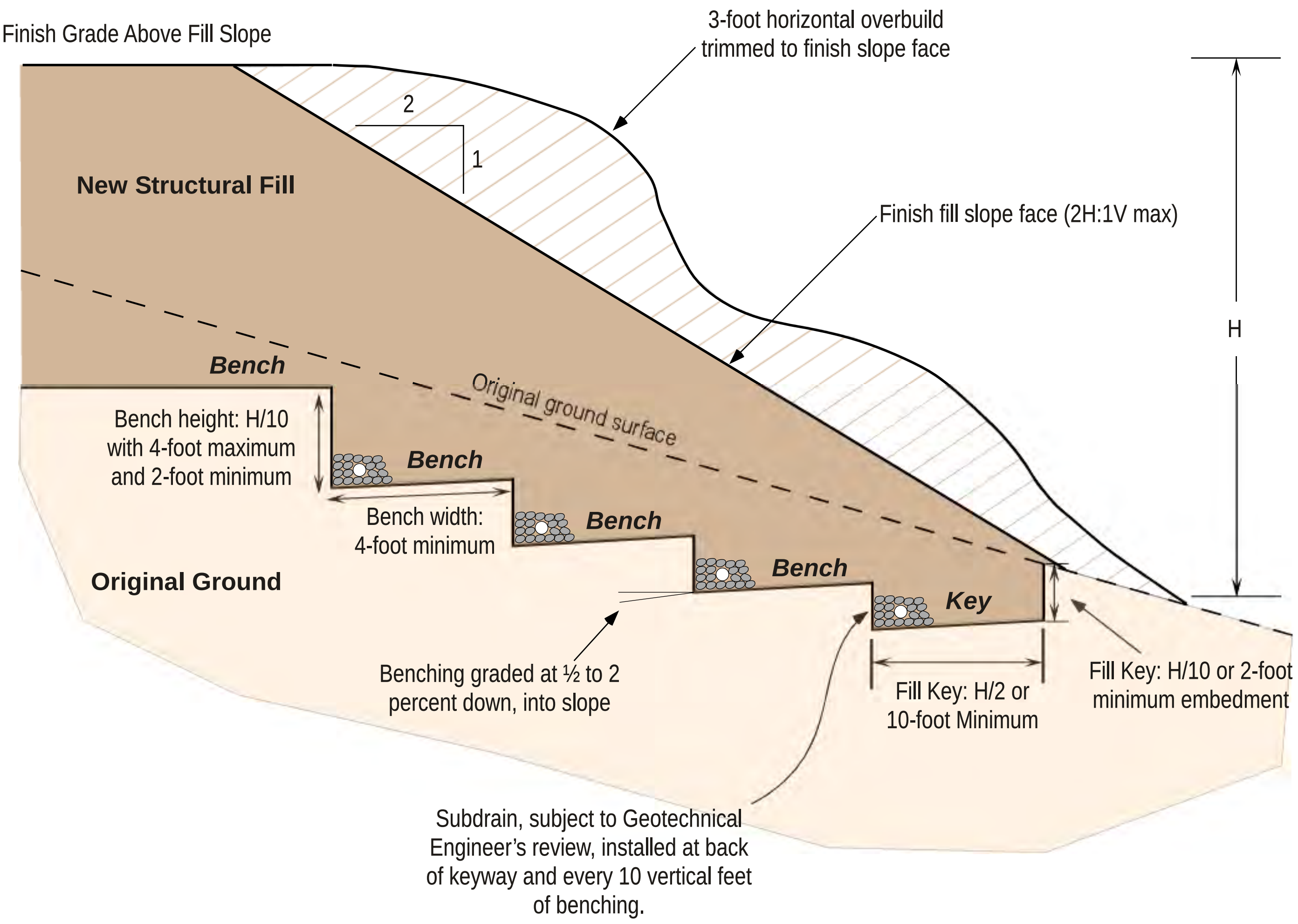
FIGURE 4

Fill Slope Detail



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NOTE: Surfaces to receive fill with slopes steeper than 5H:1V (horizontal:vertical) should be benched and keyed as shown.

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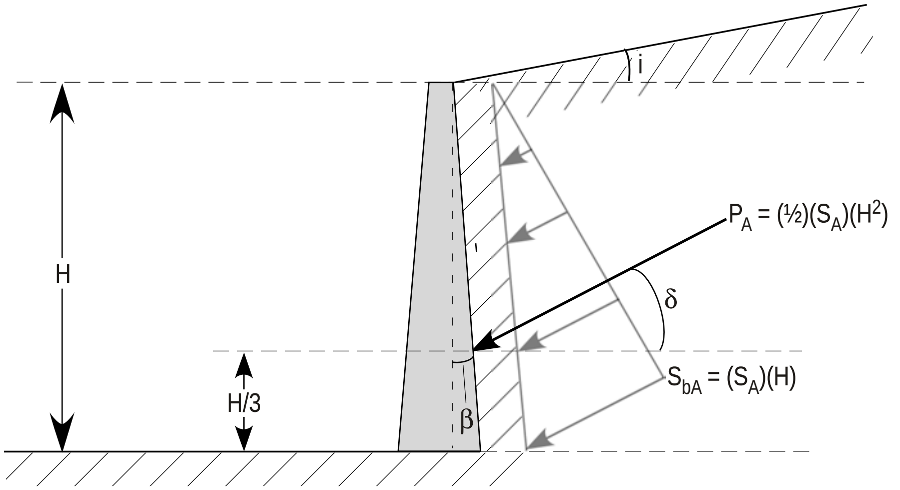
FIGURE 5

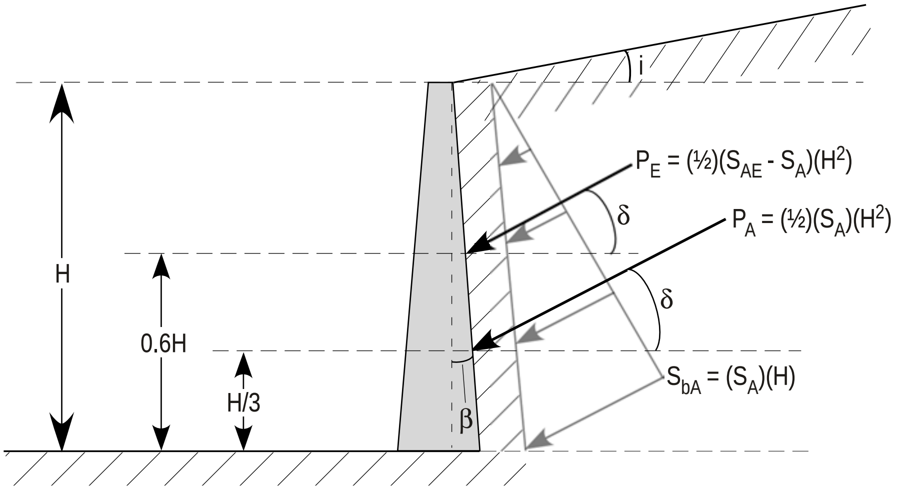
Retaining Walls

ACTIVE LATERAL PRESSURE DISTRIBUTION

STATIC LOADING CONDITIONS



SEISMIC LOADING CONDITIONS



LEGEND

S_A = Active lateral equivalent fluid pressure (lb/ft^3)*

S_{bA} = Active lateral earth pressure (static) at the bottom of wall (lb/ft^3)

S_{AE} = Active total (static + seismic) equivalent fluid pressure (lb/ft^3)*

i = Slope of backfill, relative to horizontal (degrees)**

β = Slope of back of wall, relative to vertical (degrees)**

P_A = Static active thrust force acting at H/3 from bottom of retaining wall (lb/ft)

P_E = Dynamic active thrust force acting at 0.6H from bottom of retaining wall (lb/ft)

δ = Angle from normal of back of wall (degrees). Based on friction developing between wall and backfill**

*Refer to report text for calculated values **Refer to report text for modeled/assumed values

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Notes

1. Uniform pressure distribution of seismic loading is based on empirical evaluations [Sherif et al, 1982 and Whitman, 1990].
2. Placement of seismic resultant force at 0.6H is based on wall behavior and model test results [Whitman, 1990].

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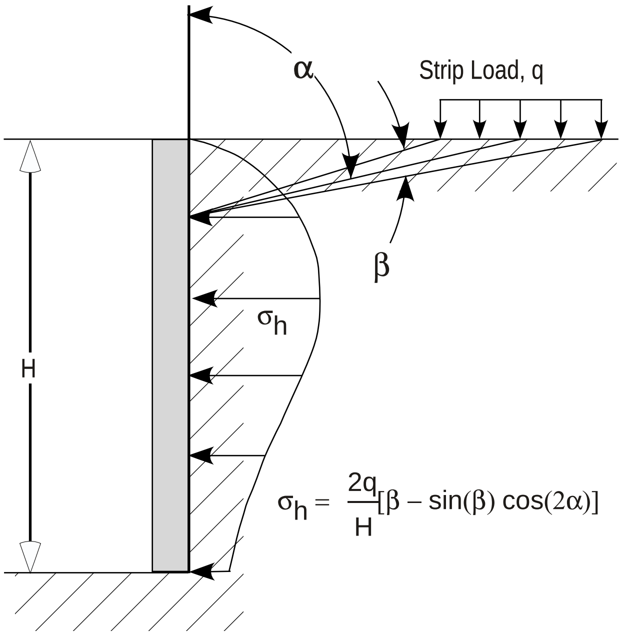
FIGURE 6

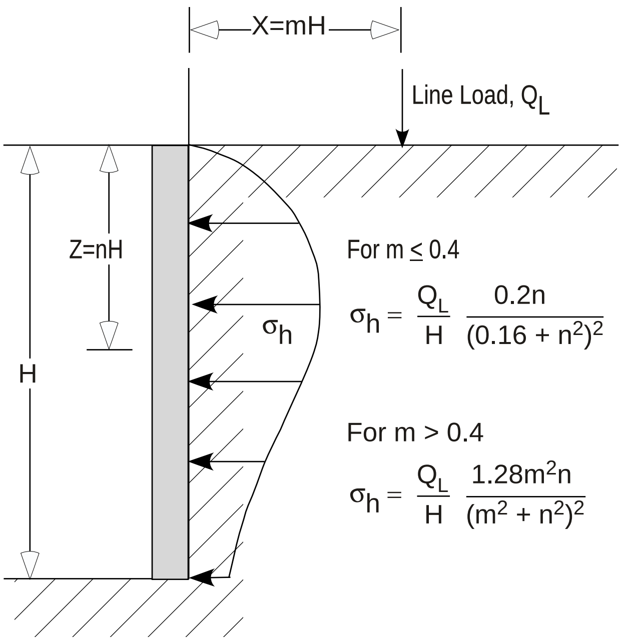
Retaining Wall Surcharge

STRIP LOAD PARALLEL TO WALL[1]



$$\sigma_h = \frac{2q}{H}[\beta - \sin(\beta)\cos(2\alpha)]$$

LINE LOAD PARALLEL TO WALL[2]



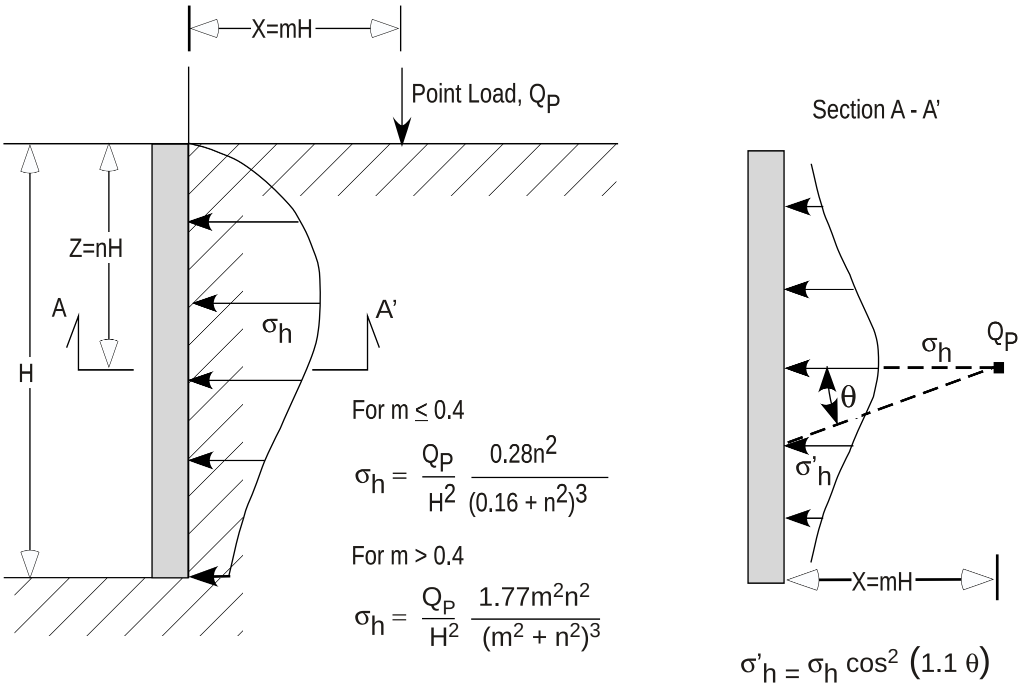
For m ≤ 0.4

$$\sigma_h = \frac{Q_L}{H}\ \frac{0.2n}{(0.16 + n^2)^2}$$

For m > 0.4

$$\sigma_h = \frac{Q_L}{H}\ \frac{1.28m^2n}{(m^2 + n^2)^2}$$

VERTICAL POINT LOAD[2]



For m ≤ 0.4

$$\sigma_h = \frac{Q_P}{H^2}\ \frac{0.28n^2}{(0.16 + n^2)^3}$$

For m > 0.4

$$\sigma_h = \frac{Q_P}{H^2}\ \frac{1.77m^2n^2}{(m^2 + n^2)^3}$$

$$\sigma'_h = \sigma_h \cos^2(1.1\,\theta)$$

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Notes: 1. Das, Principles of Geotechnical Engineering, 1990 Edition.
2. NAVFAC Design Manual 7.06.

Refer to the referenced design manuals for additional guidance. Contact CGT if there are any questions with modeling surcharge loads.

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Appendix A: Subsurface Investigation and Laboratory Testing

Classic Street Improvements
Classic Street
Manzanita, Oregon

CGT Project Number G2406158

August 16, 2024

Prepared For:

City of Manzanita
Dan Weitzel, Public Works Director
1090 Oak Street
Manzanita, Oregon 97130

Prepared by
Carlson Geotechnical

A.1.0 SUBSURFACE INVESTIGATION

Our field investigation consisted of six drilled borings completed on July 8, 2024. The exploration locations are shown on the Site Plan, attached to the geotechnical report as Figure 2. The exploration locations shown therein were determined based on measurements from existing off-site features (connecting roadways, buildings, etc.) and are approximate. Surface elevations indicated on the logs were estimated based on the topographic contours (by others) shown on schematic plans provided by our client, and are approximate. The attached figures detail the exploration methods (Figure A1), soil classification criteria (Figure A2), and present detailed logs of the explorations (Figures A3 through A8), as discussed below.

A.1.1 Drilled Borings

CGT observed the advancement of six drilled borings (B-1 through B-6) at the site using a B58 truck-mounted drill rig provided and operated by our subcontractor, PLI Systems of Hillsboro, Oregon. The borings were advanced using the hollow-stem auger drilling technique to depths of about 11½ feet below pavement surface (bps). Upon completion, the borings were backfilled with granular bentonite and the surfaces were patched with cold patch asphalt.

A.1.2 In-Situ Testing

A.1.2.1 Dynamic Cone Penetrometer (DCP) Testing

In each drilled boring, we performed a dynamic cone penetrometer (DCP) test. The DCP tests (DCP-1 through DCP-6) were conducted on the exposed subgrade below the pavement materials to depths up to about 3 feet bps. DCP testing was performed in general accordance with ASTM D6951, and consists of driving a 20-mm diameter, hardened steel cone on 16-mm diameter steel rods into the ground using a 8-kg drop hammer with a 460-mm, free-fall height. The number of hammer blows required to drive the DCP tip is typically recorded in 10-mm increments. The DCP index (defined as the amount of penetration per blow) is calculated by dividing the incremental penetration by the number of blows. The DCP index can be correlated to subgrade resilient modulus (M_R)[1]. Results of the DCP tests, including the DCP index and correlated resilient modulus values, are presented in the attached Appendix B.

A.1.2.2 Standard Penetration Tests (SPTs)

SPTs were conducted within the drilled borings using a split-spoon sampler in general accordance with ASTM D1586. The SPTs were conducted at 2½-foot intervals to the termination depths of the borings. The SPT is described on the attached Exploration Key, Figure A1.

A.1.3 Material Classification & Sampling

Soil samples were obtained at selected intervals in the borings using the referenced split-spoon (SPT) sampler and thin-walled, steel (Shelby) tube samplers, detailed on Figure A1. A qualified member of CGT's geological staff collected the samples and logged the soils in general accordance with the Visual-Manual Procedure (ASTM D2488). An explanation of this classification system is attached as Figure A2. The SPT samples were stored in sealable plastic bags and transported to our soils laboratory for further examination and testing. Our geotechnical staff visually examined all samples in order to refine the initial field classifications.

---

[1] Oregon Department of Transportation (ODOT) Pavement Services Unit, January 2019.

A.1.4 Subsurface Conditions

Subsurface conditions are summarized in Section 2.3 of the geotechnical report. Detailed logs of the explorations are presented on the attached exploration logs, Figures A3 through A8.

A.2.0 LABORATORY TESTING

Laboratory testing was performed on samples collected in the field to refine our initial field classifications and determine in-situ parameters. Laboratory testing included the following:

- Eight moisture content determinations (ASTM D2216).
- Two percentage passing the U.S. Standard No. 200 Sieve tests (ASTM D1140).
- One Atterberg limits (plasticity) test (ASTM D4318).

Results of the laboratory tests are shown on the exploration logs.

CLASSIC STREET IMPROVEMENTS - MANZANITA, OREGON
Project Number G2406158

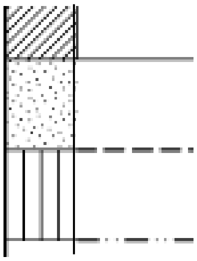
FIGURE A1
Exploration Key

PL ├─●─┤ LL MC	Atterberg limits (plasticity) test results (ASTM D4318): PL = Plastic Limit, LL = Liquid Limit, and MC= Moisture Content (ASTM D2216)
☐ FINES CONTENT (%)	Percentage passing the U.S. Standard No. 200 Sieve (ASTM D1140)

SAMPLING

GRAB	Grab sample
BULK	Bulk sample
☒ SPT	**Standard Penetration Test** (SPT) consists of driving a 2-inch, outside-diameter, split-spoon sampler into the undisturbed formation with repeated blows of a 140-pound, hammer falling a vertical distance of 30 inches (ASTM D1586). The number of blows (N-value) required to drive the sampler the last 12 inches of an 18-inch sample interval is used to characterize the soil consistency or relative density. The drill rig was equipped with an cat-head or automatic hammer to conduct the SPTs. The observed N-values, hammer efficiency, and N_{60} are noted on the boring logs.
MC	**Modified California** sampling consists of 3-inch, outside-diameter, split-spoon sampler (ASTM G3550) driven similarly to the SPT sampling method described above. A sampler diameter correction factor of 0.44 is applied to calculate the equivalent SPT N_{60} value per Lacroix and Horn, 1973.
CORE	**Rock Coring** interval
■ SH	**Shelby Tube** is a 3-inch, inner-diameter, thin-walled, steel tube push sampler (ASTM D1587) used to collect relatively undisturbed samples of fine-grained soils.
WDCP	**Wildcat Dynamic Cone Penetrometer** (WDCP) test consists of driving 1.1-inch diameter, steel rods with a 1.4-inch diameter, cone tip into the ground using a 35-pound drop hammer with a 15-inch free-fall height. The number of blows required to drive the steel rods is recorded for each 10 centimeters (3.94 inches) of penetration. The blow count for each interval is then converted to the corresponding SPT N_{60} values.
DCP	**Dynamic Cone Penetrometer** (DCP) test consists of driving a 20-millimeter diameter, hardened steel cone on 16-millimeter diameter steel rods into the ground using a 10-kilogram drop hammer with a 460-millimeter free-fall height. The depth of penetration in millimeters is recorded for each drop of the hammer.
POCKET PEN. (tsf)	**Pocket Penetrometer** test is a hand-held instrument that provides an approximation of the unconfined compressive strength in tons per square foot (tsf) of cohesive, fine-grained soils.

CONTACTS



Observed (measured) contact between soil or rock units.

Inferred (approximate) contact between soil or rock units.

Transitional (gradational) contact between soil or rock units.

ADDITIONAL NOTATIONS

Italics	Notes drilling action or digging effort
{ Braces }	Interpretation of material origin/geologic formation (e.g. { Base Rock } or { Columbia River Basalt })

All measurements are approximate.

