City of Manzanita
P.O. Box 129, Manzanita, OR 97130-0129
Phone (503) 812-2514 | Fax (503) 368-4145 | TTY Dial 711
planning@ci.manzanita.or.us

Planning Commission | **AGENDA**

Zoom Video Webinar | February 10, 2025

https://ci.manzanita.or.us/planning-commission/ | 04:00 PM Pacific Time

Video Meeting: The Planning Commission will hold this meeting through video conference. The public may watch live on the City's Website: ci.manzanita.or.us/broadcast or by joining the Zoom Meeting:

https://us02web.zoom.us/j/84855611053?pwd=B7Y7AKUdrUwK7bXPnsdKaGrcxllGhW.1

Dial in number: (253) 215 8782

Please note that a passcode is not required to enter the webinar.

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

1. **CALL TO ORDER** (4:00 p.m.)

2. **AUDIENCE PARTICIPATION**
   Comments must be limited to city topics that are not on the agenda. A topic may not be discussed if the topic record has been closed.
   Comments may also be submitted in writing before the meeting, by mail, e-mail (to planning@ci.manzanita.or.us), or in person to city staff.

3. **APPROVAL OF MINUTES**
   A. January 13, 2025

4. **UPDATES**
   A. Leila Aman

5. **NEW BUSINESS**
   A. Manzanita Pines

6. **ADJOURN** (5:00 p.m.)

CITY OF MANZANITA

PLANNING COMMISSION MEETING MINUTES January 13, 2025

I. **CALL MEETING TO ORDER: Chair Reddick-Yurka called the meeting to order at 4:01 p.m.**

II. **ROLL: Planning Commission members present were: Karen Reddick-Yurka, Lee Hiltenbrand, Bert Gregory, John Collier, Thomas Christ, Frank Squillo, and Brad Berman. Public Advisory Steering Committee members present were: Linda Kuestner, Patrick Johnston, Constance Burton, Rick Jackson, Mark Adamcin, Brian Sindt, and Jon Reimann. Staff present were: City Manager Leila Aman, Building Official Scott Gebhart, Hatfield Fellow Cody Aucoin; 3rd Party City Planners Scott Fregonese, Violet Brown, Journie Gering, and housing subject matter expert Marcy McInelly.**

III. **AUDIENCE: There were 6 persons in the audience.**

IV. **PUBLIC COMMENTS: There was no public comment.**

V. **APPROVAL OF MINUTES: OCTOBER 14, 2024 - A motion was made by Bert Gregory, seconded by John Collier, to approve October 14, 2024 minutes as submitted. Motion passed unanimously.**

VI. **PLANNING COMMISSION APPOINTMENTS: Lee Hiltenbrand and Frank Squillo were re-appointed for four (4) year terms. Brad Berman introduced himself as the newly appointed Commissioner, to serve a four (4) year term as well.**

VII. **ELECTION OF OFFICERS: Karen Reddick-Yurka offered to continue as Chair. Frank Squillo offered to continue as Vice Chair.**

A motion was made by Thomas Christ, seconded by John Collier, to retain Karen Reddick-Yurka as the Planning Commission Chair. A motion was made by John Collier, seconded by Bert Gregory, to retain Frank Squillo as the Vice Chair. Motions passed unanimously.

DISCUSSION

VIII. **UPDATE ON THE COMPREHENSIVE PLAN AND HOUSING ORDINANCE UPDATE PROJECT**

A. INTRODUCTION – City Manager Leila Aman explained that the Public Advisory Steering Committee (PASC) attending the Planning Commission meeting as their PASC meeting was cancelled in December due to a power outage in and around the City of Manzanita. A follow-up meeting will be scheduled for the PASC in February.

B. PRESENTATION – Third party city planner Scott Fregonese presented the project overview and first Community Summit results. Scott reiterated that PASC members were invited to the meeting as the housing code work needs to be adopted by the end of June, and this scheduling decision would keep the project on schedule. Henceforth, Planning Commission will focus on the housing code updates, while the PASC will focus on the Comprehensive Plan update and the vision statement. Thus far, the project is on schedule. Scott listed the project-accomplishments thus far, introduced phase 2 of the Comprehensive Plan update, and reminded attendees that the phasing was edited, moving the coastal chapters (related to Oregon's Statewide Planning Goals 17, 18, and 19) to phase 2 because the Department of Land Conservation and Development (DLCD) had additional funding and assistance to help with this portion now. Third party city planner Violet Brown presented the resources and data sources for the Comprehensive Plan chapters, then Scott continued debriefing the Community Summit results, displaying the digitized maps from the Community Summit mapping activity and their commonalities. General comments and questions followed (see below).

Housing subject matter expert Marcy McInelly presented the Middle Housing code concepts. Marcy reiterated the "have to dos," which include: ADUs, Row/Townhouses, Cottage Clusters, and Plexes (i.e., duplex, triplex, quadplex), versus the "want to dos:" Narrow Lot houses, Courtyard Apartments, "Woody Walkups," etc. Marcy then discussed the distinction between nodes and areas of most change (larger forms) versus areas of least change (smaller forms) and provided examples of each. Lastly, five preliminary code concepts and recommendations were provided: (1) Urban transect, (2) Mapping lot sizes, (3) Land use zones and development standards, (4) Land division, and (5) Floor Area Ratio (FAR). General comments and questions followed (see below).

Finally, third party city planner Scott Fregonese provided next steps. The next PASC meeting will be scheduled for February, at which PASC members will review a background report, draft vision, and the agenda for the second Community Summit, to be held late February or early/mid-March.

C. GENERAL COMMENTS AND QUESTIONS – Planning Commissioners were encouraged to be at the next Community Summit. Comments were made regarding the "back nine" – the development of a commercial center was proposed in the past and the community was against the proposal. There seems to be a change in community-perspective. There

were comments made about historic segregation occurring through zoning, red-lining, and minimum lot sizes. Comments were made about Affordable and Workforce housing, and that housing prices should accommodate both demographics. There was general agreement that a form-based approach to code-work is preferred, though density still needs to be considered. There was general agreement that parking is going to be an issue.

A comment was made that all current zoning in Manzanita allows duplexes and that there are no single family-only zones. There was also a comment about the importance of the concept of 'small' lot development versus 'narrow' lot development. General comments were made about the character of the City; that it has a small feel and village-like character. A question about the definition of 'form-based' was asked, to which the replies dealt with size, shape, orientation, and character (form), versus the more technical land use and math behind these things. A question about minimum lot sizes was asked – is 2,500 square feet to big? – and that minimums should be reviewed. Historical issues were discussed again, about how development, historically, was form-based, but then became almost entirely single-family, with a PUD being a work-around for more creative developments. A comment was made about how serious handholding will be needed, due to the density and complexity of the content. The public was encouraged to participate throughout the entirety of the process, so that re-explanation doesn't need to occur ad nauseum.

It was mentioned that the Housing Choices Guide Book is available on the DLCD website. City Manager Leila Aman also has extra hard copies at City Hall. Cody Aucoin can be emailed at caucoin@ci.manzanita.or.us if you would like a copy mailed to you or you would like to pick one up from City Hall. Housing subject matter expert Marcy McInelly will also draft a memo and send it to Planning Commission for their edit, regarding the five preliminary code concepts and recommendations.

IX. GENERAL UPDATES: **City Manager Leila Aman informed the Commission that the application for Manzanita Pines will be the focus of February's meeting. Application materials are already posted on the City's website.**

X. ADJOURNMENT:

A motion was made by Frank Squillo to adjourn. Chair Reddick-Yurka adjourned the meeting at 5:41 p.m.

Planning Commission

MINUTES
APPROVED THIS
10TH DAY OF
FEBRUARY 2025

____
Karen Reddick-Yurka, Chair

ATTEST:

____
Leila Aman, City Manager/Recorder

Planning Commission

CITY OF MANZANITA
P.O. Box 129, Manzanita,OR 97130-0129
Phone (503) 368-5343 | Fax (503) 368-4145 | TTY Dial 711
ci.manzanita.or.us

January 2, 2025

Keith Daily
Polyphon Architecture and Design, LLC
4103 Tillamook Street
Portland, Oregon 97212

RE: Completeness Letter – Manzanita Pines
Township 3 North; Range 10 West; Section 28; Tax Lot 1401

Mr. Daily:

The City of Manzanita received your application to construct a 60-unit affordable, multi-family housing project on the above noted property.

City staff reviewed the application against the submittal requirements and determined the application to be **COMPLETE**. The City will begin processing the application and provide a separate Notice of Public Hearing.

Please contact me if you have any questions.

Respectfully,

Leila Aman
City Manager
(503) 368-5343

CITY OF MANZANITA
P.O. Box 129, Manzanita,OR 97130-0129
Phone (503) 368-5343 | Fax (503) 368-4145 | TTY Dial 711
ci.manzanita.or.us

NOTICE OF PLANNED UNIT DEVELOPMENT APPLICATION

January 9, 2025

The City of Manzanita Planning Commission will hold its regular meeting on Monday, February 10, 2025, at 4:00 PM and via Zoom. Go to www.ci.manzanita.or.us for log in information. This meeting will include a public hearing to consider the following application:

Request:	**Planned Unit Development application to construct a 60-unit affordable, multi-family housing project.**
Applicant:	**Keith Daily (Polyphon Architecture and Design, LLC).**
Location:	**North side of Necarney City County Road, approximately 500-feet west of its intersection with Clipper Court.**
Assessor's Map:	**Township 3 North; Range 10 West; Section 28; Tax Lot 1401.**
Zoning:	**Special-Residential/Recreation (S-R/R).**
Criteria:	**This application will be evaluated against the Planned Unit Development criteria listed in Ordinance 95-4 Section 4.136; and, the Special Residential/Recreational Zone standards in Ordinance 95-4 Section 3.030.**

Persons interested in the proposal should become involved in the land use decision-making process. Anyone desiring to speak for or against the proposal may do so in person or by representative at the hearing. Written comments may also be filed with the City of Manzanita prior to the public hearing. All documents, evidence, and staff reports relied upon by the applicant, including a list of Manzanita Zoning Ordinance approval criteria applicable to the request, are available for inspection at Manzanita City Hall at no cost, or copies can be obtained for $0.25/page.

The Planning Commission's review is for the purpose of deciding on the proposal. A decision by the Planning Commission to approve or deny the application will be based upon the above-mentioned criteria and those criteria only. At the hearing it is important that comments relating to the request pertain specifically to the applicable criteria. Failure of an issue to be raised in the hearing, in person or by letter, or failure to provide sufficient specificity to afford the decision-maker an opportunity to respond to the issue precludes appeal to the Land Use Board of Appeals based on that issue.

A copy of the staff report will be available at least seven days prior to the hearing for inspection at no cost, or a copy can be obtained for $0.25/page. If you need any special accommodation to participate in the hearing, please notify City Hall 24-hours before the meeting. For further information please contact Leila Aman, City Manager, Manzanita City Hall, 368-5343, P.O. Box 129, Manzanita, Oregon 97130.

CITY OF MANZANITA
167 S 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

STAFF REPORT

TO: Manzanita Planning Commission

FROM: Walt Wendolowski, City Contract Planner

SUBJECT: Staff Report – Planning File# 25001
Manzanita Pines Planned Unit Development

DATE: January 20, 2025

I. BACKGROUND

A. APPLICANT: Keith Daily (Polyphon Architecture and Design, LLC).

B. PROPERTY LOCATION: North side of Necarney City County Road, 500-feet west of its intersection with Clipper Court. There is no property address, and the County Assessor places the property within a portion of Township 3 North; Range 10 West; Section 28; Tax Lot 1401.

C. PARCEL SIZE: The site contains approximately 4.62 acres.

D. EXISTING DEVELOPMENT: The vacant subject fronts on Necarney City County Road with an unnamed platted street (identified as "Loop Road") located along the property's west side. Public water and sanitary sewer service are available.

E. ZONING: Special-Residential/Recreation (S-R/R). The site is not located within the identified Dune Overlay and Floodplain Overlay zones.

F. ADJACENT ZONING AND LAND USE: Land zoned Medium Density Residential (R-2) is located to the southwest and south while property zoned Residential Manufactured Dwelling is located to the east. These properties are located outside the City limits but within the Urban Growth Boundary. To the north is land zoned Commercial (C-1) with a mix of uses while additional S-R/R zoned land is located to the northwest. The R-2 and S-R/R zoned land is vacant while the RMD zone land contains single family homes.

G. REQUEST: Planned Unit Development application to construct a 60-unit affordable, multi-family housing project.

H. REVIEW CRITERIA: Ordinance 95-4 Section 4.136; and the Special Residential/Recreational Zone standards in Ordinance 95-4 Section 3.030.

II. APPLICATION SUMMARY

A. The City annexed a 12.54-acre portion of Tax Lot 1401 in 2024 (File #24007) with the newly annexed property rezoned to Special-Residential/Recreational (S-R/R). The City approved a partition to divide the annexed property into three parcels. The subject property is Parcel #3 of the approved partition, located in the northeast corner of Tax Lot 1401.

B. The current owner wishes to construct a 60-unit affordable, multi-family housing project featuring the following:

1. The site will contain a total of five multi-family buildings with the following area, height, and dwelling unit distribution:

   Building A – 13,296 sq. ft. / 3 stories / 12 dwelling units
   Building B – 10,077 sq. ft. / 3 stories / 12 dwelling units
   Building C – 8,468 sq. ft. / 2 stories / 9 dwelling units
   Building D – 6,096 sq. ft. / 2 stories / 6 dwelling units
   Building E – 19,296 sq. ft. / 3 stories / 21 dwelling units

   Of the 60-units, there are 14 one-bedroom units, 23 two-bedrooms units, and 23 three-bedroom units.

2. In addition to housing, the site contains supporting amenities, including a one story, 2,500 square foot club house at the approximate center of the project. On the west side of the clubhouse is an open plaza with picnic tables and an equipped playground.

3. Open space accounts for 40.6% of the site (1.88 acres). This include a large natural area on the north side of the property, as well as associated landscaped open areas and play areas surrounding the buildings. The open space on the north side will remain in natural vegetation with no planned improvements. The submitted site plan includes proposed landscaping improvements.

4. A proposed public street, identified as “Loop Road” on the site plan, provides access to the project. Two points of ingress/egress access parking, effectively creating an interior roadway loop serving ninety-six spaces. In addition, the layout includes thirty-two designated bicycle parking spaces.

5. An interior walkway system will connect the buildings and parking areas. Only two, clearly identified walkways cross a parking lot. The plan does not include walkway improvements along the “Loop Road.”

6. The site plan identifies a 5-foot split rail (or similar fence) on the west side of the site, located between the two access driveways. It is not clear from the site plan whether this will continue to the north or south of the driveways.

7. The project is a multi-family complex where the developer/owner will be responsible for maintaining the property, including garbage pick-up.

8. Supporting documents include a traffic study and a storm water study , both by Mackenzie Engineering, wetland analysis by Christine McDonald, and a geotechnical analysis by Carlson Engineering. While the project requires certain improvements, e.g., construction of infiltration basins, the consultants and agencies did not identify issues that would prohibit the proposed development.

C. Section 3.030(2)(c) permits a “multi-family dwellings” in the Special Residential/Recreation Zone. In addition, Subsection (4)(c) requires the Planning Commission to use the Planned Development procedures in Section 4.136 when evaluating an application. Please note that as a PUD, the Planning Commission has the authority to modify all development standards except for housing density.

D. Section 3.030(3)(d) lists “community meeting building” as a conditionally permitted use. In this case, the community building is part of the residential development and not a separate facility designed to be open to the public. For this reason, the submittal does not require a separate conditional use application.

E. This application and review are only considering the planned development layout, and not the individual buildings. This application <u>does not</u> include a design review for any structure, nor is one required for a permitted use in the S-R/R zone. However, the layout does contain proposed building locations, and if approved, the Commission has the authority to condition their decision on the final layout conforming to the proposal, including the relative size and position of the buildings.

F. The City forwarded the application to affected agencies and area property owners. The Manzanita Department of Public Works indicated public water serves the site, with water mains available at Necarney City Road. In addition, the State of Oregon awarded grant funding to the city to add a new water main to Classic Street. This improvement will include a booster line to the property thereby providing adequate fire flows to the site. Nehalem Bay Wastewater Agency confirmed sanitary sewer is available to serve the site. Nehalem Bay Fire & Rescue noted the site is conditionally acceptable subject to a final inspection. The City did not receive additional comments as of the date of this report.

G. The City's engineering consultant reviewed the Mackenzie Engineering traffic study and noted the following:

> *Based on a review of the TIA for the proposed workforce housing development, the following revisions to the TIA are requested:*
>
> - *The TIA does not include a left-turn lane warrant analysis at the proposed site access intersection of Loop Road at Necarney City Road, as was requested in Lancaster Mobley's Traffic Scoping letter. The applicant's transportation engineer will need to update the TIA to include this analysis.*
> - *The TIA does not include a professional engineer's stamp certifying the study. The study will need to be stamped by a professional engineer licensed in the state of Oregon.*
>
> *Lancaster Mobley recommends the City of Manzanita place a condition of approval on the application to review and confirm that adequate intersection sight distances will be available at the Loop Road at Necarney City Road intersection as part of its design process.*

III. ADJUSTMENTS AND MODIFICATIONS

A. As noted, a Planning File #24007 annexed the property and established the S-R/R zoning. Condition "A." of the zone change required the following:

> *A. Development of the newly annexed property shall be limited to moderate income housing as defined in Oregon Revised Statutes 456.270 and subsequent legislative amendments. This limitation shall be placed as a deed restriction and evidence of the restriction*

shall be provided prior to submittal of any applications or permits to develop the newly annexed property.

The applicant submitted a letter from Oregon Housing and Community Services indicating the project is eligible for affordable housing funding. Therefore, this application is consistent with the requirements of Condition "A."

B. After the submittal of the application, new state regulations regarding affordable housing came into effect (SB1537) on January 1, 2025. These regulations <u>require</u> local governments to approve adjustments to certain development standards involving affordable housing projects. For example, a jurisdiction must approve a request to increase the building height by 20% or reduce required setbacks by 10%. As an affordable housing project, the application is subject to provisions in SB1537.

C. The applicant is requesting three modifications as part of the development:
   1. An increase in building height from 28'6" to 37' 2". SB1537 would automatically permit an increase to 34' 2"; the applicant is requesting an additional height increase of 3-feet.
   2. Reduction in the front yard setback from 20-feet to 10-feet.
   3. A reduction in parking spaces from two spaces per unit to 1.6 spaces per unit.

   In each above item, the decision to allow modifications of the standards rests with the Commission. Further, the Zoning Ordinance does not include criteria or guidelines on determining modification to a planned unit development.

IV. <u>PLANNED UNIT DEVELOPMENT PROVISIONS</u>

A. Evaluation of the proposal is based on the planned unit development procedures in Section 4.136. The following subsections review these provisions:

   1. Section 4.136.1., reviews the purpose of a planned development. Briefly, a "planned development" permits the application of greater freedom of design in land development than may be possible under a strict interpretation of the provisions of this Ordinance.

      FINDINGS: This is directly applicable to the request. Section 3.030(4)(c) requires the Commission to apply the planned unit development provisions in Section 4.316.

2. Section 4.136.2., establishes the following standards and requirements:

(a) A planned development may include any uses and conditional uses permitted in any underlying zone. Standards governing area, density, yards, off-street parking, or other requirements shall be guided by the standards that most nearly portray the character of the zone in which the greatest percentage of the planned development is proposed.

FINDINGS: The proposal establishes a multi-family apartment complex, a use previously identified as permitted in the S-R/R zone. Further, the S-R/R zone establishes the base requirements, that per Section 4.136.1, an applicant may modify.

(b) The developer may aggregate the dwellings in this zone in "cluster" or multiple-dwelling structures so long as it does not exceed the density limits of the Comprehensive Plan.

FINDINGS: The plan aggregates the dwellings as multiple-dwelling structures, clustered at the south end of the site.

The Zoning Ordinance implements the Comprehensive Plan and establishes the density limit for the S-R/R zone. Section 3.030(4)(a) states the following:

(a) Overall density for the SR-R zone is 6.5 dwelling units per gross acre. Dwellings may be clustered on one portion of a site within the SR-R zone and achieve a maximum density of 13 dwellings per acre where at least 40% of the total lot or parcel area is reserved or dedicated as permanent open space as a public or private park area or golf course. The open space shall be so indicated on the Plan and zoning map, and deed restrictions to that effect shall be filed with the City.

The open space totals 1.88 acres or 40.6% of the site. Therefore, the maximum allowable density on the property is 13 dwelling units. This allows 60.6 dwelling units (60 dwelling units rounded down) on the 4.62-acre site. The proposed project at 60 dwelling units complies with the density standard. Finally, all open space will remain part of the private project and limited to the residents.

(c) Assurances such as a bond or work agreement with the City may be required to ensure that a development proposal as submitted is completed within the time limit agreed upon by the developer and the commission.

FINDINGS: Bonding is an option available to the City to ensure development of the site.

B. Section 4.136.3 addresses the Planned Unit Development Procedure. The following procedures shall be observed in applying for and acting on a planned development:

(a) An applicant shall submit 10 copies of a preliminary development plan to the Planning Commission and notify all property owners within 250 feet of the proposed development by mail.

FINDINGS: The material submitted as part of the application complies with the provisions in this Section. The City provided notice to affected agencies and area property owners per provisions in this Section.

(b) Prior to discussion of the plan at a public hearing, the City Manager shall distribute copies of the proposal to appropriate City agencies or staff for study and comment.

FINDINGS: Per this item, the City posted online and distributed the submitted plans and related application material to the Commission prior to the meeting.

(c) The Planning Commission shall consider the preliminary development plan at a meeting, at which time the comments of persons receiving the plan for study shall be reviewed. In considering the plan, the Planning Commission shall seek to determine that:

(1) There are special physical conditions of objectives of development which the proposal will satisfy to warrant a departure from the standard ordinance requirements.

FINDINGS: The site's topography does not create any special limitations on development provided the developer makes certain improvements to the site such as the stormwater drainage system and building foundations (see respective engineers' reports). Provisions in Section 3.030 require the Commission to review the application as a planned unit development. Item "D." below, reviews compliance or changes to the standard ordinance requirements.

(2) Resulting development will not be inconsistent with the Comprehensive Plan provisions or zoning objectives of the area, particularly with regard to dune stabilization, geologic hazards, and storm drainage.

FINDINGS: Ordinance 95-4 implements the City's Plan and appropriately zoned the site for residential uses. This project establishes multifamily dwelling units at a density permitted by the Ordinance and is therefore consistent with the intended use.

Submitted engineers' reports indicate the site, with identified improvements, can accommodate the development. The Commission may place these requirements as development conditions.

(3) The area around the development can be planned to be in substantial harmony with the proposed plan.

FINDINGS: Residential development is located to the east but on property outside City limits. Otherwise, a sizable portion of the immediate area is undeveloped. Due to the site location, the proposed project effectively establishes the potential development pattern for this area. However, while potentially establishing such a pattern, the Zoning Ordinance clearly identifies the project as permitted in the S-R/R zone.

(4) The plan can be completed within a reasonable period of time.

FINDINGS: It is the City's understanding that the applicant intends to develop the project in a single phase. Regardless, the Commission retains the authority to place reasonable constraints on the timing of activities.

(5) The streets are adequate to support the anticipated traffic, and the development will not overload the streets outside the planned area.

FINDINGS: The applicant submitted a traffic study addressing this issue. The report provides the following summary:

> *All study area intersections are expected to operate at acceptable levels per ODOT and City standards with the addition of site trips, and vehicle queues will not exceed available storage.*
>
> *The minimum required intersection sight distance of 280 feet is available from the driveways on Loop Road. The proposed intersection between Loop Road and Necarney City Road will address required sight distances through the design process.*
>
> *Therefore, we do not recommend any mitigation measures for Necarney City Road or Loop Road.*

Effectively, the analysis concluded that the limited traffic generated by the development does not significantly impact the local street system requiring off-site improvements.

However, the analysis assumed the construction of the proposed "Loop Road." Per discussions with the City, this road will eventually be dedicated as a public street upon recording of the partition plat. At a minimum, it is recommended the street be improved at least up to the proposed south entrance to allow emergency vehicle access.

(6) Proposed utility and drainage facilities are adequate for the population densities and type of development proposed.

FINDINGS: The applicant submitted a storm water routing plan for the development. Preliminary analysis indicates the project requires the use of infiltration ponds. Compliance with this provision will be determined when the applicant submits engineering plans, and for the record, development cannot proceed unless the submitted engineering plans comply with City, and affected agency, engineering standards.

(d) The Planning Commission shall notify the applicant whether, in its opinion, the foregoing provisions have been satisfied and, if not, whether they can be satisfied with further plan revision.

FINDINGS: This is a procedural requirement, whereby the decision and any conditions of approval are determined at the Commission hearing. Afterwards, the City notifies the applicant of the Commission's decision.

(e) Following this preliminary meeting, the applicant may proceed with his request for approval of the planned development by filing an application for an amendment to this Ordinance.

FINDINGS: The purpose of this provision is to identify the site as a planned development on the City's zoning map (see item "(g)" below). In effect, this requires submittal and review of a final plan.

(f) In addition to the requirements of this section, the Planning Commission may attach conditions it finds are necessary to carry out the purposes of this Ordinance.
FINDINGS: If approved, this staff report includes a list of recommended conditions for the Commission to consider.

(g) An approved planned development shall be identified on the zoning map with the letters PD in addition to the abbreviated designation of the existing zoning.

FINDINGS: The City assumes this responsibility for an approved decision.

(h) Building permits in a planned development shall be issued only on the basis of the approved plan. Any changes in the approved plan shall be submitted to the Planning Commission for processing as an amendment to this Ordinance.

FINDINGS: The request does not include specific design standards that would apply to any building permit requirements. However, the layout identifies the location of the various buildings, parking, and open space. The project must conform to this layout unless otherwise modified by the Commission decision.

D. Section 3.030(4)(b) states the following:

Standards other than density in the SR-R zone shall conform to those established in the R-3 zone (Section 3.020) except that the Planning Commission may authorize relaxation of these standards to permit flexibility in design such as cluster development, with respect to lot size, setbacks, and lot coverage, but not use.

While zoned S-R/R, the development regulations in the R-3 zone apply to this project. As stated, the Commission may modify these standards, except for density. In addition, provisions in SB1537 mandate that a jurisdiction adjust certain standards as a means to encourage affordable housing.

Section 3.020(3) contains the applicable standards of the R-3 zone. The following reviews each standard:

1. (3)(a) - The minimum lot size shall be 5,000 square feet for single family or duplexes, plus 2,500 square feet for each additional dwelling unit.

   FINDINGS: The minimum area required for the 60 units is 150,000 square feet [5,000 + (58 x 2500] or 3.44 acres. The 4.62-acre site exceeds this minimum requirement, and as previously noted, the layout complies with the underlying density requirement.

2. (3)(b) - The minimum lot width shall be 40 feet, except on a corner lot it shall be 60 feet.

   FINDINGS: The proposal complies as the lot width is approximately 677 feet, with frontage along the “Loop Road” exceeding 300 feet.

3. (3)(c) - The minimum lot depth shall be 90 feet.

   FINDINGS: The proposal complies as the depth ranges from approximately 200-feet to 460-feet.

4. (3)(d) - The minimum front yard shall be 20 feet, or the average setback of buildings within 100 feet of both sides of the proposed building on the same side of the street, whichever is less. For purposes of determining the average setback of buildings, vacant lots within 100 feet of both sides of the proposed building on the same side of the street shall be included and shall

be assumed to have a building placed 20 feet from the front lot line to the nearest part of the building. In no case shall the front yard setbacks be less than 12 feet.

FINDINGS: The front yard is located along the “Loop Road,” where there is a 20-foot requirement. The applicant requested a reduction to 10-feet. Per 3.030(4)(b), the Commission may reduce the setback as part of the PUD process. The setback reduction affects four of the five residential buildings but only impacts an estimated 20% of the planned street frontage. This reduction allows clustering of the buildings to create the proposed open space. On balance, the reduction appears reasonable.

5. (3)(e) - The minimum side yard setback shall be 5 feet for the portion of the building at the setback line up to 10 feet in height as measured vertically from average finished grade to the highest point of that portion of the building and shall be 8 feet for any portion of the building where this height is exceeded; except that a roof with a pitch of less than or equal to 8 in 12 may extend upward from the 5-foot setback line to the 8-foot setback line. The street side yard setback of a corner lot shall be 12 feet.
FINDINGS: The side yards are located along the north and south property lines. In both cases, the layout complies with the minimum requirement.

6. (3)(f) - The maximum building or structure height shall be 28 feet, 6 inches. However, if more than one-half of the roof area has a roof pitch of less than 3 in 12, the building or structure height shall not exceed 24 feet. The height of a stepped or terraced building shall be the maximum height of any segment of the building or structure.

FINDINGS: As noted, SB1537 compels local jurisdictions to approve a height adjustment of up to 20% for affordable housing projects. This would raise the maximum height to 34 feet 2 inches. However, the applicant requested 3-foot increase to 37 feet 2 inches, or approximately 30% greater than the maximum.

In examining the elevation drawings, the interior ceiling heights are 9 or 10 feet. It is not certain whether these heights are necessary to build the structure where a slightly shorter 8-foot ceiling may be feasible, thereby limiting the height increase to 20%.

However, the difference between the two heights is only 3-feet and may be a matter of aesthetics. The increase is a purely subjective decision without applicable criteria. This project will establish a development pattern for the area and the Commission may want to consider whether the 30% increase may set a pattern for similar projects.

7. (3)(g) - The minimum rear yard setback shall be 10 feet.