CLASSIC STREET IMPROVEMENTS - MANZANITA, OREGON
Project Number G2406158

FIGURE A2
Soil Classification

Classification of Terms and Content

NAME:
- Group Name and Symbol
- Relative Density or Consistency
- Color
- Moisture Content
- Plasticity
- Other Constituents
- Other: Grain Shape, Approximate Gradation
- Organics, Cement, Structure, Odor, etc.
- Geologic Name or Formation

Grain Size

		U.S. Standard Sieve
Fines		<#200 (0.075 mm)
Sand	Fine	#200 - #40 (0.425 mm)
	Medium	#40 - #10 (2 mm)
	Coarse	#10 - #4 (4.75 mm)
Gravel	Fine	#4 - 0.75 inch
	Coarse	0.75 inch - 3 inches
Cobbles		3 to 12 inches
Boulders		> 12 inches

Coarse-Grained (Granular) Soils

Relative Density

SPT N_{60}-Value	Density
0 - 4	Very Loose
4 - 10	Loose
10 - 30	Medium Dense
30 - 50	Dense
>50	Very Dense

Minor Constituents

Percent by Volume	Descriptor	Example
0 - 5%	"Trace" as part of soil description	"trace silt"
5 - 15%	"With" as part of group name	"**POORLY GRADED SAND WITH SILT**"
15 - 49%	Modifier to group name	"**SILTY SAND**"

Fine-Grained (Cohesive) Soils

SPT N_{60}-Value	Torvane tsf Shear Strength	Pocket Pen tsf Unconfined	Consistency	Manual Penetration Test
<2	<0.13	<0.25	Very Soft	Thumb penetrates more than 1 inch
2 - 4	0.13 - 0.25	0.25 - 0.50	Soft	Thumb penetrates about 1 inch
4 - 8	0.25 - 0.50	0.50 - 1.00	Medium Stiff	Thumb penetrates about ¼ inch
8 - 15	0.50 - 1.00	1.00 - 2.00	Stiff	Thumb penetrates less than ¼ inch
15 - 30	1.00 - 2.00	2.00 - 4.00	Very Stiff	Readily indented by thumbnail
>30	>2.00	>4.00	Hard	Difficult to indent by thumbnail

Minor Constituents

Percent by Volume	Descriptor	Example
0 - 5%	"Trace" as part of soil description	"trace fine-grained sand"
5 - 15%	"Some" as part of soil description	"some fine-grained sand"
15 - 30%	"With" as part of group name	"**SILT WITH SAND**"
30 - 49%	Modifier to group name	"**SANDY SILT**"

Moisture Content

Dry: Absence of moisture, dusty, dry to the touch

Moist: Leaves moisture on hand

Wet: Visible free water, likely from below water table

	Plasticity	Dry Strength	Dilatancy	Toughness
ML	Non to Low	Non to Low	Slow to Rapid	Low, can't roll
CL	Low to Medium	Medium to High	None to Slow	Medium
MH	Medium to High	Low to Medium	None to Slow	Low to Medium
CH	Medium to High	High to Very High	None	High

Structure

Stratified: Alternating layers of material or color >6 mm thick

Laminated: Alternating layers < 6 mm thick

Fissured: Breaks along definite fracture planes

Slickensided: Striated, polished, or glossy fracture planes

Blocky: Cohesive soil that can be broken down into small angular lumps which resist further breakdown

Lenses: Has small pockets of different soils, note thickness

Homogeneous: Same color and appearance throughout

Visual-Manual Classification

Major Divisions			Group Symbols	Typical Names
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: 50% or more *retained* on the No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel/sand mixtures, little or no fines
			GP	Poorly-graded gravels and gravel/sand mixtures, little or no fines
		Gravels with Fines	GM	Silty gravels, gravel/sand/silt mixtures
			GC	Clayey gravels, gravel/sand/clay mixtures
	Sands: More than 50% *passing* the No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly-graded sands and gravelly sands, little or no fines
		Sands with Fines	SM	Silty sands, sand/silt mixtures
			SC	Clayey sands, sand/clay mixtures
Fine-Grained Soils: 50% or more Passes No. 200 Sieve	Silt and Clays Low Plasticity Fines		ML	Inorganic silts, rock flour, clayey silts
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
			OL	Organic soil of low plasticity
	Silt and Clays High Plasticity Fines		MH	Inorganic silts, clayey silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic soil of medium to high plasticity
Highly Organic Soils			PT	Peat, muck, and other highly organic soils

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<u>References:</u>

ASTM D2487 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

ASTM D2488 Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

Terzaghi, K., and Peck, R.B., 1948, Soil Mechanics in Engineering Practice, John Wiley & Sons.

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FIGURE A3

Boring B-1

PAGE 1 OF 1

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 52 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
▽ **GROUNDWATER DURING DRILLING** 10.0 ft / El. 42.0 ft
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
			ASPHALT CONCRETE: Approximately 2 inches thick.		0					
		GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, angular, up to ¼-inch in diameter.							
50		SP	**POORLY GRADED SAND:** Loose, tan, moist, fine- to medium-grained, with trace low plasticity fines.							
						SPT 1	56	3-4-4 (8)	8	
					5	SPT 2	44	1-2-3 (5)	5	
45			Increased moisture content below 7 feet bgs.							
						SPT 3	56	1-1-4 (5)	5	
			Wet below 10 feet bgs.	▽	10					
						SPT 4	56	1-1-4 (5)	5	
40										

- Boring terminated at about 11½ feet bgs.
- Groundwater encountered at about 10 feet bgs.
- No caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

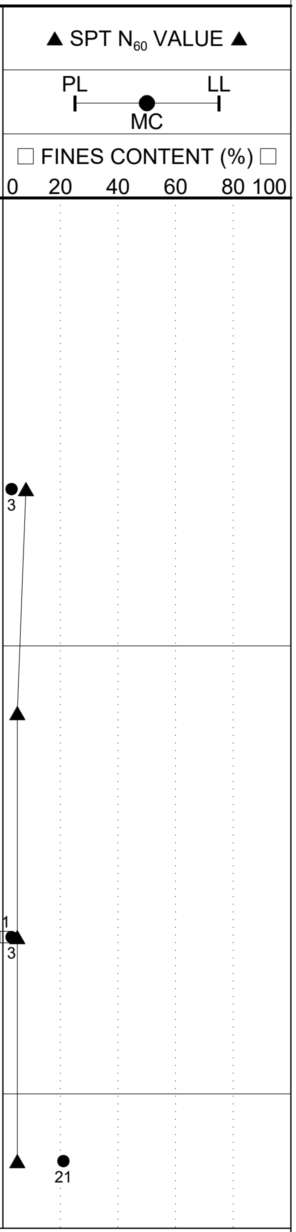

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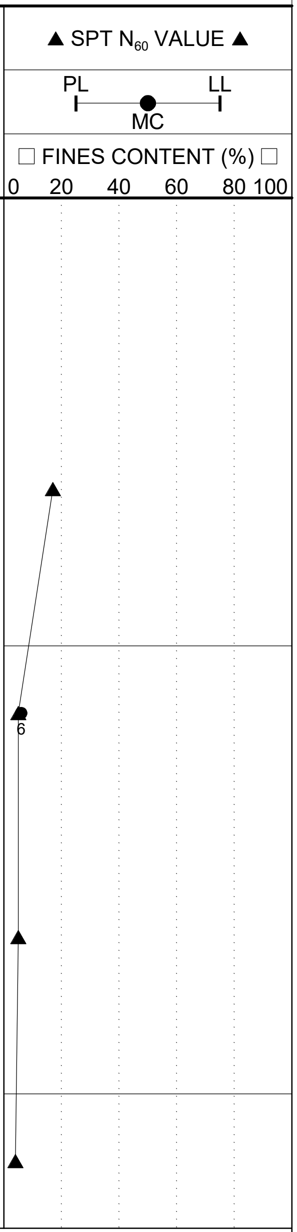
FIGURE A4

Boring B-2

PAGE 1 OF 1

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 80 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
		ASPHALT CONCRETE: Approximately 2 inches thick.		0					
	GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, angular, up to ¾-inch in diameter, with low plasticity fines.							
	SM	**SILTY SAND:** Medium dense, tan, moist, fine- to medium-grained, with low plasticity fines.			SPT 1	56	7-8-10 (18)	17	
75	SP	**POORLY GRADED SAND:** Loose, tan, moist, fine- to medium-grained, with trace low plasticity fines.		5	SPT 2	56	2-2-3 (5)	5	
					SPT 3	56	1-2-3 (5)	5	
70				10					
					SPT 4	56	1-2-2 (4)	4	
65									



- Boring terminated at about 11½ feet bgs.
- No groundwater or caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

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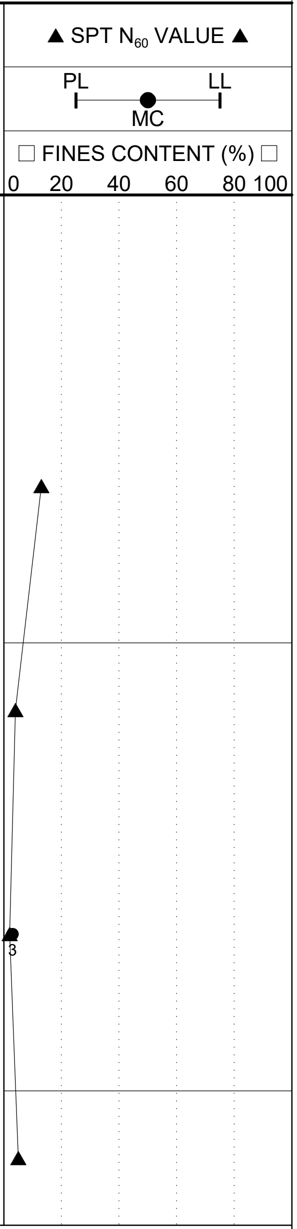
FIGURE A5

Boring B-3

PAGE 1 OF 1

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 82 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
			ASPHALT CONCRETE: Approximately 2 inches thick.		0					
80		GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, angular, up to ¾-inch in diameter, with low plasticity fines.							
		SM	**SILTY SAND:** Medium dense, tan, moist, fine- to medium-grained, with low plasticity fines.			SPT 1	56	2-6-7 (13)	13	
		SP	**POORLY GRADED SAND:** Loose, tan, moist, fine- to medium-grained, with trace low plasticity fines.		5	SPT 2	67	1-2-2 (4)	4	
75			Very loose, with trace gray mottling below 7½ feet bgs.			SPT 3	67	1-1-1 (2)	2	
			Loose below about 10 feet bgs.		10	SPT 4	67	1-2-3 (5)	5	
70										



- Boring terminated at about 11½ feet bgs.
- No groundwater or caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

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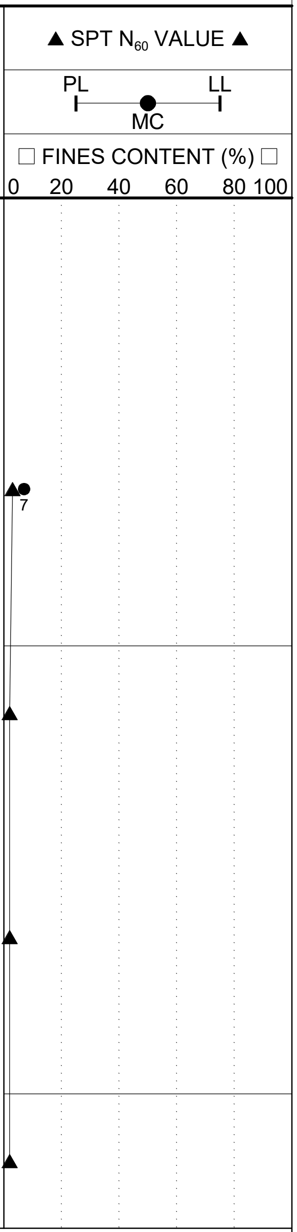
FIGURE A6

Boring B-4

PAGE 1 OF 1

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 84 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

GROUP SYMBOL	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
	ASPHALT CONCRETE: Approximately 2 inches thick.					
GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, nonplastic, angular, up to ¾-inch in diameter, with low plasticity fines.					
SP	**POORLY GRADED SAND:** Loose, tan, moist, fine- to medium-grained, with trace low plasticity fines.	SPT 1	56	1-1-2 (3)	3	
		SPT 2	67	0-1-1 (2)	2	
		SPT 3	67	0-1-1 (2)	2	
		SPT 4	67	0-1-1 (2)	2	



- Boring terminated at about 11½ feet bgs.
- No groundwater or caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

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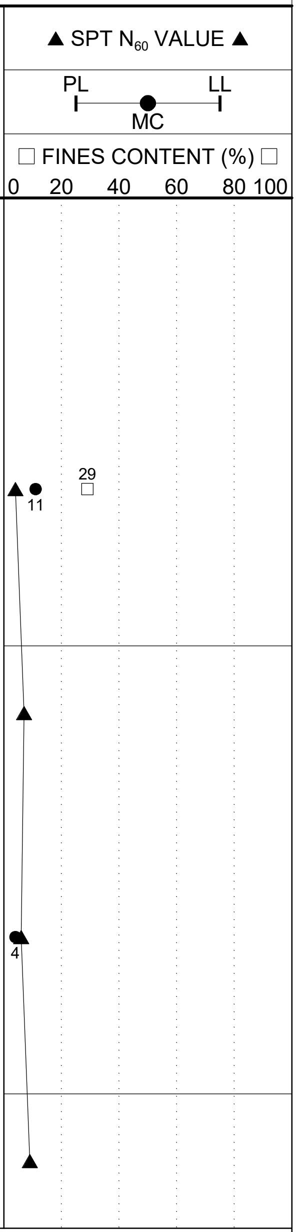
FIGURE A7

Boring B-5

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 76 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
		ASPHALT CONCRETE: Approximately 2 inches thick.		0					
75	GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, angular, up to ¾-inch in diameter, with low plasticity fines.							
	SM	**SILTY SAND:** Loose, tan with orange mottling, moist, fine- to medium-grained, with low plasticity fines.			SPT 1	33	3-3-1 (4)	4	
	SP	**POORLY GRADED SAND:** Loose, tan, moist, fine- to medium-grained, with trace low plasticity fines.		5					
70					SPT 2	67	1-3-4 (7)	7	
					SPT 3	67	1-2-4 (6)	6	
				10					
65					SPT 4	67	3-4-5 (9)	9	



- Boring terminated at about 11½ feet bgs.
- No groundwater or caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

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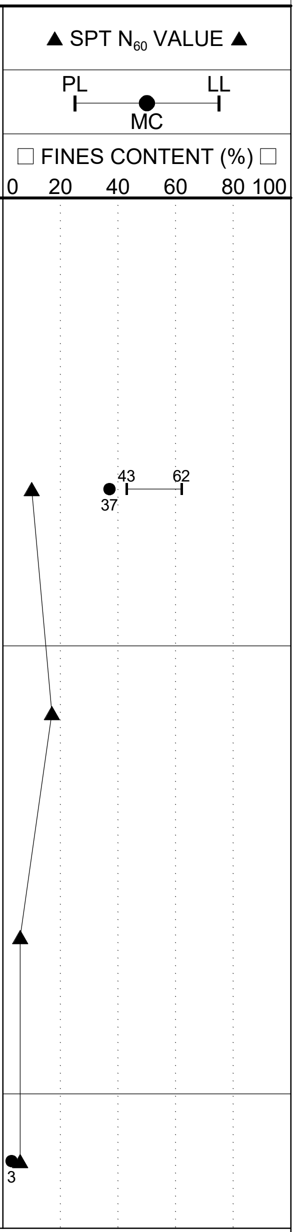
FIGURE A8

Boring B-6

PAGE 1 OF 1

CLIENT City of Manzanita - Dan Weitzel, Public Works Director
PROJECT NAME Classic Street Improvements
PROJECT NUMBER G2406158
PROJECT LOCATION Classic Street - Manzanita, Oregon
DATE STARTED 7/8/24
GROUND ELEVATION 75 ft
ELEVATION DATUM From schematic plans provided by client.
WEATHER Sunny, 78F
SURFACE Asphalt Concrete
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR PLI Systems, Inc.
SEEPAGE ---
EQUIPMENT Mobile B-57 Truck
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Hollow Stem Auger & DCP
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N_{SPT} VALUE)	N_{60} VALUE ETR_{Hammer} = 77.70%	DRY UNIT WT. (pcf)
			ASPHALT CONCRETE: Approximately 2 inches thick.		0					
		GP FILL	**POORLY GRADED GRAVEL FILL:** Brown, dry, angular, up to ¾-inch in diameter, with low plasticity fines.							
		MH	**ELASTIC SILT:** Stiff, brown with multicolored mottling, moist, low to medium plasticity, with trace fine-grained sand.			SPT 1	67	3-4-6 (10)	10	
70					5					
		SP	**POORLY GRADED SAND:** Medium dense, tan with brown mottling, moist, fine- to medium-grained, with no to trace low plasticity fines.			SPT 2	78	4-8-10 (18)	17	
			Very loose below 7½ feet bgs.			SPT 3	67	2-3-3 (6)	6	
65					10	SPT 4	67	2-3-3 (6)	6	



- Boring terminated at about 11½ feet bgs.
- No groundwater or caving encountered.
- Boring backfilled with crushed rock and surface patched with cold patch asphalt.

60

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Salem Office **(503) 589-1252**
Tigard Office **(503) 684-3460**

Appendix B: Results of DCP Tests

Classic Street Improvements
Classic Street
Manzanita, Oregon

CGT Project Number G2406158

August 16, 2024

Prepared For:

City of Manzanita
Dan Weitzel, Public Works Director
1090 Oak Street
Manzanita, Oregon 97130

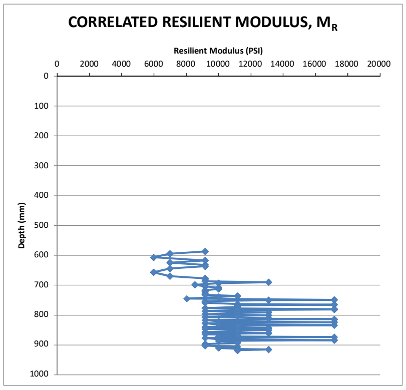
Prepared by
Carlson Geotechnical

Project:	Classic Street Improvements
Project Number:	G2406158
Date:	7/8/2024
Exploration Name:	B-1

Type of Pavement:	AC	**C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)**
Thickness of Pavement:	2	**inches**
Thickness of Base Rock:	21	**inches**
Seating Depth:	23	**(inches from ground surface to bottom of excavation)**
Initial DCP reading:	625	**mm**

Table 2 - C_f for DCP and FWD to Convert

Layer Type & Location	C_f
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33



Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 10854

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	630	A	1	5	587	23.1	Subgrade	0.35	5.00	48	9159
2	1	640		1	15	594	23.4	Subgrade	0.35	10.00	22	6990
3	1	655		1	30	607	23.9	Subgrade	0.35	15.00	14	5967
4	1	660		1	35	617	24.3	Subgrade	0.35	5.00	48	9159
5	1	670		1	45	624	24.6	Subgrade	0.35	10.00	22	6990
6	1	675		1	50	632	24.9	Subgrade	0.35	5.00	48	9159
7	1	680		1	55	637	25.1	Subgrade	0.35	5.00	48	9159
8	1	690		1	65	644	25.4	Subgrade	0.35	10.00	22	6990
9	1	705		1	80	657	25.9	Subgrade	0.35	15.00	14	5967
10	1	715		1	90	669	26.3	Subgrade	0.35	10.00	22	6990
11	1	720		1	95	677	26.6	Subgrade	0.35	5.00	48	9159
12	1	725		1	100	682	26.8	Subgrade	0.35	5.00	48	9159
13	1	730		1	105	687	27.0	Subgrade	0.35	5.00	48	9159
14	1	732		1	107	690	27.2	Subgrade	0.35	2.00	134	13094
15	1	736		1	111	693	27.3	Subgrade	0.35	4.00	62	9992
16	1	742		1	117	698	27.5	Subgrade	0.35	6.00	39	8531
17	1	747		1	122	704	27.7	Subgrade	0.35	5.00	48	9159
18	1	751		1	126	708	27.9	Subgrade	0.35	4.00	62	9992
19	1	755		1	130	712	28.0	Subgrade	0.35	4.00	62	9992
20	1	760		1	135	717	28.2	Subgrade	0.35	5.00	48	9159
21	1	765		1	140	722	28.4	Subgrade	0.35	5.00	48	9159
22	1	770		1	145	727	28.6	Subgrade	0.35	5.00	48	9159
23	1	775		1	150	732	28.8	Subgrade	0.35	5.00	48	9159
24	1	778		1	153	736	29.0	Subgrade	0.35	3.00	85	11179
25	1	782		1	157	739	29.1	Subgrade	0.35	4.00	62	9992
26	1	789		1	164	745	29.3	Subgrade	0.35	7.00	33	8033
27	1	790		1	165	749	29.5	Subgrade	0.35	1.00	292	17158
28	1	792		1	167	750	29.5	Subgrade	0.35	2.00	134	13094
29	1	797		1	172	754	29.7	Subgrade	0.35	5.00	48	9159
30	1	802		1	177	759	29.9	Subgrade	0.35	5.00	48	9159
31	1	805		1	180	763	30.0	Subgrade	0.35	3.00	85	11179
32	1	806		1	181	765	30.1	Subgrade	0.35	1.00	292	17158
33	1	809		1	184	767	30.2	Subgrade	0.35	3.00	85	11179
34	1	812		1	187	770	30.3	Subgrade	0.35	3.00	85	11179
35	1	815		1	190	773	30.4	Subgrade	0.35	3.00	85	11179
36	1	820		1	195	777	30.6	Subgrade	0.35	5.00	48	9159
37	1	821		1	196	780	30.7	Subgrade	0.35	1.00	292	17158
38	1	822		1	197	781	30.7	Subgrade	0.35	1.00	292	17158
39	1	825		1	200	783	30.8	Subgrade	0.35	3.00	85	11179
40	1	830		1	205	787	31.0	Subgrade	0.35	5.00	48	9159
41	1	832		1	207	790	31.1	Subgrade	0.35	2.00	134	13094
42	1	835		1	210	793	31.2	Subgrade	0.35	3.00	85	11179
43	1	840		1	215	797	31.4	Subgrade	0.35	5.00	48	9159
44	1	842		1	217	800	31.5	Subgrade	0.35	2.00	134	13094
45	1	845		1	220	803	31.6	Subgrade	0.35	3.00	85	11179
46	1	850		1	225	807	31.8	Subgrade	0.35	5.00	48	9159
47	1	852		1	227	810	31.9	Subgrade	0.35	2.00	134	13094
48	1	854		1	229	812	32.0	Subgrade	0.35	2.00	134	13094
49	1	855		1	230	814	32.0	Subgrade	0.35	1.00	292	17158
50	1	860		1	235	817	32.2	Subgrade	0.35	5.00	48	9159
51	1	864		1	239	821	32.3	Subgrade	0.35	4.00	62	9992
52	1	865		1	240	824	32.4	Subgrade	0.35	1.00	292	17158
53	1	870		1	245	827	32.5	Subgrade	0.35	5.00	48	9159
54	1	874		1	249	831	32.7	Subgrade	0.35	4.00	62	9992
55	1	875		1	250	834	32.8	Subgrade	0.35	1.00	292	17158
56	1	878		1	253	836	32.9	Subgrade	0.35	3.00	85	11179
57	1	883		1	258	840	33.1	Subgrade	0.35	5.00	48	9159
58	1	885		1	260	843	33.2	Subgrade	0.35	2.00	134	13094
59	1	890		1	265	847	33.3	Subgrade	0.35	5.00	48	9159
60	1	892		1	267	850	33.5	Subgrade	0.35	2.00	134	13094
61	1	895		1	270	853	33.6	Subgrade	0.35	3.00	85	11179
62	1	900		1	275	857	33.7	Subgrade	0.35	5.00	48	9159
63	1	902		1	277	860	33.9	Subgrade	0.35	2.00	134	13094
64	1	907		1	282	864	34.0	Subgrade	0.35	5.00	48	9159
65	1	910		1	285	868	34.2	Subgrade	0.35	3.00	85	11179
66	1	914		1	289	871	34.3	Subgrade	0.35	4.00	62	9992
67	1	915		1	290	874	34.4	Subgrade	0.35	1.00	292	17158
68	1	920		1	295	877	34.5	Subgrade	0.35	5.00	48	9159
69	1	924		1	299	881	34.7	Subgrade	0.35	4.00	62	9992
70	1	925		1	300	884	34.8	Subgrade	0.35	1.00	292	17158
71	1	929		1	304	886	34.9	Subgrade	0.35	4.00	62	9992
72	1	932		1	307	890	35.0	Subgrade	0.35	3.00	85	11179
73	1	935		1	310	893	35.1	Subgrade	0.35	3.00	85	11179
74	1	940		1	315	897	35.3	Subgrade	0.35	5.00	48	9159
75	1	945		1	320	902	35.5	Subgrade	0.35	5.00	48	9159
76	1	948		1	323	906	35.7	Subgrade	0.35	3.00	85	11179
77	1	952		1	327	909	35.8	Subgrade	0.35	4.00	62	9992
78	1	955		1	330	913	35.9	Subgrade	0.35	3.00	85	11179
79	1	957		1	332	915	36.0	Subgrade	0.35	2.00	134	13094
80	1	960		1	335	918	36.1	Subgrade	0.35	3.00	85	11179
81	1	962		1	337	920	36.2	Subgrade	0.35	2.00	134	13094
82	1	968		1	343	924	36.4	Subgrade	0.35	6.00	39	8531
83	1	972		1	347	929	36.6	Subgrade	0.35	4.00	62	9992
84	1	975		1	350	933	36.7	Subgrade	0.35	3.00	85	11179
85	1	979		1	354	936	36.9	Subgrade	0.35	4.00	62	9992
86	1	984		1	359	941	37.0	Subgrade	0.35	5.00	48	9159
87	1	988		1	363	945	37.2	Subgrade	0.35	4.00	62	9992
88	1	992		1	367	949	37.4	Subgrade	0.35	4.00	62	9992
89	1	995		1	370	953	37.5	Subgrade	0.35	3.00	85	11179
90	1	999		1	374	956	37.6	Subgrade	0.35	4.00	62	9992
91	1	1008		1	383	963	37.9	Subgrade	0.35	9.00	25	7283
92	1	1015		1	390	971	38.2	Subgrade	0.35	7.00	33	8033
93	1	1020		1	395	977	38.5	Subgrade	0.35	5.00	48	9159
94	1	1025		1	400	982	38.6	Subgrade	0.35	5.00	48	9159
95	1	1029		1	404	986	38.8	Subgrade	0.35	4.00	62	9992
96	1	1031		1	406	989	38.9	Subgrade	0.35	2.00	134	13094
97	1	1036		1	411	993	39.1	Subgrade	0.35	5.00	48	9159
98	1	1040		1	415	997	39.3	Subgrade	0.35	4.00	62	9992
99	1	1045		1	420	1002	39.4	Subgrade	0.35	5.00	48	9159
100	1	1050		1	425	1007	39.6	Subgrade	0.35	5.00	48	9159
101	1	1058		1	433	1013	39.9	Subgrade	0.35	8.00	28	7625
102	1	1061		1	436	1019	40.1	Subgrade	0.35	3.00	85	11179
103	1	1065		1	440	1022	40.2	Subgrade	0.35	4.00	62	9992
104	1	1069		1	444	1026	40.4	Subgrade	0.35	4.00	62	9992
105	1	1074		1	449	1031	40.6	Subgrade	0.35	5.00	48	9159
106	1	1078		1	453	1035	40.8	Subgrade	0.35	4.00	62	9992
107	1	1082		1	457	1039	40.9	Subgrade	0.35	4.00	62	9992
108	1	1090		1	465	1045	41.1	Subgrade	0.35	8.00	28	7625
109	1	1098		1	473	1053	41.5	Subgrade	0.35	8.00	28	7625
110	1	1105		1	480	1061	41.8	Subgrade	0.35	7.00	33	8033
111	1	1115		1	490	1069	42.1	Subgrade	0.35	10.00	22	6990
112	1	1120		1	495	1077	42.4	Subgrade	0.35	5.00	48	9159
113	1	1126		1	501	1082	42.6	Subgrade	0.35	6.00	39	8531
114	1	1132		1	507	1088	42.8	Subgrade	0.35	6.00	39	8531
115	1	1140		1	515	1095	43.1	Subgrade	0.35	8.00	28	7625