   FINDINGS: The rear yard is located along the east property line and the structures exceed the minimum requirement.

8. (3)(h) - The maximum lot coverage in the R-3 zone shall not exceed 55%. Less lot coverage may be required in steeply sloping areas or areas with drainage problems. In all cases, the property owner must provide the City with a storm drainage plan which conducts storm runoff into adequately sized storm drains or approved natural drainage as approved by the Public Works Director.

   FINDINGS: Based on the applicant's area calculations, the lot coverage is approximately 34%.

9. (3)(i) - In areas of the City without a high-water table, a dry well capable of absorbing the storm runoff of the impervious surfaces of the property shall be provided in accordance with City standards.

   FINDINGS: As noted, the applicant submitted a potential storm water plan, addressing these concerns. Final submittal, review, and acceptance of engineering plans will ensure compliance with this requirement.

F. The planned unit development provisions do not specifically address parking requirements. Per Section 4.090(3)(a) the parking standard is two spaces per dwelling unit, requiring 120 parking spaces for the entire development. The applicant requested a modification of this standard to require only 96 spaces, or 1.6 spaces per unit and submitted an analysis to support this request. A summary of the applicant's responses follows:

   Having two spaces per unit would provide more parking than necessary for an affordable housing development that mixes one-, two- and three-bedroom apartments. Although it is safe to assume each dwelling will need to accommodate at least one car, having more than one car is not a luxury many low-income families or individuals can afford. And smaller apartments, *with fewer residents, typically do not utilize more than one parking space. A ratio of 1.6 spaces per unit still maintains enough parking to balance the needs of the larger dwelling units with the smaller apartments.*

A relaxation of the parking standard is also requested out of respect for the limitations of the property. Reducing the parking along the northeastern edges pulls the development further away from the steeply sloped dune area. This allows more of the natural terrain and existing vegetation to remain undisturbed and preserves more open space throughout the community.

FINDINGS: On balance, the creation of 96 spaces for the proposed development appears reasonable. Also, fewer parking spaces decreases the amount of pervious surfaces, thereby reducing storm drainage impacts.

G. The current Manzanita Zoning Ordinance #95-4 does not have a requirement for bicycle parking. However, the applicant anticipates future Ordinance amendments will require bicycle parking with proposed Transportation System Plan recommending two spaces per four dwelling units. Based on this calculation, the project requires 30 spaces [60 dwelling units / 4) x 2 = 30]. The proposed site design provides 32 bicycle spaces across the development, exceeding the anticipated minimum requirement.

H. Like parking, the PUD process does not specifically address the requirements for multi-family projects. Section 4.060 lists additional siting criteria:

1. At least 50% of the required open space area is usable by residents. This can be in the form of lawns, outdoor play areas, swimming pools, patios, or decks, or where the Planning Commission permits, indoor areas such as recreation rooms, meeting areas or indoor swimming pool.

   FINDINGS: Except for the two dedicated storm water swale areas, all open space area is usable by residents. This includes an outdoor plaza, playground, lawns, pathways, and nearly two acres of natural open space reserved as natural habitat and buffer.

2. Parking and storage areas are covered if possible, or are located in an unobtrusive location, and are buffered from surrounding residences if any, with trees, hedges, fences or other types of screening.

   FINDINGS: The site includes covered maintenance and trash storage areas, located towards the rear (east side) of the property and screened by new and existing vegetation.

The parking lot, although not covered, loops around the development, with most of the parking spaces located along the rear of the property, away from the street. The parking lot configuration minimizes its visual impact on the street, allowing the buildings and landscape to become the prominent elements along the street frontage. New street trees, interior lot landscaping, perimeter hedges and existing natural vegetation all serve to screen the parking lot from the surrounding areas.

3. Parking and traffic circulation must be adequately designed to afford access to dwellings to provide loading zones and sufficient maneuvering space. Safety of ingress and egress from adjacent streets must be considered.

FINDINGS: With two proposed driveways, the parking layout provides a continuous and safe circulation loop through the development. Parking stalls are near the dwelling units, play areas, and common clubhouse building, offering convenient access for all residents. The parking area also incorporates a 26' wide drive aisle, providing sufficient maneuvering space, extra room for loading, and fire access throughout the site.

V. SUMMARY COMMENTS

A. Under consideration is a basic layout that establishes the framework for future development of the site. Based on the submitted material and layout, the Zoning Ordinance allows the use. Reducing the front yard setbacks and parking requirements appear appropriate. The Commission must approve the 20% increase in the building height but may wish to consider whether the proposal warrants an additional 3-foot increase.

B. Information submitted by the City and other public agencies state the site is serviceable. The City and NBWA must review, and approve, final engineering plans before any construction may begin. Further, the site does not contain wetlands, geotechnical hazards, or similar limitations preventing development.

C. Per Section 4.316, the applicant must return to the Commission with final plans detailing building locations, final facility improvements, and open space improvements to ensure consistency with the approved decision.

D. The planned development provisions in Section 4.136 do not establish any time limits for the project. So that the developer completes the project within a reasonable amount of time, staff suggests the Commission limit the approval to two years from the date of the final decision.

VI. RECOMMENDATION AND CONDITIONS OF APPROVAL

City staff finds the proposal complies with the applicable Planned Development criteria and recommends the Planning Commission approve the application subject to the following Conditions:

A. The preliminary approval shall be limited to the layout submitted, and approved, as part of this application and include the following:
   1. The minimum front yard setback shall be 10-feet.
   2. The site shall include a minimum of 96 vehicle parking spaces and 32 bicycle parking spaces.
   3. The maximum building height for any structure shall be 34-feet, 2-inches.

B. The final plan shall be approved within two years of the final date of approval.

C. The applicant shall submit evidence confirming that adequate intersectional sight distances shall be available at the “Loop Road” at Necarney City Road intersection as part of its design process. This evidence shall be prepared by a licensed individual and shall be reviewed and approved by the City prior to commencing construction of any one structure.

D. No one structure shall be occupied until such time the proposed “Loop Road” is platted and dedicated to the public. During construction, "Loop Road" shall be sufficiently improved, according to Nehalem Bay Fire District requirements, to ensure emergency vehicle access.

E. Compliance with the Conditions of Approval shall be the sole responsibility of the applicant.

VII. PLANNING COMMISSION ACTION

A. The Planning Commission has the following options:

   1. Approve the application, adopting findings and conditions contained in the staff report;

   2. Approve the application, adopting modified findings and/or conditions;

   3. Deny the application, establishing findings as to why the application fails to comply with the decision criteria.

   4. Continue the hearing to a date and time certain.

B. Staff will prepare the appropriate document for the Chair’s signature.

1130 SW Morrison St., Suite 318
Portland, OR 97205
503.248.0313
lancastermobley.com

Memorandum

To: **Scott Gebhart**
City of Manzanita

From: **Daniel Stumpf, PE**
Todd Mobley, PE

Date: **January 31, 2025**

Subject: **Workforce Housing**
Transportation Impact Analysis Review

Introduction

This memorandum provides our transportation engineering review comments for a proposed workforce housing project located in Manzanita, Oregon at tax lot 3N10280001401. The proposal will include the construction of a 60-unit apartment complex, where dwelling units are intended as an affordable housing option for local residents. Access to the site will be provided via the future intersection of Loop Road at Necarney City Road.

The following section details Lancaster Mobley's review findings of the application's Transportation Impact Analysis (TIA) dated November 13, 2024, and prepared by Mackenzie.

Review Findings

Trip Generation & Distribution

The project's TIA indicates the proposal will construct a 60-unit apartment use on currently undeveloped property. This will result in the project generating 28 PM peak hour trips and 289 daily trips during a typical weekday. During a typical Saturday, the proposed development is estimated to generate 25 peak hour trips. Trip generation estimates were based on the current *ITE Trip Generation Manual, 11th Edition*, utilizing data from the following land use codes:

- Weekday Trip Generation: 223, *Affordable Housing (Income Limits)*, based on the number of dwelling units.
- Saturday Trip Generation: 220, *Multifamily Housing (Low-Rise)*, based on the number of dwelling units.

The reason the applicant used data from land use code 220 to estimate Saturday peak hour trip generation is because code 223 has limited available data for this time period.

The TIA utilized traffic count data collected at the intersection of Pine Ridge Lane at Necarney City Road and at the study intersection, as well as referenced data from other similar residential development studies in the area, to develop site trip distribution assumptions for a typical weekday and Saturday.

Lancaster Mobley concurs with the TIA's trip generation & distribution methodologies and findings.

Traffic Volumes
To estimate existing year 2024 traffic volumes at the study intersections, the TIA utilized weekday PM peak hour and Saturday peak hour traffic counts collected at the intersections of Pine Ridge Lane at Necarney City Road and Oregon Coast Highway (US-101) at Necarney City Road. Counts were collected on the following dates and time periods:

- Thursday, October 10, 2024, from 4:00 PM to 6:00 PM.
- Saturday, October 12, 2024, from 11:30 AM to 2:30 PM as well as from approximately 12:00 PM to 2:45 PM.

The volumes were seasonally adjusted to reflect the 30th highest hour volumes per ODOT's Analysis Procedures Manual. A seasonal adjustment factor of 1.19 was calculated utilizing Coastal Destination trend data from ODOT's 2023 Seasonal Trend Table.

To estimate year 2026 traffic conditions, the anticipated opening date of the proposed apartments, the following were conducted:

- Utilizing ODOT's 2040 Future Volumes Table, a 1% per year growth rate was calculated along US-101 and applied to the existing year volumes over a two-year period.
- In-process development trips associated with the following nearby development projects were added to the grown traffic volume estimates: Manzanita Lofts, Heron's Rest, and Nehalem Bay State Park Expansion.
- Site trips generated by the proposed apartment project were added to the study intersection volumes.

Upon reviewing Figures 3 through 10 in Appendix A of the report, the estimated traffic volumes and methodologies used to develop these volumes appear to be reasonable and correctly calculated.

Capacity Analysis
The TIA reviewed operation at the study intersections by utilizing 2024 existing volumes (seasonally adjusted), 2026 pre-development volumes, and 2026 post-development volumes, based on the Highway Capacity Manual (HCM) 7th Edition. For all analysis scenarios, the study intersections operated no worse than the following level of services (LOS) and volume-to-capacity (v/c) ratios:

1. US-101 at Necarney City Road: LOS C with a v/c ratio of 0.36.
2. Loop Road at Necarney City Road: LOS A with v/c ratio of 0.02.

According to the Oregon Highway Plan, the intersection of US-101 at Necarney City Road is required to operate with a v/c ratio no greater than 0.85. The City of Manzanita does not have an adopted mobility standard for intersections; therefore, intersections are assumed to have to operate at LOS D or better.

Based on a review of the reported operational results and capacity reports, all study intersections are expected to operate within acceptable agency standards. Lancaster Mobley concurs with these findings.

Queuing Analysis
The TIA includes a queuing analysis at the study intersections, where 95th percentile queues were estimated utilizing SimTraffic software. Adequate queue storage space was reported to be available at the study intersections. Lancaster Mobley concurs with these findings.

Crash Data Analysis
The TIA reviewed historical crash data between 2018 and 2022 (five-years) at the intersection of US-101 at Necarney City Road and along Necarney City Road between US-101 and Classic Street. Per the crash data, none of the reported crashes resulted in fatalities, the intersection crash rate was well below ODOT's 90th percentile crash rate threshold, and no other intersection-related crashes were observed along the segment of Necarney City Road (note four crashes not related to a specific intersection that involved only a single vehicle were reported). The TIA concludes that the proposed development will not create or exacerbate safety issues at these transportation facilities.

Lancaster Mobley concurs with these findings and believes the transportation system is expected to operate relatively safely following buildout of the proposed development.

Sight Distance
According to the TIA, sight distances were evaluated at the two proposed driveway intersections along Loop Road. Assuming a design speed of 25 mph along Loop Road, adequate sight distances are expected to be available to allow for safe operation of the two driveways. Lancaster Mobley concurs with these findings.

Intersection sight distances were not reviewed at the proposed access intersection of Loop Road at Necarney City Road, as was requested in Lancaster Mobley's Traffic Scoping letter, dated October 2, 2024. The TIA recommends sight distances be reviewed for the intersection as part of the design process of the proposed intersection. Lancaster Mobley recommends the City of Manzanita place a condition of approval on the application to review and confirm that adequate intersection sight distances will be available at the Loop Road at Necarney City Road intersection as part of its design process.

Missing Items and Analysis
The following items will need to be addressed prior to Lancaster Mobley deeming the TIA complete:

- The TIA does not include a left-turn lane warrant analysis at the proposed site access intersection of Loop Road at Necarney City Road, as was requested in Lancaster Mobley's Traffic Scoping letter. The applicant's transportation engineer will need to update the TIA to include this analysis.
- The TIA does not include a professional engineer's stamp certifying the study. The study will need to be stamped by a professional engineer licensed in the state of Oregon.

Additional Review Comments
During Lancaster Mobley's review of the TIA, several typos/errors were noted in the analysis. Assuming they are corrected, these items are not expected to result in significant changes to the findings and conclusions of the TIA. Therefore, Lancaster Mobley is not recommending the applicant address these items in order to deem their TIA complete, rather, these items are presented for transparency purposes and for the City's consideration.

- Figure 9, which pertains to the proposed development's trip assignment, depicts 16 Saturday peak hour trips enter the project site rather than the 15 peak hour trips reported in Table 2 – Trip Generation. This typo carried through the remainder of the Figures and capacity analysis. No revisions are deemed necessary given the increased entering trips provides a more conservative evaluation of development impacts to the transportation system.

- In the intersection capacity reports:
  - The peak hour factors (PHF) and heavy vehicle percentages used in the 2024 existing conditions analysis do not reflect those reported in the count data that was collected for the study intersections.
  - The PHFs and heavy vehicle percentages used in the 2026 post-development volumes for the weekday PM peak hour were coded to match the Saturday PHFs and heavy vehicle percentages.

  No revisions to address these errors are deemed necessary since correcting these issues are not expected to cause either study intersection to exceed adopted mobility standards or result in significant changes to the queuing analysis findings.

Conclusions & Recommendations

Based on a review of the TIA for the proposed workforce housing development, the following revisions to the TIA are requested:

- The TIA does not include a left-turn lane warrant analysis at the proposed site access intersection of Loop Road at Necarney City Road, as was requested in Lancaster Mobley's Traffic Scoping letter. The applicant's transportation engineer will need to update the TIA to include this analysis.
- The TIA does not include a professional engineer's stamp certifying the study. The study will need to be stamped by a professional engineer licensed in the state of Oregon.

Lancaster Mobley recommends the City of Manzanita place a condition of approval on the application to review and confirm that adequate intersection sight distances will be available at the Loop Road at Necarney City Road intersection as part of its design process.

If you have any questions or concerns regarding this review or would like additional information, please don't hesitate to contact us.

CITY OF MANZANITA
P.O. Box 129, Manzanita,OR 97130-0129
Phone (503) 812-2514 | Fax (503) 368-4145 | TTY Dial 711
planning@ci.manzanita.or.us

PLANNED UNIT DEVELOPMENT

Date: 11 / 26 / 24

File #:	**Pre-App. File #:** 24040 (Date - 10/01/2024)

PRE-APPLICATION CONFERENCE REQUIRED PRIOR TO SUBMITTING APPLICATION

Once submitted, application materials and applicant information become public record.

APPLICANT INFORMATION:

Project Contact Name: Keith Daily	Company: Polyphon Architecture & Design, LLC	
Mailing Address: 4103 NE Tillamook Street, Portland, OR		Zip: 97212
Phone(s): 503-327-8679	Email: keith@polyphon.com	
City Limits: Yes	Urban Growth: Yes ☑ No ☐	

SITE INFORMATION:

Site Address:	
Map & Tax Lot(s): Tax Map - 03N10W28 / Tax Lot - 1401	Zone: SR/R
PROPOSAL (brief description):	
Develop 60 units of affordable, multifamily housing on a 4.62 acre site. Development includes fourteen 1-bedroom apartments, twenty-three 2-bedroom apartments and twenty-three 3-bedroom apartments distributed across 5 residential buildings. The cluster development reserves permanent open space and also includes a common clubhouse building, outdoor plaza, playground and on-site parking.	

REQUIRED DOCUMENTS

(Please submit electronic copies of all documents as a PDF to buidling@ci.manzanita.or.us)

Planned Unit Development- $2,250 +5% Tech Fee

1. Completed Request Form (An invoice with payment instructions will be emailed once all required documents have been received)
2. Email a PDF Copy of all documents to building@ci.manzanita.or.us. Provide Three (3) paper copies of all submittal documents. Drawings must be to scale.
3. Approval letters from the following:
   a. Public Works, 503-368-5343
   b. Nehalem Bay Wastewater, 503-368-5125
   c. Nehalem Bay Fire & Rescue, 503-368-7590
   d. Tillamook County Environmental Health Program Manager, 503-842-3909 (When required)
4. Wetland Delineation Study (When required)
5. Stormwater Retention
6. Traffic impact Analysis (When required)
7. Narrative: A detailed description of your proposal. Include a brief description of the physical context of the site, including a map showing the site and surrounding properties.

8. The design plan must identify: **(Manzanita Zoning Ordinance 95-4, Section 4.136 3. (a)**
    a. A map of existing conditions showing contour lines, major vegetation, natural drainage, streams, water bodies and wetlands.
    b. Proposed land uses, lot overages, building locations and housing unit densities.
    c. Proposed circulation pattern indicating the status of street ownership.
    d. Proposed open space uses.
    e. Proposed grading and drainage pattern.
    f. Geologic hazards study where required.
    g. Proposed method of water supply and sewage disposal.
    h. Relation of the proposed development to the surrounding area and the Comprehensive Plan.
9. **See Section 4.136 3. (c) for additional information**

MANZANITA PINES

LAND USE REVIEW SET
01/03/25

PROJECT TEAM

OWNER / DEVELOPER
HOME FIRST DEVELOPMENT
4351 SE HAWTHORNE BLVD.
PORTLAND, OR 97215
360.530.9914
HFDPARTNERS.COM

GREEN LIGHT DEVELOPMENT
3462 NE SANDY BLVD.
PORTLAND, OR 97232
CELL : 503.528.6129
GREENLIGHTHOUSING.COM

JIM PENTZ
ENCORE INVESTMENTS LLC

ARCHITECT
SCHUYLER SMITH
POLYPHON ARCHITECTURE & DESIGN, LLC.
4103 NE TILLAMOOK STREET
PORTLAND, OR 97212
503.327.8679
POLYPHON.COM

CIVIL
RALPH HENDERSON, PE
MACKENZIE
D: 971.346.3685 | C: 503.705.2612
WWW.MACKENZIE.INC

CONTRACTOR
PAUL NICKERSON
EICHLER CONSTRUCTION
PAULN@EICHLER-CG.COM
CCB#

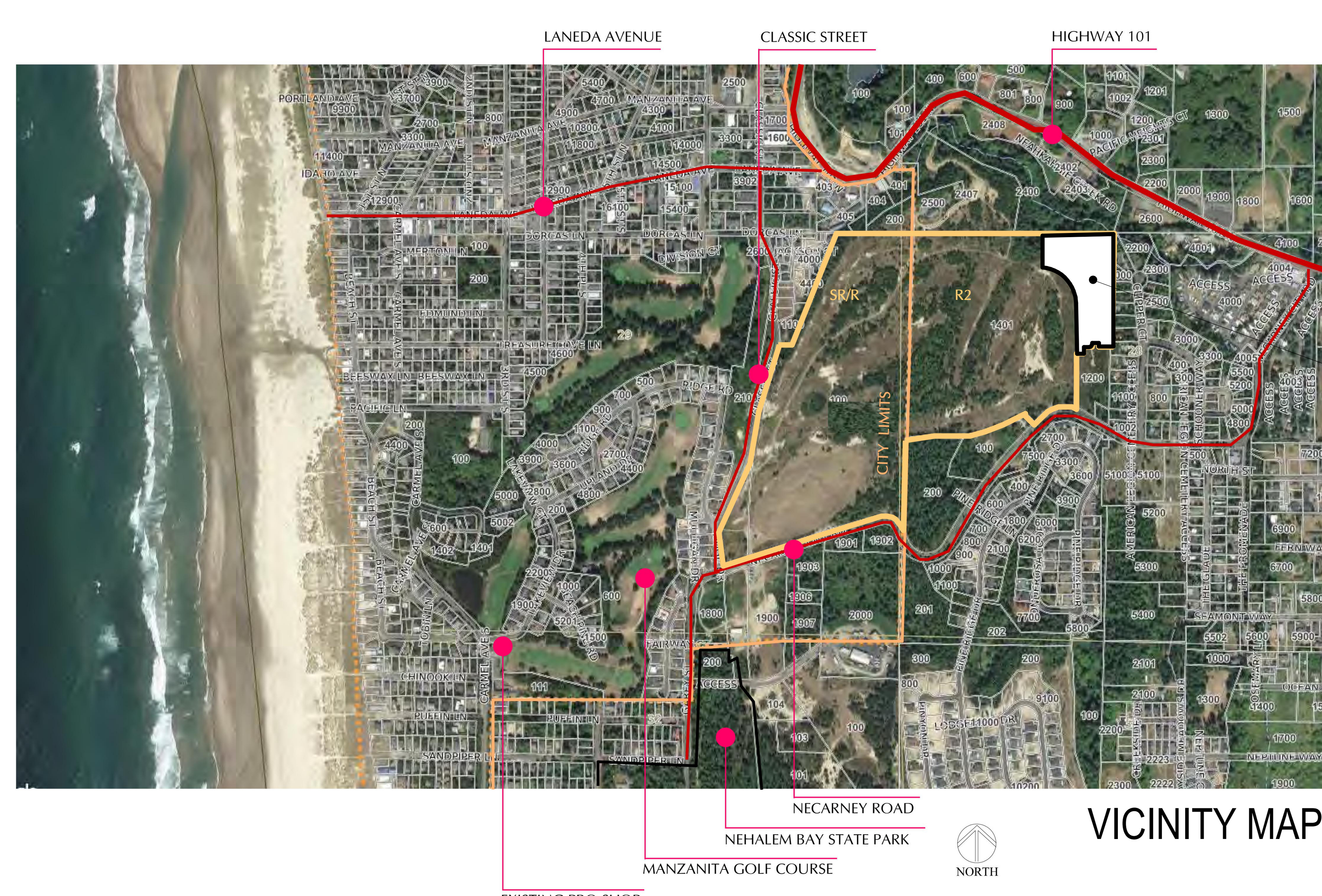
GEOTECH
BRAD WILCOX, PE, GE
CARLSON GEOTECHNICAL
503.601.8250
WWW.CARLSONTESTING.COM

LANDSCAPE
LAURA A. ANTONSON, RLA, ASLA
LAURUS DESIGNS, LLC.
1012 PINE STREET
SILVERTON, OR 97381
503.784.6494
LAURA@LAURUSDESIGNS.COM

STRUCTURAL
GABY MASSAAD PE, SE
MASSAAD ENGINEERING GROUP, LLC.
6775 SW 111TH AVENUE
BEAVERTON, OR 97008
503.486.5387
MGROUPENGINEERING.COM

SURVEY
ERICK WHITE
ONION PEAK DESIGN
503-440-4403
ERICK.OPD@GMAIL.COM

SHEET INDEX



VICINITY MAP

polyphon
ARCHITECTURE & DESIGN, LLC
polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

KEYNOTES

NOTES
1. INSERT NOTE
2. INSERT NOTE

1 C1.01 EXISTING CONDITIONS PLAN

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

M.
Architecture • Interiors
Planning • Engineering

Portland, OR 503.224.9560
Vancouver, WA 360.695.7879
Seattle, WA 206.749.9993
www.mackenzie.inc
MACKENZIE.

MANZANITA PINES - LAND USE REVIEW
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

EXISTING CONDITIONS PLAN

SHEET TITLE
C1.01

ORIGINAL SHEET SIZE : 22"x34"

KEYNOTES

NOTES

TO DETERMINE AVERAGE FINISHED GRADE, SPOT ELEVATIONS ARE PROVIDED ADJACENT TO THE MID POINT OF EACH BUILDING ELEVATION, 5' OFF THE EXTERIOR WALL. AVERAGE FINISHED GRADE IS NOTED AT EACH BUILDING ELEVATION FOR THE PURPOSE OF CALCULATING BUILDING HEIGHT.
REFER TO THE ARCHITECTURAL SITE PLAN, A0.1 AND EXTERIOR BUILDING ELEVATIONS FOR RIDGE AND BUILDING HEIGHT CALCULATIONS RELATIVE TO THE AVERAGE FINISHED GRADES NOTED HERE.

AVERAGE FINISHED GRADES

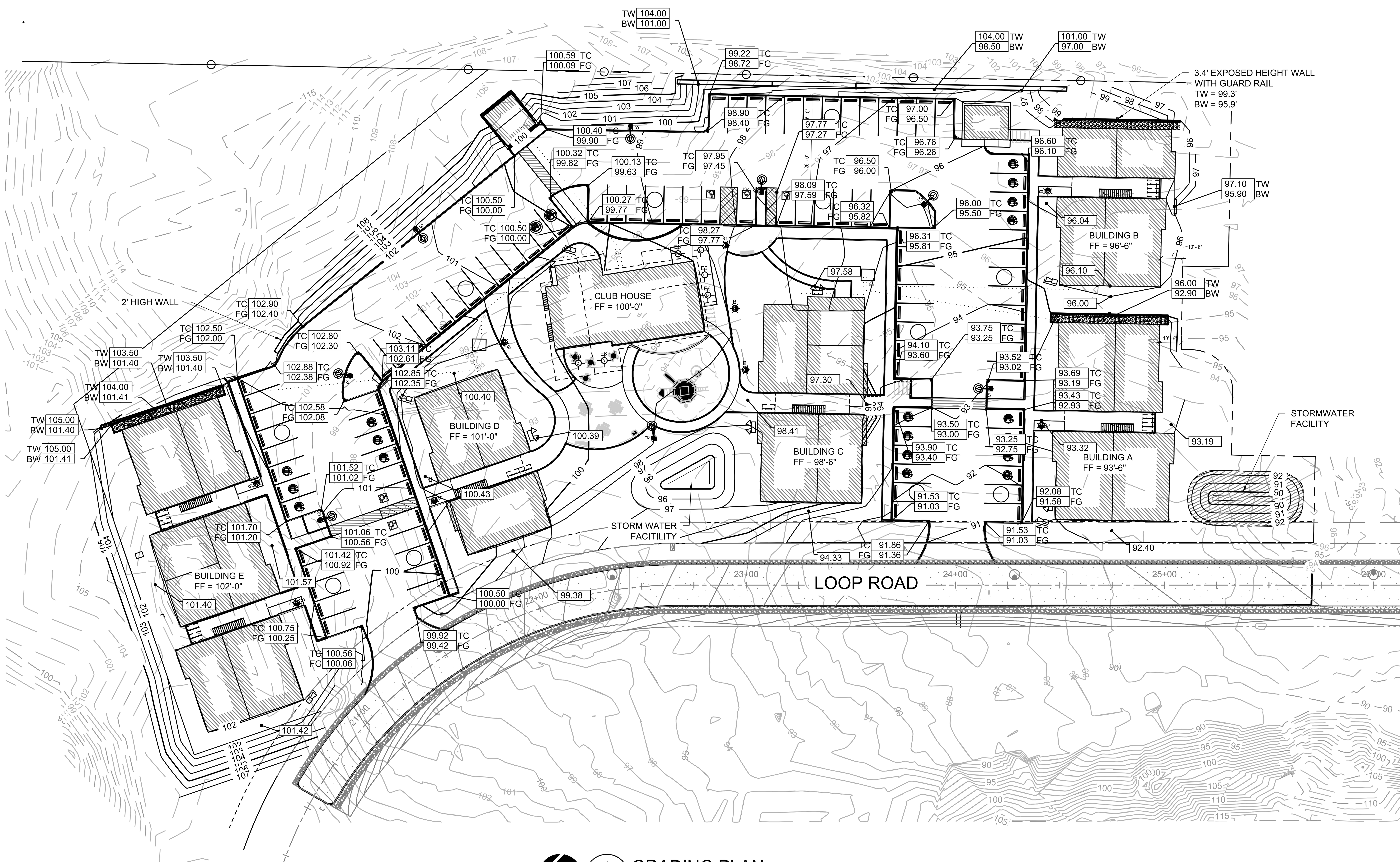
BUILDING A - NORTH ELEVATION = 93.32
BUILDING A - EAST ELEVATION = 96.00
BUILDING A - SOUTH ELEVATION = 93.19
BUILDING A - WEST ELEVATION = 92.40

BUILDING B - NORTH ELEVATION = 96.04
BUILDING B - EAST ELEVATION = 99.3
BUILDING B - SOUTH ELEVATION = 97.10
BUILDING B - WEST ELEVATION = 96.00

BUILDING C - NORTH ELEVATION = 98.41
BUILDING C - EAST ELEVATION = 97.58
BUILDING C - SOUTH ELEVATION = 97.30
BUILDING C - WEST ELEVATION = 94.33

BUILDING D - NORTH ELEVATION = 100.43
BUILDING D - EAST ELEVATION = 100.40
BUILDING D - SOUTH ELEVATION = 100.39
BUILDING D - WEST ELEVATION = 99.38

BUILDING E - NORTH ELEVATION = 101.40
BUILDING E - EAST ELEVATION = 103.50
BUILDING E - SOUTH ELEVATION = 101.57
BUILDING E - WEST ELEVATION = 101.42



1 C1.20 GRADING PLAN

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212
polyphon.com

M.
Architecture • Interiors
Planning • Engineering

Portland, OR 503.224.9560
Vancouver, WA 360.695.7879
Seattle, WA 206.749.9993
www.mackenzie.inc

MACKENZIE.