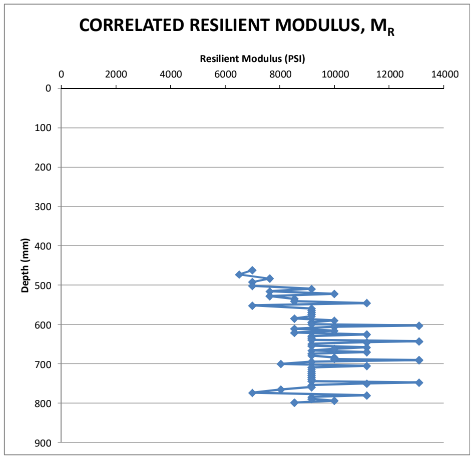
Project:	Classic Street Improvements
Project Number:	G2406158
Date:	7/8/2024
Exploration Name:	B-2

Type of Pavement:	AC	**C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)**
Thickness of Pavement:	2	**inches**
Thickness of Base Rock:	16	**inches**
Seating Depth:	18	**(inches from ground surface to bottom of excavation)**
Initial DCP reading:	795	**mm**

Table 2 - C_f for DCP and FWD to

Layer Type & Location	C_f
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	805	A	1	10	462	18.2	Subgrade	0.35	10.00	22	6990
2	1	817		1	22	473	18.6	Subgrade	0.35	12.00	18	6510
3	1	825		1	30	483	19.0	Subgrade	0.35	8.00	28	7625
4	1	835		1	40	492	19.4	Subgrade	0.35	10.00	22	6990
5	1	845		1	50	502	19.8	Subgrade	0.35	10.00	22	6990
6	1	850		1	55	510	20.1	Subgrade	0.35	5.00	48	9159
7	1	858		1	63	516	20.3	Subgrade	0.35	8.00	28	7625
8	1	862		1	67	522	20.6	Subgrade	0.35	4.00	62	9992
9	1	870		1	75	528	20.8	Subgrade	0.35	8.00	28	7625
10	1	876		1	81	535	21.1	Subgrade	0.35	6.00	39	8531
11	1	882		1	87	541	21.3	Subgrade	0.35	6.00	39	8531
12	1	885		1	90	546	21.5	Subgrade	0.35	3.00	85	11179
13	1	895		1	100	552	21.7	Subgrade	0.35	10.00	22	6990
14	1	900		1	105	560	22.0	Subgrade	0.35	5.00	48	9159
15	1	905		1	110	565	22.2	Subgrade	0.35	5.00	48	9159
16	1	910		1	115	570	22.4	Subgrade	0.35	5.00	48	9159
17	1	915		1	120	575	22.6	Subgrade	0.35	5.00	48	9159
18	1	920		1	125	580	22.8	Subgrade	0.35	5.00	48	9159
19	1	926		1	131	585	23.0	Subgrade	0.35	6.00	39	8531
20	1	930		1	135	590	23.2	Subgrade	0.35	4.00	62	9992
21	1	935		1	140	595	23.4	Subgrade	0.35	5.00	48	9159
22	1	940		1	145	600	23.6	Subgrade	0.35	5.00	48	9159
23	1	942		1	147	603	23.7	Subgrade	0.35	2.00	134	13094
24	1	946		1	151	606	23.9	Subgrade	0.35	4.00	62	9992
25	1	952		1	157	611	24.1	Subgrade	0.35	6.00	39	8531
26	1	956		1	161	616	24.3	Subgrade	0.35	4.00	62	9992
27	1	962		1	167	621	24.5	Subgrade	0.35	6.00	39	8531
28	1	965		1	170	626	24.6	Subgrade	0.35	3.00	85	11179
29	1	970		1	175	630	24.8	Subgrade	0.35	5.00	48	9159
30	1	975		1	180	635	25.0	Subgrade	0.35	5.00	48	9159
31	1	980		1	185	640	25.2	Subgrade	0.35	5.00	48	9159
32	1	982		1	187	643	25.3	Subgrade	0.35	2.00	134	13094
33	1	985		1	190	646	25.4	Subgrade	0.35	3.00	85	11179
34	1	990		1	195	650	25.6	Subgrade	0.35	5.00	48	9159
35	1	995		1	200	655	25.8	Subgrade	0.35	5.00	48	9159
36	1	998		1	203	659	25.9	Subgrade	0.35	3.00	85	11179
37	1	1002		1	207	662	26.1	Subgrade	0.35	4.00	62	9992
38	1	1007		1	212	667	26.2	Subgrade	0.35	5.00	48	9159
39	1	1010		1	215	671	26.4	Subgrade	0.35	3.00	85	11179
40	1	1015		1	220	675	26.6	Subgrade	0.35	5.00	48	9159
41	1	1020		1	225	680	26.8	Subgrade	0.35	5.00	48	9159
42	1	1024		1	229	684	26.9	Subgrade	0.35	4.00	62	9992
43	1	1028		1	233	688	27.1	Subgrade	0.35	4.00	62	9992
44	1	1030		1	235	691	27.2	Subgrade	0.35	2.00	134	13094
45	1	1035		1	240	695	27.4	Subgrade	0.35	5.00	48	9159
46	1	1042		1	247	701	27.6	Subgrade	0.35	7.00	33	8033
47	1	1045		1	250	706	27.8	Subgrade	0.35	3.00	85	11179
48	1	1050		1	255	710	27.9	Subgrade	0.35	5.00	48	9159
49	1	1055		1	260	715	28.1	Subgrade	0.35	5.00	48	9159
50	1	1060		1	265	720	28.3	Subgrade	0.35	5.00	48	9159
51	1	1065		1	270	725	28.5	Subgrade	0.35	5.00	48	9159
52	1	1070		1	275	730	28.7	Subgrade	0.35	5.00	48	9159
53	1	1075		1	280	735	28.9	Subgrade	0.35	5.00	48	9159
54	1	1080		1	285	740	29.1	Subgrade	0.35	5.00	48	9159
55	1	1085		1	290	745	29.3	Subgrade	0.35	5.00	48	9159
56	1	1087		1	292	748	29.5	Subgrade	0.35	2.00	134	13094
57	1	1090		1	295	751	29.6	Subgrade	0.35	3.00	85	11179
58	1	1095		1	300	755	29.7	Subgrade	0.35	5.00	48	9159
59	1	1100		1	305	760	29.9	Subgrade	0.35	5.00	48	9159
60	1	1107		1	312	766	30.1	Subgrade	0.35	7.00	33	8033
61	1	1117		1	322	774	30.5	Subgrade	0.35	10.00	22	6990
62	1	1120		1	325	781	30.7	Subgrade	0.35	3.00	85	11179
63	1	1125		1	330	785	30.9	Subgrade	0.35	5.00	48	9159
64	1	1130		1	335	790	31.1	Subgrade	0.35	5.00	48	9159
65	1	1134		1	339	794	31.3	Subgrade	0.35	4.00	62	9992
66	1	1140		1	345	799	31.5	Subgrade	0.35	6.00	39	8531
67												


CORRELATED RESILIENT MODULUS, M_R

Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 9399

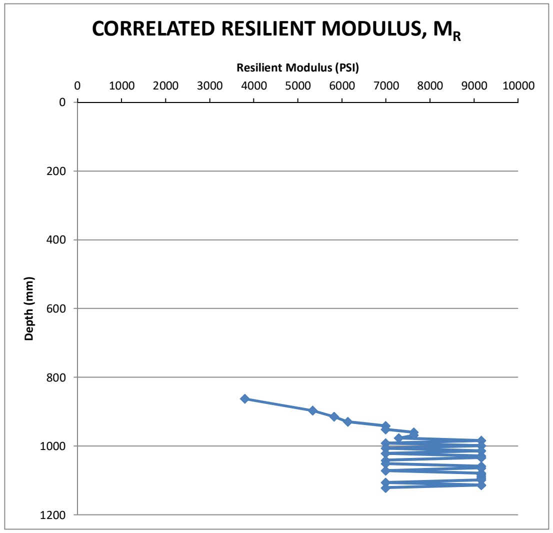
Project:	Classic Street Improvements	
Project Number:	G2406158	
Date:	7/8/2024	
Exploration Name:	B-3	

Type of Pavement:	AC	**C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)**
Thickness of Pavement:	2	**inches**
Thickness of Base Rock:	24	**inches**
Seating Depth:	33	**(inches from ground surface to bottom of excavation)**
Initial DCP reading:	852	**mm**

Table 2 - C_f for DCP and FWD to

Layer Type & Location	C_f
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	900	A	1	48	862	33.9	Subgrade	0.35	48.00	4	3791
2	1	920		1	68	896	35.3	Subgrade	0.35	20.00	10	5334
3	1	936		1	84	914	36.0	Subgrade	0.35	16.00	13	5819
4	1	950		1	98	929	36.6	Subgrade	0.35	14.00	15	6130
5	1	960		1	108	941	37.1	Subgrade	0.35	10.00	22	6990
6	1	970		1	118	951	37.4	Subgrade	0.35	10.00	22	6990
7	1	978		1	126	960	37.8	Subgrade	0.35	8.00	28	7625
8	1	986		1	134	968	38.1	Subgrade	0.35	8.00	28	7625
9	1	995		1	143	977	38.5	Subgrade	0.35	9.00	25	7283
10	1	1000		1	148	984	38.7	Subgrade	0.35	5.00	48	9159
11	1	1010		1	158	991	39.0	Subgrade	0.35	10.00	22	6990
12	1	1015		1	163	999	39.3	Subgrade	0.35	5.00	48	9159
13	1	1025		1	173	1006	39.6	Subgrade	0.35	10.00	22	6990
14	1	1030		1	178	1014	39.9	Subgrade	0.35	5.00	48	9159
15	1	1040		1	188	1021	40.2	Subgrade	0.35	10.00	22	6990
16	1	1045		1	193	1029	40.5	Subgrade	0.35	5.00	48	9159
17	1	1050		1	198	1034	40.7	Subgrade	0.35	5.00	48	9159
18	1	1060		1	208	1041	41.0	Subgrade	0.35	10.00	22	6990
19	1	1070		1	218	1051	41.4	Subgrade	0.35	10.00	22	6990
20	1	1075		1	223	1059	41.7	Subgrade	0.35	5.00	48	9159
21	1	1080		1	228	1064	41.9	Subgrade	0.35	5.00	48	9159
22	1	1090		1	238	1071	42.2	Subgrade	0.35	10.00	22	6990
23	1	1095		1	243	1079	42.5	Subgrade	0.35	5.00	48	9159
24	1	1100		1	248	1084	42.7	Subgrade	0.35	5.00	48	9159
25	1	1105		1	253	1089	42.9	Subgrade	0.35	5.00	48	9159
26	1	1110		1	258	1094	43.1	Subgrade	0.35	5.00	48	9159
27	1	1115		1	263	1099	43.3	Subgrade	0.35	5.00	48	9159
28	1	1125		1	273	1106	43.6	Subgrade	0.35	10.00	22	6990
29	1	1130		1	278	1114	43.8	Subgrade	0.35	5.00	48	9159
30	1	1140		1	288	1121	44.1	Subgrade	0.35	10.00	22	6990
31												



Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 7753

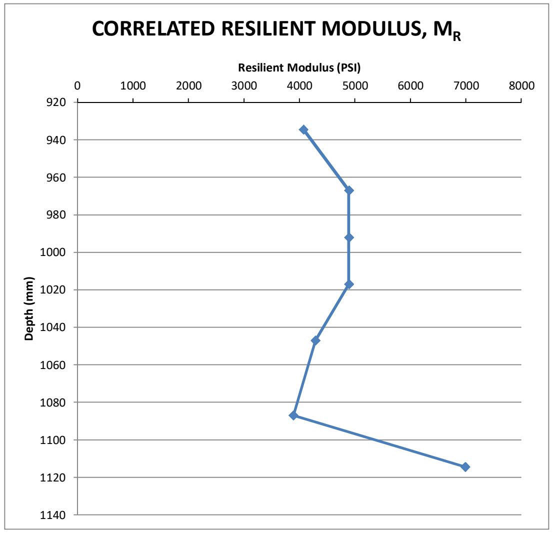
Project:	Classic Street Improvements
Project Number:	G2406158
Date:	7/8/2024
Exploration Name:	B-4

Type of Pavement:	AC	**C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)**
Thickness of Pavement:	2	**inches**
Thickness of Base Rock:	34	**inches**
Seating Depth:	36	**(inches from ground surface to bottom of excavation)**
Initial DCP reading:	935	**mm**

Table 2 - C_f for DCP and FWD to

Layer Type & Location	**C_f**
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	975	A	1	40	934	36.8	Subgrade	0.35	40.00	5	4071
2	1	1000		1	65	967	38.1	Subgrade	0.35	25.00	8	4890
3	1	1025		1	90	992	39.1	Subgrade	0.35	25.00	8	4890
4	1	1050		1	115	1017	40.0	Subgrade	0.35	25.00	8	4890
5	1	1085		1	150	1047	41.2	Subgrade	0.35	35.00	5	4288
6	1	1130		1	195	1087	42.8	Subgrade	0.35	45.00	4	3888
7	1	1140		1	205	1114	43.9	Subgrade	0.35	10.00	22	6990
8												
9												
10												
11												
12												
13												
14												
15												
16												



Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 4844

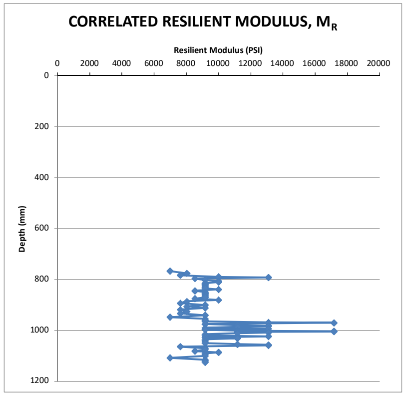
Project:	Classic Street Improvements
Project Number:	G2406158
Date:	7/8/2024
Exploration Name:	B-5

Type of Pavement:	AC	C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)
Thickness of Pavement:	2	inches
Thickness of Base Rock:	28	inches
Seating Depth:	30	(inches from ground surface to bottom of excavation)
Initial DCP reading:	775	mm

Table 2 - C_f for DCP and FWD to Convert

Layer Type & Location	C_f
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	785	A	1	10	767	30.2	Subgrade	0.35	10.00	22	6990
2	1	792		1	17	776	30.5	Subgrade	0.35	7.00	33	8033
3	1	800		1	25	783	30.8	Subgrade	0.35	8.00	28	7625
4	1	804		1	29	789	31.1	Subgrade	0.35	4.00	62	9992
5	1	806		1	31	792	31.2	Subgrade	0.35	2.00	134	13094
6	1	812		1	37	796	31.3	Subgrade	0.35	6.00	39	8531
7	1	817		1	42	802	31.6	Subgrade	0.35	5.00	48	9159
8	1	821		1	46	806	31.7	Subgrade	0.35	4.00	62	9992
9	1	825		1	50	810	31.9	Subgrade	0.35	4.00	62	9992
10	1	830		1	55	815	32.1	Subgrade	0.35	5.00	48	9159
11	1	835		1	60	820	32.3	Subgrade	0.35	5.00	48	9159
12	1	840		1	65	825	32.5	Subgrade	0.35	5.00	48	9159
13	1	845		1	70	830	32.7	Subgrade	0.35	5.00	48	9159
14	1	850		1	75	835	32.9	Subgrade	0.35	5.00	48	9159
15	1	854		1	79	839	33.0	Subgrade	0.35	4.00	62	9992
16	1	860		1	85	844	33.2	Subgrade	0.35	6.00	39	8531
17	1	865		1	90	850	33.4	Subgrade	0.35	5.00	48	9159
18	1	870		1	95	855	33.6	Subgrade	0.35	5.00	48	9159
19	1	875		1	100	860	33.8	Subgrade	0.35	5.00	48	9159
20	1	880		1	105	865	34.0	Subgrade	0.35	5.00	48	9159
21	1	885		1	110	870	34.2	Subgrade	0.35	5.00	48	9159
22	1	891		1	116	875	34.4	Subgrade	0.35	6.00	39	8531
23	1	895		1	120	880	34.6	Subgrade	0.35	4.00	62	9992
24	1	902		1	127	886	34.9	Subgrade	0.35	7.00	33	8033
25	1	910		1	135	893	35.2	Subgrade	0.35	8.00	28	7625
26	1	915		1	140	900	35.4	Subgrade	0.35	5.00	48	9159
27	1	922		1	147	906	35.6	Subgrade	0.35	7.00	33	8033
28	1	927		1	152	912	35.9	Subgrade	0.35	5.00	48	9159
29	1	935		1	160	918	36.1	Subgrade	0.35	8.00	28	7625
30	1	942		1	167	926	36.4	Subgrade	0.35	7.00	33	8033
31	1	950		1	175	933	36.7	Subgrade	0.35	8.00	28	7625
32	1	955		1	180	940	37.0	Subgrade	0.35	5.00	48	9159
33	1	965		1	190	947	37.3	Subgrade	0.35	10.00	22	6990
34	1	970		1	195	955	37.6	Subgrade	0.35	5.00	48	9159
35	1	975		1	200	960	37.8	Subgrade	0.35	5.00	48	9159
36	1	980		1	205	965	38.0	Subgrade	0.35	5.00	48	9159
37	1	982		1	207	968	38.1	Subgrade	0.35	2.00	134	13094
38	1	983		1	208	970	38.2	Subgrade	0.35	1.00	292	17158
39	1	985		1	210	971	38.2	Subgrade	0.35	2.00	134	13094
40	1	990		1	215	975	38.4	Subgrade	0.35	5.00	48	9159
41	1	993		1	218	979	38.5	Subgrade	0.35	3.00	85	11179
42	1	995		1	220	981	38.6	Subgrade	0.35	2.00	134	13094
43	1	997		1	222	983	38.7	Subgrade	0.35	2.00	134	13094
44	1	1000		1	225	986	38.8	Subgrade	0.35	3.00	85	11179
45	1	1005		1	230	990	39.0	Subgrade	0.35	5.00	48	9159
46	1	1007		1	232	993	39.1	Subgrade	0.35	2.00	134	13094
47	1	1012		1	237	997	39.2	Subgrade	0.35	5.00	48	9159
48	1	1015		1	240	1001	39.4	Subgrade	0.35	3.00	85	11179
49	1	1016		1	241	1003	39.5	Subgrade	0.35	1.00	292	17158
50	1	1017		1	242	1004	39.5	Subgrade	0.35	1.00	292	17158
51	1	1020		1	245	1006	39.6	Subgrade	0.35	3.00	85	11179
52	1	1022		1	247	1008	39.7	Subgrade	0.35	2.00	134	13094
53	1	1025		1	250	1011	39.8	Subgrade	0.35	3.00	85	11179
54	1	1030		1	255	1015	39.9	Subgrade	0.35	5.00	48	9159
55	1	1035		1	260	1020	40.1	Subgrade	0.35	5.00	48	9159
56	1	1037		1	262	1023	40.3	Subgrade	0.35	2.00	134	13094
57	1	1042		1	267	1027	40.4	Subgrade	0.35	5.00	48	9159
58	1	1045		1	270	1031	40.6	Subgrade	0.35	3.00	85	11179
59	1	1050		1	275	1035	40.7	Subgrade	0.35	5.00	48	9159
60	1	1055		1	280	1040	40.9	Subgrade	0.35	5.00	48	9159
61	1	1060		1	285	1045	41.1	Subgrade	0.35	5.00	48	9159
62	1	1065		1	290	1050	41.3	Subgrade	0.35	5.00	48	9159
63	1	1068		1	293	1054	41.5	Subgrade	0.35	3.00	85	11179
64	1	1070		1	295	1056	41.6	Subgrade	0.35	2.00	134	13094
65	1	1072		1	297	1058	41.7	Subgrade	0.35	2.00	134	13094
66	1	1080		1	305	1063	41.9	Subgrade	0.35	8.00	28	7625
67	1	1085		1	310	1070	42.1	Subgrade	0.35	5.00	48	9159
68	1	1090		1	315	1075	42.3	Subgrade	0.35	5.00	48	9159
69	1	1096		1	321	1080	42.5	Subgrade	0.35	6.00	39	8531
70	1	1100		1	325	1085	42.7	Subgrade	0.35	4.00	62	9992
71	1	1105		1	330	1090	42.9	Subgrade	0.35	5.00	48	9159
72	1	1110		1	335	1095	43.1	Subgrade	0.35	5.00	48	9159
73	1	1115		1	340	1100	43.3	Subgrade	0.35	5.00	48	9159
74	1	1125		1	350	1107	43.6	Subgrade	0.35	10.00	22	6990
75	1	1130		1	355	1115	43.9	Subgrade	0.35	5.00	48	9159
76	1	1135		1	360	1120	44.1	Subgrade	0.35	5.00	48	9159
77	1	1140		1	365	1125	44.3	Subgrade	0.35	5.00	48	9159
78												



Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 10103

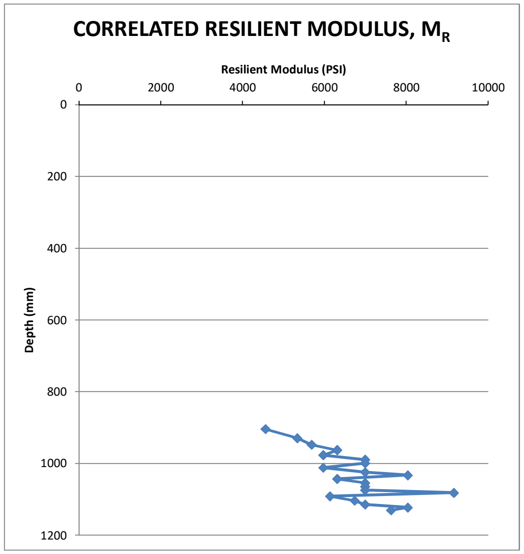
Project:	Classic Street Improvements
Project Number:	G2406158
Date:	7/8/2024
Exploration Name:	B-6

Type of Pavement:	AC	**C/AC/N (C = Portland Cement Concrete, AC = Asphaltic Concrete, N = None)**
Thickness of Pavement:	3	**inches**
Thickness of Base Rock:	32	**inches**
Seating Depth:	35	**(inches from ground surface to bottom of excavation)**
Initial DCP reading:	895	**mm**

Table 2 - C_f for DCP and FWD to Convert

Layer Type & Location	C_f
Subgrade Below AC & Aggregate Base	0.35
Aggregate Base or Subbase Below AC	0.62
Subgrade Below PCC or CTB	0.25
Aggregate Base or Subbase Below PCC	0.62
None (no pavement)	0.33

Reading No.	No. of Blows	Depth Reading (mm)	Type of Hammer A=17.6 lb hammer B=10.1 lb hammer (only need to note change in hammer)	Hammer Blow Index	Accumulative Penetration (mm)	Middle of interval (mm)	Middle of interval (inches)	Material Type	Material Type Coefficient C_f	DCP Index mm/blow	CBR (correlation from user manual) %	Subgrade Modulus (Pg. 21 ODOT Pavement Design Guide) psf
1	1	925	A	1	30	904	35.6	Subgrade	0.35	30.00	6	4554
2	1	945		1	50	929	36.6	Subgrade	0.35	20.00	10	5334
3	1	962		1	67	948	37.3	Subgrade	0.35	17.00	12	5683
4	1	975		1	80	963	37.9	Subgrade	0.35	13.00	17	6310
5	1	990		1	95	977	38.4	Subgrade	0.35	15.00	14	5967
6	1	1000		1	105	989	38.9	Subgrade	0.35	10.00	22	6990
7	1	1010		1	115	999	39.3	Subgrade	0.35	10.00	22	6990
8	1	1025		1	130	1012	39.8	Subgrade	0.35	15.00	14	5967
9	1	1035		1	140	1024	40.3	Subgrade	0.35	10.00	22	6990
10	1	1042		1	147	1033	40.6	Subgrade	0.35	7.00	33	8033
11	1	1055		1	160	1043	41.0	Subgrade	0.35	13.00	17	6310
12	1	1065		1	170	1054	41.5	Subgrade	0.35	10.00	22	6990
13	1	1075		1	180	1064	41.9	Subgrade	0.35	10.00	22	6990
14	1	1085		1	190	1074	42.3	Subgrade	0.35	10.00	22	6990
15	1	1090		1	195	1082	42.6	Subgrade	0.35	5.00	48	9159
16	1	1104		1	209	1091	43.0	Subgrade	0.35	14.00	15	6130
17	1	1115		1	220	1104	43.4	Subgrade	0.35	11.00	20	6735
18	1	1125		1	230	1114	43.9	Subgrade	0.35	10.00	22	6990
19	1	1132		1	237	1123	44.2	Subgrade	0.35	7.00	33	8033
20	1	1140		1	245	1130	44.5	Subgrade	0.35	8.00	28	7625
21												



CORRELATED RESILIENT MODULUS, M_R

Mr (average) within upper 300 mm (12 inches) of subgrade (psi) = 6595

Appendix C: Pavement Structural Capacity Evaluation

Classic Street Improvements
Classic Street
Manzanita, Oregon

CGT Project Number G2406158

August 16, 2024

Prepared For:

City of Manzanita
Dan Weitzel, Public Works Director
1090 Oak Street
Manzanita, Oregon 97130

Prepared by
Carlson Geotechnical

C.1.0 BACKGROUND

In order to evaluate the existing pavement within the subject portion[1] of Classic Street[2], and determine if structural enhancements were required to help maintain a minimum level of serviceability[3] for a design period of 20 years[4], a structural capacity evaluation was performed. We performed the structural capacity evaluation based on visual survey and materials investigation/testing in general accordance with Sections 5.3 and 5.4 of the AASHTO Guide for Design of Pavement Structures, 1993 (AASHTO). The following sections summarize the results of the visual condition survey, the results of our structural capacity analyses, and conclusions for the pavement structure.

C.2.0 PAVEMENT MATERIALS INVESTIGATION

As indicated in the geotechnical report, CGT advanced six drilled borings (B-1 through B-6) and six dynamic cone penetrometer (DCP) tests along the subject road segment. The results of our completed field investigation are briefly summarized in the following table.

Table C1 Pavement Material Thicknesses at Core Locations

Exploration	Location	Pavement Material Thickness (inches)		Correlated Subgrade Resilient Modulus (psi)[1]
		Asphalt Concrete	Aggregate Base	
B-1	See Figure 2	2	21	10854
B-2	See Figure 2	2	16	9399
B-3	See Figure 2	2	24	7753
B-4	See Figure 2	2	34	4844
B-5	See Figure 2	2	28	10103
B-6	See Figure 2	3	35	6595

[1]Average value within upper 1-foot of subgrade based on DCP testing in August 2024.

C.3.0 VISUAL CONDITION SURVEY

C.3.1 Overview

CGT engineering staff observed surface conditions of the asphalt concrete (AC) pavement within Classic Street on June 25, 2024. The purpose of the visit was to identify the type, frequency, severity, and location of any observed surface distress in the existing pavement in accordance with AASHTO procedures and the 2022 Oregon Department of Transportation Distress Survey Manual (ODOT DSM).

The following table presents a checklist of typical surface distress in flexible (asphalt) pavement. This table also includes our observations of the presence (or lack thereof) of the surface distress within the road.

---

[1] This evaluation covers Classic Street, between Dorcas Lane and Necarney City Road.

[2] Classic Street is a Minor Collector per input form the City of Manzanita.

[3] Terminal serviceability assigned as 2.5 in accordance with the 2019 Oregon Department of Transportation (ODOT) pavement design manual.

[4] Assumed design period for the structural capacity analysis. *If an alternative design period is warranted, please contact us.*

Table C2 Pavement Distress Type & Those Observed at Site

Distress Type	Typical Cause(s)	Observed at Site?
Rutting in the wheel paths	Ruts typically develop from consolidation or lateral movement under traffic.	None of significance observed
Fatigue (alligator) cracking	Typically caused by excessive deflection of the surface over unstable subgrade or lower courses of pavement. The unstable support usually is the result of saturated granular base or subgrade.	Yes, see discussion below
Longitudinal/transverse cracking	Typically due to poorly constructed paving joints, shrinkage of asphalt layer, daily temperature cycling, etc.	Yes, see discussion below
Patching	Typically used where the original pavement surface is removed and replaced, or additional material is applied to the pavement surface after original construction.	Yes, see discussion below
Disintegration (potholes)	Typically caused by weakness in the pavement resulting from insufficient asphalt, failure of base, and/or poor drainage.	None observed
Disintegration (raveling)	Typically caused by lack of compaction and/or improper mix proportions.	None observed
Localized Subsidence	Typically caused by poor quality subgrade materials susceptible to consolidation	Yes, see discussion below
Edge cracking	Typically due to lack of lateral (shoulder) support. Another cause of edge cracking can be settlement or yielding of subgrade or granular base.	Yes, see discussion below
Edge joint (seam) “cracking”	Typically due to poor drainage due to a shoulder being higher than the main pavement.	None observed
Corrugations (washboarding)	This form of distress typically occurs in asphalt layers that lack stability due to less than favorable mix proportions.	None observed
Upheaval	Typically caused by expansive soils and/or tree roots.	None observed

C.3.2 Fatigue Cracking

We observed fatigue (alligator) cracking within a few localized areas within the subject street. The cracks were generally ¼- to ½-inch in width and exhibited low spalling. The degree of fatigue cracking was characterized as “low to moderate” in accordance with guidelines presented in the ODOT DSM. Examples of fatigue cracking are shown on Photographs 5, 6, 11, 12, 14, and 25 on the attached Figure C2.

C.3.3 Longitudinal & Transverse Cracking

We observed longitudinal and transverse cracking within the subject street. The longitudinal cracks were generally ¼ to ½ inch in width and observed mostly along the pavement centerline (and interpreted to be attributed to asphalt shrinkage along a paving joint). The degree of longitudinal cracking was characterized as “low to moderate” in accordance with guidelines presented in the ODOT DSM. Examples of longitudinal and transverse cracks are shown on Photographs 2, 11, 18 through 23, and 29 on the attached Figure C2.

C.3.4 Patching

We observed a total of four patches within the subject street. The patches were relatively small in terms of footprint and along the edges of the street. The degree of patching was characterized as “low severity” in accordance with guidelines presented in the ODOT DSM. The patches are shown on Photographs 13 and 28 on the attached Figure C2.

C.3.5 Localized Subsidence

We observed localized subsidence (localized slumps) within three areas along the west margin of the subject street. These areas are approximated on the Site Plan (Figure 2) attached to the main body of the geotechnical report. The areas exhibiting subsidence are shown on Photographs 2, 3, 4, 6, 7, 9, 10, and 25 on the attached Figure C2. As shown therein, the east margin of each area exhibited distress (in the form of fatigue/linear cracking). Each area was relatively close to a descending slope. Additional discussion of these areas and recommendations for repairs are presented in the main body of this report.

C.3.6 Edge Cracking

We observed edge cracking at one location within the west side of the subject street (just north of one of the areas exhibiting subsidence described in the preceding section). The edge cracking is shown on Photograph 8 on the attached Figure C2.

C.4.0 STRUCTURAL CAPACITY ANALYSES

C.4.1 Methodology

We evaluated the structural capacity of the existing pavement structure using the results of the pavement materials investigation and visual condition survey in general accordance with Section 5.4.5 of AASHTO. The purpose of this evaluation was to determine whether structural enhancement (such as an overlay) was required to help manage anticipated design vehicular traffic. The methodology presented by AASHTO incorporates the use of structural numbers (SN) as follows:

- SN_{eff} = Effective structural number of the existing pavement structure, determined from the visual condition survey and investigation of the existing pavement.
- SN_f = Required structural number for future traffic.
- SN_{ol} = Required additional AC pavement thickness structural number. This value is equal to SN_f - SN_{eff}. The methodology indicates that, in the event that SN_{eff} is greater than S_f, and no functional deficiencies are observed in the existing pavement, an overlay is not required. Similarly, in the event that SN_{eff} is less than SN_f, additional AC pavement thickness is required to maintain the desired level of serviceability over the indicated design period.

C.4.2 Design Input Parameters

For the purposes of calculating the structural numbers, a number of parameters were estimated based on the results of the visual survey and pavement investigation. In addition, input parameters related to future traffic and level of serviceability were estimated based on guidelines presented by AASHTO and within the ODOT Pavement Design Guide (ODOT PDG)[5] and the Asphalt Pavement Association of Oregon (APAO)[6] manual. The parameters used in the evaluation are shown in the following table and are discussed in narrative thereafter.

---

[5] Oregon Department of Transportation (ODOT) Pavement Design Guide, January 2019.

[6] Asphalt Pavement Association of Oregon (APAO) Asphalt Pavement Design Guide, Revised October 2003.

Table C3 Design Input Parameters

Structural Number	Required Input Parameter	Value Used in Evaluation
SN_{eff}	a_1 = Structural layer coefficient, AC layer	0.35
	a_2 = Structural layer coefficient, base layer	0.10
	a_3 = Structural layer coefficient, subbase layer	---
	D_1 = Thickness of existing pavement, surface layer[1]	2 inches
	D_2 = Thickness of existing pavement, base layer[1]	16 inches
	D_3 = Thickness of existing pavement, subbase layer	---
	M_2 = Drainage coefficient for granular base	1.0
	M_3 = Drainage coefficient for granular subbase	---
SN_f	N_f = Design period	20 years
	$ESAL_f$ = Design 18-kip ESAL over design period[2]	100,000
	M_R = Design resilient modulus[3]	8,200 psi
	Design Serviceability (PSI) Loss (Initial = 4.2, Terminal = 2.5)	1.7
	R = Design Reliability	85 percent
	S_o = Design Standard Deviation	0.49

[1] Value based on typical AC thickness observed in boring B-2 (representing the thinnest pavement section identified during drilling).
[2] Value selected based on street classification (Minor Collector) per APAO manual. Additional discussion presented below.
[3] Value selected based on results of DCP testing (average value used for design purposes).

The following summarizes additional comments on the values presented in Table C3:

- Layer coefficients (a_1, a_2, and a_3) were determined based on results of visual condition survey discussed in Section C.3 above and Table 5.2 of AASHTO.
- Layer thicknesses (D_1, D_2, and D_3) were based on results of our pavement materials investigation.
- A design period of 20 years was assigned for the subject street in accordance with current standard of practice for new construction.
- The design 18-kip equivalent single axle load (ESAL) was assigned based on Table 3.1 of the APAO manual considering a “Level III (Moderate)” traffic classification. This value is at the upper limit of the anticipated traffic demand. The APAO manual includes “Urban Minor Collectors” under Level III traffic classification. *Detailed traffic loading information was not provided for our review*. *If an increased traffic load is estimated, please contact us so that we may refine the traffic loading and revise our recommendations, if warranted.*
- The value used for drainage coefficients (m_n) was selected in accordance with Table 2.4 of the referenced AASHTO manual, based on “good” drainage characteristics of the base and subgrade materials. This quality of drainage was selected based on the unsaturated nature of the pavement materials during our investigation in August 2024.
- The value used for design reliability (R) and standard deviation (S_o) was selected in accordance with Table 11 and Section 5.3.3, respectively, of the referenced ODOT design manual.

C.4.3 Results of Analyses

Using the above inputs and procedures presented by AASHTO, we calculated the structural numbers for the subject street. The following table summarizes the results of our analyses:

Table C4 Calculated Structural Numbers for Classic Street

Area of Interest	Calculated Structural Number		
	SN_{eff}	SN_f	SN_{ol}
Classic Street, between Dorcas Lane and Necarney City Road	2.3	2.35	0.05

C.5.0 REVIEW & DISCUSSION

As indicated above, we completed a structural capacity evaluation of the subject portion of the roadway (Classic Street) to determine whether structural enhancement (such as an overlay) was required to accommodate design vehicular traffic when considering the 20-year design period. Our analyses indicated that, for the modeled design ESAL, the effective structural number (SN_{eff}) for the existing pavement is slightly below the required future structural number (SN_f). Accordingly, structural enhancement is required to accommodate the indicated vehicular traffic and maintain the desired level of serviceability.

Within the context of this assignment, it is our opinion that improvement to the pavement structure within the existing roadway is warranted to support the indicated vehicular traffic over the design period of 20 years. Recommendations for roadway improvements are presented in the main body of the geotechnical report.

CLASSIC STREET IMPROVEMENTS - MANZANITA, OREGON
Project Number G2406158

FIGURE C1

Site Plan

LEGEND

◁1 Orientation of site photographs shown on Figure C2

CARLSON
CGT
GEOTECHNICAL
503-601-8250

Drafted by: EEH/bmw

NOTES: Drawing based on observations made while on site. 2023 aerial image from ArcGIS (www.arcgis.com). All photograph locations are approximate.

1 Inch = 250 Feet

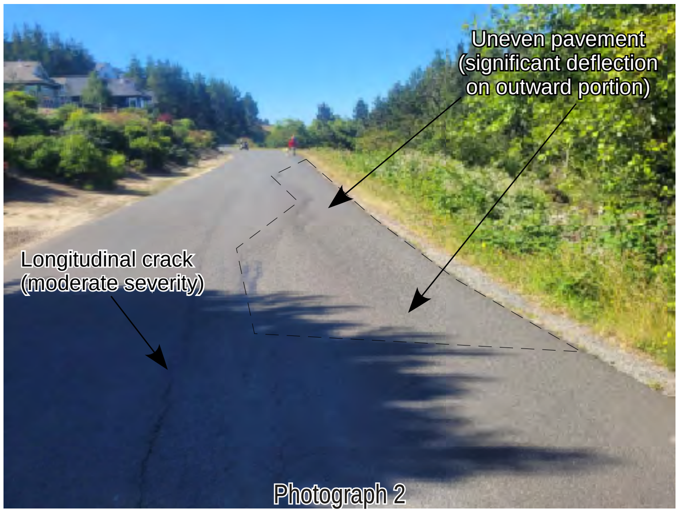
0 250 500

CLASSIC STREET IMPROVEMENTS - MANZANITA, OREGON
Project Number G2406158

FIGURE C2

Site Photographs


Photograph 1

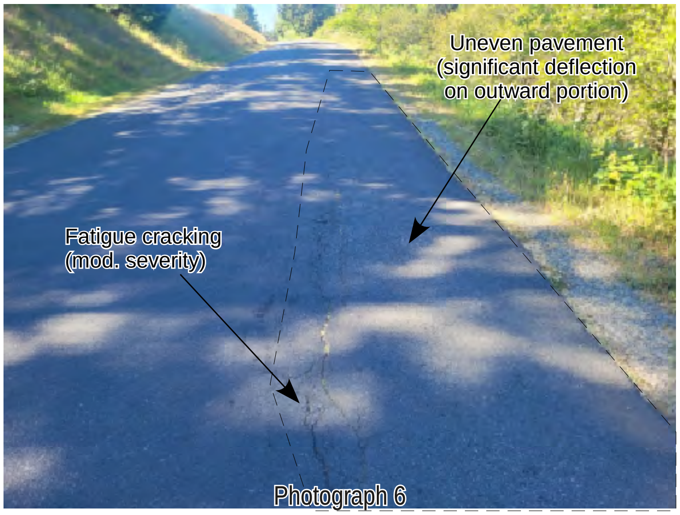


Photograph 2

Photograph 3

Photograph 4

Photograph 5



Photograph 6

CARLSON CGT GEOTECHNICAL
503-601-8250
Drafted by: BMW

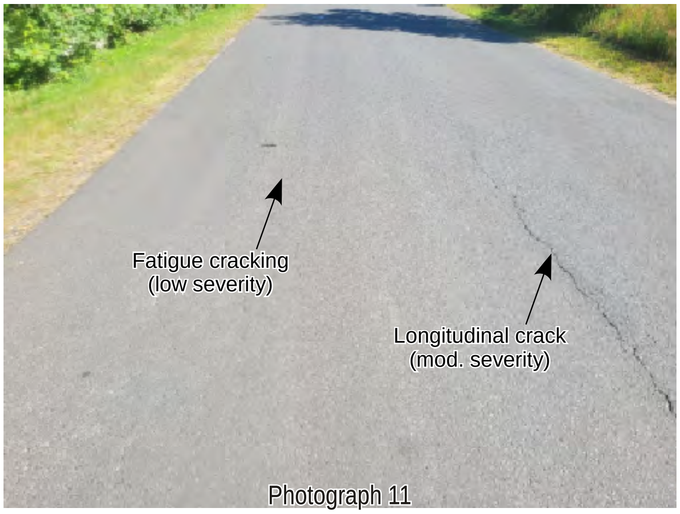
Photographs were taken at the time of our fieldwork on June 25, 2024.