MANZANITA PINES - LAND USE REVIEW

0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

GRADING PLAN

SHEET TITLE

C1.20

ORIGINAL SHEET SIZE : 22"x34"

216045400\4_DRAWINGS\CIVIL\PHASE 8\454-C1.20.DWG:C1.20 AOC 01/02/25 12:33 1:30

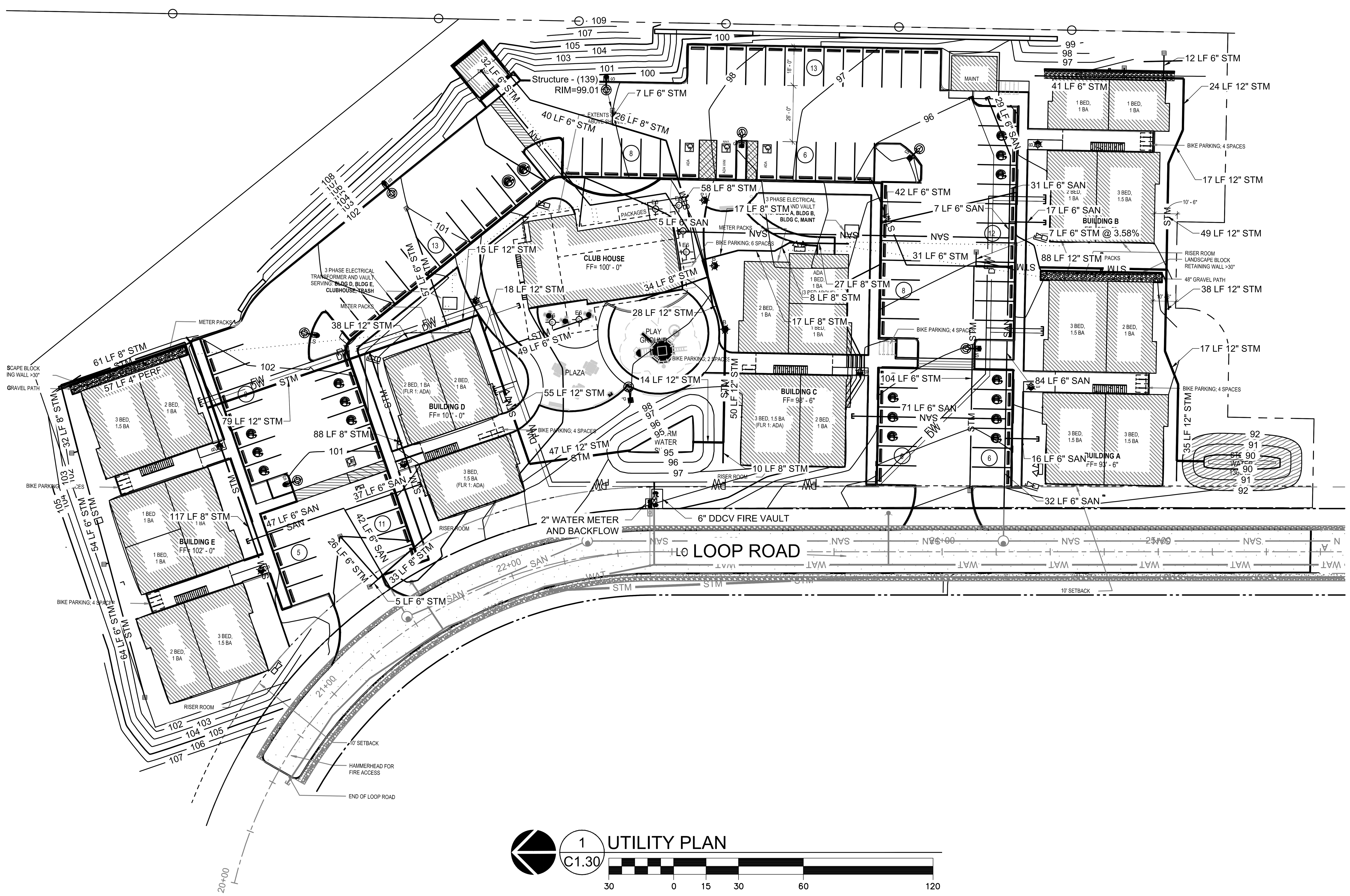
KEYNOTES

NOTES

1. INSERT NOTE
2. INSERT NOTE

STORM STRUCTURES TABLE

SEWER STRUCTURES TABLE



1 C1.30 UTILITY PLAN

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

MECHANICAL JOINT RESTRAINTS

PIPE SIZE	PIPE FITTING	MINIMUM MECHANINCAL JOINT RESTRAINT LENGTH

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212
polyphon.com

M.
Architecture • Interiors
Planning • Engineering

Portland, OR 503.224.9560
Vancouver, WA 360.695.7879
Seattle, WA 206.749.9993
www.mackenzie.inc

MACKENZIE.

MANZANITA PINES - LAND USE REVIEW

0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

UTILITY PLAN

SHEET TITLE

C1.30

ORIGINAL SHEET SIZE : 22"x34"

216045400\4_DRAWINGS\CIVIL\PHASE 8\454-C1.30.DWG:C1.30 AOC 11/22/24 16:11 1:30

MANZANITA PINES APARTMENTS

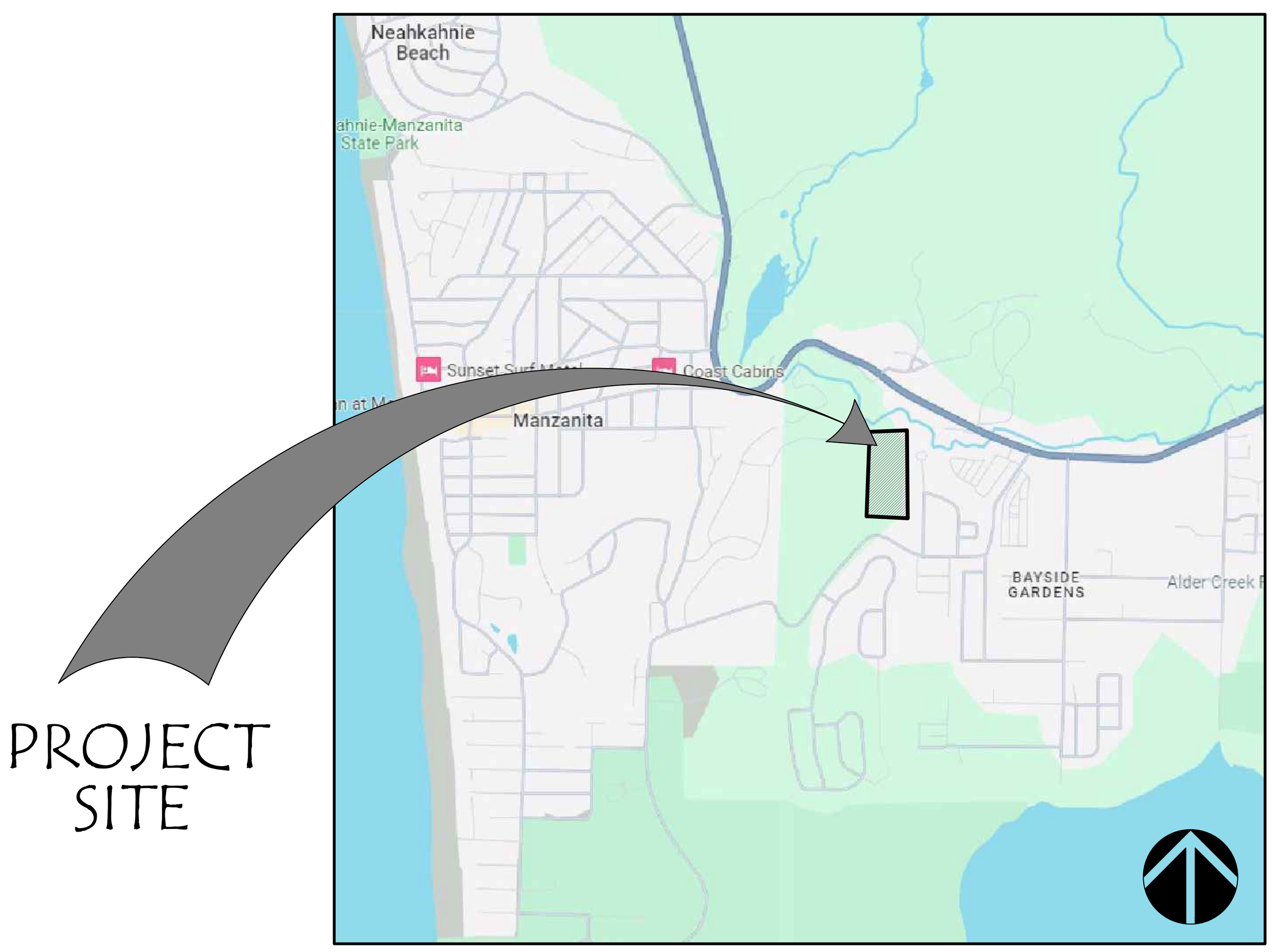
LOOP ROAD
MANZANITA, OREGON

DRAWINGS FOR:

HOME FIRST DEVELOPMENT
4351 SE HAWTHORNE BLVD.
PORTLAND, OREGON 97215

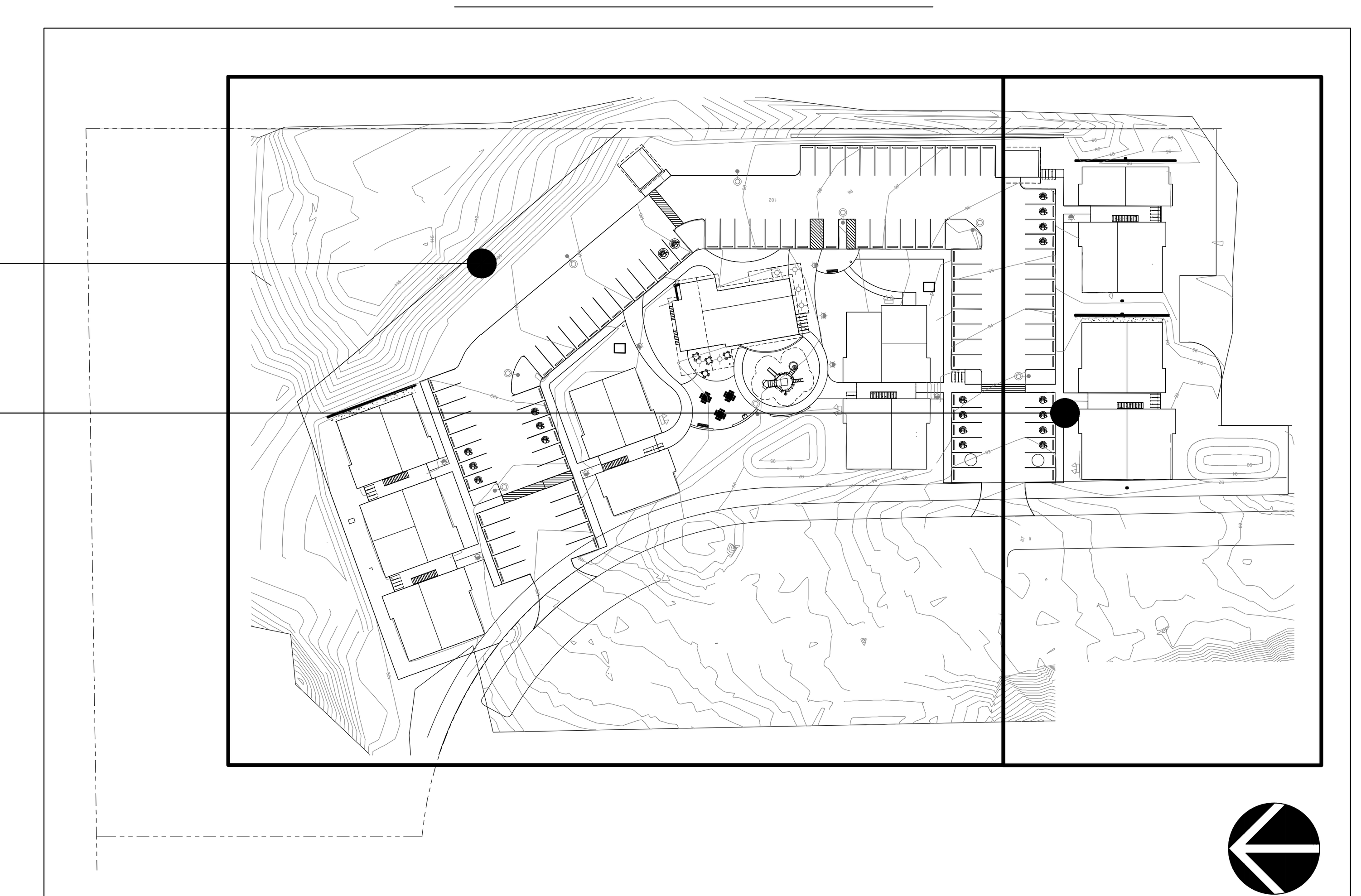
SHEET INDEX:

VICINITY MAP:



MAP COURTESY OF GOOGLE

KEY MAP:



LANDSCAPE ARCHITECT:

LAURUS DESIGNS, LLC
LAURA ANTONSON, RLA, ASLA
1012 PINE STREET
SILVERTON, OREGON 97381
503 . 784 . 6494
LAURA@LAURUSDESIGNS.COM

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

Laurus Designs, LLC
1012 Pine Street
Silverton, Oregon
503.784.6494

MANZANITA PINES - LAND USE REVIEW
0 LOOP RD MANZANITA, OR

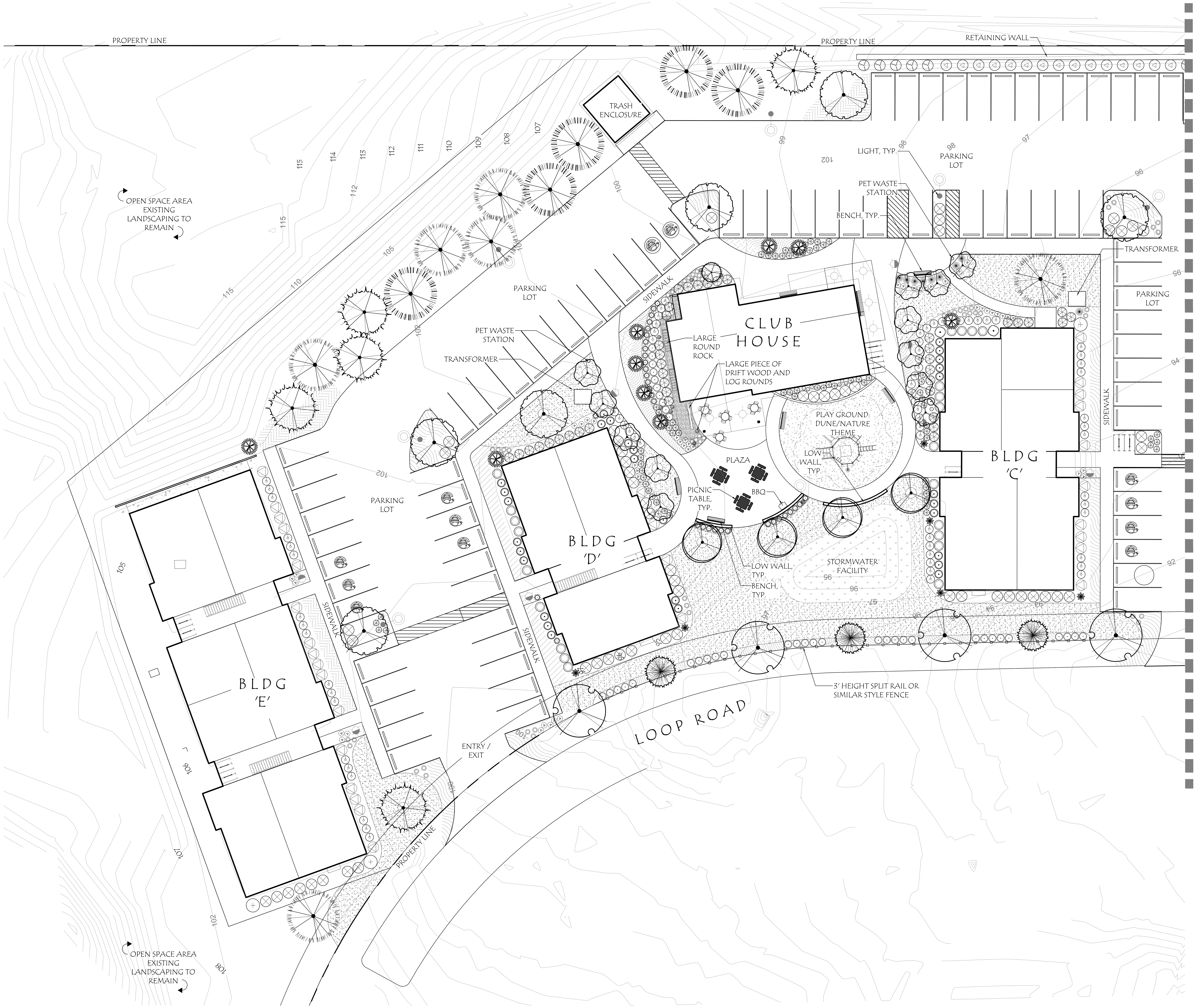
CLIENT :
HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

COVER SHEET

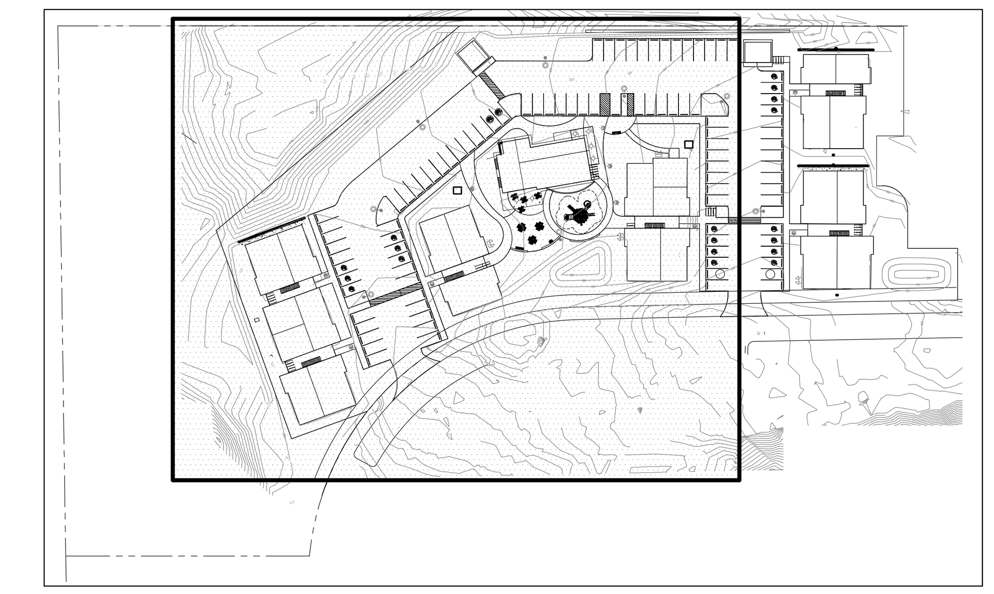
.L00

ORIGINAL SHEET SIZE : 22"x34"

PRINTED : 11/21/2024 1:43:54 PM



KEY MAP:



LEGEND:

- 6" ROUND ROCK, GRAY, 6" DEPTH
- PLAY AREA SURFACE, SEE NOTES FOR SAFETY INFORMATION
- DRIFTWOOD LOG AND TREE ROUNDS

GENERAL NOTES:

1. DRAWINGS ARE PRELIMINARY, NOT FOR CONSTRUCTION OR BIDDING.
2. SEE ARCHITECTURAL DRAWINGS FOR SITE PLAN AND AREA CALCULATIONS.
3. SEE CIVIL DRAWINGS FOR GRADING, UTILITIES, AND STORMWATER INFORMATION.
4. PLANTS TO BE SIZED ACCORDING TO MANZANITA REQUIREMENTS FOR GENERAL PLANTING.
5. STORMWATER FACILITY PLANTINGS TO BE SEEDED PER MANZANITA STANDARDS.
6. CHILDREN'S PLAY AREA AND WOODCHIP PLAY SURFACE TO CONFORM TO CPSC AND ASTM PLAYGROUND STANDARD AND GUIDELINES. PLAY EQUIPMENT TO BE SELECTED.
7. PRELIMINARY PLANT SCHEDULE SEE SHEET L11.
8. LANDSCAPE TO BE IRRIGATED BY AN AUTOMATIC UNDERGROUND SYSTEM.

SCALE: 1" = 20' - 0"

0' 10' 20' 40'

SCALE

PRINTED : 11/21/2024 1:42:03 PM

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212
polyphon.com

Laurus Designs, LLC
1012 Pine Street
Silverton, Oregon
503.784.6494

MANZANITA PINES - LAND USE REVIEW

0 LOOP RD MANZANITA, OR

CLIENT :

HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

PRELIMINARY PLANTING PLAN

.L10

ORIGINAL SHEET SIZE : 22"x34"

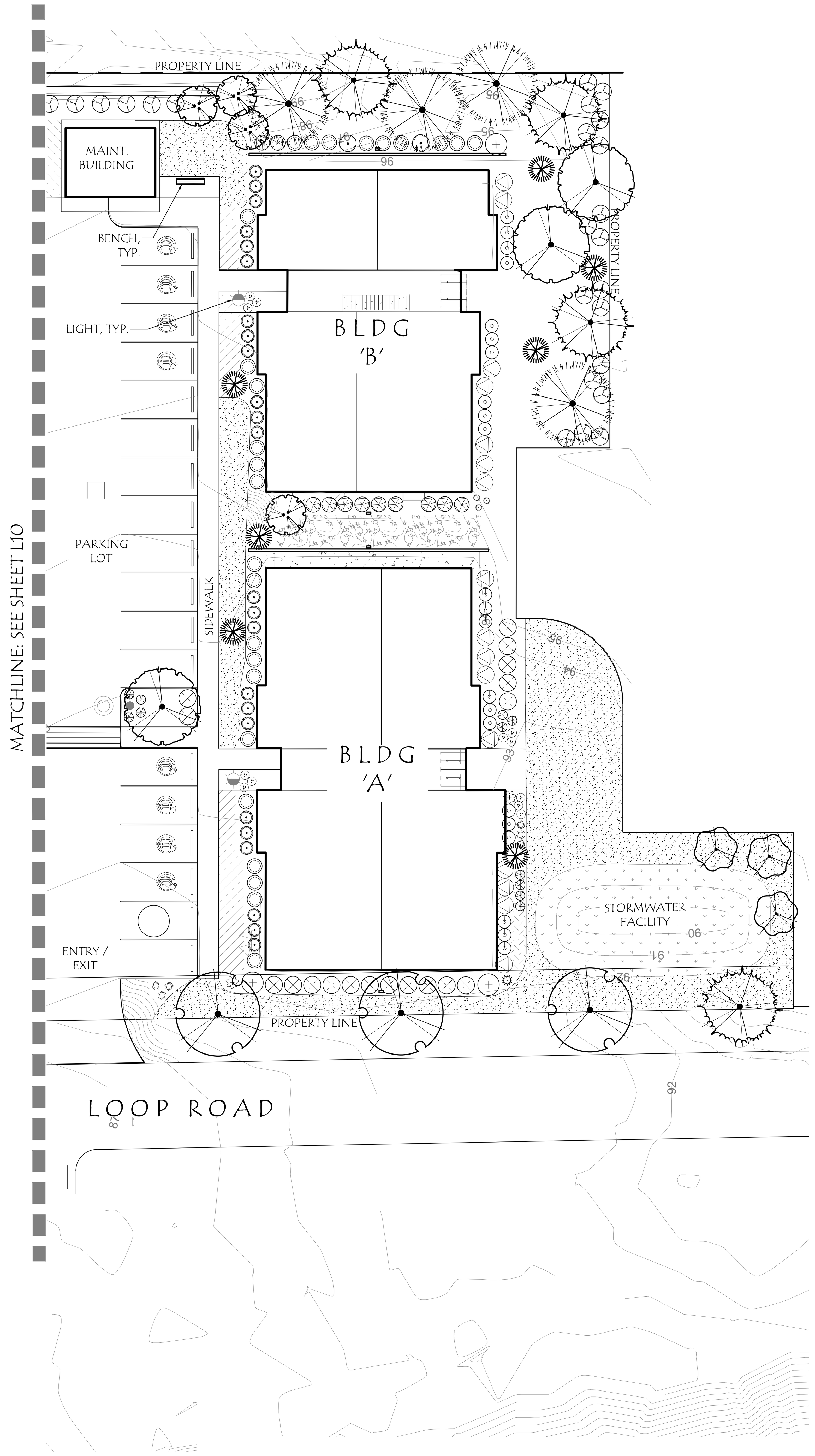
PRELIMINARY PLANT SCHEDULE

TREES	QTY	BOTANICAL / COMMON NAME	SIZE
	4	ACER CIRCINATUM "PACIFIC FIRE" / PACIFIC FIRE VINE MAPLE	1 1/2" CAL., B&B
	4	ACER PLATANOIDES 'CRIMSON SENTRY' / CRIMSON SENTRY NORWAY MAPLE	1 1/2" CAL., B&B
	16	CHAMAECYPARIS NOOTKATENSIS 'GLAUCA PENDULA' / BLUE WEEPING NOOTKA CYPRESS	6'-8' HT., B&B
	7	GINKGO BILOBA / MAIDENHAIR TREE	1 1/2" CAL., B&B
	5	PICEA SITCHENSIS / SITKA SPRUCE	6'-8' HT., B&B
	10	PINUS CONTORTA CONTORTA / SHORE PINE	6'-8' HT., B&B
	9	PINUS NIGRA / AUSTRIAN PINE	6'-8' HT., B&B
	1	PINUS NIGRA 'ARNOLD SENTINEL' / ARNOLD SENTINEL AUSTRIAN PINE	6'-8' HT., B&B
	3	PINUS NIGRA 'OREGON GREEN' / OREGON GREEN AUSTRIAN PINE	6'-8' HT., B&B
	15	PRUNUS SERRULATA 'AMANOGAWA' / JAPANESE FLOWERING CHERRY	1 1/2" CAL., B&B
	9	SORBUS AUCUPARIA / EUROPEAN MOUNTAIN ASH	1 1/2" CAL., B&B

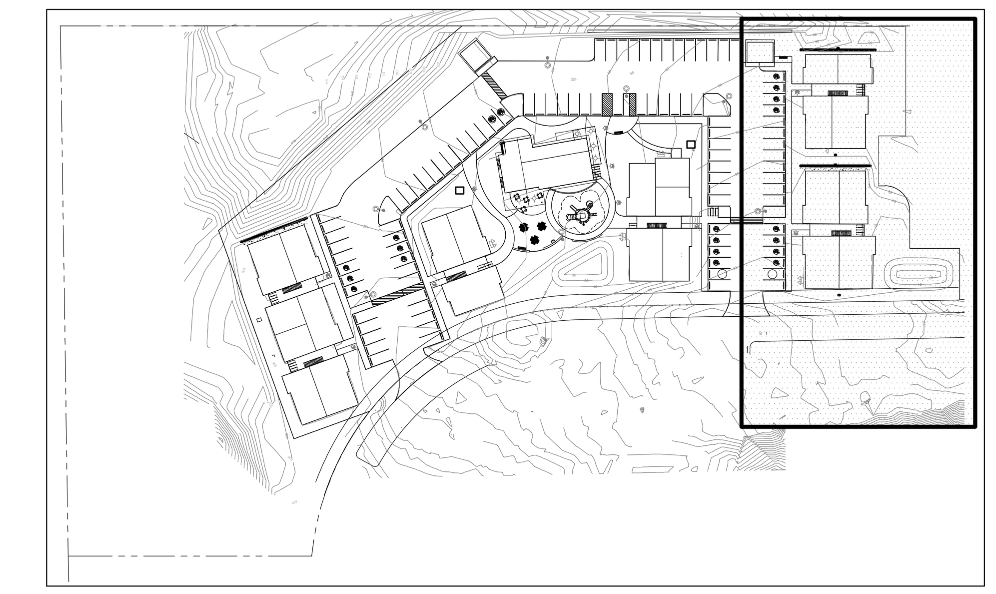
SHRUBS	QTY	BOTANICAL / COMMON NAME	SIZE
	6	CHOISYA TERNATA 'SUNDANCE' / SUNDANCE MEXICAN MOCK ORANGE	5 GAL.
	15	ELAEAGNUS X EBBINGEI "GILT EDGE" / EBBING SILVERBERRY	5 GAL.
	74	ESCALLONIA X 'COMPACT PINK' / COMPACT PINK ESCALLONIA	2 GAL.
	93	HEBE BUXIFOLIA 'PATTY'S PURPLE' / PATTY'S PURPLE BOXLEAF HEBE	2 GAL.
	4	HYDRANGEA MACROPHYLLA 'NIKKO BLUE' / NIKKO BLUE HYDRANGEA	2 GAL.
	46	ILEX CRENATA "DROPS OF GOLD" / DROPS OF GOLD JAPANESE HOLLY	2 GAL.
	3	PHORMIUM TENAX "WINGS OF GOLD" / WINGS OF GOLD NEW ZEALAND FLAX	2 GAL.
	6	PHORMIUM TENAX 'SHIRAZ' / SHIRAZ NEW ZEALAND FLAX	2 GAL.
	48	PIERIS JAPONICA "PURITY" / PURITY JAPANESE PIERIS	2 GAL.
	54	SPIRAEA JAPONICA "GOLDFLAME" / SPIREA	2 GAL.
	29	VACCINIUM OVATUM / EVERGREEN HUCKLEBERRY	2 GAL.
	50	VIBURNUM DAVIDII / DAVID VIBURNUM	2 GAL.

GRASSES / PERENNIALS	QTY	BOTANICAL / COMMON NAME	SIZE
	10	CALAMAGROSTIS X ACUTIFLORA 'KARL FOERSTER' / KARL FOERSTER FEATHER REED GRASS	1 GAL.
	62	HELICTOTRICHON SEMPERVIRENS 'SAPPHIRE' / SAPPHIRE BLUE OAT GRASS	1 GAL.
	59	HEMEROCALLIS X 'STELLA IN RED' / STELLA IN RED DAYLILY	1 GAL.
	82	MISCANTHUS SINENSIS 'LITTLE KITTEN' / LITTLE KITTEN EULALIA GRASS	1 GAL.
	34	MISCANTHUS SINENSIS 'LITTLE MISS' / LITTLE MISS EULALIA GRASS	1 GAL.
	39	MISCANTHUS SINENSIS 'YAKUSHIMA' / YAKUSHIMA DWARF EULALIA GRASS	1 GAL.
	9	PANICUM VIRGATUM 'HALF PINT' / HALF PINT SWITCH GRASS	1 GAL.

GROUND COVERS	QTY	BOTANICAL / COMMON NAME	SIZE	SPACING
	102	ARCTOSTAPHYLOS UVA-URSI / KINNIKINNICK	1 GAL.	36" O.C.
	54	CEANOTHUS GLORIOSUS / POINT REYES CEANOTHUS	1 GAL.	48" O.C.
	175	ERICA CARNEA 'SPRINGWOOD PINK' / SPRINGWOOD PINK WINTER HEATH	1 GAL.	42" O.C.
	89	FRAGARIA VESCA / WOODLAND STRAWBERRY	1 GAL.	24" O.C.
	95	PHLOX SUBULATA / CREEPING PHLOX	4" POT	18" O.C.
	11,087 SF	PRO TIME 305 SUN/SHADE (COASTAL)	SEED OR SOD	
	2,656 SF	RAIN GARDEN MIX	SEED	



KEY MAP:



LEGEND:

6" ROUND ROCK, GRAY, 6" DEPTH

PLAY AREA SURFACE. SEE NOTES FOR SAFETY INFORMATION

DRIFTWOOD LOG AND TREE ROUNDS

GENERAL NOTES:

1. DRAWINGS ARE PRELIMINARY, NOT FOR CONSTRUCTION OR BIDDING.
2. SEE ARCHITECTURAL DRAWINGS FOR SITE PLAN AND AREA CALCULATIONS.
3. SEE CIVIL DRAWINGS FOR GRADING, UTILITIES, AND STORMWATER INFORMATION.
4. PLANTS TO BE SIZED ACCORDING TO MANZANITA REQUIREMENTS FOR GENERAL PLANTING.
5. STORMWATER FACILITY PLANTINGS TO BE SEEDED PER MANZANITA STANDARDS.
6. CHILDREN'S PLAY AREA AND WOODCHIP PLAY SURFACE TO CONFORM TO CPSC AND ASTM PLAYGROUND STANDARD AND GUIDELINES. PLAY EQUIPMENT TO BE SELECTED.
7. PRELIMINARY PLANT SCHEDULE SEE THIS SHEET.
8. LANDSCAPE TO BE IRRIGATED BY AN AUTOMATIC UNDERGROUND SYSTEM.

SCALE: 1" = 20' - 0"

0' 10' 20' 40'

SCALE

PRINTED : 11/22/2024 2:32:37 PM

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212
polyphon.com

Laurus Designs, LLC
1012 Pine Street
Silverton, Oregon
503.784.6494

MANZANITA PINES - LAND USE REVIEW

0 LOOP RD MANZANITA, OR

CLIENT :

HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT/ ENCORE INVESTMENTS

PRELIMINARY PLANTING PLAN

.L11

ORIGINAL SHEET SIZE : 22"x34"

SITE INFORMATION

ZONING: SR/R

PROPOSED AREA: 4.62 ACRES (201,340 SF)

UNITS ALLOWED:
- 6.5 UNITS PER ACRE BY RIGHT
- 13 UNITS PER ACRE W/ 40% OPEN SPACE

UNITS PROPOSED:
- 60 UNITS
- (60 UNITS / 13 PER ACRE = 4.6 ACRES)

OPEN SPACE REQUIRED: 1.85 ACRES (80,536 SF)
OPEN SPACE PROPOSED: 1.88 ACRES (81,704 SF)

MOTOR VEHICLE PARKING SPACES:
- TOTAL: 96 (1.6 PER DWELLING UNIT)
- EV SPACES: 20 (20% OF TOTAL SPACES)

BICYCLE PARKING: 30 REQUIRED
32 PROVIDED

ADJUSTMENTS REQUESTED

1. MINIMUM FRONT YARD SETBACK
   - REQUIRED: 20' - 0"
   - REQUESTED: 10' - 0"
2. MAXIMUM BUILDING HEIGHT
   - REQUIRED (W/ STATE SENATE BILL 1537): 34' - 2"
   - REQUESTED: 37' - 2"
3. MOTOR VEHICLE PARKING
   - REQUIRED: 2 SPACES/ 1 DWELLING UNIT
   - REQUESTED: 1.6 SPACES / 1 DWELLING UNIT

BUILDING AREAS / HEIGHTS

BUILDING A:	13,296 SF / 3 STORIES
BUILDING B:	10,077 SF / 3 STORIES
BUILDING C:	8,468 SF / 2 STORIES
BUILDING D:	6,096 SF / 2 STORIES
BUILDING E:	19,296 SF / 3 STORIES
CLUBHOUSE:	2,580 SF / 1 STORY

IMPERVIOUS AREAS

DRIVE AISLE:	34,117 SF
BUILDINGS:	24,140 SF
PED PATHS:	9,770 SF
ACCESSORY STRUCTURES:	738 SF
TOTAL IMPERVIOUS:	68,765 SF

OVERALL UNIT MIX

1-BED / 1 BATH (558 SF):	14
2-BED / 1 BATH (882 SF):	23
3-BED / 1.5 BATH (1134 SF):	23
TOTAL UNITS:	60

UNITS BY BUILDING

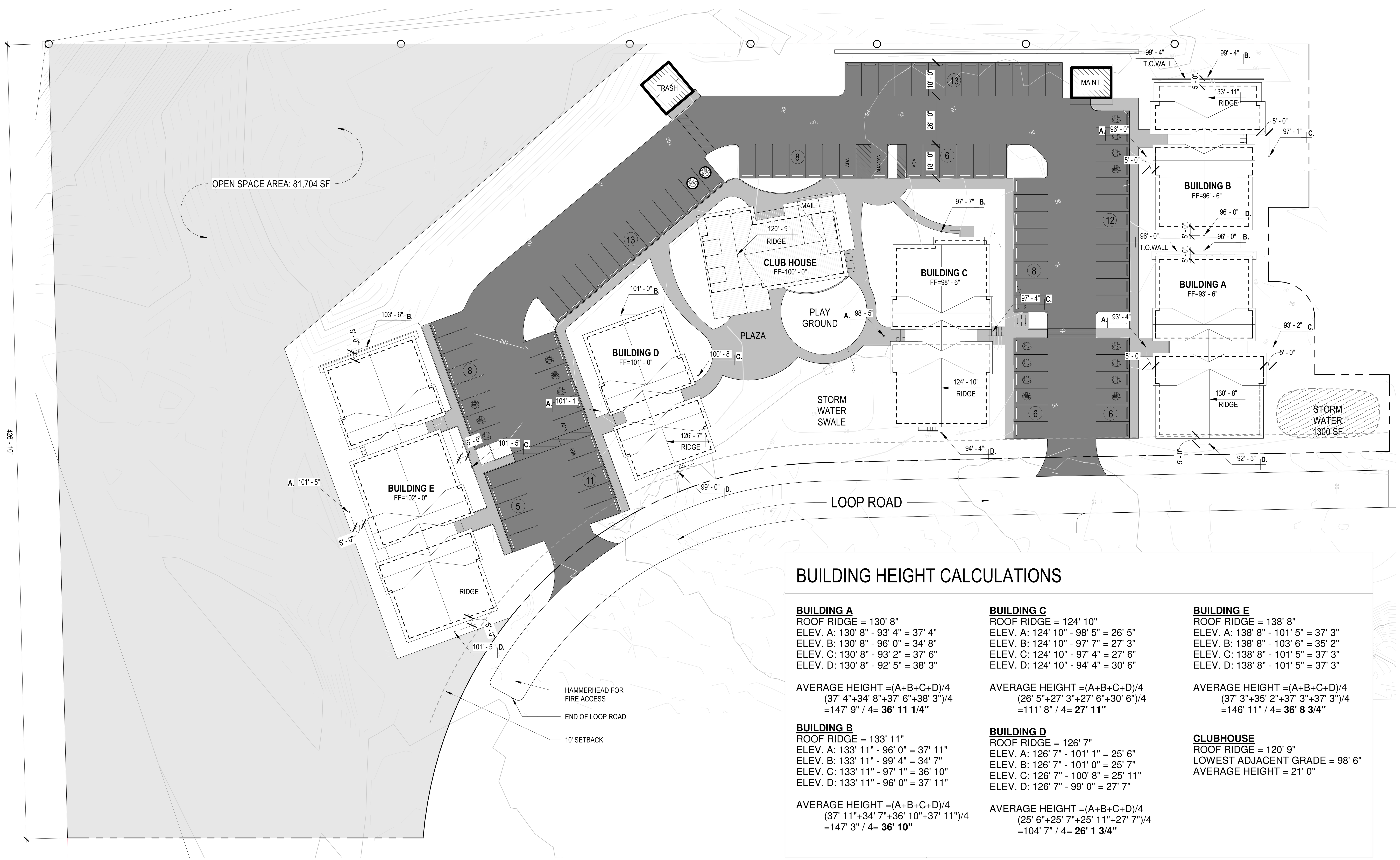
BUILDING A - 12 UNITS
- LEVEL 1:
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 3
- LEVEL 2:
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 3
- LEVEL 3:
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 3

BUILDING B - 12 UNITS
- LEVEL 1:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 1
- LEVEL 2:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 1
- LEVEL 3:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 1
  - 3 BED / 1.5 BATH: 1

BUILDING C - 9 UNITS
- LEVEL 1:
  - 1 BED / 1 BATH: 2 (1=ADA)
  - 2 BED / 1 BATH: 2
  - 3 BED / 1.5 BATH: 1
- LEVEL 2:
  - 2 BED / 1 BATH: 2
  - 3 BED / 1.5 BATH: 2

BUILDING D - 6 UNITS
- LEVEL 1:
  - 2 BED / 1 BATH: 2 (1=ADA)
  - 3 BED / 1.5 BATH: 1 (ADA)
- LEVEL 2:
  - 2 BED / 1 BATH: 2
  - 3 BED / 1.5 BATH: 1

BUILDING E - 21 UNITS
- LEVEL 1:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 3
  - 3 BED / 1.5 BATH: 2
- LEVEL 2:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 3
  - 3 BED / 1.5 BATH: 2
- LEVEL 3:
  - 1 BED / 1 BATH: 2
  - 2 BED / 1 BATH: 3
  - 3 BED / 1.5 BATH: 2



BUILDING HEIGHT CALCULATIONS

BUILDING A
ROOF RIDGE = 130' 8"
ELEV. A: 130' 8" - 93' 4" = 37' 4"
ELEV. B: 130' 8" - 96' 0" = 34' 8"
ELEV. C: 130' 8" - 93' 2" = 37' 6"
ELEV. D: 130' 8" - 92' 5" = 38' 3"

AVERAGE HEIGHT =(A+B+C+D)/4
(37' 4"+34' 8"+37' 6"+38' 3")/4
=147' 9" / 4= **36' 11 1/4"**

BUILDING B
ROOF RIDGE = 133' 11"
ELEV. A: 133' 11" - 96' 0" = 37' 11"
ELEV. B: 133' 11" - 99' 4" = 34' 7"
ELEV. C: 133' 11" - 97' 1" = 36' 10"
ELEV. D: 133' 11" - 96' 0" = 37' 11"

AVERAGE HEIGHT =(A+B+C+D)/4
(37' 11"+34' 7"+36' 10"+37' 11")/4
=147' 3" / 4= **36' 10"**

BUILDING C
ROOF RIDGE = 124' 10"
ELEV. A: 124' 10" - 98' 5" = 26' 5"
ELEV. B: 124' 10" - 97' 7" = 27' 3"
ELEV. C: 124' 10" - 97' 4" = 27' 6"
ELEV. D: 124' 10" - 94' 4" = 30' 6"

AVERAGE HEIGHT =(A+B+C+D)/4
(26' 5"+27' 3"+27' 6"+30' 6")/4
=111' 8" / 4= **27' 11"**

BUILDING D
ROOF RIDGE = 126' 7"
ELEV. A: 126' 7" - 101' 1" = 25' 6"
ELEV. B: 126' 7" - 101' 0" = 25' 7"
ELEV. C: 126' 7" - 100' 8" = 25' 11"
ELEV. D: 126' 7" - 99' 0" = 27' 7"

AVERAGE HEIGHT =(A+B+C+D)/4
(25' 6"+25' 7"+25' 11"+27' 7")/4
=104' 7" / 4= **26' 1 3/4"**

BUILDING E
ROOF RIDGE = 138' 8"
ELEV. A: 138' 8" - 101' 5" = 37' 3"
ELEV. B: 138' 8" - 103' 6" = 35' 2"
ELEV. C: 138' 8" - 101' 5" = 37' 3"
ELEV. D: 138' 8" - 101' 5" = 37' 3"

AVERAGE HEIGHT =(A+B+C+D)/4
(37' 3"+35' 2"+37' 3"+37' 3")/4
=146' 11" / 4= **36' 8 3/4"**

CLUBHOUSE
ROOF RIDGE = 120' 9"
LOWEST ADJACENT GRADE = 98' 6"
AVERAGE HEIGHT = 21' 0"

.A01 1 OVERALL SITE PLAN
SCALE: 1" = 30'-0"

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

PROJECT SUMMARY & ZONING REVIEW

.A01

ORIGINAL SHEET SIZE : 22"x34"

PRINTED : 1/3/2025 1:09:18 PM

SITE LIGHTING LEGEND

SYMBOL	LABEL	DESCRIPTION
	S	POLE MOUNTED AREA LUMINAIRE P2: 5774 OUTPUT
	P	POST TOP LIGHT W/ ASYMMETRIC DISTRIBUTION: 2720 OUTPUT
	B	BOLLARD LIGHT; HEIGHT: 42"; 180 DEGREE - DIRECTIONAL;
	B1	BOLLARD LIGHT; HEIGHT: 42"; 360 DEGREE
	W1	EXTERIOR LED SURFACE LIGHT: WET LABEL
	WP	WALL PACK @HEIGHT SPECIFIFIED PER PHOTOMETRIC PLAN
	C	OUTDOOR SECURITY CAMERA

NOTE: ALL LUMINARES ARE *IDA DARK SKY APPROVED* PER MANZANITA ORDINANCE 24-02

SITE LIGHTING NOTES

1. PROPOSED STREET LIGHT FIXTURES WITHIN THE PUBLIC RIGHT-OF-WAY NOT SHOWN. SEE CIVIL PLANS.

2. MINIMUM ILLUMINATION LEVELS SHALL MEET THE FOLLOWING:

   a. MINIMUM ILLUMINATION LEVELS ARE TO MEASURED HORIZONTALLY AT GROUND LEVEL.

   - THE MINIMUM AVERAGE ILLUMINATION IS 1.5 FOOTCANDLES FOR PATHS, EXCEPT THOSE WITHIN PARKING AREAS, WHICH ARE SUBJECT TO THE LIGHTING STANDARDS IN SUBSECTION 18.410.040.I. ALL POINTS OF MEASUREMENT MUST BE A MINIMUM OF 0.5 FOOTCANDLES.
   - THE MINIMUM AVERAGE ILLUMINATION IS 3.5 FOOTCANDLES FOR REQUIRED BUILDING ENTRANCES AND 2.0 FOOTCANDLES FOR ANY NON-REQUIRED BUILDING ENTRANCES. ALL POINTS OF MEASUREMENT MUST BE A MINIMUM OF 1.0 FOOTCANDLE.

   b. MAXIMUM ILLUMINATION LEVELS ARE MEASURED VERTICALLY AT THE PROPERTY LINE OR SENSITIVE LANDS BOUNDARY LINE. THE MAXIMUM ILLUMINATION IS 0.5 FOOTCANDLES AT SIDE AND REAR PROPERTY LINES, EXCEPT THAT THE MAXIMUM ILLUMINATION MAY BE INCREASED TO 1.0 FOOTCANDLE WHERE THE DEVELOPMENT ABUTS A COMMERCIAL OR INDUSTRIAL ZONE. THE MAXIMUM ILLUMINATION IS 0 FOOTCANDLES AT ANY SENSITIVE LANDS BOUNDARY LINE.

   c. LIGHTING MUST BE SHIELDED, WITH A CUTOFF ANGLE OF 90 DEGREES OR GREATER TO ENSURE THAT IT DOES NOT SHINE UPWARDS. LIGHTING SOURCES, SUCH AS LAMPS AND BULBS, MAY NOT BE DIRECTLY VISIBLE FROM ADJACENT PROPERTIES OR SENSITIVE LANDS.

3. PARKING AREA STANDARDS:

   a. PARKING AREAS MUST INCLUDE LIGHTING SUFFICIENT TO ILLUMINATE ALL PEDESTRIAN PATHS AND BICYCLE PARKING AREAS TO A MINIMUM LEVEL OF 0.5 FOOTCANDLES AT ALL POINTS, MEASURED HORIZONTALLY AT THE GROUND LEVEL.

   b. LIGHTING LUMINAIRES MUST HAVE A CUTOFF ANGLE OF 90 DEGREES OR GREATER TO ENSURE THAT LIGHTING IS DIRECTED TOWARD THE PARKING SURFACE.

   c. PARKING AREA LIGHTING MAY NOT CAUSE A LIGHT TRESPASS OF MORE THAN 0.5 FOOTCANDLES MEASURED VERTICALLY AT THE BOUNDARIES OF THE SITE.

PARKING SPACE WITH LEVEL 2 EV CHARGING INSTALLED
(VIA FLO-CORE+ DUAL PORT EV CHARGER)

PARKING SPACE WITH LEVEL 2 EV CHARGING CAPACITY

X — NUMBER OF PARKING SPACES IN A ROW
(A "c" SUFFIX DENOTES 'COMPACT' SPACES)

.A10 1 PROPOSED SITE PLAN
SCALE: 1" = 20'-0"

SITE PLAN LEGEND

PRINTED : 1/3/2025 1:09:21 PM

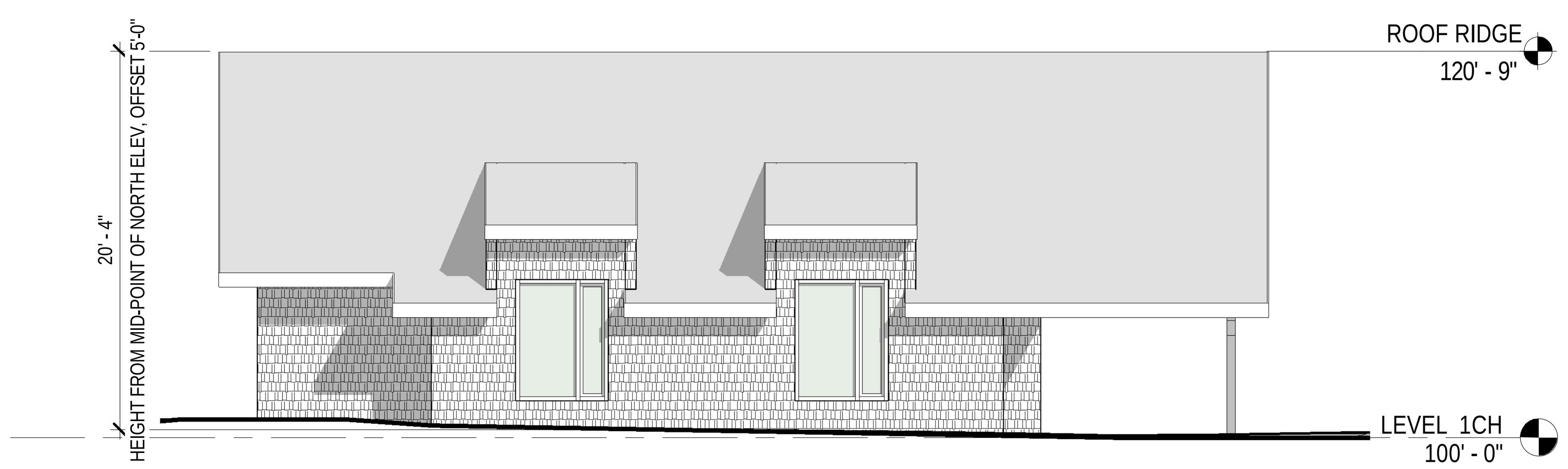
polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

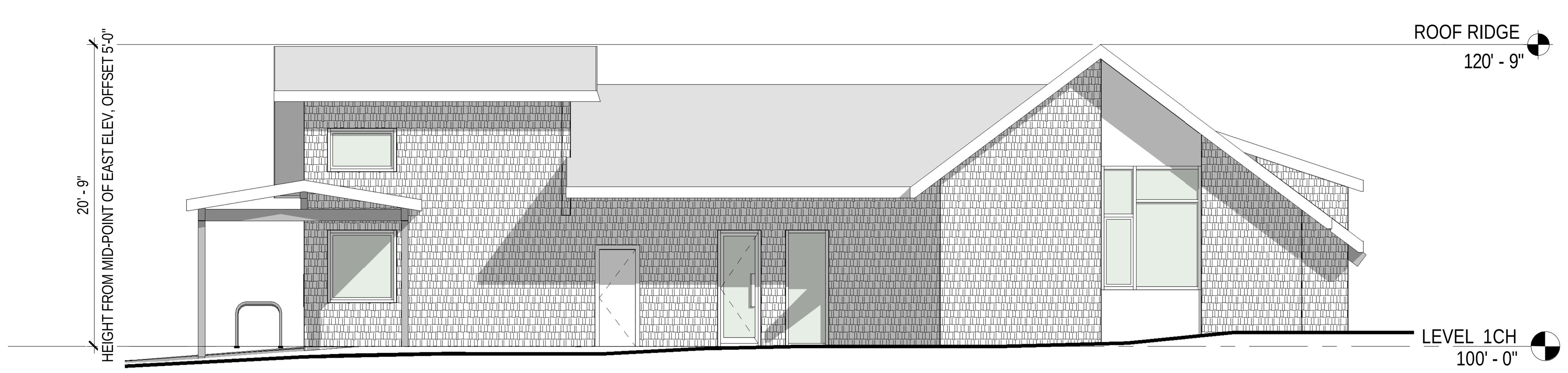
SITE PLAN - LUR

.A10
ORIGINAL SHEET SIZE : 22"x34"



.A20 4 CLUBHOUSE - NORTH ELEVATION - LUR
SCALE: 1/8" = 1'-0"

.A20 2 CLUBHOUSE - WEST ELEVATION - LUR
SCALE: 1/8" = 1'-0"



.A20 3 CLUBHOUSE - EAST ELEVATION - LUR
SCALE: 1/8" = 1'-0"

.A20 1 CLUBHOUSE - SOUTH ELEVATION - LUR
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

CLUBHOUSE ELEVATIONS

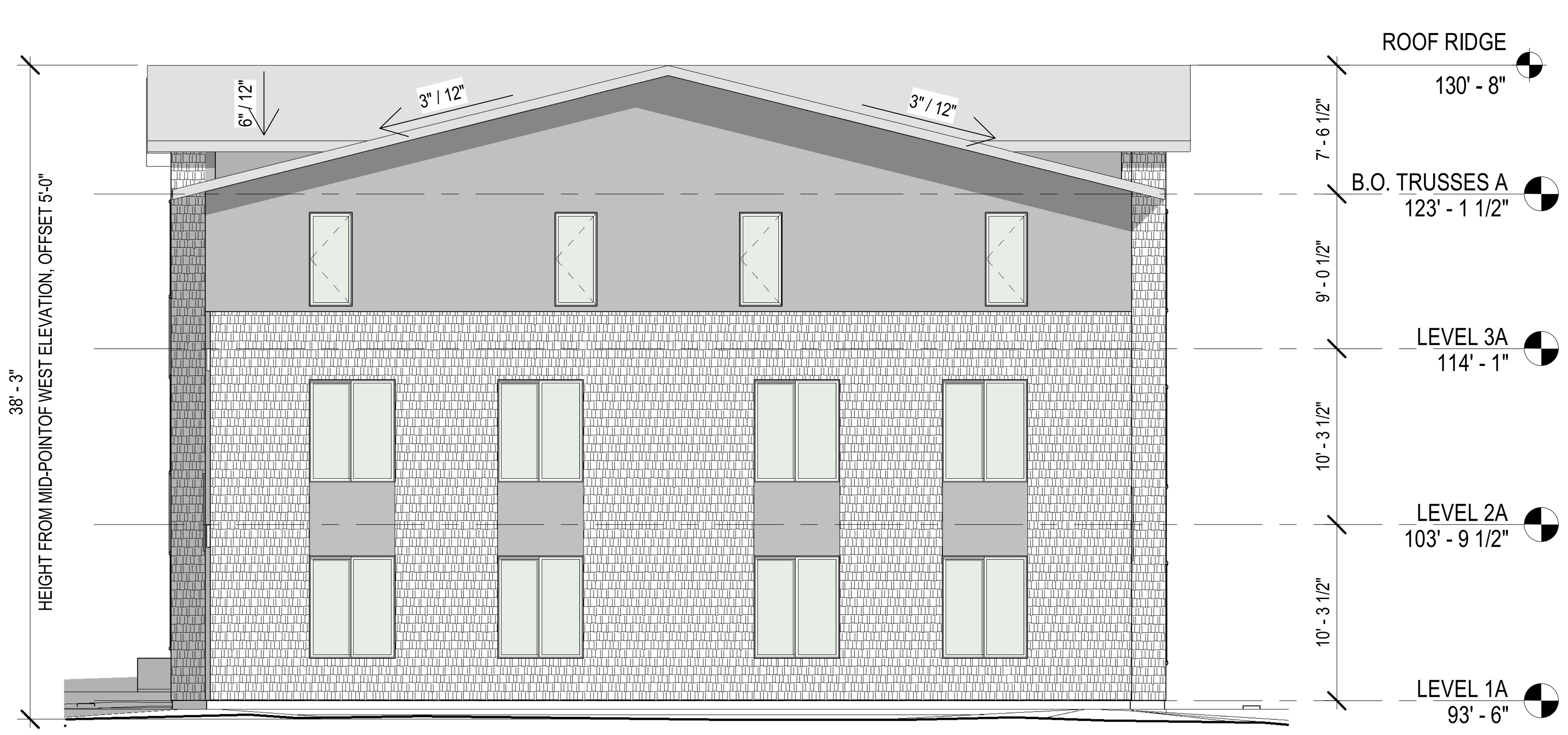
.A20

ORIGINAL SHEET SIZE : 22"x34"

PRINTED : 12/24/2024 4:01:28 PM

.A21
3 BUILDING A - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

.A21
1 BUILDING A - EAST ELEVATION
SCALE: 1/8" = 1'-0"



.A21
4 BUILDING A - WEST ELEVATION
SCALE: 1/8" = 1'-0"

.A21
2 BUILDING A - NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
polyphon.com
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

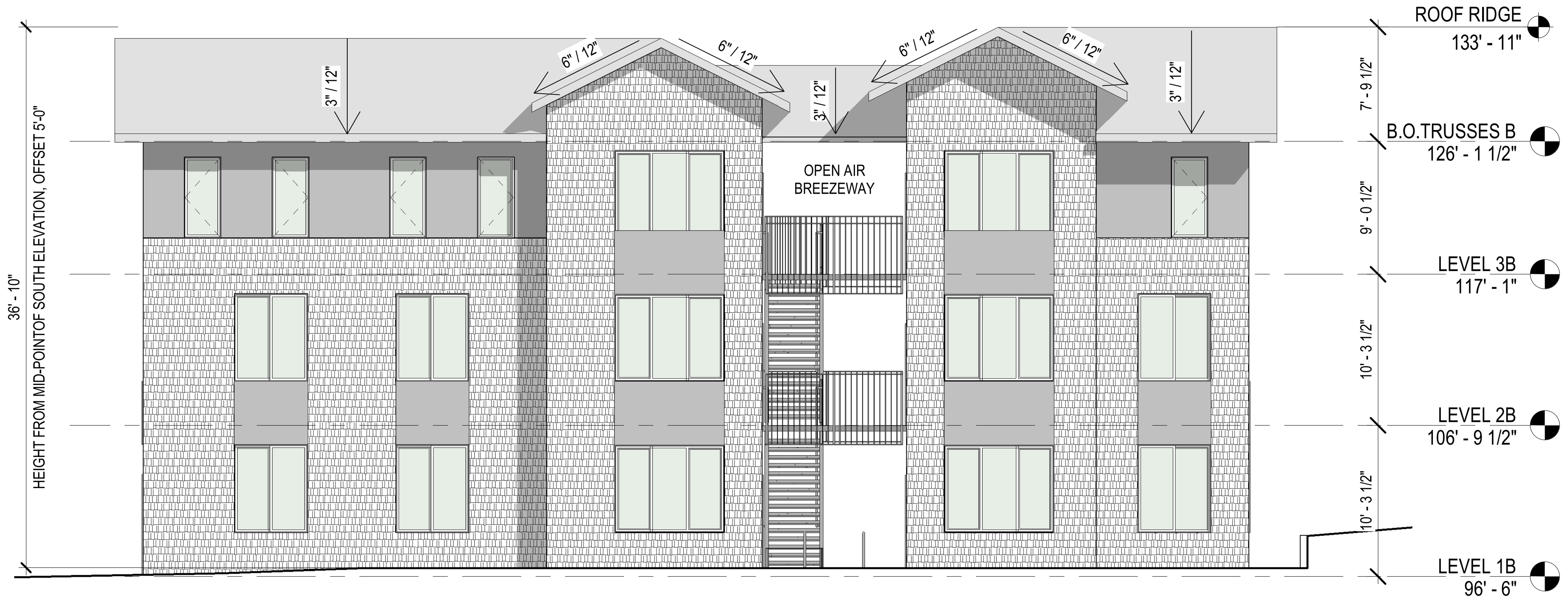
CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