Photograph 7

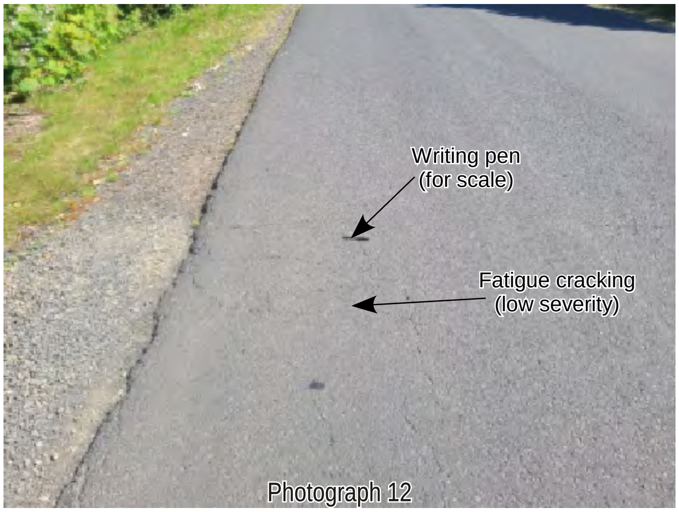
Photograph 8

Photograph 9

Photograph 10

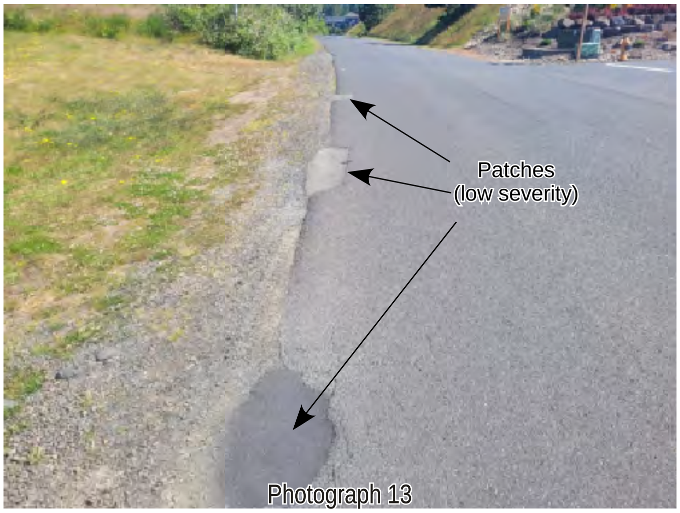


Photograph 11

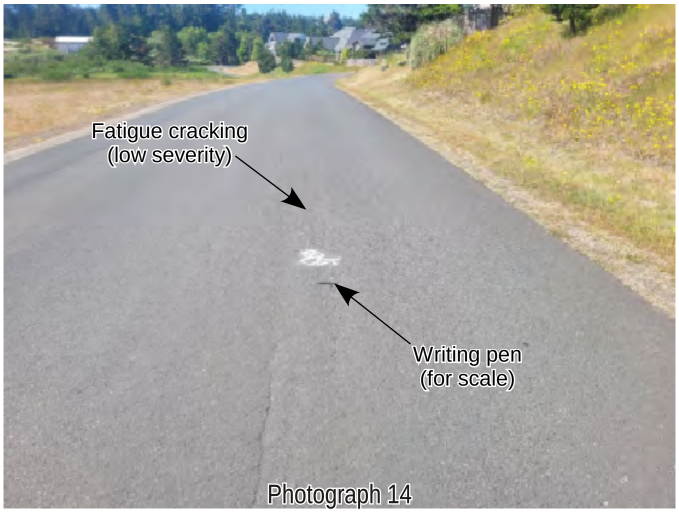


Photograph 12

Photographs were taken at the time of our fieldwork on June 25, 2024.



Photograph 13



Photograph 14

Photograph 15

Photograph 16

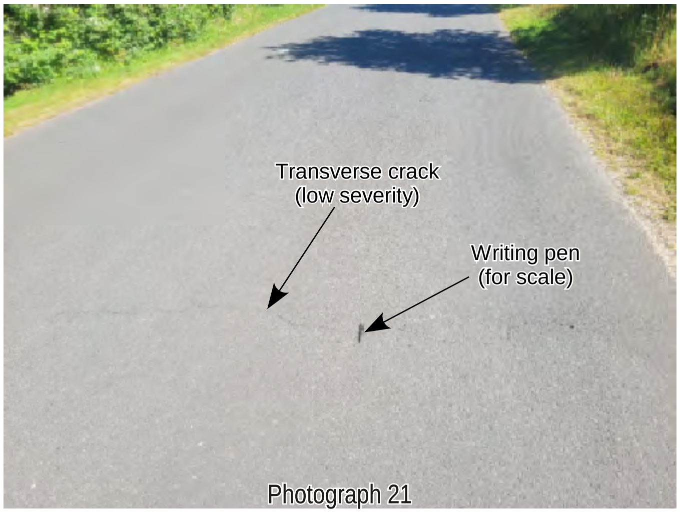
Photograph 17

Photograph 18

Photographs were taken at the time of our fieldwork on June 25, 2024.

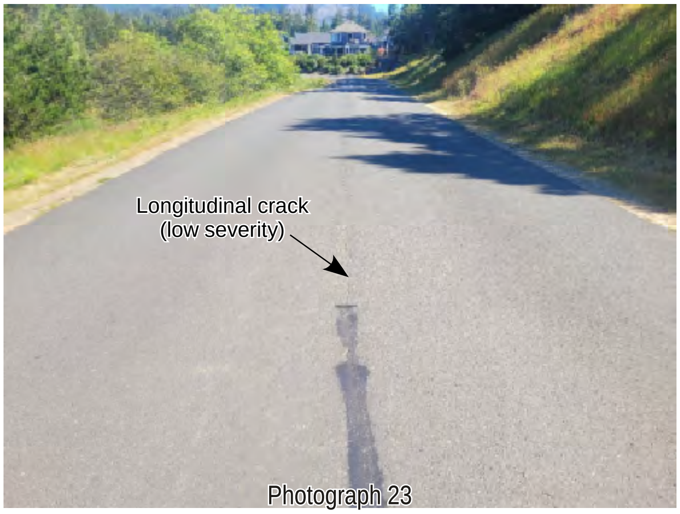
Photograph 19

Photograph 20



Photograph 21

Photograph 22



Photograph 23

Photograph 24

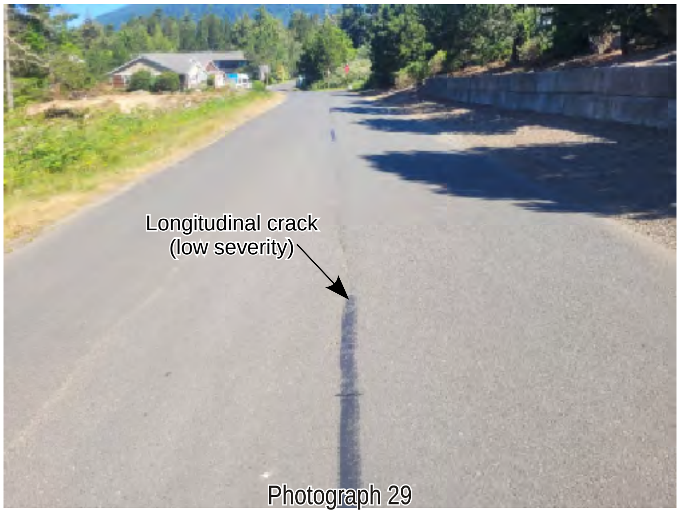
Photographs were taken at the time of our fieldwork on June 25, 2024.

Photograph 25

Photograph 26

Photograph 27

Photograph 28



Photograph 29

Photograph 30

Photographs were taken at the time of our fieldwork on June 25, 2024.

Pacific Northwest Power

Today's Challenge of Maintaining Affordable and Reliable Electric Service

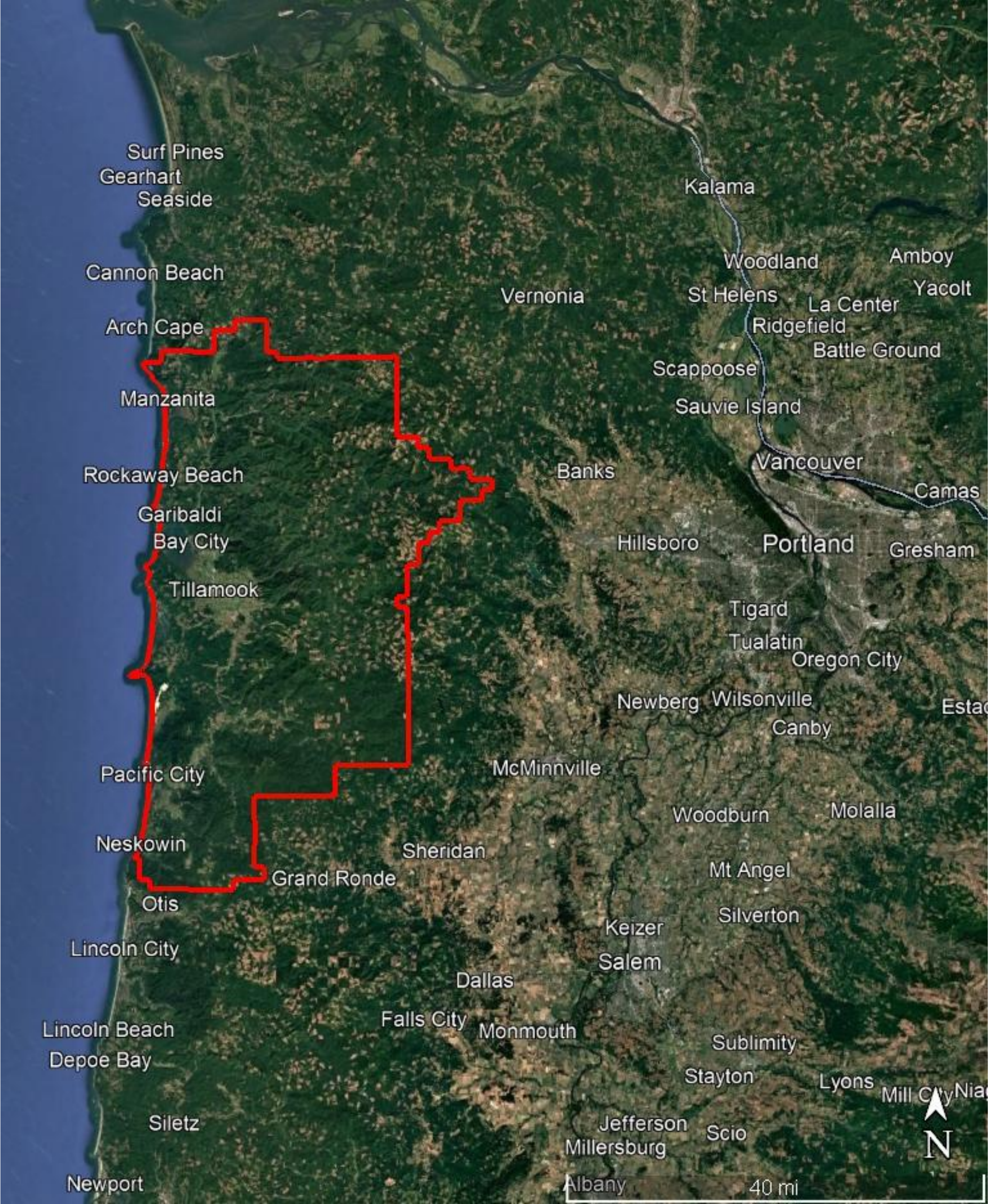
---

Todd Simmons, General Manager, Tillamook PUD

Manzanita City Council Meeting

February 5, 2025

About Tillamook PUD



HISTORY

- Established by vote of the people in 1933.
- Bought Mountain States Power in 1941.
- Bought Pacific Power & Light infrastructure in 1961.
- Bonneville Power Administration preference power customer.

SERVICE TERRITORY

- 1,125 square miles, covering Tillamook County, and small portions of Clatsop and Yamhill counties.

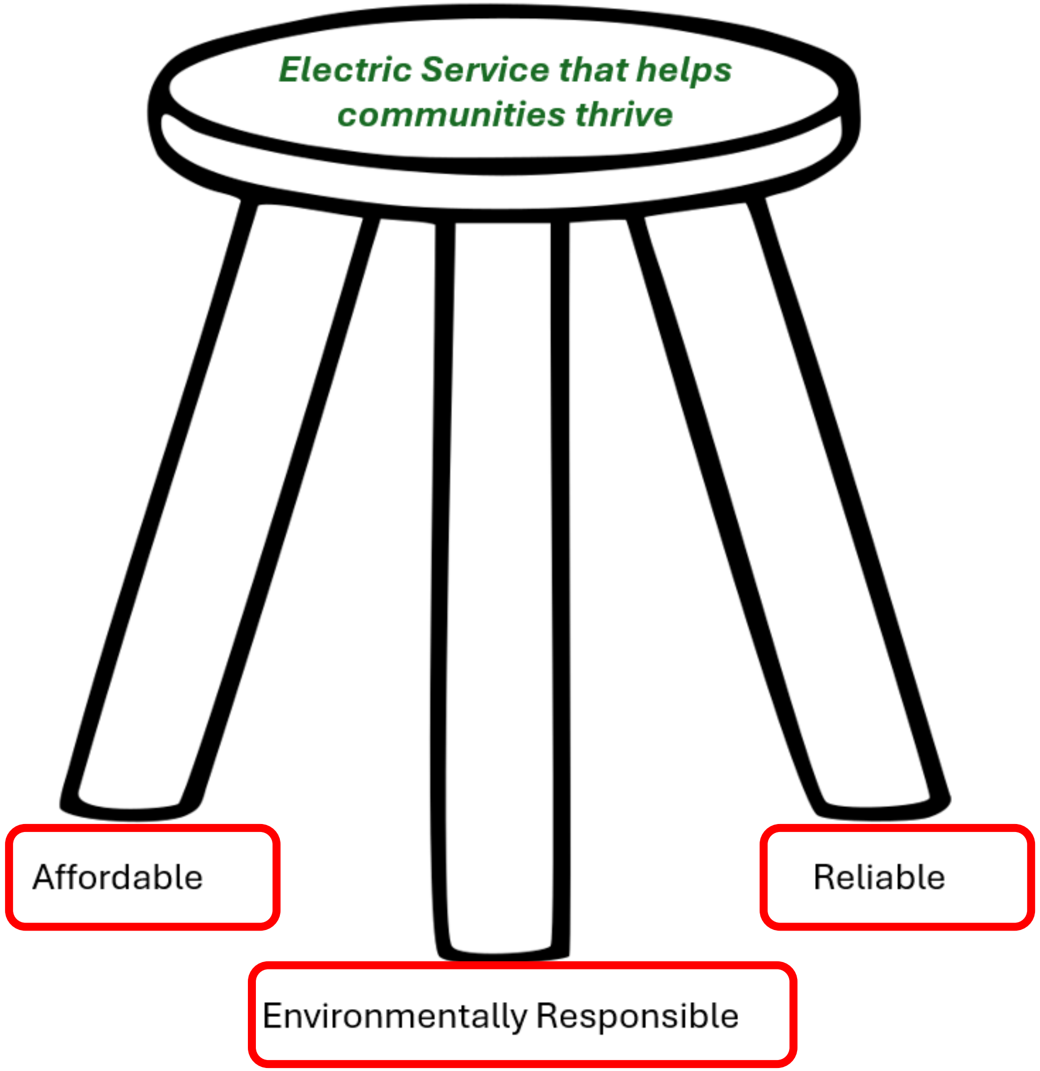
CUSTOMERS

- Over 23,000 Customers.
    - Residential 89% of customers, kWh usage 56.5%
    - Commercial 10.3% of customers, kWh usage 26.5%
    - Industrial .1%, kWh usage 19.7 %
    - Lighting & Fixed Rates - .6%, kWh usage .6%

EMPLOYEES & BOARD

- 86 Employees.
- Governed by a five member elected Board of Directors.

Our Balancing Act



Electric Service that helps communities thrive

Affordable

Reliable

Environmentally Responsible

Mission

Through collaboration and operational excellence, Tillamook PUD provides safe, reliable, sustainable, and competitively priced power to our customers.

Vision

Tillamook PUD provides high value to our customers, staff, and community, performing now and preparing for the future. We balance community, economic, and environmental commitments.

The Region’s Track Record

- Historically, the Northwest has led the way on each of these fronts.

2021

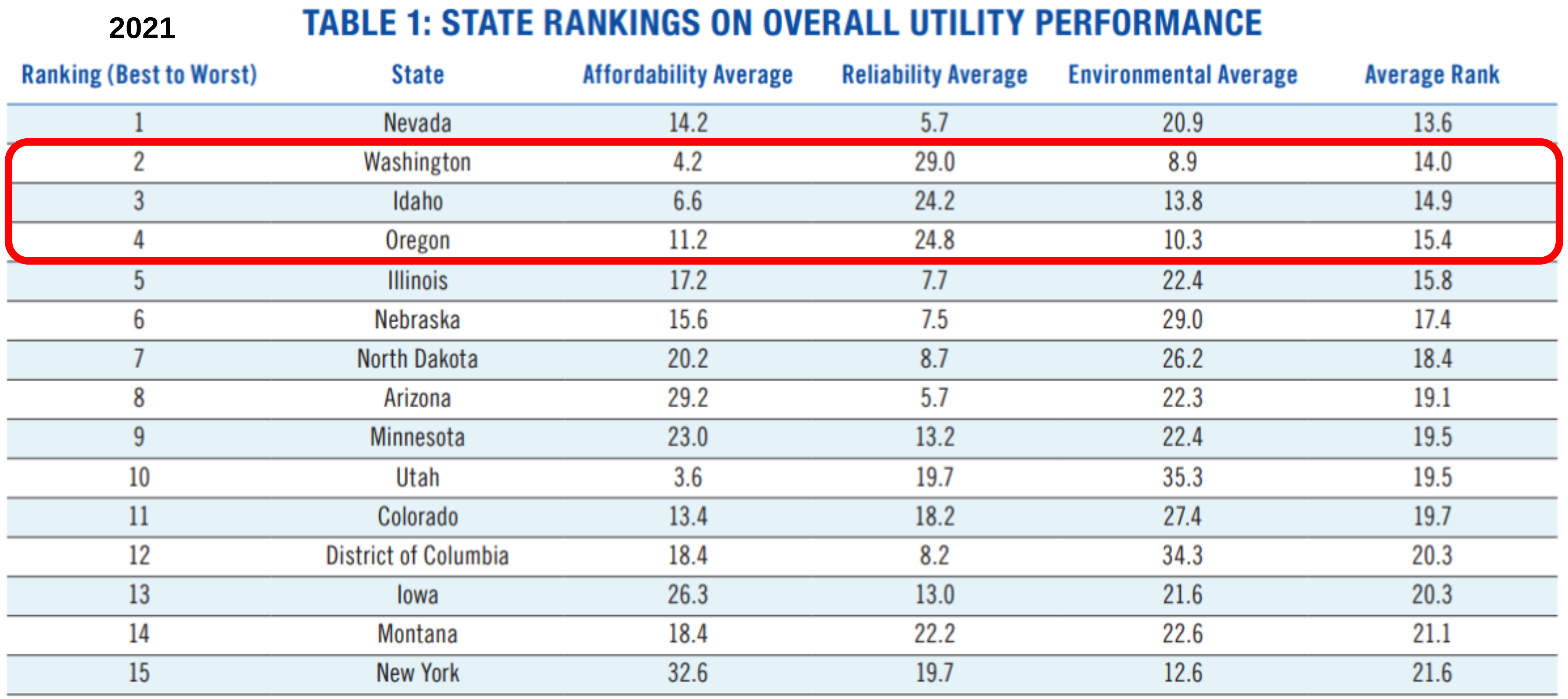


TABLE 1: STATE RANKINGS ON OVERALL UTILITY PERFORMANCE

Ranking (Best to Worst)	State	Affordability Average	Reliability Average	Environmental Average	Average Rank
1	Nevada	14.2	5.7	20.9	13.6
2	Washington	4.2	29.0	8.9	14.0
3	Idaho	6.6	24.2	13.8	14.9
4	Oregon	11.2	24.8	10.3	15.4
5	Illinois	17.2	7.7	22.4	15.8
6	Nebraska	15.6	7.5	29.0	17.4
7	North Dakota	20.2	8.7	26.2	18.4
8	Arizona	29.2	5.7	22.3	19.1
9	Minnesota	23.0	13.2	22.4	19.5
10	Utah	3.6	19.7	35.3	19.5
11	Colorado	13.4	18.2	27.4	19.7
12	District of Columbia	18.4	8.2	34.3	20.3
13	Iowa	26.3	13.0	21.6	20.3
14	Montana	18.4	22.2	22.6	21.1
15	New York	32.6	19.7	12.6	21.6

Source: Electric Utility Performance: A STATE-BY-STATE DATA REVIEW (published by the Citizens Utility Board of Illinois).

https://www.citizensutilityboard.org/wp-content/uploads/2021/07/Electric-Utility-Performance-A-State-By-State-Data-Review_final.pdf

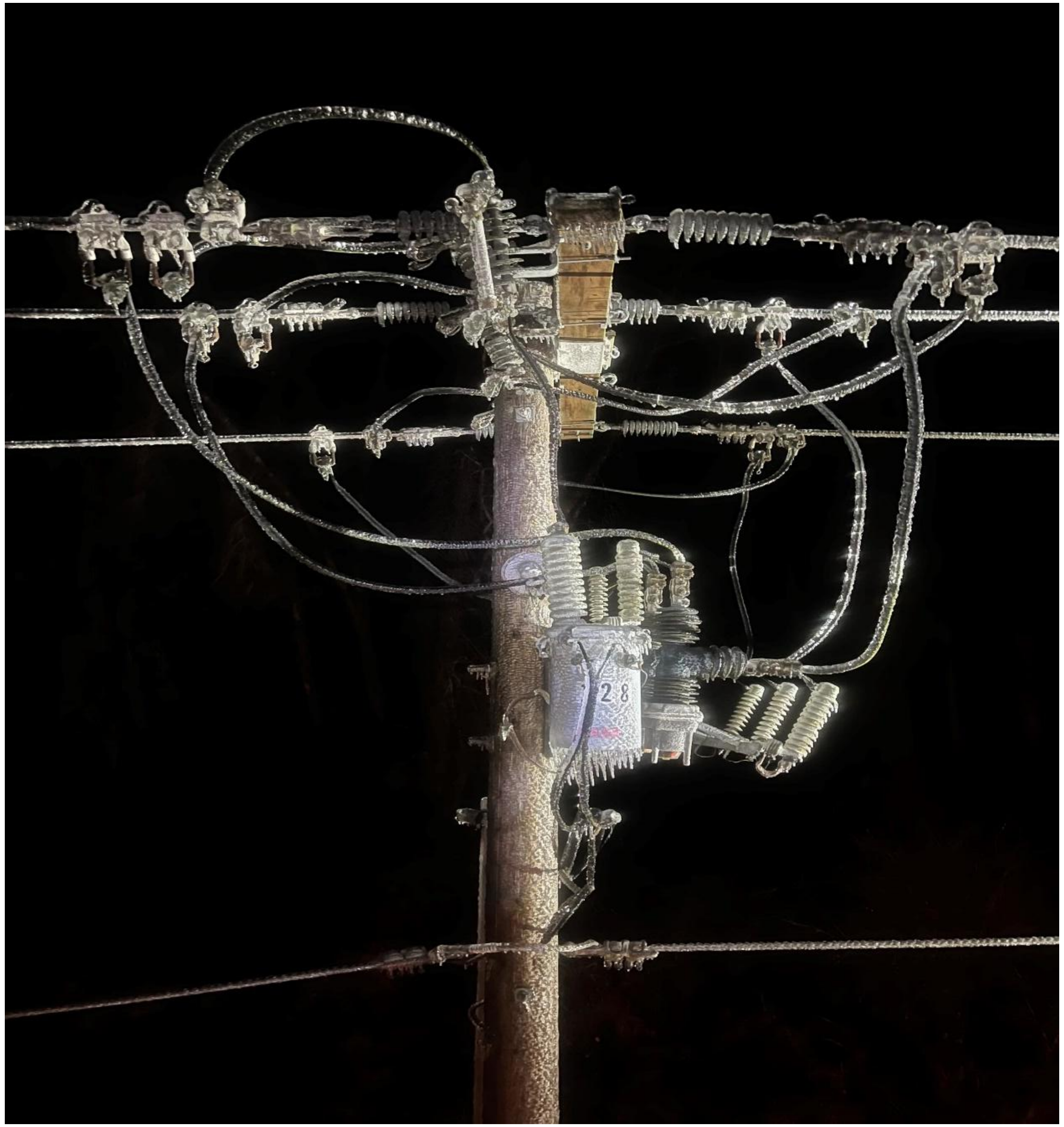
New Risks to Manage

- Maintaining this position is becoming more challenging by the day.