ISSUE DATES:

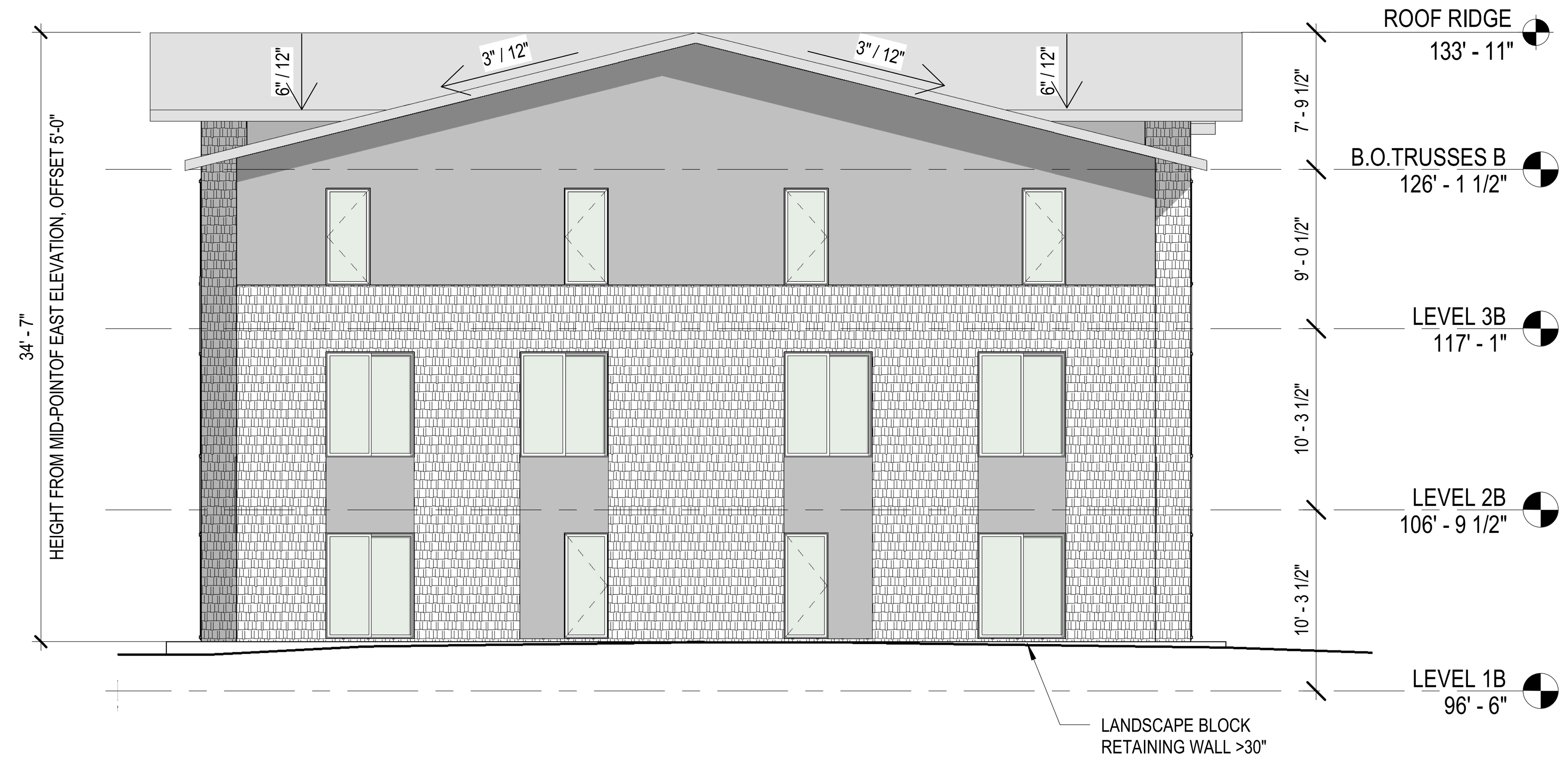
JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:25 PM

BUILDING A ELEVATIONS

.A21
ORIGINAL SHEET SIZE : 22"x34"

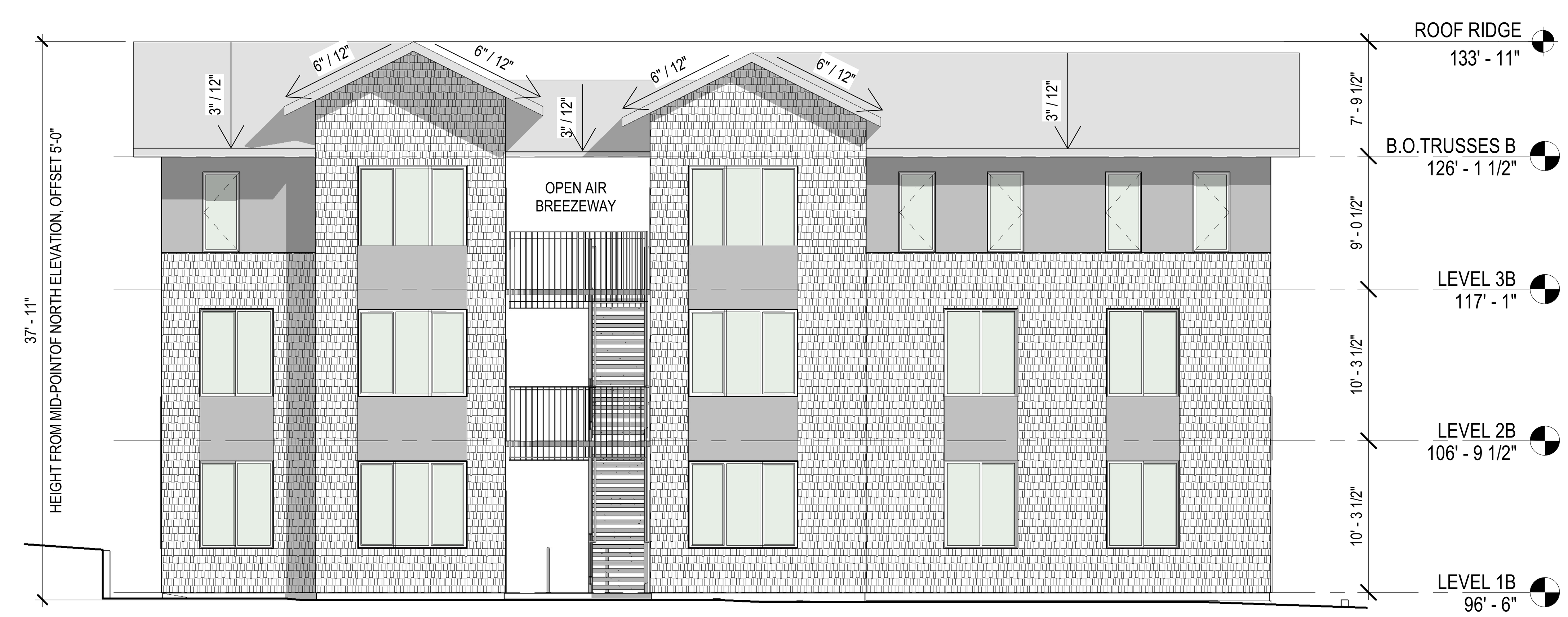


.A22
3 BUILDING B - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



.A22
1 BUILDING B - EAST ELEVATION
SCALE: 1/8" = 1'-0"

.A22
4 BUILDING B - WEST ELEVATION
SCALE: 1/8" = 1'-0"



.A22
2 BUILDING B - NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

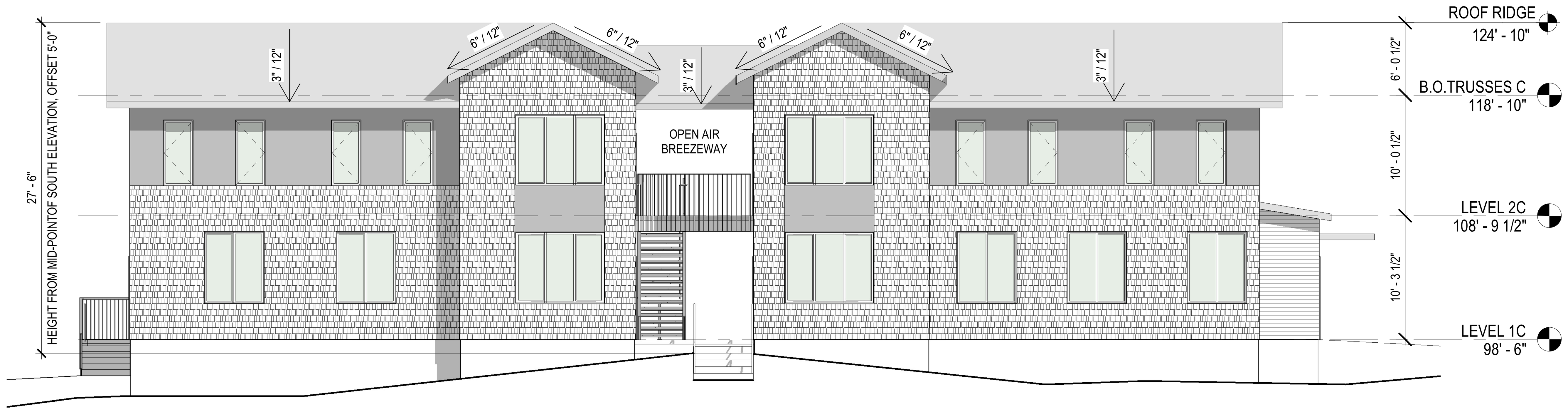
CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

ISSUE DATES:

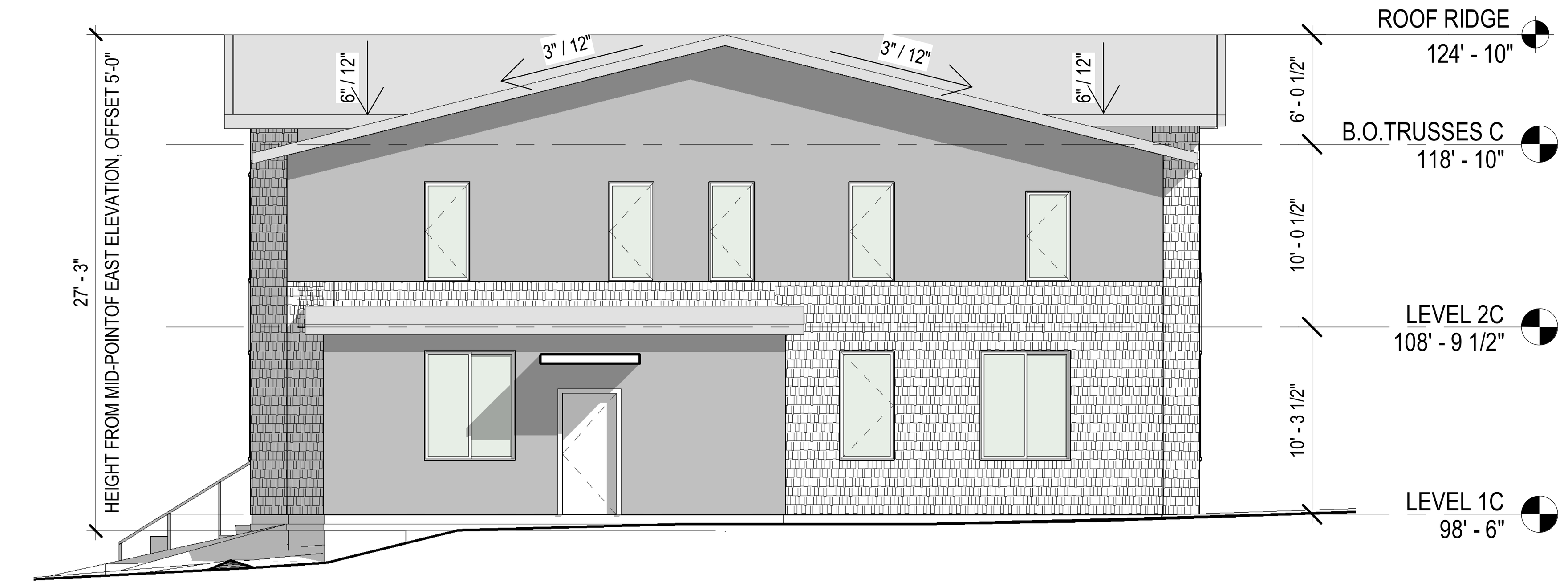
JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:28 PM

BUILDING B ELEVATIONS

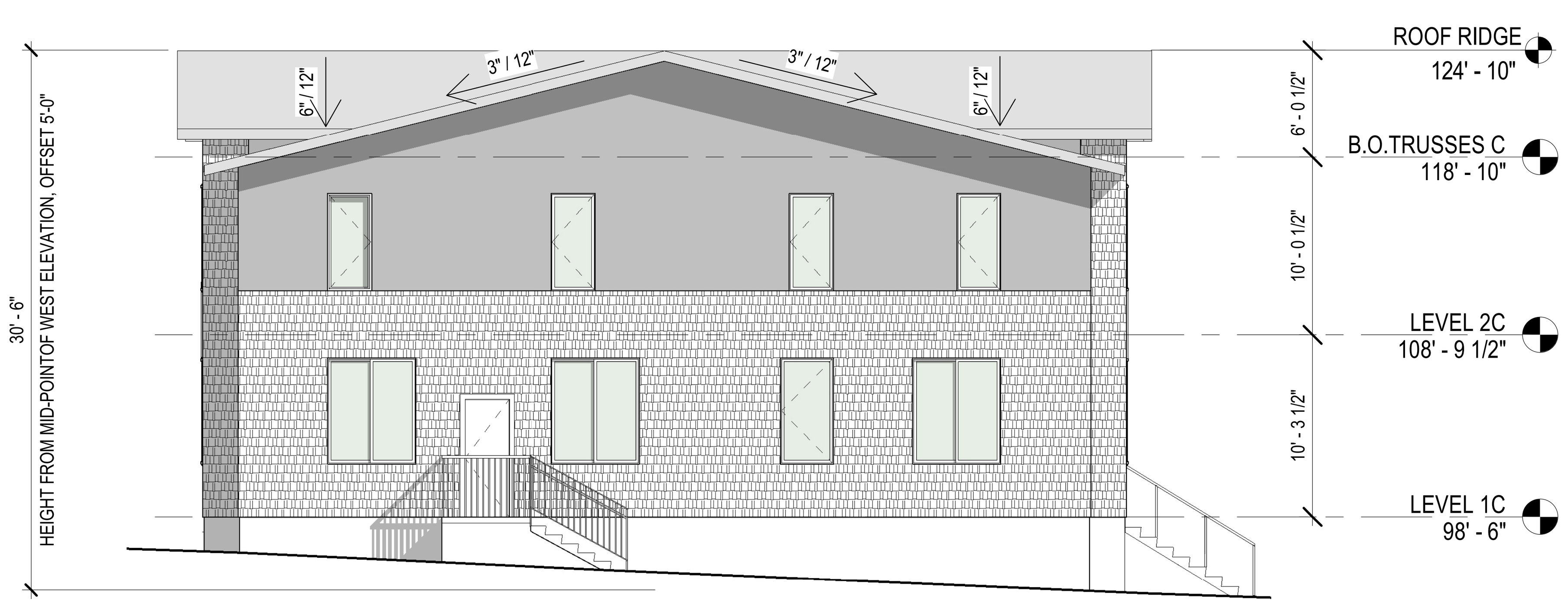
.A22
ORIGINAL SHEET SIZE : 22"x34"



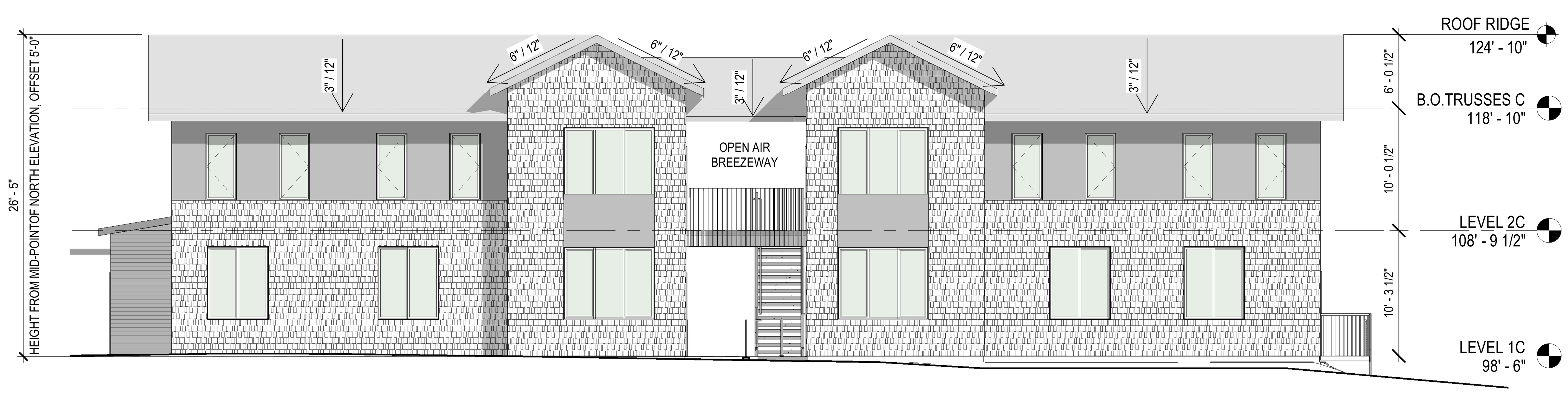
.A23 3 BUILDING C - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



.A23 1 BUILDING C - EAST ELEVATION
SCALE: 1/8" = 1'-0"



.A23 4 BUILDING C - WEST ELEVATION
SCALE: 1/8" = 1'-0"



.A23 2 BUILDING C - NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

ISSUE DATES:

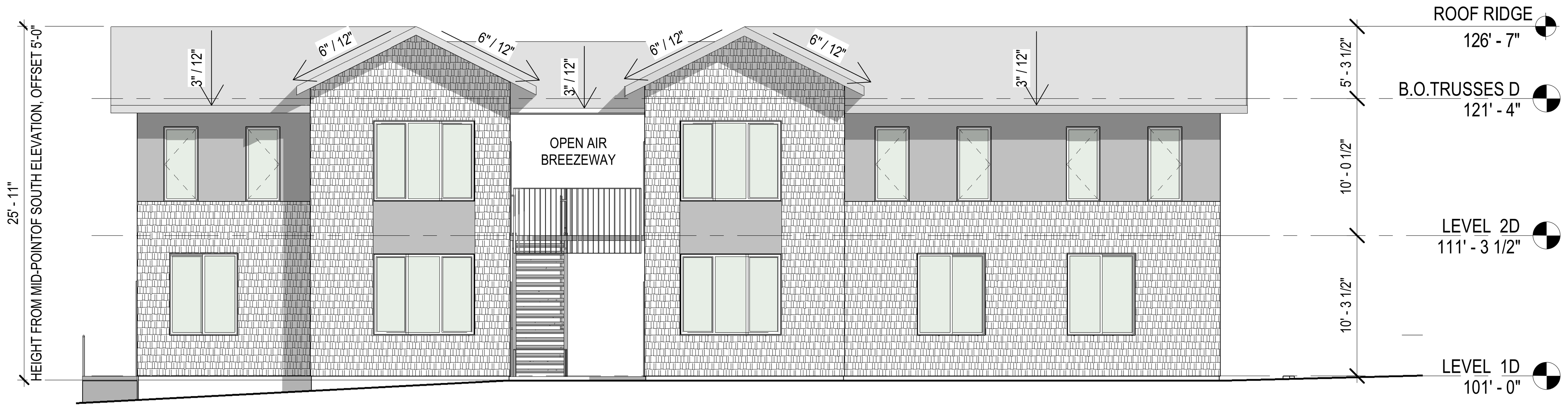
JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:30 PM

BUILDING C ELEVATIONS

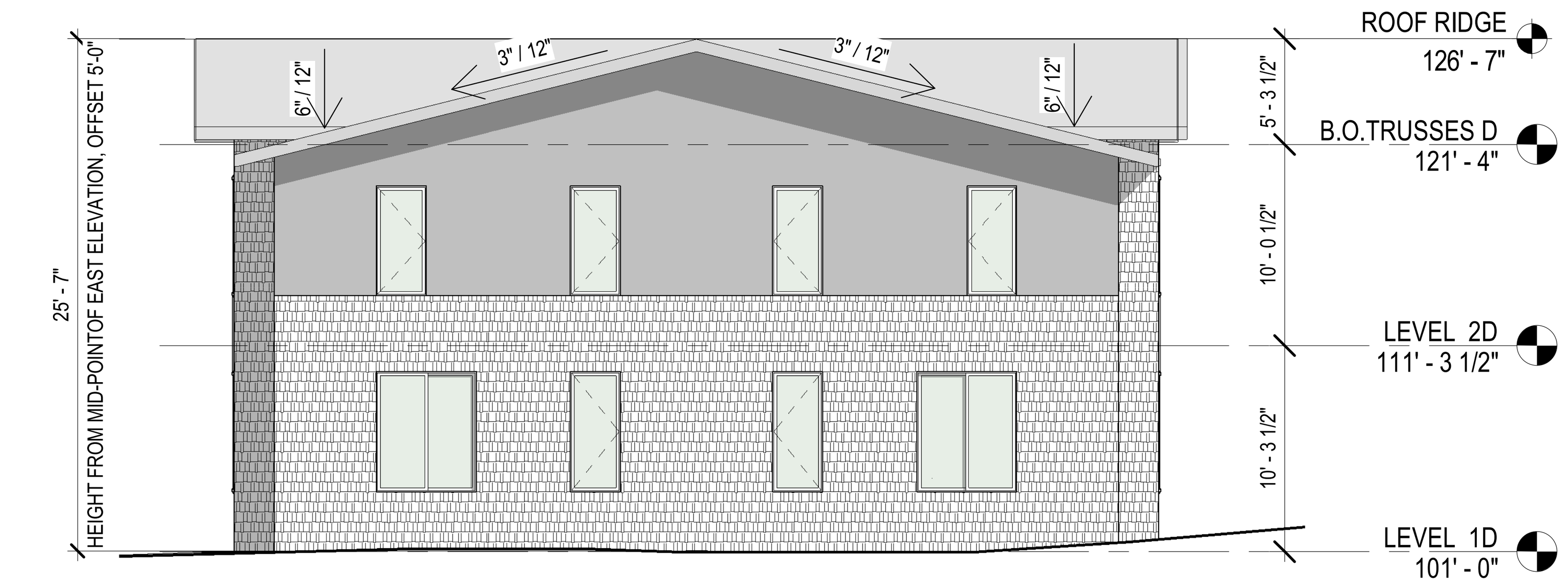
.A23
ORIGINAL SHEET SIZE : 22"x34"

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

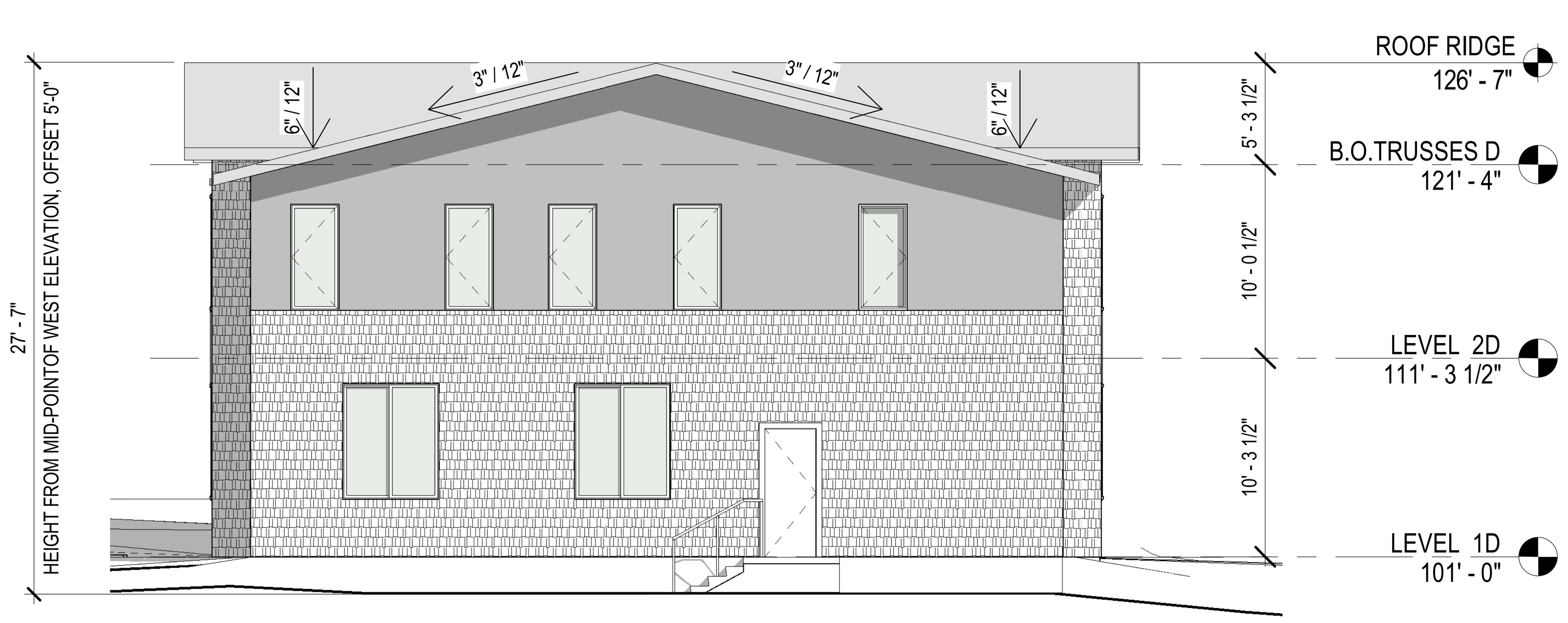
MANZANITA PINES
0 LOOP RD MANZANITA, OR



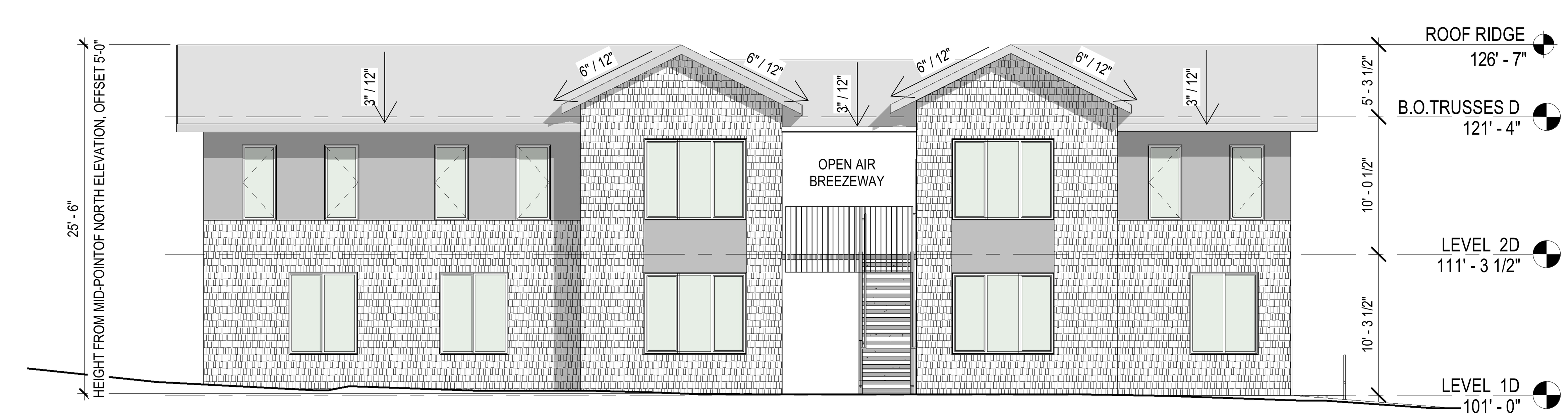
A24
3 BUILDING D - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"



A24
1 BUILDING D - EAST ELEVATION
SCALE: 1/8" = 1'-0"



A24
4 BUILDING D - WEST ELEVATION
SCALE: 1/8" = 1'-0"