Risk Category	**Description**	**Takeaways**
1. Extreme Winter Storms	*A changing climate is driving new weather extremes, with winter snow and ice storms causing unprecedented levels of damage.*	• Mitigating the impacts will require much higher levels of investment • Despite our best efforts, extended outages will still occur • We need to help citizens be prepared for real threats to life and safety
2. Wildfires	*The risk of wildfires has created a "second storm season" with threats to public safety and utility financial health.*	• Mitigating the impacts will require continued high levels of investment • Utilities have different liability profiles but none of us can rest easy • We're doing everything we can but it's impossible to reduce the risk to zero • Consequences may include bankrupt utilities, higher rates, less reliability
3. Power Supply Deficits	*The region's power supply system is inadequate for the rising level of electricity demand.*	• Demand for electricity is increasing rapidly; regional supply is running short • Resource shortages have already led to forced outages; these will continue • We are losing baseload resources faster than we are adding replacements • New resources tend to produce intermittently, adding volatility and risk

Extreme Winter Storms

- Tillamook County has faced ice and snowstorms at unprecedented rates
- Windstorms with windspeeds of 60 mph+ is the norm
- Trees and branches from outside utility easements and right of ways continue to be the major cause of outages in these storms
- Our distribution system has stood in the same place for 80+ years
- Rarely have we seen the level of destruction brought about by these recent events




57
64

Extreme Winter Storms: Mitigation

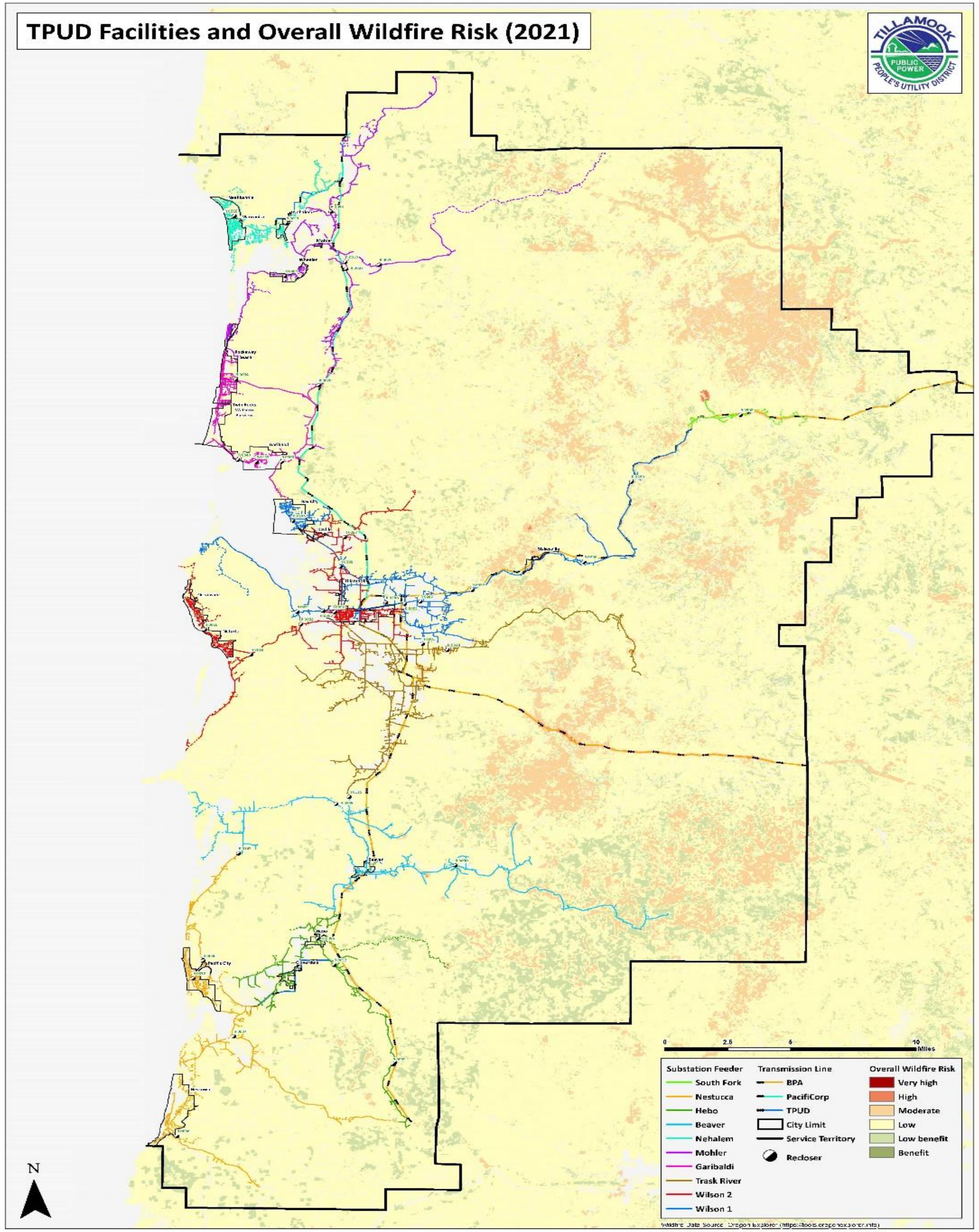
- Mitigation starts with aggressive tree trimming and vegetation removal
- We’re also making capital investments (hardier construction; undergrounding)
- Ultimately, some extended outages are going to be unavoidable
- Helping customers with emergency preparation is key
- This is particularly important in rural communities without many resources
- 4 of 5 transmission lines serving the county were out of service during the holiday windstorm in December 2024

Wildfires

- The threat of wildfires is a near constant from April - October
- Currently in Oregon there is no uniform, agreed upon standard of care
- Utilities face different liability profiles but none of us can fully mitigate this risk
- There are only so many tree trimmers and we don’t have unlimited budgets
- Consequences may include bankrupt utilities, higher rates, and lower reliability
- Public Safety Power Shutoffs will become more frequent

Wildfires: Mitigation

- We operate our system at varying levels of sensitivity based on weather conditions
- We are also aggressive with tree trimming, including partnering with our customers
- We haven’t had one yet, but do have a process for Public Safety Power Shutoffs
- ***There is no foolproof solution***
- Utilities can do everything right and still face liability

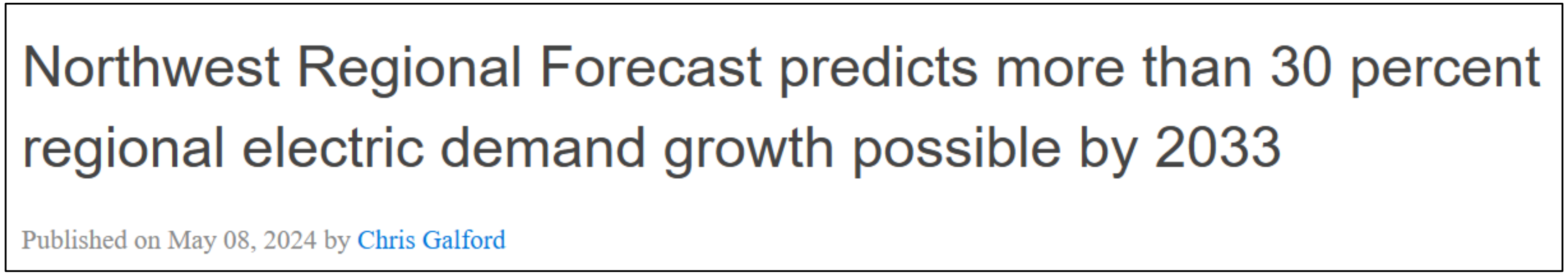

TPUD Facilities and Overall Wildfire Risk (2021)

Wildfire Data Source: Oregon Explorer (https://tools.oregonexplorer.info)

Power Supply Deficits

- Finally, the Northwest is facing growing power supply deficits
- Demand for electricity is increasing substantially
- At the same time, critical baseload resources are being removed
- The only current replacement options are variable in nature (wind and solar)
- This is creating a much more volatile regional power supply system
- The inevitable result is lower reliability and much higher cost

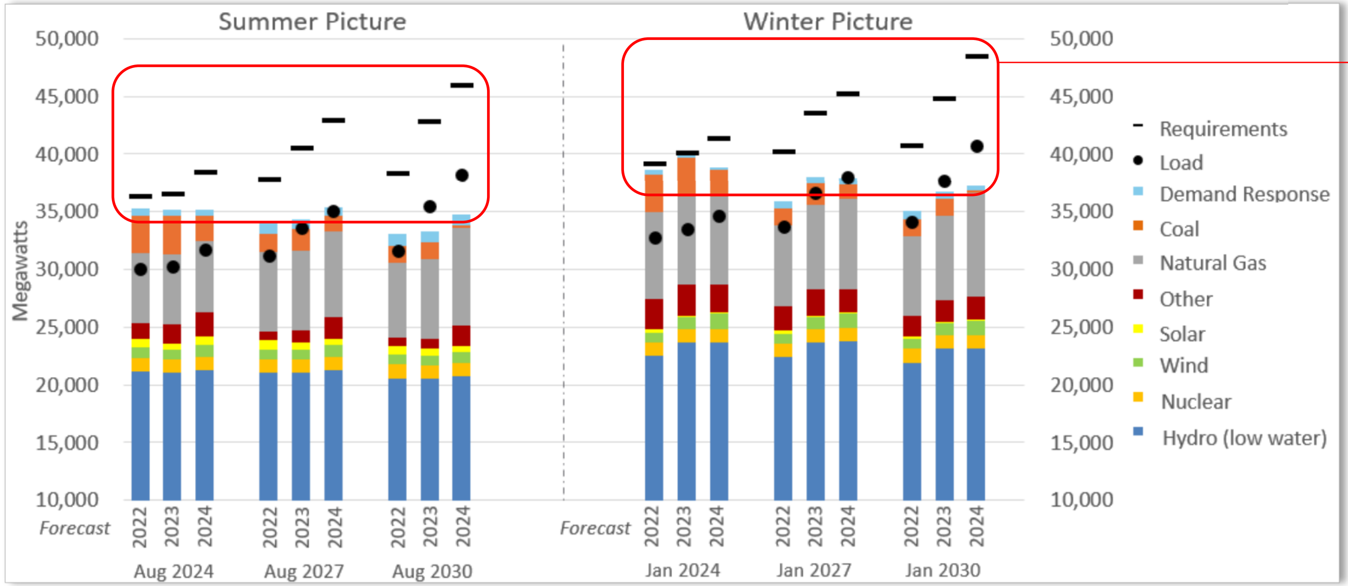
Northwest Regional Forecast (PNUCC)



Northwest Regional Forecast predicts more than 30 percent regional electric demand growth possible by 2033

Published on May 08, 2024 by Chris Galford

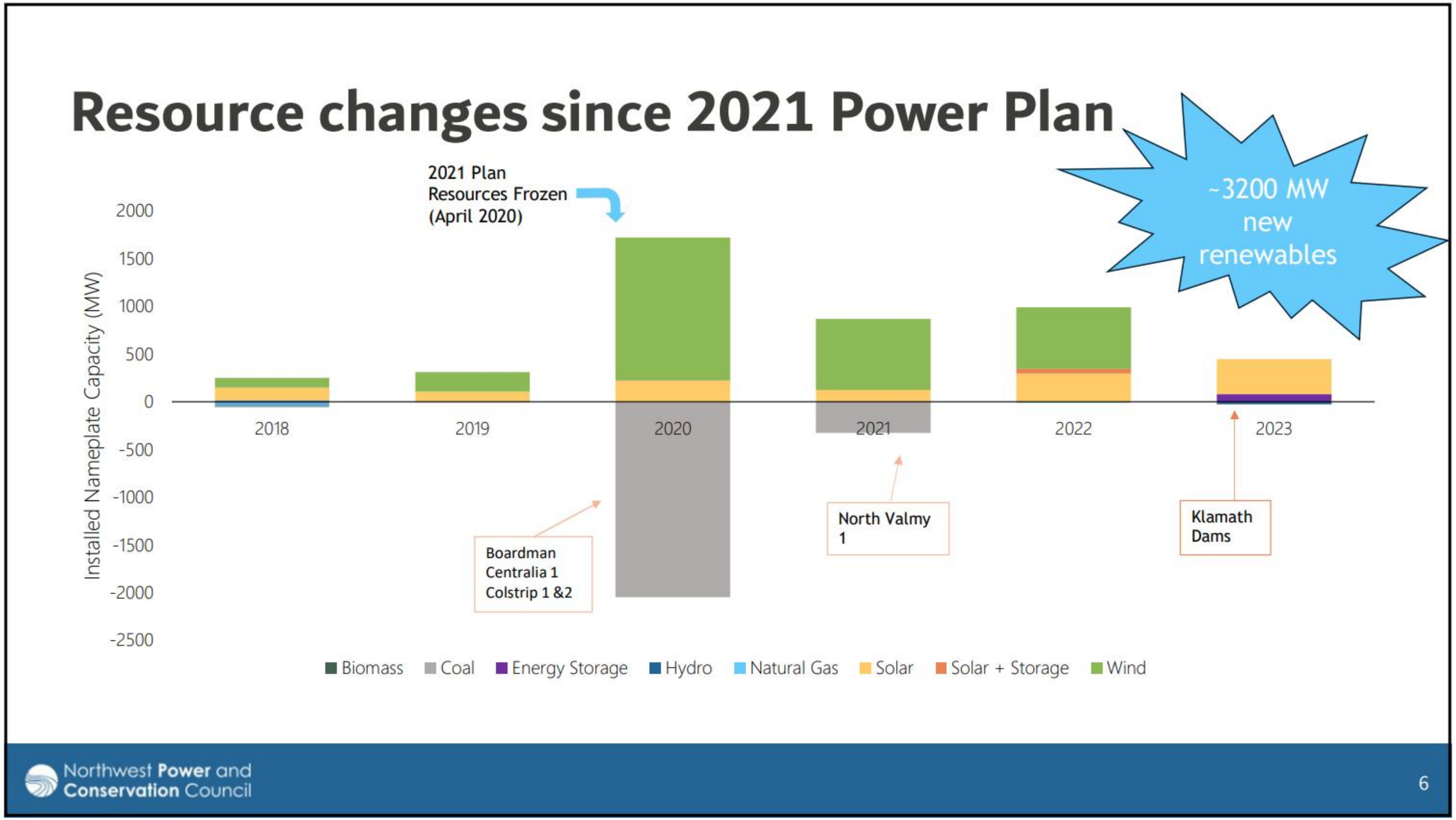
Figure 7: 2024 Load and Resource Forecast Compared to 2023 and 2022



Power supply deficits exist now and will get worse in the future

Source: https://www.pnucc.org/wp-content/uploads/2024-PNUCC-Northwest-Regional-Forecast-final.pdf

NW Resource Changes (2018-2023)



Resource changes since 2021 Power Plan

2021 Plan Resources Frozen (April 2020)

~3200 MW new renewables

Boardman
Centralia 1
Colstrip 1 &2

North Valmy 1

Klamath Dams

- ~3,000 MW of coal replaced by ~3,000 MW of wind and solar
- *From*: firm baseload capacity (***supply is there when we need it***)

  To: non-firm, near-zero capacity (***supply is not there when we need it!***)

Source: NW Power and Conservation Council. https://www.nwcouncil.org/fs/18692/2024_04_p3.pdf

Impact on Reliability

TOP STORY

Winter Storm Pushed Northwest Close to Rolling Blackouts

Steve Ernst Mar 22, 2024

January 2024

MONEYWATCH

As Pacific Northwest cooks, some energy customers hit with multiple blackouts

July 1, 2021 / 4:11 PM EDT / AP

June 2021

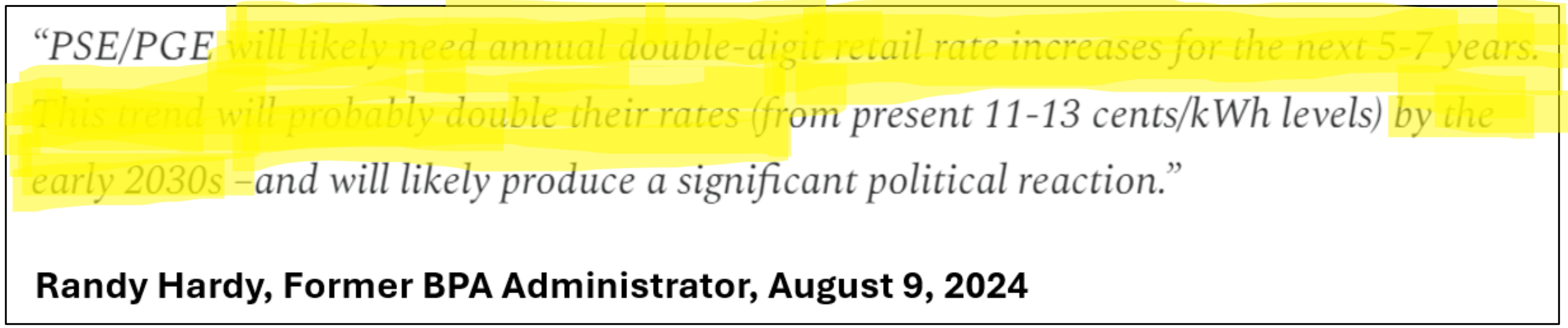
Impact on Affordability

Pacific Power Asks for 21.6% Rate Increase for 2025

Posted on April 15, 2024 by **Charlotte Shuff**
Tags, **Energy**, **General Interest**

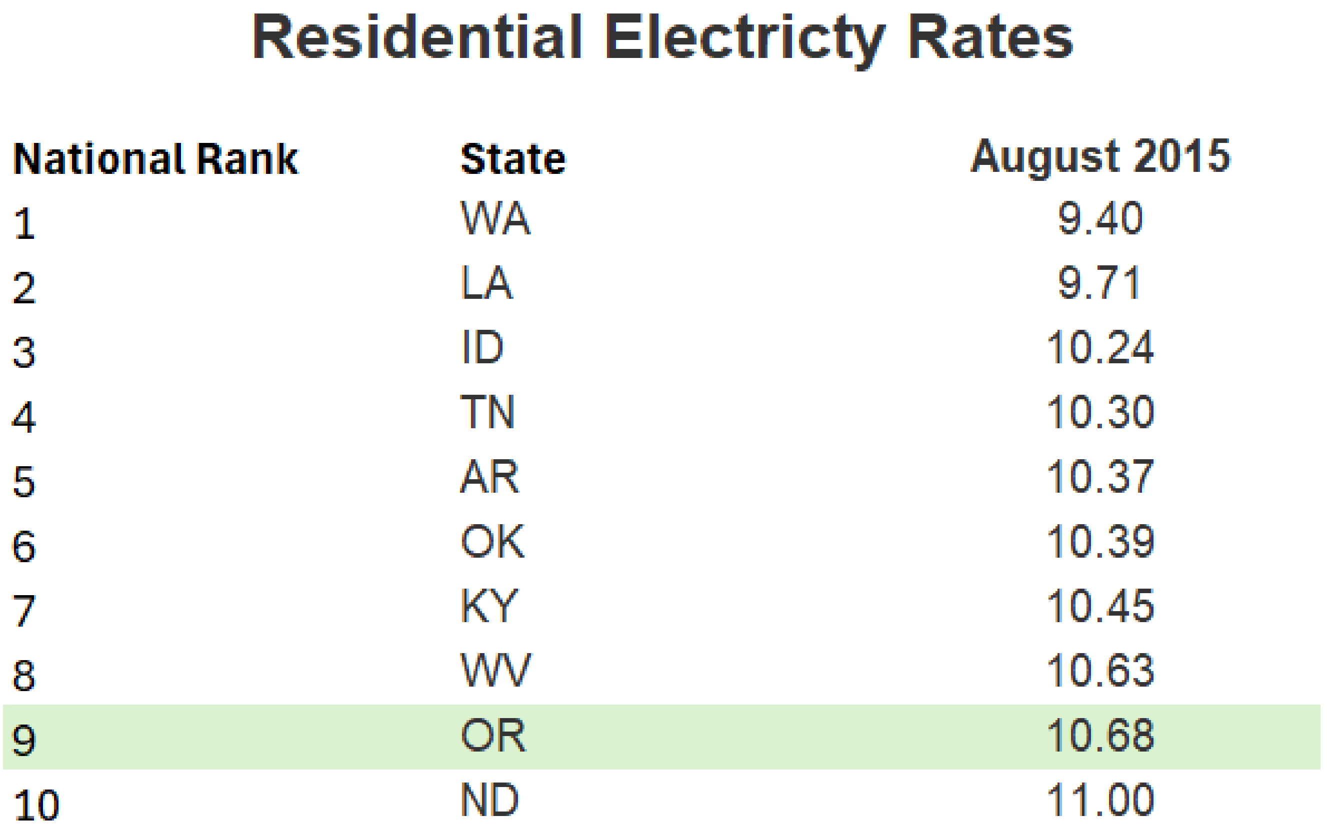
PGE wins approval for largest rate increase in two decades

Updated: Nov. 03, 2023, 11:41 a.m. | Published: Nov. 03, 2023, 6:00 a.m.