A24
2 BUILDING D - NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

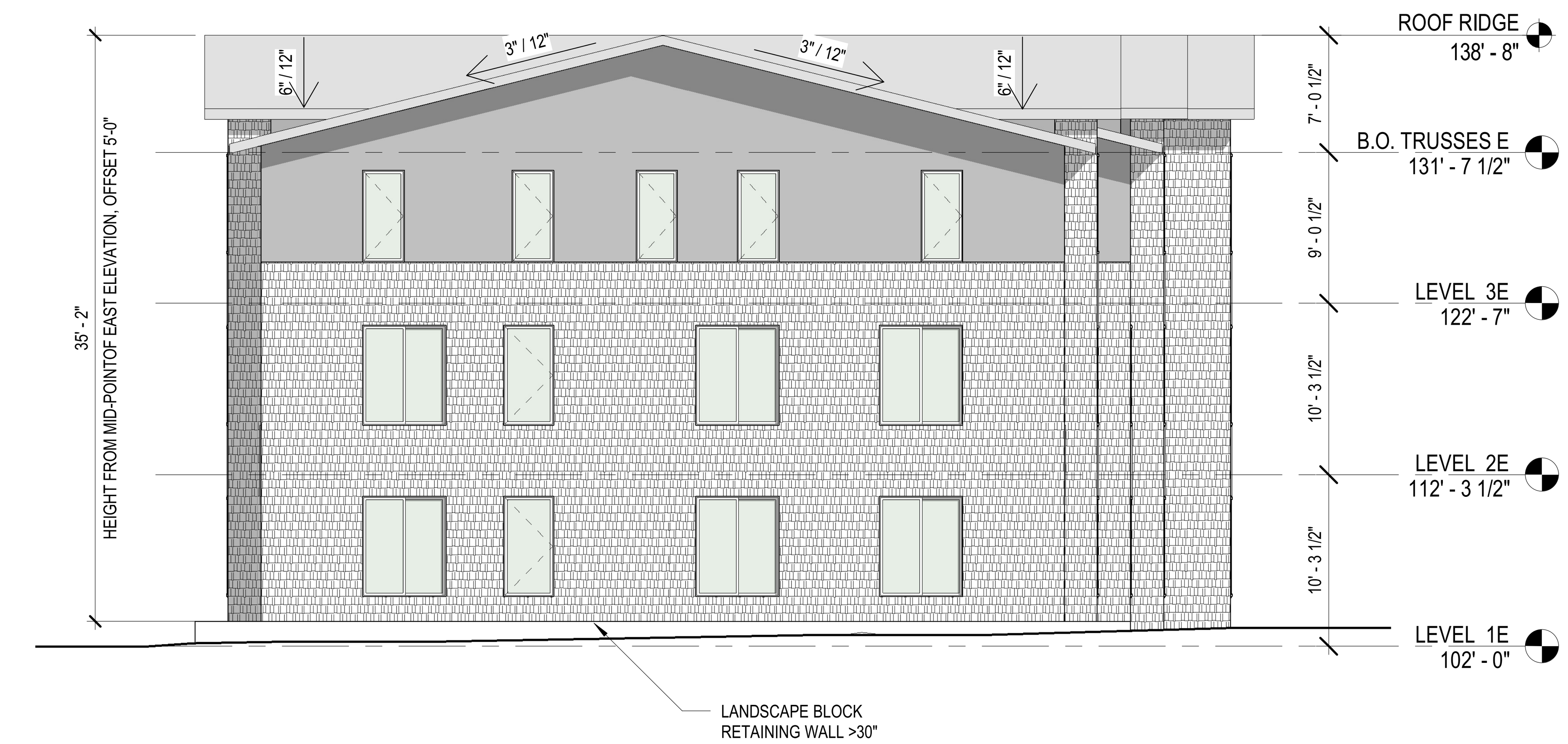
ISSUE DATES:

JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:32 PM

BUILDING D ELEVATIONS

.A24

ORIGINAL SHEET SIZE : 22"x34"



.A25
1 BUILDING E - EAST ELEVATION
SCALE: 1/8" = 1'-0"

.A25
2 BUILDING E - NORTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES
0 LOOP RD MANZANITA, OR

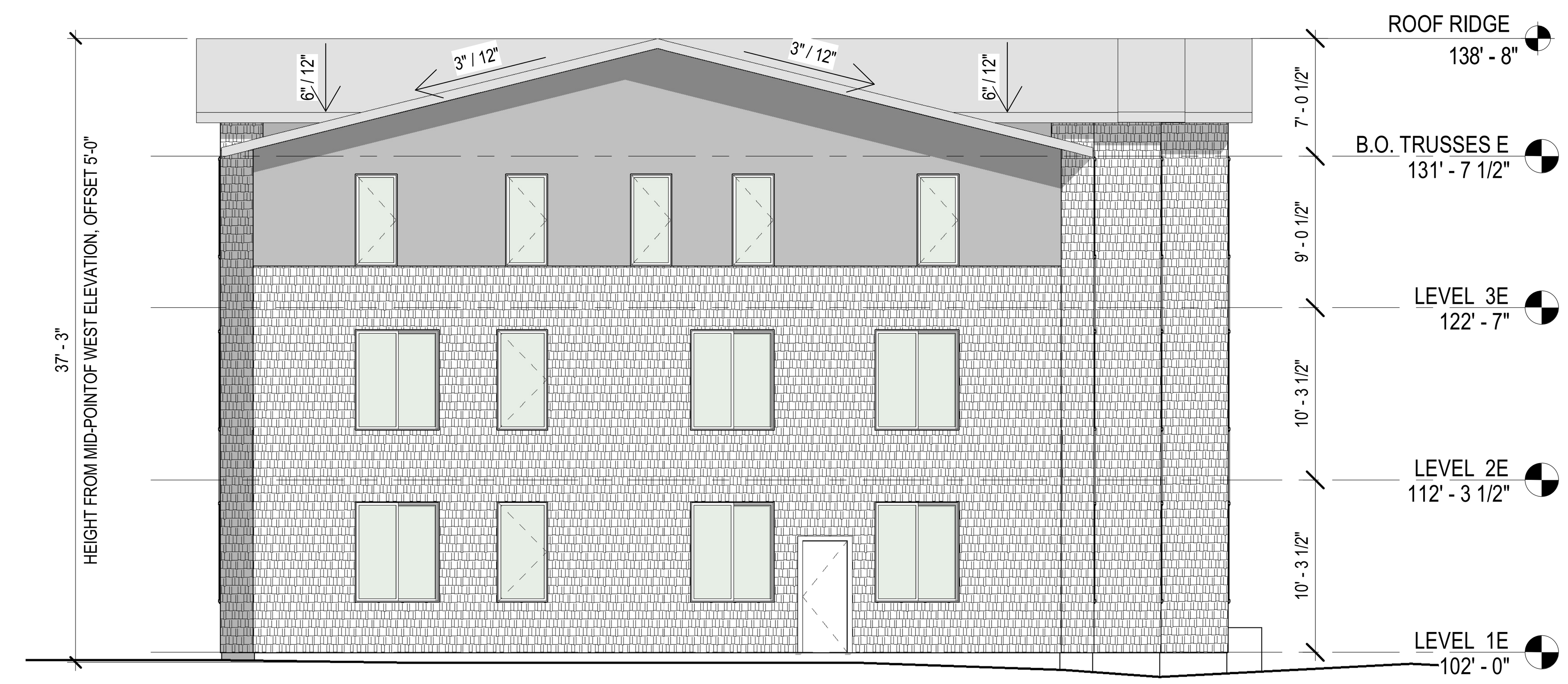
CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

ISSUE DATES:

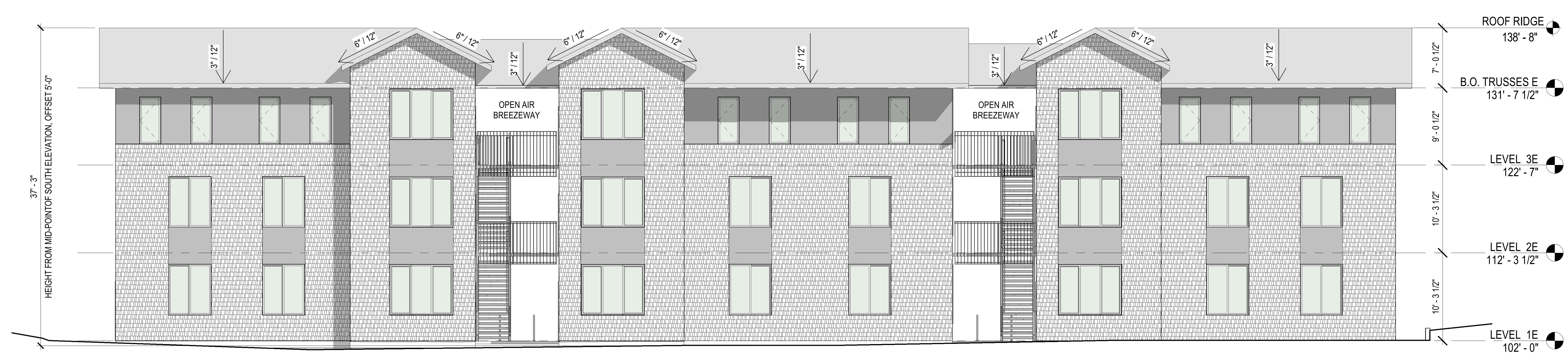
JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:35 PM

BUILDING E ELEVATIONS

.A25
ORIGINAL SHEET SIZE : 22"x34"



.A26
1 BUILDING E - WEST ELEVATION
SCALE: 1/8" = 1'-0"



.A26
2 BUILDING E - SOUTH ELEVATION
SCALE: 1/8" = 1'-0"

SEE SHEET A01 FOR BUILDING HEIGHT CALCULATED FROM AVERAGE FINISHED GRADE PER MANZANITA ZONING ORDINANCE 95-4

polyphon
ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212
polyphon.com

MANZANITA PINES
0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST / GREEN LIGHT DEVELOPMENT; ENCORE INVESTMENTS

ISSUE DATES:

JOB # : 2301
STATUS : LUR
PRINTED : 1/3/2025 1:09:38 PM

BUILDING E ELEVATIONS

.A26
ORIGINAL SHEET SIZE : 22"x34"

LEFT: OVERHEAD VIEW FROM WEST

ABOVE: VIEW FROM **BLDG C** SOUTH TO **BLDG A**

ABOVE: VIEW OF PLAZA AND SOUTH FACADE OF **BLDG D**

ABOVE: VIEW OF WEST FACADE OF CLUBHOUSE

ARCHITECTURE & DESIGN, LLC
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

MANZANITA PINES - LAND USE REVIEW

0 LOOP RD MANZANITA, OR

CLIENT :
HOME FIRST DEVELOPMENT/ GREEN LIGHT DEVELOPMENT

RENDERINGS

.A30

ORIGINAL SHEET SIZE : 22"x34"

PRINTED : 11/14/2024 3:57:01 PM

1.2.2025

POLYPHON
ARCHITECTURE
& DESIGN, LLC
4103 NE TILLAMOOK ST
PORTLAND, OR 97212

Project: 2301: Manzanita Pines

General Narrative

The proposed Manzanita Pines project will bring 60 new units of affordable housing to the Oregon Coast. Situated on 4.62 acres within a larger, master-planned area, the multifamily development includes a mix of 1-bedroom, 2-bedroom and 3-bedroom apartments spread across five residential buildings. The design incorporates varying building scales that are informed by the coastal and forested surroundings of the property. Tucked at the base of the hills sloping up from the site, three-story buildings flank the north and south ends of the development, while a pair of two-story buildings and single-story clubhouse surround a central playground and open space at the heart of the new, family-friendly community.

Project Information

Zoning:	SR-R - Development proposals evaluated by Planned Unit Development (PD) procedures
Site Area:	4.62 acres (201,340 sq. ft.)
Density:	13 dwellings per acre (allowed where at least 40% of total parcel area is reserved as permanent open space)
Open Space:	1.88 acres (81,704 sq. ft.) provided – 40.6% of total site area
Dwelling Units:	60 total (60 / 13 units per acre – 4.62 acres) Overall Unit Mix: 1-Bedroom Units = 14 2-Bedroom Units = 23 3-Bedroom Units = 23
Building Totals:	Building A – 13,296 sq. ft. / 3 stories / 12 dwelling units Building B – 10,077 sq. ft. / 3 stories / 12 dwelling units Building C – 8,468 sq. ft. / 2 stories / 9 dwelling units Building D – 6,096 sq. ft. / 2 stories / 6 dwelling units Building E – 19,296 sq. ft. / 3 stories / 21 dwelling units Clubhouse – 2,500 sq. ft. / 1 story
Auto Parking:	96 auto parking spaces provided (1.6 per dwelling unit)
Bicycle Parking:	32 bicycle parking spaces provided

Site Location & Characteristics

The project site is located at the eastern edge of the City of Manzanita, situated between Highway 101 to the north and Necarney Road to the south, and bounded by Clipper Ct. to the east. The undeveloped, 4.62 acre property was recently annexed into the City and lies at the northeast corner of a larger, 70-acre parcel that is master-planned for future residential housing extending west towards Classic Street. The existing surrounding areas are predominantly residential neighborhoods, and with access from Necarney Road, the site is in close proximity to Nehalem Bay State Park, the main shopping and dining areas of Laneda Avenue, and other popular Manzanita destinations.

Additionally, please refer to the Tree Density Survey prepared by Onion Peak Design for information regarding the density and species of existing tree vegetation on the site.

Conformance with Manzanita Zoning Ordinance #95-4

<u>Section 3.030 Special Residential / Recreational Zone, SR/R</u>

3.030(2) – Uses Permitted Outright

The proposed use is a multi-family housing development allowed per 3.030(2)(c)

3.030(4) – Standards

(a) Overall density for the SR/R zone is 6.5 dwelling units per gross acre. Dwellings may be clustered on one portion of a site within the SR/R zone and achieve a maximum density of 13 dwelling units per acre where at least 40% of the total lot or parcel area is reserved or dedicated as permanent open space as a public or private park area or golf course. The open space shall be so indicated on the Plan and zoning map, and deed restrictions to that effect shall be filed with the City.

The proposed design clusters the dwellings to the south portion of the site and reserves more than 40% of the total lot area as permanent open space, allowing for a maximum density of 13 units per acre.

(b) Standards other than density in the SR/R zone shall conform to those established in the R-3 zone except that the Planning Commission may authorize relaxation of these standards to permit flexibility in design such as cluster development, with respect to lot size, setbacks and lot coverage, but not use.

Refer to the notes that follow for Section 3.020(3) High Density Residential Zone, R-3 Standards regarding conformance to standards and requested relaxation of certain standards to be authorized by the Planning Commission per 3030(4)(b).

(c) The Planning Commission shall use the procedure set forth in Section 4.136 of this Ordinance (Planned Development) in order to evaluate development proposals in this area.

The proposed project shall be reviewed as a Planned Development per 4.136.

(d) The maximum lot coverage in the SR/R zone shall not exceed 40%. Less lot coverage may be required in steeply sloped areas or areas with drainage problems. In all cases, the

property owner must provide the City with a storm drainage plan which conducts storm runoff into adequately sized storm drains or approved natural drainage as approved by the Public Works Director.

The proposed lot coverage is 34% (68,765 square feet).
The proposed storm drainage plan directs runoff into storm basins for natural treatment and infiltration.

(e) In areas without a high water table, a dry well capable of absorbing the storm runoff shall be provided in accordance with City standards.

The proposed storm drainage plan directs runoff into storm basins for natural treatment and infiltration. There is not a high water table in the project location.

Section 3.020(3) High Density Residential Zone, R-3 Standards

(d) The minimum front yard setback shall be 20 feet.

A relaxation of this standard is requested of the Planning Commission per 3.030(4)(b). The proposed design provides a front setback of 10 feet. The buildings have been clustered to the south portion of the property to minimize disturbance of the steeply sloped dunes and to preserve open space areas. The reduction of the front setback down to 10 feet allows the development to be sited further away from the steep slopes at the north and east sides of the property, reducing the impact on the existing slopes and vegetation.

(e) The minimum side yard setback shall be 5 feet for the portion of the building at the setback line up to 10 feet in height...and shall be 8 feet for any portion of the building where this height is exceeded…

The proposed minimum side yard setback is 10 feet.

(f) The maximum building or structure height shall be 28 feet, 6 inches. However, if more than one-half of the roof area has a roof pitch of less than 3 in 12, the building or structure height shall not exceed 24 feet.

The proposed development is for affordable housing. New state law stipulates certain accommodations for affordable housing, including an increase in building heights. Senate Bill 1537 allows for *"a 20 percent increase to base zone height with rounding consistent with methodology outlined in city code, if any."* With the 20% increase allowed, the maximum building height is now 34 feet, 2 inches (28'-6" x 1.20).

A relaxation of this maximum height standard is requested of the Planning Commission per 3.030(4)(b). The proposed design clusters the buildings to preserve open space and avoid development in steeply sloped areas of the site. To minimize building footprint and lot coverage while maintaining livability, affordability, and use of standard construction methods, the design incorporates some 3-story structures with roof pitches of 3 in 12. In order to accommodate three (of the six total) multifamily structures which are three stories, the proposed development requests an additional 3 feet in maximum height, for a total maximum height of 37 feet, 2 inches.

Please refer to the drawing package for additional building height information. Average finished grades around all of the buildings have been provided by the civil engineer on drawing sheet, C1.20. Building height calculations per those average finished grades have been provided by the architect on the Overall Site Plan, drawing sheet, .A01, and elevation views, with building heights noted, have been provided for all of the buildings on drawing sheets, .A20-.A26.

(g) The minimum rear yard setback shall be 10 feet.

The proposed minimum rear yard setback will be 10 feet.

Section 4.060 Multifamily or Apartment Siting Criteria

1. *At least 50% of the required open space area is usable by residents. This can be in the form of lawns, outdoor play areas, swimming pools, patios or decks, or where the Planning Commission permits, indoor areas such as recreation rooms, meeting areas or indoor swimming pool.*

   Except for the two dedicated storm water swale areas, all of the open space area is usable by residents. This includes an outdoor plaza, playground, lawns, pathways, and nearly two acres of natural open space reserved as natural habitat and buffer.

2. *Parking and storage areas are covered if possible, or are located in unobtrusive location, and are buffered from surrounding residences if any, with trees, hedges, fences or other types of screening.*

   The maintenance storage and trash storage areas will be covered structures, located towards the rear (east side) of the property and screened by new and existing vegetation from adjacent residential areas to the east.

   The parking lot, although not covered, loops around the development, with most of the parking located along the rear of the property, away from the street. The parking lot configuration minimizes its visual impact on the street, allowing the buildings and landscape to become the prominent elements along the street frontage. New street trees, interior lot landscaping, perimeter hedges and existing natural vegetation all serve to screen the parking lot from the surrounding areas.

3. *Parking and traffic circulation must be adequately designed to afford access to dwellings to provide loading zones and sufficient maneuvering space. Safety of ingress and egress from adjacent streets must be considered.*

   With two ingress/egress driveways proposed, the parking layout provides a continuous and safe circulation loop through the development. Parking stalls are located in close proximity to all of the dwelling units and common clubhouse building, offering convenient access for all residents. A 26’ wide drive aisle is proposed throughout the parking lot to provide sufficient maneuvering space, extra room for loading, and fire access throughout the site.

Section 4.090 Off-Street Parking Requirements

Vehicle Parking
4.090(3)(a) – *Requirements for specific uses – Dwelling – Two spaces for each dwelling unit.*

A relaxation of this standard is requested of the Planning Commission. The project requests to establish a minimum ratio of 1.6 parking spaces per dwelling unit for this Planned Development.

The proposed multifamily development has 60 dwelling units and the parking lot provides a total of 96 spaces, for a ratio of 1.6 parking spaces per dwelling unit. Having two spaces per unit would provide more parking than necessary for an affordable housing development that mixes one-, two-, and three-bedroom apartments. Although it is safe to assume each dwelling will need to accommodate at least one car, having more than one car is not a luxury many low-income families or individuals can afford. And smaller apartments, with fewer residents, typically do not utilize more than one parking space. A ratio of 1.6 spaces per unit still maintains enough parking to balance the needs of the larger dwelling units with the smaller apartments.

A relaxation of the parking standard is also requested out of respect for the limitations of the property. Reducing the parking along the northeastern edges pulls the development further away from the steeply sloped dune area. This allows more of the natural terrain and existing vegetation to remain undisturbed, and preserves more open space throughout the community.

There is precedent for reduced parking ratios being approved within the City of Manzanita by the Planning Commission. The Heron's Rest project is one example, a cottage cluster housing development of one and two bedroom homes with a ratio of 1.4 spaces per dwelling unit. Similar to Heron's rest, the proposed Manzanita Pines development includes mostly smaller, one and two bedroom living units, but in the form of attached, multifamily, (rather than detached, single-family) structures, which further warrants consideration for reduced parking ratios.

Bicycle Parking (Future Amendment to Ordinance #95-4)
4.090(3)(a) – *Requirements for specific uses – Dwelling – Two spaces per four dwelling units.*

Although the current Manzanita Zoning Ordinance #95-4 does not have a requirement for bicycle parking, the proposed project anticipates the future amendments requiring bicycle parking per the Transportation System Plan Ordinance Amendments Memorandum dated May 13, 2024.

Per the proposed amendment, 30 bicycle parking spaces would be required for the Manzanita Pines development (60 dwelling units / 4 = 15 x 2 = 30).

The proposed site design provides 32 bicycle spaces across the development, exceeding the minimum that would be required per the amendment.

Section 4.136 Planned Unit Development (PD)

1. *Purpose. The purpose of "planned development" is to permit the application of greater freedom of design in land development than may be possible under a strict interpretation of the provisions of this Ordinance. The use of these provisions is dependent upon the submission of an acceptable plan and satisfactory assurance it will be carried out. Such plan should accomplish substantially the same general objectives as proposed by the Comprehensive Plan for the area.*

Situated within a large, undeveloped area that is zoned SR/R, the site presents an opportunity to bring affordable, multifamily housing into the City, through the greater freedom of design in land development that is permitted by the “planned development” process. The proposed project largely meets the requirements of the SR/R zoning although it is a different building typology than has been historically typical for Manzanita. With the exception of the request for additional building height, reduced parking ratio, and reduced front setbacks, the project meets the Zoning Ordinance requirements, and it aligns with the Comprehensive Plan objectives for Residential Land Uses, Housing and Open Space. Additionally, the project provides much-needed affordable housing and density to meet the housing and affordability crisis that is occurring on the coast.

2. *Standards and Requirements. The following standards and requirements shall govern the application of a planned development in an area in which it is permitted.*
   a. *A planned development may include any uses and conditional uses permitted in any underlying zone. Standards governing area, density, yards, off-street parking, or other requirements shall be guided by the standards that most nearly portray the character of the zone in which the greatest percentage of the planned development is proposed.*

The proposed use is a multi-family housing development, which is allowed in the SR/R zone per 3.030(2)(c). With the exception of the request for additional building height, reduced parking ratio, and reduced front setbacks, the proposed development adheres to the standards and requirements stipulated for the SR/R zone.

b. *The developer may aggregate the dwellings in this zone in “cluster” or multiple-dwelling structures so long as it does not exceed the density limits of the Comprehensive Plan.*

The proposed design, “clusters” the multifamily structures to the south portion of the site, and reserves the northern area as permanent open space. With over 40% of the total lot area reserved as permanent open space, a maximum density of 13 units per acre is allowed (and proposed) for this development per Section 3.030(4)(a) of the Zoning Ordinance.

c. *Assurances such as a bond or work agreement with the City may be required to insure that a development proposal as submitted is completed within the time limit agreed upon by the developer and the commission.*

Upon approval of the Planned Development, the intention is to submit the proposed project for building permits within one year, and to begin construction upon permit approval. The expectation is the project will be completed within two years of building permit approval.

Relation to Comprehensive Plan

<u>Residential Land Uses</u>

Goal:
To maintain and create residential living areas which are safe and convenient, which make a positive contribution to the quality of life, and which are harmonious with the coastal environment.

Manzanita Pines is an innovative, multifamily development that will provide affordable housing for local workers and residents. The five residential buildings and common clubhouse are sited in response to the surrounding landscape, creating a blend of open space and built form that’s in harmony with the coastal environment. The design features a mix of one-, two-, and three-bedroom apartments, fostering a safe and secure community for individuals and families alike.

Objectives:

1. *Maintain livability by preserving within residential areas natural places and other environmental amenities.*

   Over 40% of the site will be retained as open space. The buildings are clustered on the south portion of the property, allowing for nearly two acres of natural vegetation and older dunes on the north end to remain untouched by development. This open space buffers the site from surrounding properties and maintains a natural environment for residents, guests and the general public to enjoy.

   In addition to the preserved open space, the buildings are clustered around a central plaza, playground and large swale area, putting the outdoor amenities and natural environment at the heart of the residential community.

2. *Establish residential densities suited to topography and soil conditions, public facilities, accessibility and prior land platting.*

   Clustering the buildings and preserving open space allows for the greater density of 13 units per acre for a multifamily development. The buildings are situated to work with the natural topography, avoiding the steeper slopes of the dune at the north end of the property and allowing that area to serve as a buffer from adjacent neighborhoods.

3. *Protect the character and quality of existing residential areas and neighborhoods from incompatible new development.*

   The proposed multifamily development is one piece of a larger, 70-acre residential master plan for an undeveloped area that is secluded by its topography and adjoining streets. Open space to the north, and a landscape buffer to the east, separate the Manzanita Pines property from adjacent residential areas. And the site is only accessed from Necarney Road to the south, so no direct connections are made between the property and existing residential streets.

4. *Encourage street patterns which are curving and responsive to natural terrain rather than the traditional rectilinear grid pattern.*

   Working with the natural terrain, the project site boundary is designed to follow the curve of a new access road being constructed down to Necarney Road.

5. *Make effective use of vacant city residential lots, particularly odd-shaped parcels and those isolated within blocks.*

   Situated at the upper corner of a large, unplatted land area, the proposed multifamily project provides an effective use for undeveloped land at the far east end of the City.

6. *Encourage new residential development in established areas already zoned, serviced and developed for residential use.*

The large, undeveloped site is zoned SR/R and is bounded on the east and south by existing residential development served by municipal and county utilities. The proposed new development at Manzanita Pines would tie into the existing utility systems.

The SR/R zone is described as, *"Intended for major unplatted land areas where dwellings are appropriate, but where the character and density of development has yet to be established. This land use category will allow greater freedom and flexibility in site design, setbacks and the use of open space than in medium and high density area where standard platting has taken place. Uses may include single-family, or multi-family dwellings and commercial uses developed to serve the development."*

The undeveloped site within the SR/R zone represents an ideal opportunity to create multifamily housing for the City of Manzanita.

7. *Foster housing and living environments to meet the needs of families of different size, income, age, taste and life style.*

   As an affordable housing development, the Manzanita Pines project will create an opportunity for the City's lower income residents to find safe and secure, quality housing. The 60-unit development provides a mix of 1-bedroom / 1-bath apartments (~560 square feet), 2-bedroom / 1 bath apartments (~880 square feet), and 3-bedroom / 1.5 bath apartments (~1135 square feet). The blend of unit types allows for individuals and families of different sizes and life styles to find living space within the community. With a playground, outdoor plaza, common clubhouse and accessible ground floor units, the site design embraces people of all ages, from children to seniors.

8. *Enhance the quality of residential areas with attractive public improvements. To eliminate conditions which contribute to blight, neglect and unsightliness, such as shacks, abandoned vehicles and machinery, dilapidated signs, fences, open storage and junk.*

   Home First Development has a proven track record of building high-quality, affordable housing communities throughout the Northwest. Amenities at Manzanita Pines will include a common clubhouse, outdoor plaza and playground for the residents, plus dedicated, natural open space for the greater community to enjoy. An on-site property management team will ensure that a safe, secure and attractive environment is maintained throughout the property.

Applicable Policies:

1. *Protect living qualities by requiring landscaped screening or buffering between dwellings and commercial uses.*

   Significant existing vegetation will remain along the north / northeast portions of the property to provide a landscape buffer from the adjacent neighborhoods. New landscaping toward the south and east will supplement the existing to help further screen the development from neighboring properties. Additionally, street trees and interior landscaping will be provided throughout the property to enhance the living experience and create a buffer between individual buildings within the development.

2. *Require that subdivisions include adequate public street access for each house and lot, paved streets, adequate water and sewer systems, storm drainage, underground*

telephone, TV cable and electrical lines. Street plantings and trees are desirable. Improvements should be of good quality.

Public access per City of Manzanita and Fire District standards will be provided to all areas of the development. The new access road and the parking lot that loops through the site will be paved. Water and sewer systems will tie into existing municipal and county systems, and other utilities will be underground. Street plantings and trees will be provided to supplement the existing natural environment.

The new access road will be built to City standards and turned over to the City once completed. Refer to the Street Policies section of this narrative for additional information pertaining to the new access road.

3. *Permit a variety of dwellings and flexibility in densities and site design for large planned developments. Density standards established in the vicinity will generally serve as the basis for the overall density of such planned developments. Special review and approval by the Planning Commission will be required. Projects will be expected to provide usable open space, community facilities and other special amenities. The clustering of dwelling units in order to leave a greater amount of land for open space is encouraged.*

   The planned development of Manzanita Pines incorporates a variety of apartment types within a multifamily building configuration. Featuring five residential buildings and 60 total apartments, the design clusters the dwelling units to the south portion of the site, leaving the north area as a large, natural open space. Over 40% of the site area is reserved as permanent open space, establishing a density of 13 units per acre as allowed by the SR/R zone regulations. In addition to the natural open space, the development also includes resident amenities such as a common clubhouse, outdoor plaza and playground.