> *"PSE/PGE will likely need annual double-digit retail rate increases for the next 5-7 years. This trend will probably double their rates (from present 11-13 cents/kWh levels) by the early 2030s –and will likely produce a significant political reaction."*
>
> **Randy Hardy, Former BPA Administrator, August 9, 2024**

Affordability (Oregon Ranking in 2015)



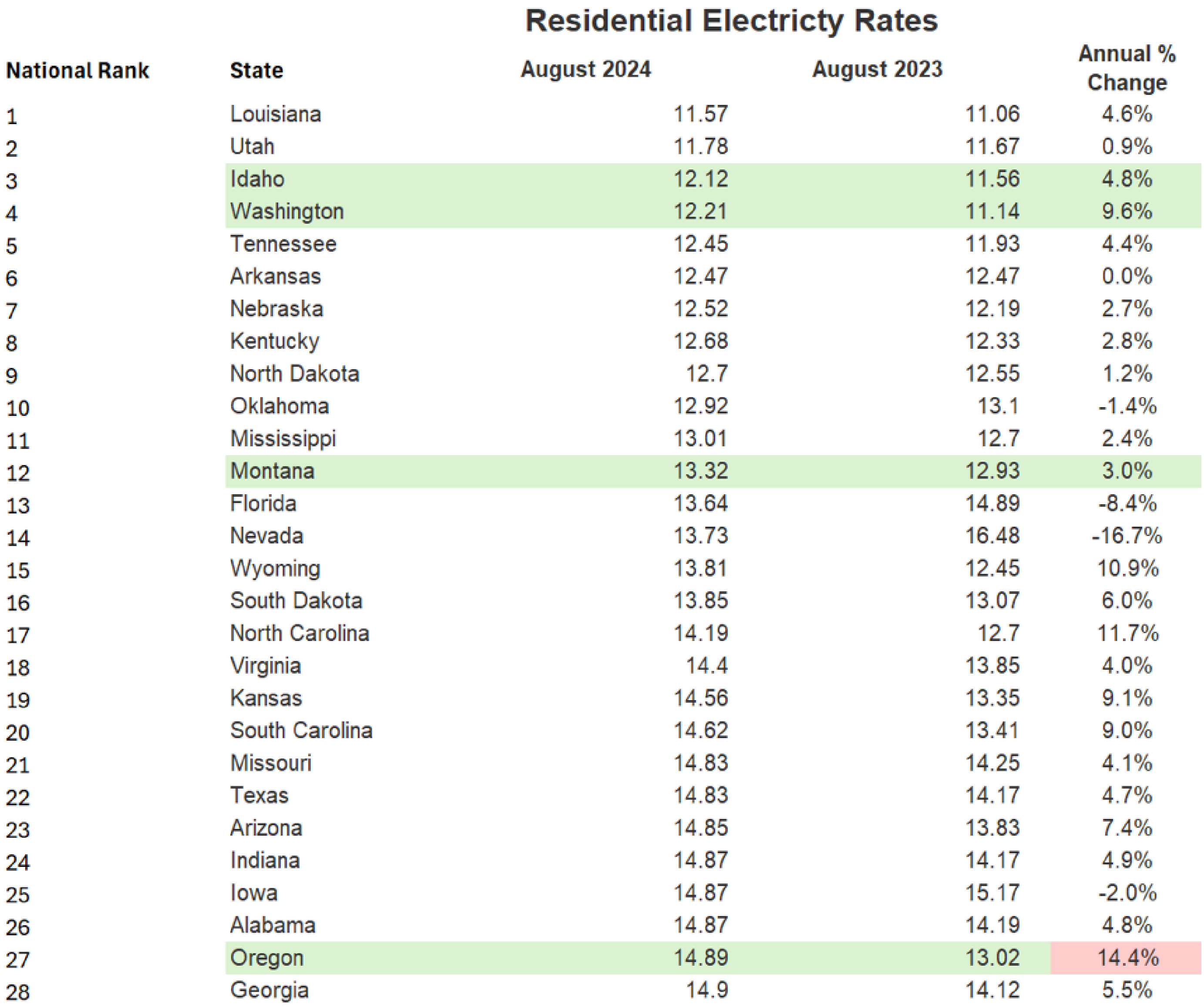
Residential Electricty Rates

National Rank	State	August 2015
1	WA	9.40
2	LA	9.71
3	ID	10.24
4	TN	10.30
5	AR	10.37
6	OK	10.39
7	KY	10.45
8	WV	10.63
9	OR	10.68
10	ND	11.00

In 2015, Oregon had the 9th lowest residential electric rates in the country.

Source: U.S. Energy Information Administration (EIA)
https://www.eia.gov/electricity/data/state/

Affordability (Oregon Ranking in 2024)



Residential Electricty Rates

National Rank	State	August 2024	August 2023	Annual % Change
1	Louisiana	11.57	11.06	4.6%
2	Utah	11.78	11.67	0.9%
3	Idaho	12.12	11.56	4.8%
4	Washington	12.21	11.14	9.6%
5	Tennessee	12.45	11.93	4.4%
6	Arkansas	12.47	12.47	0.0%
7	Nebraska	12.52	12.19	2.7%
8	Kentucky	12.68	12.33	2.8%
9	North Dakota	12.7	12.55	1.2%
10	Oklahoma	12.92	13.1	-1.4%
11	Mississippi	13.01	12.7	2.4%
12	Montana	13.32	12.93	3.0%
13	Florida	13.64	14.89	-8.4%
14	Nevada	13.73	16.48	-16.7%
15	Wyoming	13.81	12.45	10.9%
16	South Dakota	13.85	13.07	6.0%
17	North Carolina	14.19	12.7	11.7%
18	Virginia	14.4	13.85	4.0%
19	Kansas	14.56	13.35	9.1%
20	South Carolina	14.62	13.41	9.0%
21	Missouri	14.83	14.25	4.1%
22	Texas	14.83	14.17	4.7%
23	Arizona	14.85	13.83	7.4%
24	Indiana	14.87	14.17	4.9%
25	Iowa	14.87	15.17	-2.0%
26	Alabama	14.87	14.19	4.8%
27	Oregon	14.89	13.02	14.4%
28	Georgia	14.9	14.12	5.5%

Source: U.S. Energy Information Administration (EIA)
https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a
Note: this report changes monthly. Archived historical data is here:
https://www.eia.gov/electricity/data/state/

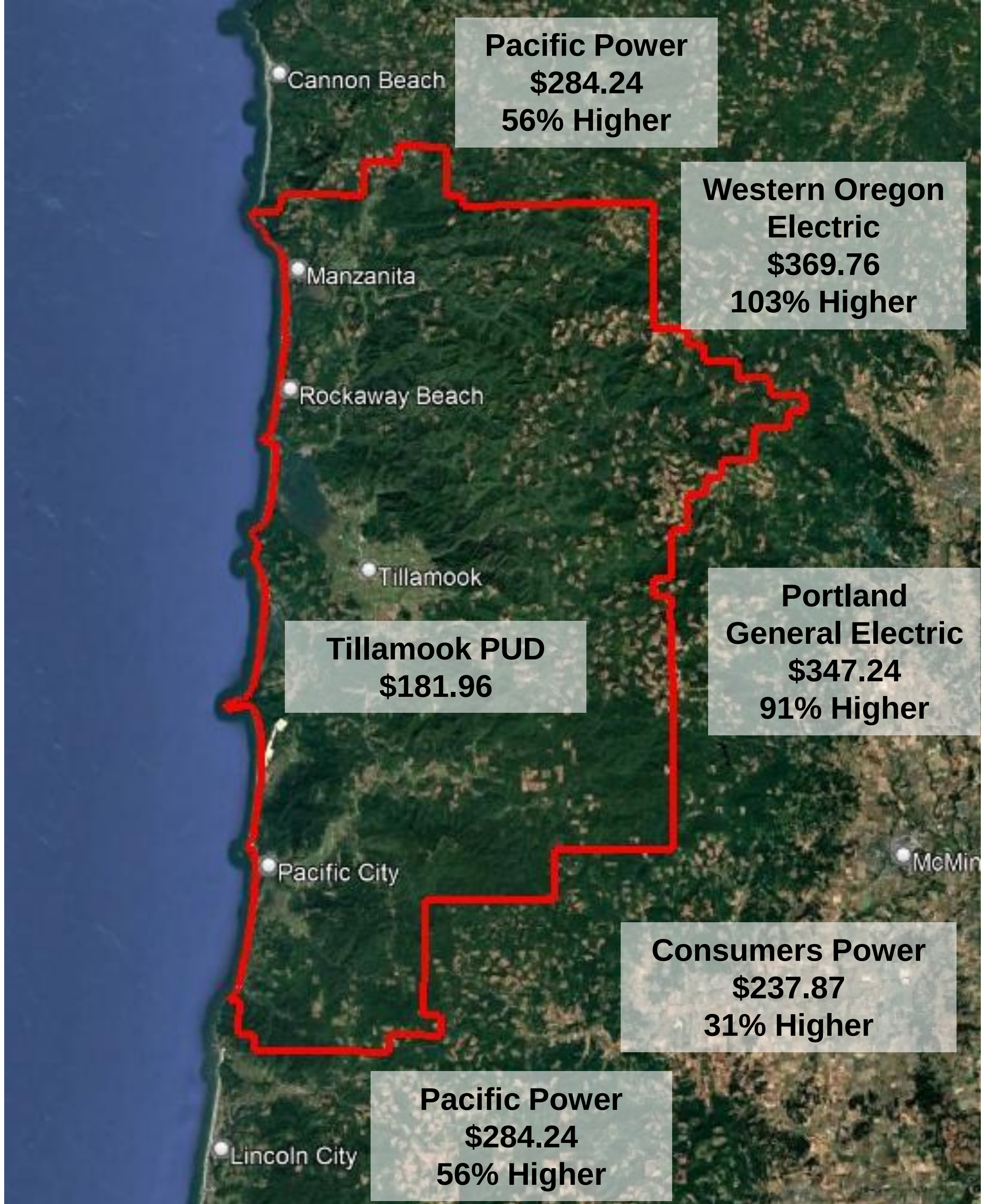
In 2024, Oregon ranks 27th and rates are increasing faster than any state other than Illinois!

Affordability

- Bonneville Power Administration rate increase in 2025
    - Power: 10.6%
    - Transmission: 22%
- Tillamook PUD rate increase in 2025: 7%
- Tier One Power Rate from BPA: $40/MW
- Tier Two Power Rate from BPA: $70/MW
- Tillamook PUD will need to buy Tier Two power in 2030? 2031?

2025 Average Electric Bill

1,600 kWh



Pacific Power
$284.24
56% Higher

Western Oregon Electric
$369.76
103% Higher

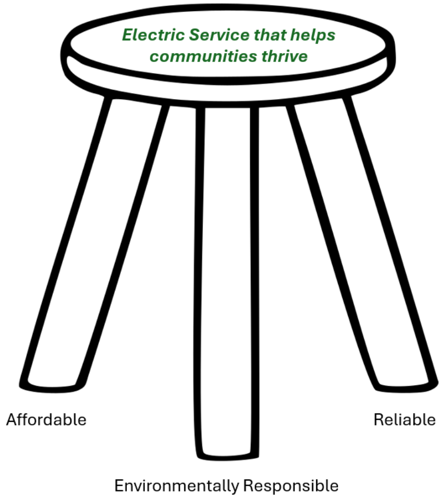
Portland General Electric
$347.24
91% Higher

Tillamook PUD
$181.96

Consumers Power
$237.87
31% Higher

Pacific Power
$284.24
56% Higher

Power Supply Deficits: Mitigation



- Policymaking must keep in mind all three pillars:
- Affordable, Reliable, Environmentally Responsible
- A single-minded focus on one puts the others at risk
- Maintaining baseload resources that generate on-demand is critical
- These include hydroelectricity, nuclear, and natural gas
- It’s also imperative to keep the focus on commercially available technology

Thank You!

Todd Simmons

General Manager

tsimmons@tpud.org

(503)815-8650

City of Manzanita

COUNCIL RESOLUTION No. 25-

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MANZANITA, OREGON, ADOPTING FINDINGS AND GRANTING EXEMPTION FROM COMPETITIVE BIDDING FOR CLASSIC STREET CONSTRUCTION PROJECT AND TO AUTHORIZE SOLICITATION BY MEANS OF A COMPETITIVE REQUEST FOR PROPOSALS THAT CONSIDERS QUALIFICATION AND BID PRICE

WHEREAS, the Manzanita City Council acts as the local contract review board for the City of Manzanita (the "City"), and in that capacity, has authority to exempt certain contracts from the competitive bidding requirements of ORS Chapter 279C; and

WHEREAS, ORS 279C.335(2) provides a process for exempting certain contracts from competitive bidding and authorizes the selection of a contractor through the request for proposal ("RFP") process; and

WHEREAS, draft findings ("Findings") addressing competition, operational, budget and financial data, public benefits, value engineering, specialized expertise required, market conditions, technical complexity, public safety and funding sources recommended by the City were available 14 days in advance of the public hearing on this Resolution; and

WHEREAS, the City Council determines that the contract for the Classic Street Construction Project, which is described in more detail in Exhibit A to this Resolution, should be solicited pursuant to a competitive RFP process that considers qualifications as well as bid price.

Now, Therefore, the City Council resolves as follows:

Section 1: The City Council adopts the Findings set forth in Exhibit A to this Resolution.

Section 2: The exemption of the contract for the Classic Street Construction Project from competitive bidding will promote competition and will not encourage favoritism because the contractor will be chosen by a competitive request for proposal process that considers qualifications and price.

Section 3: The exemption of the contract for the Classic Street Construction Project from competitive bidding is likely to result in substantial cost savings and other substantial benefits to the City.

Introduced and adopted by the City Council on **February 5, 2025**.

This resolution is effective on **February 5, 2025**.

Kathryn Stock, Mayor

ATTEST:

Leila Aman, City Manager/ City Recorder

CITY OF MANZANITA

RESOLUTION NO. 25-03

EXHIBIT A

FINDINGS OF FACT

IN SUPPORT OF AN EXEMPTION FROM COMPETITIVE BIDDING TO AUTHORIZE THE USE OF A COMPETITIVE REQUEST FOR PROPOSALS PROCESS THAT CONSIDERS BOTH THE CONTRACTOR'S QUALIFICATIONS AND THE BID PRICE TO SOLICIT THE CONSTRUCTION CONTRACT TO BUILD WATER, STORMWATER, ROAD RECONSTRUCTION IMPROVEMENTS, INCLUDING A PEDESTRIAN PATHWAY AND TRAFFIC CALMING INFRASTRUCTURE WHICH WILL SUPPORT RESIDENTIAL HOUSING DEVELOPMENT

1. General

ORS 279C.335(2) permits a local contract review board to exempt contracts from traditional competitive bidding upon approval of findings of fact showing that an alternative contracting process is unlikely to encourage favoritism or diminish competition and that the process will result in cost savings to the City of Manzanita (the "City"). The City, through its City Council, acts as the Local Contract Review Board ("LCRB") for the City.

ORS 279C.400 – ORS 279C.410 describe the Request for Proposals method of solicitation as an alternative to traditional competitive bidding. Pursuant to ORS 279C.410(8), a public Agency using the Request for Proposals method may award a contract to the responsible proposer "whose proposal is determined in writing to be the most advantageous to the contracting agency based on the evaluation factors set forth in the request for proposals and, when applicable, the outcome of any negotiations authorized by the request for proposals."

ORS 279C.330 defines "Findings" and identifies specific information to be provided as a part of the City's justification. Under ORS 279C.335(5) a public hearing must be held before the findings are adopted, allowing an opportunity for interested parties to comment on the draft findings.

PURPOSE OF THESE FINDINGS: The City will hold a public hearing as required by ORS 279C.335 and to consider the following findings with respect to the issue of whether the construction contract for construction of water, stormwater, and associated infrastructure in support of residential housing development ("Project"), as defined herein, should be exempt from competitive bidding to authorize the use of a competitive request for proposals process that considers both the contractor's qualifications and the bid price ("Qual + Bid") to solicit the construction contract to build the Project.

2. Background

The City received a grant from the State of Oregon to construct necessary infrastructure in order to support 120 units of affordable housing currently in the development pipeline, and additional housing development anticipated in the south eastern section of the City's Urban Grown Boundary ("UGB") commonly referred to as the Highlands. Currently, there is not sufficient fire flow/pressure to serve the land within the City's UGB, including the site of the proposed affordable housing. Knowing this issue was coming, the City has been exploring options to expedite the construction of this expanded water line along Classic Street. This expansion would divide a very large looped water system, creating two smaller linked loops, increasing available water flow to meet current/future fire flow standards for the entire UGB, including the area where the 120 units are proposed. The Project will also provide a critical redundancy increasing resiliency within the City's water system.

Secondly, the Project will include a storm drainage component. The absence of a storm water connection for Classic Street leads to flooding and erosion issues on what has become a very critical transportation connection. Flooding not only poses a safety hazard for drivers and pedestrians, but it also hinders the overall functionality and longevity of the travel way. Construction of a storm water system will allow the current storm basin to flow in two separate directions and connect to the recently completed storm line constructed in Dorcas Lane which intersects with Classic Street. The Project provides another viable step toward full reconstruction of the roadway.

Finally, the Project will include a pedestrian pathway along Classic Street and traffic calming measures on Classic Street, including some crossings at intersections. The Project will require a full road reconstruction of Classic Street requiring structures to be built on the eastern side of the road to ensure long term roadway stability. Additionally increasing pedestrian and bicycle safety on Classic Street is the top project in the city's recently adopted Transportation System Plan (TSP). The Project will include a pedestrian pathway on the east side of the Right of Way.

The priority of this Project is to provide necessary water infrastructure to unlock affordable housing in the UGB and allow for new housing development consistent with the new SB 406 Oregon's Middle Housing Rules.

The nature of the Project requires a level of knowledge and experience working with construction on public projects with significant slope issues, unique soil conditions, and retaining walls (these issues are described in greater detail below). The Project will be at a higher risk and have a higher level of technical complexity due to the slope issues, soil conditions, the proximity of construction area to homes and heavily-trafficked rights of way, and an adjacent commercial construction project. Additionally, the Project is funded by a grant from the Orgon Business Development Department and, therefore, is subject to completion deadlines and budget limitations that require close monitoring of the Project schedule and budget. It is critical to maintain both the schedule and budget of the Project.

In consideration of these facts, an alternate method of construction of these public improvements should be considered. Therefore, the following findings support an exemption from competitive bidding and the use of the Request for Proposal based upon Qual+Bid as an alternative method of construction contracting.

There are slope issues of concern that will be documented in the Construction Documents and are currently shown in the 60% Plans, which include existing topographic data as well as proposed improvements. The existing topography features steep slopes on portions of the east and west side of Classic Street. There are homes, private backyards, a public street, and other public and private items such as fences, small retaining walls, and landscaping on the slope to the east and above the slope. The nature of the slope conditions are further described in the Geotechnical Report, prepared by Pali Consulting on 12/20/2024, which is attached to these findings.

The unique soil conditions are described in two Geotechnical Reports. Both reports are attached to these findings, including a report prepared by Carlson Geotechnical on 8/16/2024 and a report prepared by Pali Consulting on 12/20/2024. The native soil conditions found in much of the Project area is loose sand. The sand creates construction challenges including such activities as trenching, shoring, compacting, and retaining.

Retaining walls will be needed to stabilize slopes in some locations along Classic Street. The retaining walls will be installed in sandy ground conditions.

FINDINGS OF FACT

SUMMARY FINDINGS

Use of the Qual+Bid process for the Project complies with the criteria outlined in ORS 279C.335(2):

1. It is unlikely the exemption will encourage favoritism or substantially diminish competition. The request for proposals selection process will be competitive based upon relevant selection criteria including qualifications and bid price and will open to all interested proposers as described in the findings below. As further described in these findings, the City will host a public pre-proposal meeting in which prospective proposers can see the Project and ask questions. To ensure fairness, any answers given will be provided in writing to all prospective proposers and other planholders.

2. The exemption could result in substantial cost savings to the City. Also, value will be added to the Project, via reduction in Project risks, that could not otherwise be obtained by ensuring a qualified contractor that is experienced with construction of like projects under similar conditions.

SPECIFIC FINDINGS which substantiate the summary findings are as follows:

1. **The Contractor will be selected through a competitive process in accordance with the qualifications-based selection process authorized by the City that will include bid price. Therefore, it is unlikely that the awarding of the construction contract for the Project will encourage favoritism or substantially diminish competition. This finding is supported by the following:**

   A. **SOLICITATION PROCESS:** Pursuant to ORS 279C.360, the Qual+Bid solicitation will be advertised at least once in the Daily Journal of Commerce, and in as many additional issues of publication as the City may determine.

   B. **FULL DISCLOSURE:** To ensure full disclosure of all information, the Request for Proposals solicitation package will include:

      a. Detailed Description of the Project

      b. Contractual Terms and Conditions
      c. Selection Process

d. Evaluation Criteria
e. Role of Evaluation Committee

f. Provisions for Comments
g. Complaint Process and Remedies Available

C. COMPETITION: As outlined below, the City will follow processes which maintain competition in the procurement of a Qual+Bid Contractor.

a. The City anticipates that competition for this contract will be similar to that experienced in other Projects of this type. The competition will remain open to all qualifying proposers.

b. The City has been communicating with the construction contracting community as well as the engineering consulting community about the Qual+Bid contracting method.

c. The evaluation and solicitation process employed will be open and impartial. Selection will be made on the basis of final proposal scores derived from qualifications, price and other components, which expand the ground of competition beyond price alone to include experience, quality, innovation factors, etc.

D. SELECTION PROCESS: Other highlights of the selection process will include:

a. The RFP will include specific submittal requirements associated with relevant skills, experience, scheduling, and capacity deemed necessary for the Project. The submittal requirements will be developed by City staff and its technical and legal representatives. The Request for Proposals will also include select criteria, a description of how proposals will be evaluated, and the relative weighting of the items to be scored.

b. The City will hold a pre-proposal meeting. This meeting will be open to all interested parties. During this pre-proposal meeting, as well as any time prior to ten (10) days before the close of the solicitation, interested parties will be able to ask questions, request clarifications and suggest changes in the solicitation documents if such parties believe that the terms and conditions of the solicitation are unclear, inconsistent with industry standards, or unfair and unnecessarily restrictive of competition.

b. The evaluation process will determine whether a proposal meets the screening requirements of the RFP, and to what extent. The following process will be used:

- Proposals will be evaluated for completeness and compliance with the screening requirements of the RFP. Those proposals that are materially incomplete or non-responsive will be rejected.

- Proposals considered complete and responsive will be evaluated to determine if they meet and comply with the qualifying criteria of the RFP. If a proposal is unclear, the proposer may be asked to provide written clarification. Those proposals that do not meet all requirements will be rejected.

- Proposals will independently be scored by the voting members of the Evaluation Committee. Scores will then be combined and assigned to the proposals.

- The bid price will be one of the factors that is considered as part of the evaluation.

- The Evaluation Committee may convene to select from the highest-scoring proposers, a finalist(s) for formal interviews.

- The Evaluation Committee will conduct the interviews.

- The Evaluation Committee will use the interview to confirm the scoring of the proposal and to clarify any questions. Based upon the revised scoring, the Evaluation Committee will rank the proposers, and provide an award recommendation.

- The City will negotiate a contract with the top-ranked firm. If an agreement cannot be reached, the City will have the option to enter into an agreement with the second-ranked firm, and so forth.

c. Competing proposers will be notified in writing of the selection of the apparent successful proposal. Any questions, concerns, or protests about the selection process will be subject to the requirements of the OAR 137-049-0450, must be in writing, and must be delivered to the City within seven (7) calendar days after receipt of the selection notice. No protest of the award selection shall be considered after this time period.

2. FINDING: The awarding of construction contract(s) for the Project using the Qual+Bid method will likely result in substantial cost savings to the City. This finding is supported by the following information required by ORS 279C.335(2)(b) and ORS 279C.330.

A. PERSONS AVAILABLE TO BID. Based the City’s outreach to the contracting community, the City does not expect that the pool of interested and qualified contractors will materially affected by this process.

B. OPERATIONAL, BUDGET, FINANCIAL DATA

a. BUDGET: The City has a fixed budget available for the Project that cannot be exceeded. Furthermore, the completion date cannot be exceeded.

b. SAVINGS: Under the Qual+Bid method, the City will enjoy the savings associated with competitive bidding in an active market because price will be one of the evaluation factors.

c. FUNDING SOURCE: The Project is funded primarily by a grant from the Oregon Business Development Department with some limited funds from the City.

C. PUBLIC BENEFITS The City will benefit from QUAL+BID by ensuring that the selected contractor has a complete understanding of the City's needs, the scope of the Project and the unique risks of the Project posed by both slope issues and unique soil/subsurface conditions, and that has experience in constructing this type of project under similar conditions, budget constraints, and time constraints.

D. VALUE ENGINEERING. The QUAL+BID process will ensure that the selected contractor has the experience and qualifications to construct the Project and to suggest alternatives or improvements that will save City funds while achieving the goals of the Project.

E. SPECIALIZED EXPERTISE: Selection of a contractor using a QUAL+BID framework will ensure that the selected contractor has the experience and expertise to construct the Project. The consideration of the bid price as a factor in the selection will ensure that the City obtains this expertise at the best price.

The construction Project is complex because it involves unique slope issues and soil conditions as well as a strict adherence to budget and schedule requirements.

F. PUBLIC SAFETY: All work must be coordinated to avoid safety and security risks to the general public and to ensure efficiency in construction. The coordination between the City, Engineer, and an experienced and qualified contractor will assure coordination of work and consideration for the safety of vehicular and pedestrian traffic crossed by the Project. In addition, QUAL+BID contracting of the Project will ensure that public safety and security is being effectively managed by a qualified contractor.

G. REDUCTION OF RISK TO THE CONTRACTING AGENCY AND THE PUBLIC. The unique soil conditions and slope issues associated with this Project create risk to the City that would be increased by retaining a contractor that is not familiar, or has little experience, with construction of this type at a project site with similar soil conditions. Consideration of experience and expertise through a request for proposals process will ensure that the Project will be constructed a contractor who understands the unique Project risks and conditions and has experience addressing them.

H. SOURCE OF FUNDING. The City will fund the Project with grant funds. Use of the Qual+Bid RFP process will not affect this funding source.

I. MARKET CONDITIONS: As multitude of construction market factors exist today in Oregon: competition with other projects, a variable bid market, inflation, and uncertainty regarding future tariffs and policy impacts on the labor market. Additionally, the City, and many of its local contractors, are geographically isolated from larger construction markets in the Portland metro area and the I-5 corridor. Given the market conditions and the smaller construction market on the Oregon Coast, generally, the City anticipates that contractors may bid for jobs for which they might not be qualified. Alternative contracting methods will be more likely to result in a more experienced and better suited contractor for this Project than the usual competitive procurement. The complexities which need to be addressed for this Project are not well served by the usual competitive procurement as the lowest bidder may not be the best suited for this particular Project.

J. TECHNICAL COMPLEXITY: Technical expertise will be required for managing slope issues, working in unique soil conditions and scheduling. The complexity and scheduling issues discussed in the Background section above will require special expertise. A high level of coordination among the City and all the engineering and construction entities is required and will be best achieved by retaining an experienced contractor. As noted above, the request for proposals method of selection will enable the City to ensure that the selected contractor has the necessary skills and experience and capacity to address this technical complexity.

K. NEW CONSTRUCTION/RENOVATION/OCCUPATION STATUS. The Project involves new construction, but will take place adjacent to a major connecting roadway that intersects with a main street, requiring a contractor with expertise in traffic calming and safety measures. Construction of the Project will result in impactful right of way closures.

L. PHASING. The Project will be constructed in one phase.

M. CITY EXPERTISE. City staff and its consultant engineering representatives have substantial expertise with construction. In addition, the City's legal representation, Miller Nash LLP, has years of experience with alternative contracting methods, including selection by competitive requests for proposal.

City of Manzanita

COUNCIL RESOLUTION No. 25 -

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MANZANITA, OREGON, SETTING SALARY FOR THE POSITION OF PROJECT MANAGER FOR FISCAL YEAR 2024-2025.

WHEREAS, the City Manager has determined that there is sufficient workload and funding available to support a new FTE in the administration department to support the ongoing efforts; and

WHEREAS the position of Project Manager will manage key projects and provide support to the City Manager as defined in the job description attached to this Resolution.

Now, Therefore, be it Resolved that the salary schedule for the Project Manager position for Fiscal Year 2024-2025 is hereby adopted as follows:

FY 24-25 Salary Schedule (Project Manager Position Only)

Position	Step A	Step B	Step C	Step D	Step E
Project Manager	4,911	5,156	5,415	5,686	5,970

Introduced and adopted by the City Council on _________.

This resolution is effective on _________.

Kathryn Stock, Mayor

ATTEST:

Leila Aman, City Manager/ City Recorder

CITY OF
MANZANITA, OREGON

Position Description

Job Title: Program/Project Manager **FLSA:** Exempt

Supervisor: City Manager **Type:** Full-Time

Department: Administration

General Statement of Responsibilities

Provides executive level support to the City Manager. Plans, organizes and oversees projects, and programs including coordinating activities and tasks to support the city manager.

Supervision Received

Works under the general direction of the City Manager.

Supervision Exercised

Supervision of others is not a typical function assigned to this position. May assign work to consultants and volunteers.

Examples of Duties - Essential Functions

1. Provides advanced administrative support and technical assistance to the City Manager.
2. Conducts a variety of special projects as assigned by the City Manager
3. Prepares reports and memorandums for City Council Meetings as assigned and attends City Council meetings and work sessions.
4. Manages contracts and consultants as assigned including conducting procurement, developing workplans, budgets, timelines, work products and reviewing project invoices and billing.
5. Prepares agenda and organizes meeting materials for the Planning Commission. Maintains minutes and attends all Planning Commission meetings.
6. Serves as designee for the City Manager for City Committees or other meetings, or committees as assigned.

7. Conducts Committee Selection processes including developing applications, materials and conducing interviews as assigned.

8. Manages city communications of various social media and other platforms including drafting and finalizing monthly updates, press releases and other forms of communication and outreach to the community.

9. Assists City Manager with procurement of goods and services including drafting procurement documents such as Requests for Proposals, Requests for Qualifications.

10. Reviews and prepares staff reports for City Council meetings, and presentations on an as needed basis.

11. Reviews and edits Resolutions, Ordinances and other documents as requested.

12. Other duties as assigned.

Screening Criteria

Education and Experience:

- A Bachelors Degree in Public Administration, Planning or related field;
- AND two years' public sector experience;
- OR any satisfactory equivalent combination of education and experience which ensures the ability to perform the essential functions of the position.
- Masters degree in Public Administration, Planning or related field is preferred.

Knowledge of: Broad knowledge of municipal government organization, powers, and functions. Knowledge of the principles and practices of public administration including finance, budgeting, management, and grant writing. Knowledge of inter- and intragovernmental relationships.
General knowledge of public contracting laws and best practices. Knowledge of general office procedures and practices; business English, spelling, and punctuation; and personal computer applications in a Windows environment including spreadsheets, database management, and word processing.

Skill in: Computer skills, preferably in Microsoft Office Suite® products. Verbal and written communication skills. Interpersonal skills. Supervisory skills. Excellent customer service skills. Strong organizational Skills. Skill in performing basic mathematical calculations and preparing reports.

Ability to: Ability to establish and maintain effective working relationships with elected officials, consultants, staff, other agencies, and the general public. Ability to understand and carry out oral and written instructions. Ability to prioritize, delegate, and complete objectives with little functional oversight. Ability to maintain a high degree of discretion when dealing with confidential information. Ability to

This description covers the most significant essential and auxiliary duties performed by the position for illustration purposes, but does not include other occasional work, which may be similar, related to, or a logical assignment for the position. This job description does NOT constitute an employment agreement between the employer and employee, and is subject to change by the employer as the organizational needs and requirements of the job change.

communicate effectively, both orally and in writing, using proper grammar and spelling in the English language. Ability to meet the physical demands of the position. Successfully complete pre-employment background checks.

Physical Demands of Position: *The physical demands listed below represent those that must be met by an incumbent to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with qualified disabilities to perform the essential functions.*

While performing the duties of this position, the employee is required to sit, stand, walk, reach, bend, see, talk, type, and hear. The position requires mobility including the ability to lift and/or move materials under 5 lbs. daily and up to 10 pounds occasionally. Manual dexterity and coordination are required for over half of the daily work period (about 75%) which is spent sitting while operating office equipment such as computers, keyboards, 10-key, and telephones. This position requires both verbal and written communication abilities.

Working Conditions: *The work environment characteristics described here are representative of those an employee encounters while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.*

While performing the duties of this position, the employee is primarily working indoors in an office environment. The employee is not exposed to hazardous conditions. The noise level in the work environment is usually moderate and lighting is adequate. Hybrid work is an option at the discretion of the city manager.

SIGNATURES:

This document has been reviewed by the Supervisor and the Incumbent. I understand that this document is intended to describe the most significant essential and auxiliary duties performed by the job/position for illustration purposes, but does not include other occasional work, which may be similar, related to, or a logical assignment for the position. This job/position description does NOT constitute an employment agreement between the employer and employee, and is subject to change by the employer as the organizational needs and requirements of the job change.

Incumbent Name	Incumbent Signature	Date

This description covers the most significant essential and auxiliary duties performed by the position for illustration purposes, but does not include other occasional work, which may be similar, related to, or a logical assignment for the position. This job description does NOT constitute an employment agreement between the employer and employee, and is subject to change by the employer as the organizational needs and requirements of the job change.

Supervisor Name Supervisor Signature Date

Date Created: January 2025

This description covers the most significant essential and auxiliary duties performed by the position for illustration purposes, but does not include other occasional work, which may be similar, related to, or a logical assignment for the position. This job description does NOT constitute an employment agreement between the employer and employee, and is subject to change by the employer as the organizational needs and requirements of the job change.

COUNCIL RESOLUTION No. 25-

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF MANZANITA, OREGON, MAKING APPOINTMENTS TO THE BUDGET COMMITTEE.

WHEREAS, ORS 294.414 requires that the governing body of each municipal corporation shall establish a budget committee in accordance with the provisions of the statute; and

WHEREAS ORS 294.414 requires that the budget committee consists of members of the governing body, and a number equal to the number of members of the governing body of electors of the municipal corporation appointed by the governing body; and

WHEREAS, there are currently two open positions on the budget committee; and

WHEREAS, the City Council at its December 4, 2024, meeting approved selection criteria and assigned a member of city council and a member of the budget committee to conduct a selection process;

WHEREAS, Councilor Jerry Spegman, and Budget Committee member Joy Nord were selected to serve on the selection committee; and

WHEREAS the selection committee conducted the application review and evaluation process; and

WHEREAS, the selection committee unanimously recommends the following candidates to serve on the City's Budget Committee for a three-year term:

1. Kit Keating
2. Shawn Koch

Now, Therefore, be it Resolved by the City Council of the City of Manzanita, Kit Keating and Shawn Koch are hereby appointed to the budget committee for a three year term commencing March 2025.

Introduced and adopted by the City Council on _________.

This resolution is effective on _________.

Kathryn Stock, Mayor

ATTEST:

Leila Aman, City Manager/ City
Recorder

City of Manzanita
PO BOX 129, Manzanita OR 97130-0129
Phone (503) 812-2514 | Fax (503) 368-4145 | TTY Dial 711 ci.manzanita.or.us

2025 Budget Committee Application

Name: Kit Keating Phone:

Address: Email:

City/State/Zip: Manzanita, OR 97130

Occupation: Real Estate Agent

There are two positions open on the Budget Committee. These positions will be 3-year appointments and will end March 2028.

Overview

The role of the Budget Committee is to provide a lay review of the proposed budget in the context of services that the city provides as well as additional programs or policies based on council goals. The budget committee receives the budget message and the proposed budget document from the budget officer, holds at least one meeting in which the public may ask questions about and comment on the budget, and ultimately approves the budget document. Committee members need to have a good understanding of the city's fiscal constraints and how services and programs are funded and be able to explain it to their friends and neighbors throughout the community.

Committee members are expected to do their homework and be prepared to participate actively in the budget process. This includes taking the training provided by the Oregon Department of Revenue, reviewing and understanding the budget document, and understanding their role as a member of the budget committee in relation to the budget officer.

Successful candidates shall have a solid basis or background in finance and/or budgeting experience in either the public, private, or non-profit sectors. Experience should be substantial or significant in nature.

Committee members should be able to take an active role in developing, evaluating and proposing policy that ensures the city's financial wellbeing. While this will likely happen outside of the budget process, members will be asked for guidance and feedback on proposed financial policies.

Committee members should have experience working in a constructive and collaborative committee format that is focused on supporting the budget officer, and supporting the development of a budget that advances the city's fiscal health and wellbeing while serving the community's needs and goals.

Please explain your interest in serving on the budget committee. Be brief but be as specific as possible.

In my prior employment as an accounting executive, I became very proficient in all aspects of general accounting, financial analyses, and all projects associated with developing , tracking, and assessing budgetary constituents against acatual expenditures. I believe my participation on the budgeting review can provide greater transparency to the process. I am a valuable resource for the city staff on the subjects of accounting and budgeting.

What experience do you have working with budgets?

I served in the budget commitee of the City of Manzanita in the past two budgetary cycles. I have good understanding of the current financial of the city, the budgeting process, and what are importants in determining the directions of each cycle of budget.

Describe a situation where you had to compromise to reach consensus on a budget related issue.

My experience during the time I served in the budget committee leads me to consider all sides of arguements if confrontations occur. I put aside personal preferences, use my critical thinkings and knowledge to make valuable comments and recommendations based on the greater good of the people who live in the City.

Describe what you believe the role of a Budget Committee member is.

Committee members should exercise independent thinkings and oneself's budgeting understandings to ask questions and make comments regardless of where the majority goes.

Do you have any expected or anticipated conflicts of interest? If yes, please describe.

If a committee member always give impartial comments and recommendations, there will not be any conflicts of interest.

The budget committee meeting calendar is attached below. Applicants must be able to attend all scheduled budget committee meetings. Can you meet this commitment?

_x_Yes __No

All members appointed to the budget committee shall review and observe the requirements set forth in Chapter 9 – Ethics, Decorum, Outside Statements of the City of Manzanita Rules of Procedure for City Council Meetings (attached below). Can you commit to reviewing and observing these requirements?

x__Yes ___No

You are also welcome and encouraged to submit a CV or Resume as part of your application.

THE DEADLINE FOR SUBMISSIONS IS FRIDAY, JANUARY 3, 2025, AT 4:00 PM

APPLICANTS MUST BE AVAILABLE TO INTERVIEW JANUARY 13 – 17 AND BE AVAILABLE FOR ALL SCHEDULED MEETINGS ON THE 25/26 BUDGET CALENDAR

Please return this form
by email to cityhall@ci.manzanita.or.us

If you have any questions, please call 503-812-2514 or email us at cityhall@ci.manzanita.or.us

City of Manzanita
PO BOX 129, Manzanita OR 97130-0129
Phone (503) 812-2514 | Fax (503) 368-4145 | TTY Dial 711 ci.manzanita.or.us

2025 Budget Committee Application

Name: Shawn Koch

Phone: [redacted]

Address: [redacted]

Email: [redacted]

City/State/Zip: Manzanita OR 97130

Occupation: Retired

There are two positions open on the Budget Committee. These positions will be 3-year appointments and will end March 2028.

Overview

The role of the Budget Committee is to provide a lay review of the proposed budget in the context of services that the city provides as well as additional programs or policies based on council goals. The budget committee receives the budget message and the proposed budget document from the budget officer, holds at least one meeting in which the public may ask questions about and comment on the budget, and ultimately approves the budget document. Committee members need to have a good understanding of the city's fiscal constraints and how services and programs are funded and be able to explain it to their friends and neighbors throughout the community.

Committee members are expected to do their homework and be prepared to participate actively in the budget process. This includes taking the training provided by the Oregon Department of Revenue, reviewing and understanding the budget document, and understanding their role as a member of the budget committee in relation to the budget officer.

Successful candidates shall have a solid basis or background in finance and/or budgeting experience in either the public, private, or non-profit sectors. Experience should be substantial or significant in nature.

Committee members should be able to take an active role in developing, evaluating and proposing policy that ensures the city's financial wellbeing. While this will likely happen outside of the budget process, members will be asked for guidance and feedback on proposed financial policies.

Committee members should have experience working in a constructive and collaborative committee format that is focused on supporting the budget officer, and supporting the development of a budget that advances the city's fiscal health and wellbeing while serving the community's needs and goals.

Please explain your interest in serving on the budget committee. Be brief but be as specific as possible.

Since retiring and moving to Manzanita, I've been interested in getting involved in the community and city government. There is a wealth of information about city priorities, projects and funding sources in the budget-related documents. The research to prepare for this application has provided a good background about both the budget process and how the city is run.

What experience do you have working with budgets?

I have experience setting multi-million dollar budgets as a manager in corporate settings; as part of a management committee; as part of a committee in not-for-profit organizations; and as a financial advisor coaching hundreds of individuals and couples on budgeting and cash flow.

Describe a situation where you had to compromise to reach consensus on a budget related issue.

When I managed corporate benefits at a large manufacturer, I initially had administrative committees that oversaw my decisions. Subsequently, a corporate supply chain department was created, and its manager was given joint oversight with me on vendor selection. The supply chain manager was new to the complex world of 401(k) and health plans, and we had differing views on the role of consultants and vendor selection. I was able to teach him a great deal about benefit plans, design and administration, and he was receptive to the instruction. We then successfully collaborated on vendor and plan design choices that met both of our needs.

Describe what you believe the role of a Budget Committee member is.

I see budget committee members as taking a deep dive into all aspects of the budget. The role will require looking at each budget item from funding, policy and priority standpoints, and collaborating on the final budget. I expect that there would be a fair amount of work and research to successfully carry out this role.

Do you have any expected or anticipated conflicts of interest? If yes, please describe.

I have no conflicts, or anticipated conflicts, beyond those of any Manzanita city resident. I own a home in Manzanita that I reside in but have no other real property or business interests here.

The budget committee meeting calendar is attached below. Applicants must be able to attend all scheduled budget committee meetings. Can you meet this commitment?

_x_ Yes   __No

All members appointed to the budget committee shall review and observe the requirements set forth in Chapter 9 – Ethics, Decorum, Outside Statements of the City of Manzanita Rules of Procedure for City Council Meetings (attached below). Can you commit to reviewing and observing these requirements?

__xYes   ___No

You are also welcome and encouraged to submit a CV or Resume as part of your application.

THE DEADLINE FOR SUBMISSIONS IS FRIDAY, JANUARY 3, 2025, AT 4:00 PM

APPLICANTS MUST BE AVAILABLE TO INTERVIEW JANUARY 13 – 17 AND BE AVAILABLE FOR ALL SCHEDULED MEETINGS ON THE 25/26 BUDGET CALENDAR

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CITY OF MANZANITA
167 5th Street – Manzanita Oregon 97130
P.O. Box 129, Manzanita, OR, 97130-0129
Phone: (503) 812-2514 | Fax: (503) 812-2514 | TTY Dial 711
ci.manzanita.or.us

February 5, 2025

Oregon Secretary of State
Audits Division
255 Capital St. NE, Suite # 500
Salem, OR 97310

Plan of Action for City of Manzanita

The City of Manzanita respectfully submits the following corrective action plan in response to the deficiency reported in our audit of fiscal year ending June 30, 2024. The audit was completed by the independent auditing firm Accuity and the following deficiencies were reported. The plan of action was adopted by the governing body at their meeting on February 5, 2025, as indicated by signatures below.

The deficiency is listed below, including the adopted plan of action and timeframe.

1. Deficiency #1
    a. Significant Deficiency – Adequate segregation of duties in most areas is impractical due to the limited number of employees.
    b. The City is working with a financial consultant to develop documented internal control procedures, expected to be completed in FY 25/26.
    c. The City has developed alternative procedures to mitigate deficiency as much as possible. Management continually evaluates the monitoring and controls established to ensure risks are mitigated.
    d. Continually working towards segregation of duties.

Kathryn Stock, Mayor

Date

Leila Aman, City Manager

Date