Special Residential / Recreational Area (SR/R Zone)

Intended for major unplatted land areas where dwellings are appropriate, but where the character and density of the residential development has yet to be established. This land use category will allow greater freedom and flexibility in site design, setbacks, and the use of open space than in medium and high density areas where standard platting has taken place. Uses may include single-family, or multi-family dwellings and commercial uses developed to serve the development.

Overall residential densities shall not exceed 6.5 dwelling units per acre. In determining dwelling densities, considerations will be given to the amount of designated open space areas, the quality of site and building design and other improvements and amenities.

The 4.62 acre project site is part of a large, unplatted, 70-acre area that is being master planned for future residential use. Zoned as an SR/R property, the undeveloped site serves as an ideal location to provide multifamily housing for the City of Manzanita. The proposed design clusters the buildings to the south portion of the site and reserves more than 40% of the overall area for open space, thus establishing an allowable density of 13 dwellings per acre within the SR/R zone, per Section 3.030(4)(a) of the Manzanita Zoning Ordinance.

Housing

Goal:
The City of Manzanita supports the statewide housing goal by its intention to provide opportunities for development of a wide variety of housing types and price ranges within the Urban Growth Area and the City of Manzanita.

The proposed Manzanita Pines development will bring multifamily affordable housing to the City, filling a need for a different housing type at an attainable price point for lower income residents.

Applicable Policies:

1. *Zone adequate land to meet identified future housing needs for a broad range of housing types, including single-family attached and detached homes, manufactured homes, duplexes and multi-family dwellings.*

   The unplatted and undeveloped land area is zoned SR/R, allowing for the flexibility to create higher density, multifamily housing on the property.

2. *The City supports the efforts of the Northwest Oregon Housing Authority and other public, private and non-profit entities to provide needed low and moderate income housing, including for seniors.*

   Home First Development builds and maintains affordable housing throughout the Northwest, partnering with public, private and socially responsible investors to provide access to safe, affordable homes for vulnerable families and individuals in need.

3. *The City, through its enforcement of the Oregon Residential Specialty Code, shall maintain a high standard of housing construction.*

   Home First Development strategically partners with a dedicated team of architects, engineers and contractors to ensure a high standard of design and construction. The development at Manzanita Pines will be designed to meet all local and state building codes, and the team will coordinate with the City to apply for and acquire the necessary building permits prior to construction.

5. *The City shall encourage innovative design techniques such as cluster development in order to promote the preservation of open space, to lower the cost of public facilities, and to maintain vegetative cover.*

   The proposed design clusters the buildings to the south portion of the site, allowing for the preservation of nearly two acres of open space on the north end of the site. The open space maintains the existing vegetative cover, providing a buffer from adjacent properties and allowing the community to enjoy the natural coastal environment.

9. *The City should regularly maintain and update the City's inventory of buildable land and use it to both identify housing development opportunities and assess the ability to meet future housing needs.*

   Situated at the east end of the City limits and zoned SR/R, this undeveloped site of buildable land represents an ideal opportunity to create multifamily housing to help meet Manzanita's increasing housing needs.

Parks and Open Space

Goal:
To create and maintain ample places and facilities for indoor and outdoor recreation and to preserve the natural environment and scenic qualities of the City and surrounding areas.

The proposed design preserves over 40% of the site for open space, buffering the development with the natural landscape and providing the community with ample space to enjoy the coastal environment. In addition to the preserved open space, the project design also incorporates an outdoor plaza, playground and common clubhouse for use by the residents.

Objectives:

1. *To provide parks, facilities and open space suitable for each segment of the population.*

   With a playground, accessible plaza and clubhouse, and preserved natural terrain for walking and hiking, the proposed Manzanita Pines development offers recreation space to be enjoyed by all age groups, from children to seniors.

3. *To preserve some open spaces within residential neighborhoods, to create a harmonious balance of open and built-up areas, provide recreation space near dwelling places and to help maintain community identity.*

   Open space lies at the heart of the proposed site design. Located in the center of the development and flanked on both sides by dwelling units, the common clubhouse opens to the outdoor plaza and playground areas that overlook a large, vegetated swale. The residential buildings are sited to allow ample open space around all of the structures, connecting the dwelling units with the landscape. The buildings have also been clustered on the site to preserve a large area of open space, balancing the built forms with the natural environment of the coast.

Applicable Policies:

5. *Require that new subdivisions include dedicated future park sites or open space. To require that large planned developments include a suitable amount of recreation or usable open space.*

   The proposed design preserved more than 40% of the site area (nearly two acres) as dedicated open space. Additionally, the project also includes an outdoor plaza and playground as open space for residents to enjoy.

11. *Respect the limitations of the land. To insure that development avoids or makes proper allowance for steep, unstable or poorly drained soils and areas of high ground water.*

    The site is designed to work with the natural topography as much as possible. The development is clustered on the south portion of the site, in order to minimize disturbance of the steeply sloped dune areas to the north. The buildings are arranged so that storm water swales can be located at the lower points of the site, embracing the natural drainage flow for stormwater.

Storm Drainage Policies

1. *Adequate storm drainage facilities, including culverts, drywells, catchment basins, natural or surface channel systems or pipelines, as approved by the Public Works Director (PWD), shall be a part of all subdivisions, planned developments, street construction or improvements or other developments which may impact storm drainage patterns.*

   A storm conveyance system will be built for the project consisting of storm pipes to collect rain water from roof downspouts, parking area catch basins and plaza and landscape area drains. These will be conveyed to landscaped storm basins on the site to provide water quality treatment and infiltration into the existing sand-based soils.

2. *Subdivisions in areas that have drainage problems shall make adequate provision for handling storm runoff. This may be accomplished through larger lot sizes, use of special facilities such as pumps and holding ponds, reduced lot coverage, or other methods.*

   There are no known drainage problems on the site, and none are expected based on our knowledge of the adjacent properties.

3. *Wherever possible in subdivision design, natural drainageways shall be used and riparian vegetation shall be maintained. Larger lot sizes shall be required adjacent to natural drainages. Structures shall be set back sufficiently to protect the capacity of the natural drainageway. Natural shall not be filled or altered.*

   The existing dune, gully and escarpment to the north of the project will be maintained in their existing condition. The project will disturb the minimum area possible and will maintain as much existing vegetation as possible for a project of this scale.

4. *All roof drains will be required to flow into properly constructed drywells, except in areas where it can be shown that the water table is too high for this to be done effectively, in which case other methods shall be employed. Lot coverage may be reduced and roof drains may be piped into adequate culverts. Roof drains are not to be connected to sanitary sewer lines.*

   A storm conveyance system will be built for the project consisting of storm pipes to collect rain water from roof drains, parking area catch basins and plaza and landscape area drains. These will be conveyed to landscaped storm basins on the site to provide water quality treatment and infiltration into the existing sand-based soils. Drywells will not be needed as surface storm facilities will be capable of infiltrating all of the site storm water closer to the ground surface. Roof drains will NOT be connected to sanitary sewer lines.

Street Policies

1. *The cost of constructing streets in new subdivisions, planned developments, or in rights-of-way where no improved street exists shall be the responsibility of the developer or the adjacent property owners.*

   In conjunction with the proposed Manzanita Pines development and to provide access to the property, a new street is being constructed by the developer under a separate proposal. The new street, Loop Road, will connect to Necarney City Road a distance of 0.2 miles east of the entrance to Pine Ridge gated community. The road will head north for approximately 0.2 miles.

2. *Asphaltic concrete pavement shall be required for all streets.*

   Loop Road will be asphaltic concrete pavement.

3. *Storm drainage, as determined by the PWD, shall be required for all street improvements and construction.*

   Loop Road will be a local road with 20' paved width, draining to the west with a gutter at the west side. The drainage will be picked up in storm drains and drain to a storm facility at the intersection of Loop Road and Necarney City Road.

5. *Street standards for the City of Manzanita are located in the Street Improvement Standards Ordinance and future improvements to intersections along US 101 are identified in the adopted Downtown Transportation Plan, Section 4.*

   The proposed Loop Road will be constructed to City of Manzanita street standards. In addition to the paving and storm drainage components noted above, the road will also have a water line and two new fire hydrants, as well as a sewer line that will drain to an existing manhole at Clipper Court. It will also have an electric line and electric vaults. Once completed, the road will be turned over to the City of Manzanita.

MACKENZIE.

TRANSPORTATION IMPACT ANALYSIS

To
City of Manzanita

For
Oregon Coast Development

Dated
November 13, 2024

Project Number
2160454.11

MACKENZIE
Since 1960

RiverEast Center | 1515 SE Water Avenue, Suite 100, Portland, OR 97214
PO Box 14310, Portland, OR 97293 | T 503.224.9560 | www.mackenzie.inc

TABLE OF CONTENTS

LIST OF TABLES

APPENDIX A: LIST OF FIGURES

I. INTRODUCTION

This Transportation Impact Analysis (TIA) has been prepared in support of the proposed Manzanita Pines residential project in Manzanita, Oregon. Figure 1 in Appendix A presents a vicinity map indicating the project location.

Project Description

The proposed Manzanita Pines residential project located on the proposed Loop Road connected to Necarney City Road in Manzanita, Oregon will include multiple phases of development. Phase 1 will include 60 residential units between one- and three-bedroom and 500-1,200 square feet (SF) in size. The project will also include a common building, plaza, and playground. The apartments are intended to be an affordable option for local residents.

Scope of Analysis

This TIA has been prepared in accordance with the ODOT APM Version 2 and the scoping memo from Lancaster Mobley dated October 2, 2024. This TIA includes a summary of existing traffic conditions, proposed trip generation, trip distribution and assignment, crash review, an analysis of intersection operations, and queuing. The scoping letter is provided in Appendix B.

Study Area

This TIA includes a study of the following City of Manzanita intersections:

- Necarney City Road/Highway 101
- Necarney City Road/Loop Road

Analysis Scenarios

Analysis is provided for all study area intersections. Construction is anticipated at the end of 2025, so this study assumes cull occupancy in 2026. This TIA addresses transportation conditions for the following analysis scenarios during the PM peak hours and Saturday peak hours:

- 2024 Existing
- 2026 Pre-Development without Manzanita Pines
- 2026 Post-Development with Manzanita Pines

II. EXISTING CONDITIONS

The existing conditions analysis is based on a current year inventory of transportation facilities and traffic data collected on October 10 and 12, 2024.

Site Conditions

The project site is located on the north side of Necarney City Road between Clipper Court and Pine Ridge Drive in Manzanita, Oregon. The site is zoned R2, Medium Density Residential. The site is currently vacant.

Vehicular Transportation Facilities

The study area presented in this TIA includes roadways under City of Manzanita as well as ODOT jurisdiction. Figure 3 presents the existing lane configurations and traffic control devices for the study area intersections (Appendix A). Table 1 summarizes the characteristics of the study area roadways.

TABLE 1 – ROADWAY CHARACTERISTICS

Roadway	Functional Classification	Posted Speed (mph)	Travel Lanes	Lane Width	Bike Lanes	On-Street Parking	Sidewalks
Necarney City Road	Minor Collector	35	2	12 feet	No	No	No
Highway 101	Principal Arterial/ Statewide Highway	40	2	12 feet	No	No	No
Loop Road	Local Street	25	2	10 feet	No	No	No

Pedestrian and Bike Facilities

Bike lanes and sidewalks are not currently provided on any of the area roadways as noted above.

Transit Facilities

The City of Manzanita is part of the NWConnector transit system. Route 3 provides service to Manzanita as it passes between Cannon Beach and Tillamook. The greater NWConnector transit system provides connections between Astoria to the north and Yachats to the south along Highway 101. It also provides connections to the east, from Kelso, Washington to the north to Albany, Oregon to the south, primarily along the I-5 corridor. A copy of the NWConnector Route 3 schedule and map have been provided in Appendix C.

Existing Traffic Counts

Turning movement counts utilized in this study were collected on Thursday, October 10, 2024, and Saturday, October 12, 2024. Because the Loop Road intersection with Necarney City Road does not yet exist and to obtain data on residential trip distribution, we collected data at the intersection of Pine Ridge and Necarney City Road. Figure 4 presents the existing PM peak hour and Saturday peak hour traffic volumes for all study area intersections (Appendix A). Raw traffic count summaries are provided in Appendix D.

Seasonal Adjustment

Seasonal adjustment factors were reviewed using ODOT's ATR Seasonal Trend Table for coastal destination with a count conducted on October 10 and 12. The calculated seasonal adjustment factor of 1.19 was applied to the 2024 existing traffic counts at all locations. Figure 5 presents the seasonally adjusted 2024 volumes (Appendix A).

Crash Analysis

Historical crash data reported for the study area were evaluated for safety. Crash data for the 5-year period of 2018 through 2022 were obtained from ODOT and used to review crash patterns and estimate crash rates for the study area intersection of Necarney City Road with Highway 101 and along Necarney City Road between Highway 101 and Classic Street. Two crashes were noted at the intersection and four crashes along the approximately one-mile segment of Necarney City Road.

Intersection Crash Rates

When evaluating the relative safety of an intersection, consideration is given not only to the total number and types of crashes occurring, but also to the number of vehicles entering the intersection. This concept, referred to as a "crash rate," is usually expressed in terms of the number of crashes occurring per one million entering vehicles (MEV) for the intersection per year. Intersections having a crash rate higher than 1.0 crashes/MEV should be reviewed for opportunities to improve safety.

The intersection crash rate is calculated by dividing the average number of crashes per year by the MEV per year. A daily traffic volume was estimated by dividing the PM peak hour volume at the intersection by a peak-to-daily factor, or k-factor. A k-factor of 0.144 from ODOT traffic data taken 0.1 miles east of Necarney City Road on Highway 101 was found on ODOT's TransGIS web portal was applied to the PM peak hour traffic volume collected on October 10, 2024, to estimate ADT.

Road segment crash rates are calculated similarly to intersections but are based on the vehicle miles traveled. The number of crashes is divided by the vehicle volume times the length of the segment and is expressed in crashes per million vehicle miles traveled (MVMT). The daily volume on Necarney City Road was estimated by applying the same k-factor to the PM peak hour volume just south of the intersection with Highway 101.

The raw crash data and calculations is provided in Appendix F.

Crash Data Summary

There were two crashes reported at the intersection of Necarney City Road with Highway 101. One was a fixed-object crash in 2018 caused by an improper westbound left turning movement, resulting in a suspected minor injury (Injury Type B). The other was a crash with a cyclist caused by a failure to yield by the driver at fault, resulting in a suspected serious injury (Injury Type A). With an estimated daily volume of 5,000 vehicles, the resulting crash rate is 0.18 crashes per MEV. This is much less than ODOT's 90th Percentile rate of 0.475 for similar intersection types.

There were four crashes reported along Necarney City Road between Highway 101 and Classic Street. All four appear to be single-vehicle crashes caused by driver error (i.e., driving too fast for conditions, hitting a fixed object or deer/elk, etc.). None of the crashes occurred near the proposed Loop Road intersection. With an estimated daily volume 938 vehicles, the crash rate was calculated to be 2.34 crashes per MVMT.

Though the crash rate is high on the segment of Necarney City Road, it is generally the result of driver behavior such as driving too fast for conditions. None of the crashes were intersection-related and all involved a single vehicle. Therefore, we do not believe the added Loop Road intersection will have an impact on safety on the roadway. No further crash analysis is recommended.

III. PRE-DEVELOPMENT CONDITIONS

The pre-development condition reflects a buildout year scenario without the proposed development. This scenario includes traffic from the 2024 existing condition, background traffic growth to the year 2026, and in-process traffic from other approved developments that have not been constructed.

Planned Transportation Improvements

None noted in the study area.

Background Traffic Growth

Based on data from ODOT's 2040 Future Volumes Table from 0.2 miles north of Manzanita and 0.2 miles south of Laneda, and recent studies prepared in Manzanita, a 1% growth rate per year was applied to the study area intersections.

Figure 6 presents the PM peak hour and Saturday peak hour background traffic growth volumes for all study area intersections (Appendix A).

In-Process Traffic

In-process traffic volumes account for developments that have been approved or that are under construction at the time of the traffic counts. These traffic volumes account for trips that will be added to the external roadway network before build-out of the proposed development. Traffic volumes for the following developments were included in the analysis to account for in-process traffic:

- Manzanita Lofts
- Heron’s Rest
- Nehalem Bay State Park Expansion

The detailed trip generation analysis for the Nehalem Bay State Park Expansion provided by ODOT via Lancaster Mobley listed zero trips on Saturday due to limited ITE data. The PM peak hour rate has been assumed for Saturday as a more appropriate estimate. Figure 7 presents the PM peak hour and Saturday peak hour in-process trips for the above project (Appendix A). Detailed information for the in-process projects is included in Appendix E.

Pre-Development Traffic

The 2026 pre-development analysis scenario is a combination of 2024 traffic volumes, a 1% annual background growth rate over two years, and in-process traffic. The pre-development traffic without the project trips will indicate if traffic issues are present before the addition of the proposed residential project.

Figure 8 presents the PM peak hour and Saturday peak hour 2026 pre-development traffic volumes (Appendix A).

IV. SITE DEVELOPMENT

The trip-making characteristics of the proposed development are described below.

Trip Generation

Trip generation estimates for the proposed project were developed using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual,* 11th Edition. The ITE land uses that best match the proposed project is "Affordable Housing" (LUC 223). The data set for Saturday trip generation for "Affordable Housing" is limited, so the trip rates from "Multifamily Housing (Low-Rise)" (LUC 220) were used.

A trip generation summary is presented in Table 2.

TABLE 2 – TRIP GENERATION										
ITE Code	ITE Land Use	Size	Trip Type	PM Peak Hour			Saturday Peak Hour			Daily
				In	Out	Total	In	Out	Total	
223	Affordable Housing (Income Limit)	60	DU	15	13	28	15[1]	10[1]	25[1]	289

[1]Trip rates from "Multifamily Housing (Low-Rise)" (LUC 220) used

As shown in Table 2, the affordable housing development is expected to generate 28 PM peak hour, 25 Saturday peak hour, and 289 weekday daily trips.

Trip Distribution and Assignment

Trip distribution for the proposed development was estimated using similar studies for residential development and review of existing traffic volumes at the study area intersections and to the intersection of Necarney City Road with Pine Ridge Lane. Because of the nature of residential developments in this area, trip patterns differ between weekday and the weekend. The following trip distribution was used for PM peak hour trips:

- 5% to/from Nehalem Bay State Park
- 35% to/from Central Manzanita
- 20% to/from the north on Highway 101 via Necarney City Road
- 40% to/from the south on Highway 101 via Necarney City Road

The following trip distribution was used for Saturday peak hour trips:

- 5% to/from Nehalem Bay State Park
- 45% to/from Central Manzanita
- 15% to/from the north on Highway 101 via Necarney City Road
- 35% to/from the south on Highway 101 via Necarney City Road

Figure 9 presents the PM peak hour and Saturday peak hour site trip distribution and volumes (Appendix A).

Post-Development Traffic

Post-development traffic volumes are the sum of the site trips and the pre-development traffic volumes. Figure 10 presents the PM peak hour and Saturday peak hour 2024 post-development traffic volumes (Appendix A).

V. SITE ACCESS, CIRCULATION, AND PARKING

The evaluation of site access and on-site circulation are presented below. This evaluation includes assessment of sight distance.

Site Access and Circulation

The residential project will have access via two driveways on the proposed Loop Road. The southern driveway is proposed approximately 575 feet from Necarney City Road, and the second driveway is proposed 265 feet north of the first.

Sight Distance Evaluation

Based on the proposed Loop Road and project site, the site driveways on Loop Road will meet minimum stopping sight distance (SSD) and intersection sight distance (ISD) requirements per AASHTO design guidelines.

TABLE 3 – SIGHT DISTANCE EVALUATION

Access	Design Speed (MPH)	Design Vehicle	Recommended ISD (feet)	Required SSD (feet)	Available Sight Distance (feet)	
					To North	To South
South Access	25 MPH	Passenger Car	280	155	280	280
North Access	25 MPH	Passenger Car			N/A	280

The proposed intersection between Loop Road and Necarney City Road will address required sight distances through the design process.

VI. OPERATIONS ANALYSIS

Two aspects of operation analysis were evaluated for the study area intersections: 1) intersection operation analysis, which evaluates how well an intersection processes traffic demand; and 2) queuing analysis, which compares intersection queues with available storage for different travel lanes.

Intersection Operations Analysis

Intersection operations are generally measured by three mobility standards: volume-to-capacity (v/c) ratio, level-of-service (LOS), and delay (measured in seconds).

- V/C ratio is a measurement of capacity used by a given traffic movement or for an entire intersection. It is defined by the rate of traffic flow or traffic demand divided by the theoretical capacity calculated for the roadway geometry and traffic control.
- LOS is an expression of the average control delay (in seconds) experienced by drivers as described by a letter on the scale from A to F. LOS A represents optimum operating conditions and minimum delay, while LOS F indicates lengthy delays and often over-capacity conditions.
- Delay is a measurement of the average vehicle delay resulting from the type of traffic control and the conflicting traffic volumes. An average delay can be expressed for a certain movement, a specific lane, a single approach, or for an entire intersection.

Performance Measures

The Oregon Highway Plan (OHP) designates Highway 101 as a statewide highway that is Non-MPO outside of a Special Transportation Area. With a posted speed of 40 mph Table 6 of the OHP states the mobility target for the Highway 101 and Necarney City Road intersection is a v/c ratio of 0.85 or less.

The City of Manzanita has no clear operational standards for City intersections. It is assumed a level of service "D" or better would be sufficient for City intersections.

Methodology

Intersection operations were analyzed with the use of Synchro 11 software, which utilizes the Transportation Research Board's *Highway Capacity Manual* (HCM) 2000, HCM 2010, and HCM 7 methodologies. All the study area intersections are stop controlled.

Findings

The operation results for the worst-operating movement at each intersection are presented in Table . HCM 2000 and seven reports have been made available in Appendix G.

TABLE 4 – PEAK HOUR INTERSECTION OPERATIONS				
Intersection (Control)	Peak Hour	Analysis Results (v/c-LOS-Delay in seconds)		
		2024 Existing	2026 Pre-Development	2026 Post-Development
Necarney City Road/Hwy 101 (Stop)	PM	0.19-B-13.3 (NB)	0.23-B-14.2 (NB)	0.24-B-14.2 (NB)
	SAT	0.30-C-16.1 (NB)	0.34-C-17.2 (NB)	0.36-C-17.6 (NB)
Necarney City Road/Loop Road (Stop)	PM	N/A	N/A	0.02-A-9.3 (SB)
	SAT	N/A	N/A	0.01-A-9.7 (SB)

As presented in Table 4, all study area intersections currently operate within ODOT and City standards and are projected to continue meeting standards under post-development conditions.

Intersection Queuing Analysis

An intersection queuing analysis was conducted for the study area intersections during the PM peak hour and Saturday peak hours to identify vehicle queuing needs. The 95th percentile queues were estimated using SimTraffic software, with results rounded to the nearest 25 feet to represent average vehicle lengths.

Because queues are based on an average of five traffic simulations using random arrivals, some fluctuation in results can be anticipated, particularly for movements that are near or projected to be over capacity.

Methodology

Available queue storage lengths were estimated using Google Earth Pro software and rounded to the nearest five feet. For turn lanes, two available storage values are stated: the first represents the striped storage; and the second is the effective storage, or the length physically available regardless of striping, such as a center turn lane upstream of a striped left-turn lane at an intersection. Although through lanes have no storage defined by striping, two values are reported for storage: the first is the distance to an upstream driveway; and the second is the distance to an upstream public street intersection.

Findings

The PM peak hour and Saturday 95th percentile queues are presented in Table . Bold text indicates the calculated queue exceeds the storage for the travel lane. SimTraffic output sheets are provided in Appendix I.

TABLE 5 – 95TH PERCENTILE QUEUING ANALYSIS					
Intersection (Control)	Approach/ Movement	Available/ Effective Storage (feet)	PM/Saturday Queue (feet)		
			2024 Existing	2026 Pre-Development	2026 Post-Development
Necarney City Road/ Hwy 101 (Stop)	WBL	375/500	50/75	50/75	50/75
	NB L+R	40/135	75/100	75/125	100/100
Necarney City Road/ Loop Road (Stop)	EB L+R	765/765	N/A	N/A	25/25
	SB L+R	TBD	N/A	N/A	25/25

As presented in Table 5, all existing and future conditions queues are expected to be accommodated by available storage. No queues will exceed available storage distances.

VII. MITIGATION AND RECOMMENDATIONS

All study area intersections are expected to operate at acceptable levels per ODOT and City standards with the addition of site trips, and vehicle queues will not exceed available storage.

The minimum required intersection sight distance of 280 feet is available from the driveways on Loop Road. The proposed intersection between Loop Road and Necarney City Road will address required sight distances through the design process.

Therefore, we do not recommend any mitigation measures for Necarney City Road or Loop Road.

VIII. APPENDIX

Appendix A.	Figures
Appendix B.	Scoping Material
Appendix C.	Transit Information
Appendix D.	Traffic Count Summaries
Appendix E.	Seasonal Adjustment Calculations
Appendix F.	In-Process Trips and Vicinity Map
Appendix G.	Crash Data
Appendix H.	Operations Calculations
Appendix I.	Queuing Analysis

APPENDIX A.

FIGURES

M. MACKENZIE.

Portland 503.224.9560
Vancouver 360.695.7879
Seattle 206.749.9993
www.mcknze.com

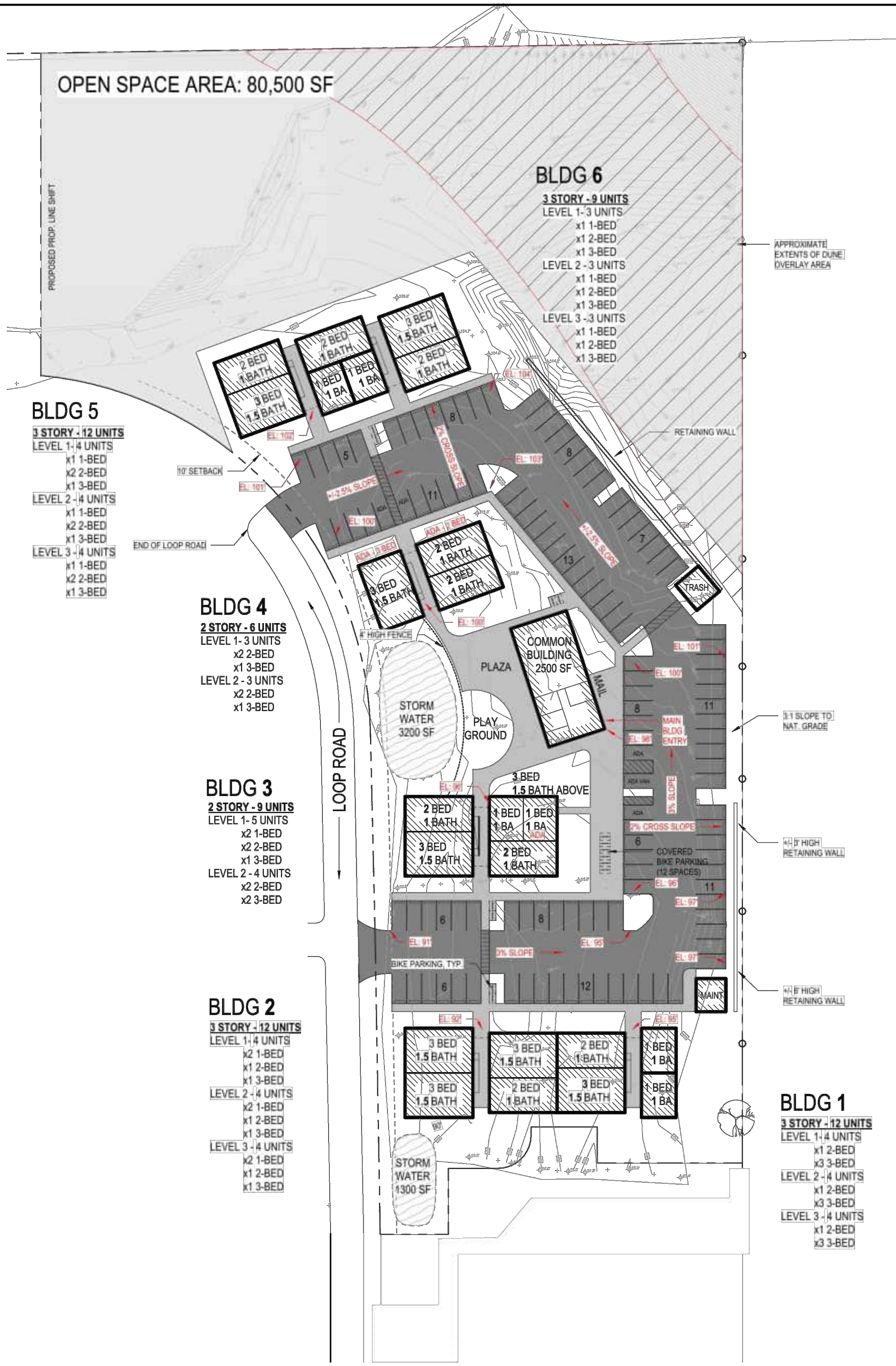
Architecture ▪ Interiors
Planning ▪ Engineering

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

VICINITY MAP

MANZANITA PINES
MANZANITA, OREGON

FIGURE 1



SD07
1 PROPOSED SITE PLAN_05-13-2024
SCALE: 1" = 40'-0"

NOT TO SCALE

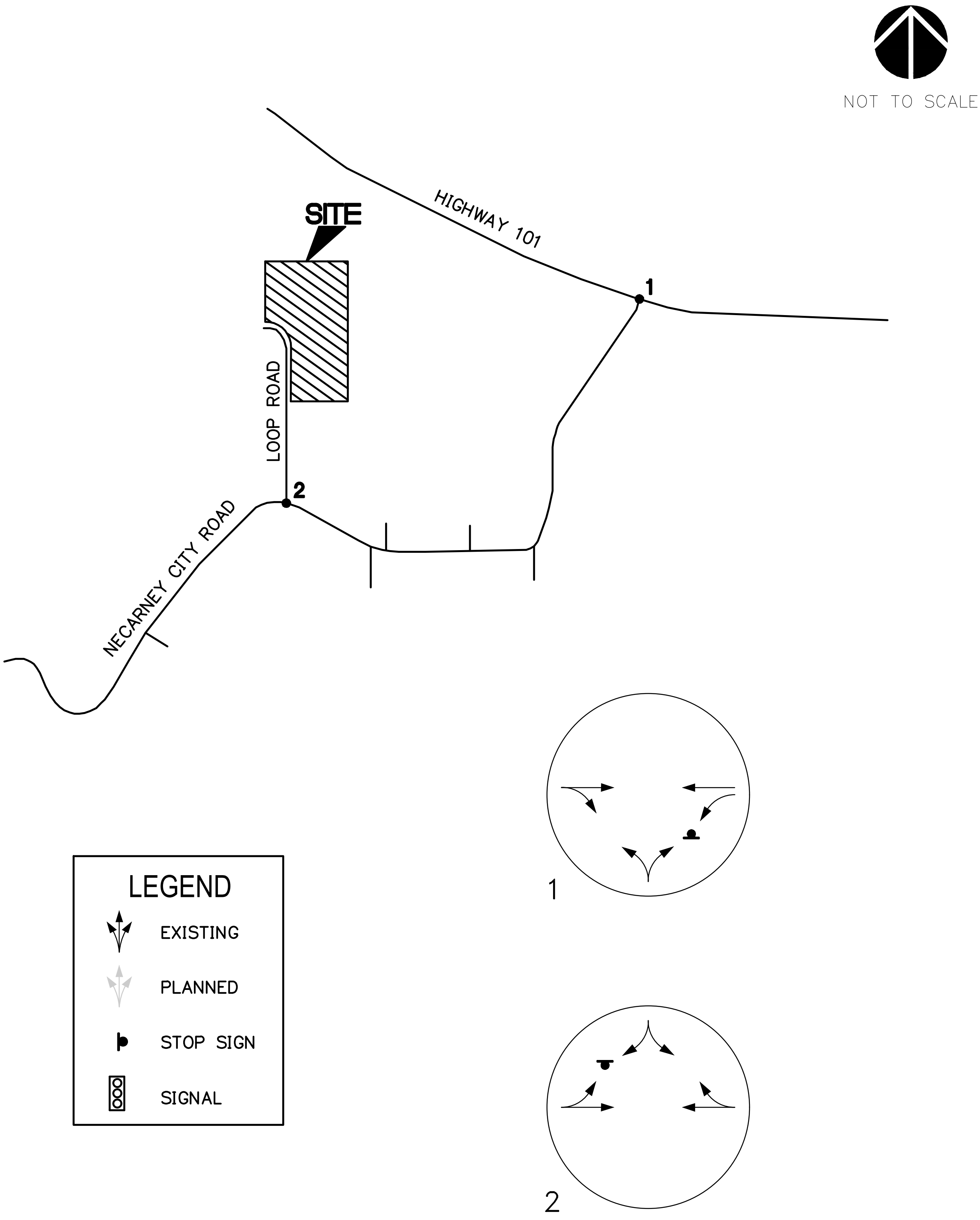
Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering
MACKENZIE

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

SITE PLAN

MANZANITA PINES
MANZANITA, OREGON

FIGURE 2



M.

Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993

www.mcknze.com

Architecture ▪ Interiors
Planning ▪ Engineering

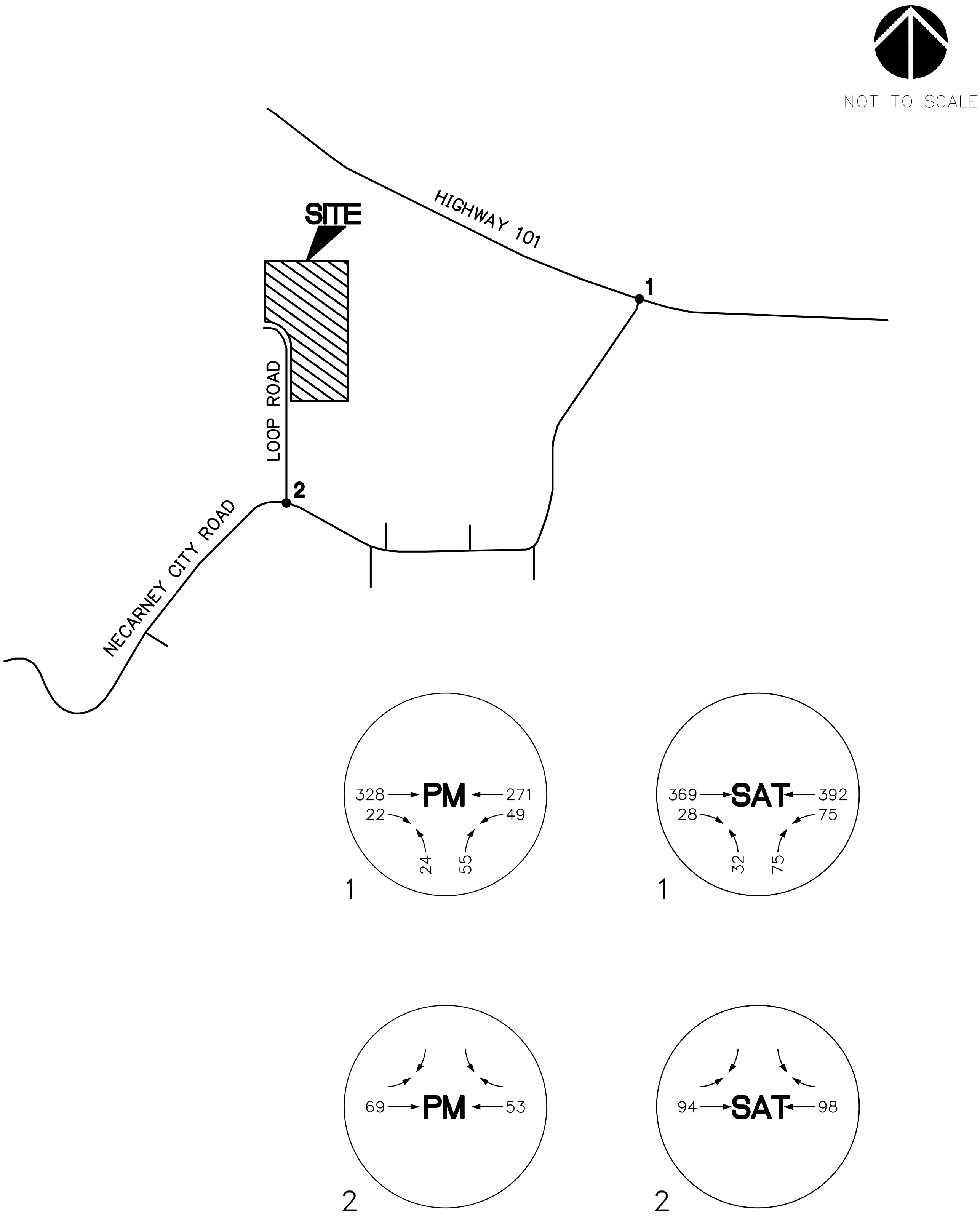
MACKENZIE.

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

EXISTING + PLANNED TRAFFIC CONTROL DEVICES + LANE CONFIGURATIONS

MANZANITA PINES
MANZANITA, OREGON

FIGURE 3



Portland 503.224.9560 Vancouver 360.695.7879 Seattle 206.749.9993

www.mcknze.com

Architecture ▪ Interiors
Planning ▪ Engineering

MACKENZIE.

DATE: 11.13.2024

DRAWN BY: CNL

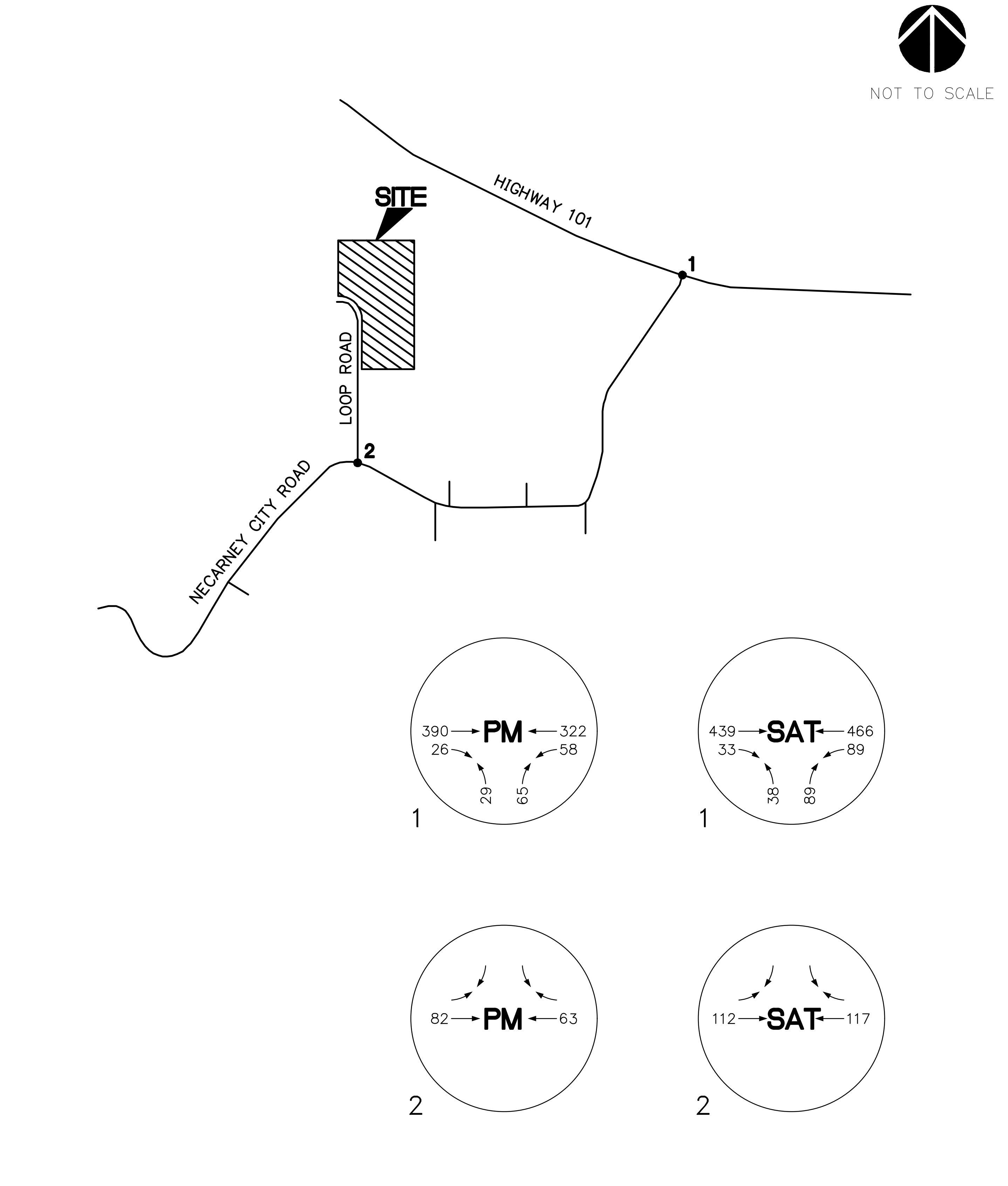
CHECKED BY: BTA

JOB NO: 216045400

2024 EXISTING TRAFFIC VOLUMES - PM + SATURDAY PEAK HOUR

MANZANITA PINES
MANZANITA, OREGON

FIGURE 4



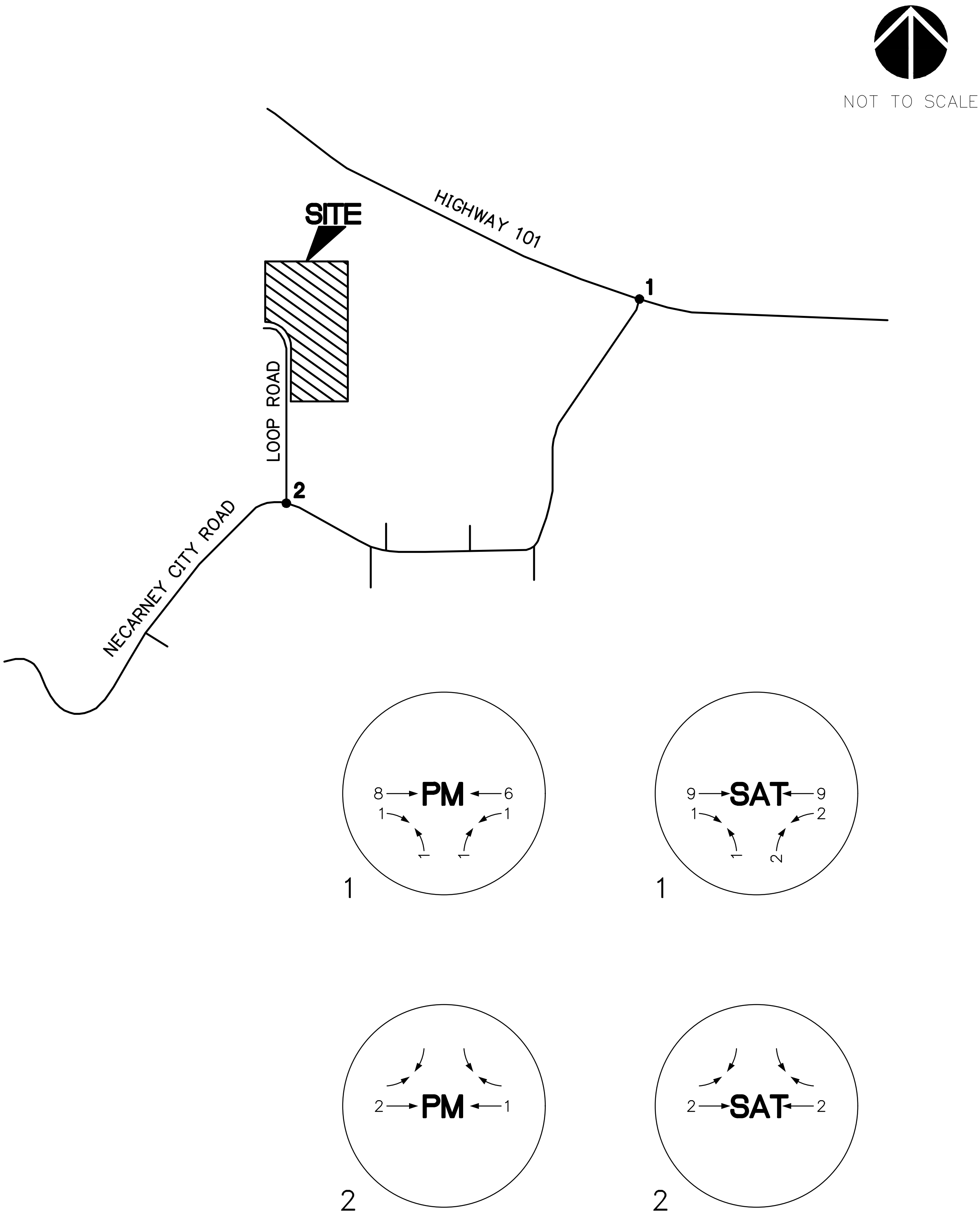
Portland 503.224.9560 Vancouver 360.695.7879 Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering
MACKENZIE.

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

2024 SEASONALLY ADJUSTED TRAFFIC VOLUMES - PM + SATURDAY PEAK HOUR

MANZANITA PINES
MANZANITA, OREGON

FIGURE 5



BACKGROUND TRAFFIC GROWTH, 2 YEARS AT 1.0% PER YEAR - PM + SATURDAY PEAK HOUR

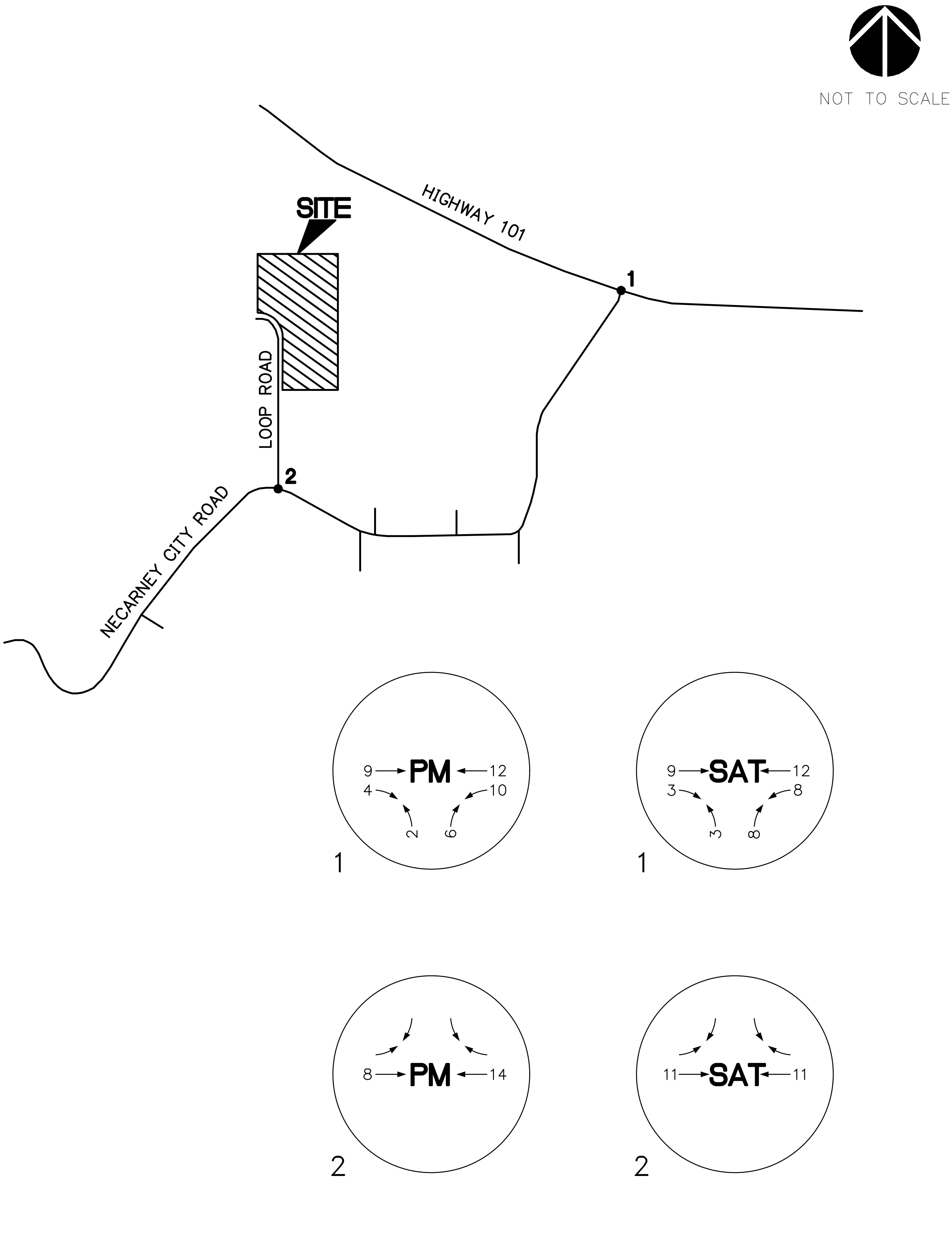
FIGURE 6

MANZANITA PINES
MANZANITA, OREGON

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

MACKENZIE.

Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering



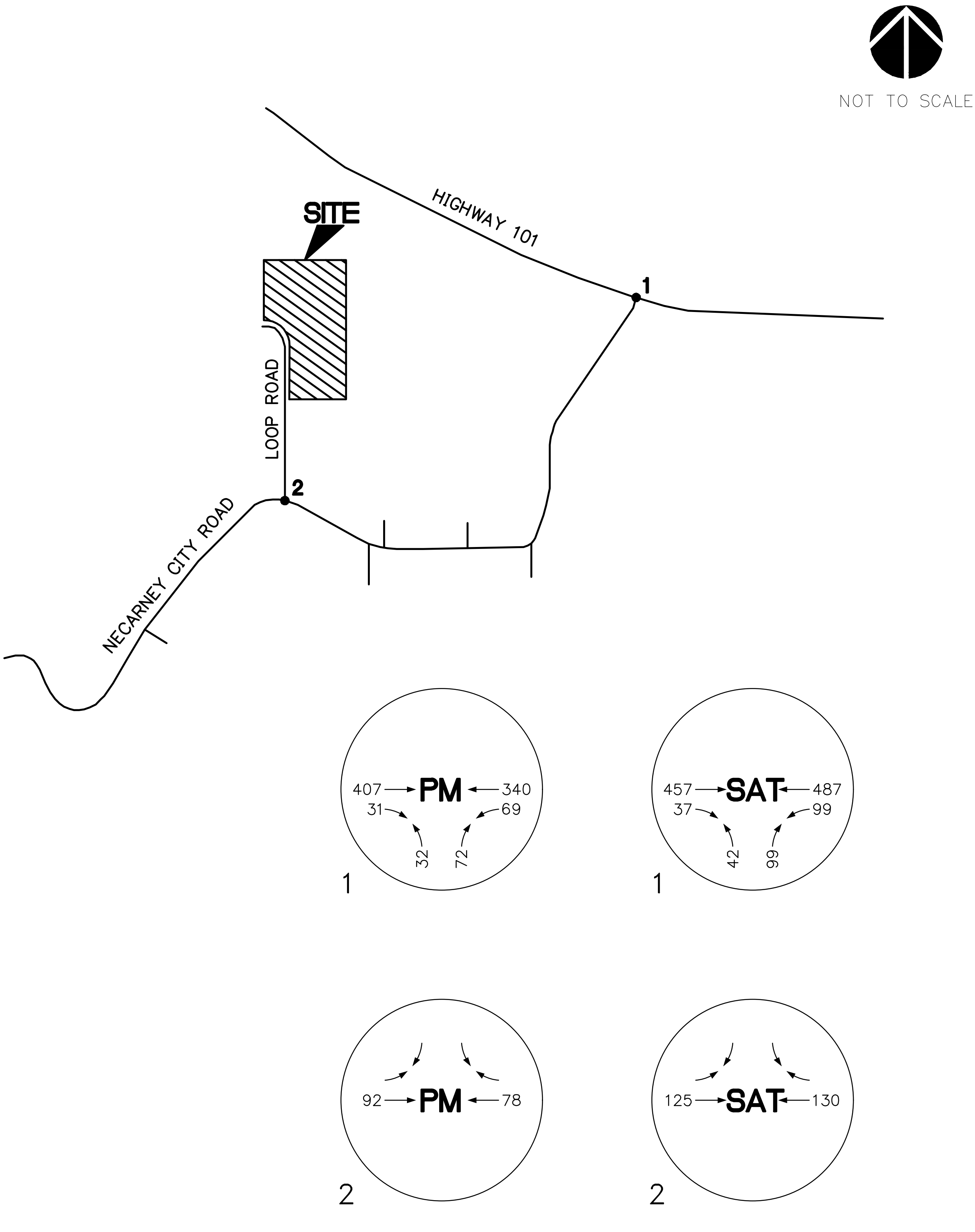
Portland 503.224.9560
Vancouver 360.695.7879
Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering
MACKENZIE.

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

IN-PROCESS
TRAFFIC VOLUMES -
PM + SATURDAY PEAK HOUR

MANZANITA PINES
MANZANITA, OREGON

FIGURE
7



Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993

www.mcknze.com

Architecture ▪ Interiors
Planning ▪ Engineering

MACKENZIE.

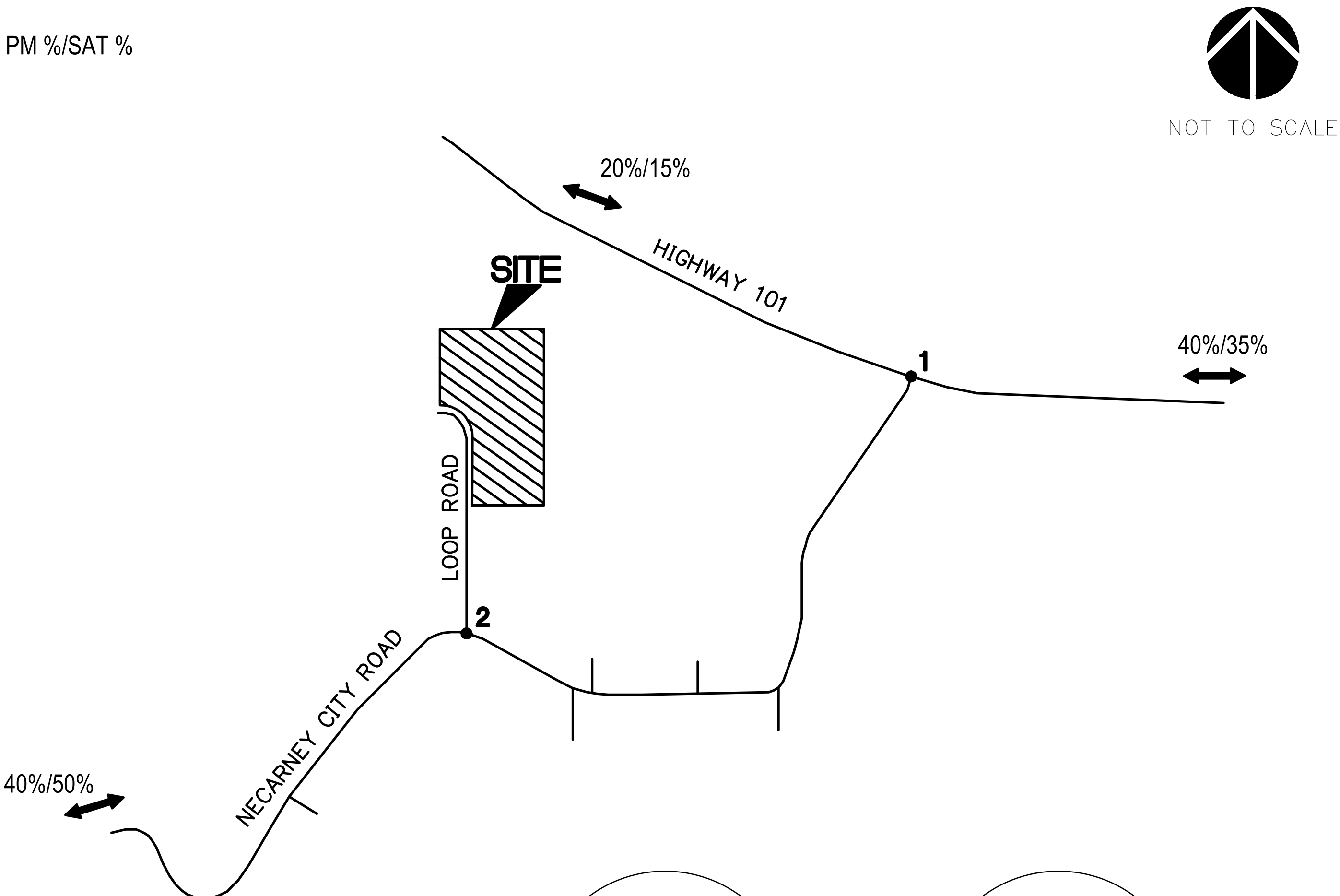
DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

2026 PRE-DEVELOPMENT TRAFFIC VOLUMES - PM + SATURDAY PEAK HOUR

MANZANITA PINES
MANZANITA, OREGON

FIGURE 8

PM %/SAT %

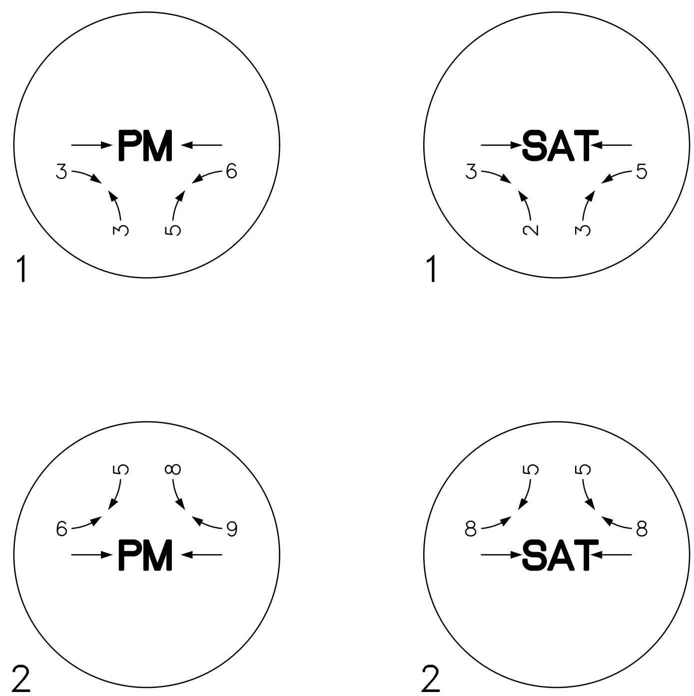


PM PEAK HOUR

Enter – 15
Exit – 13
Total – 28

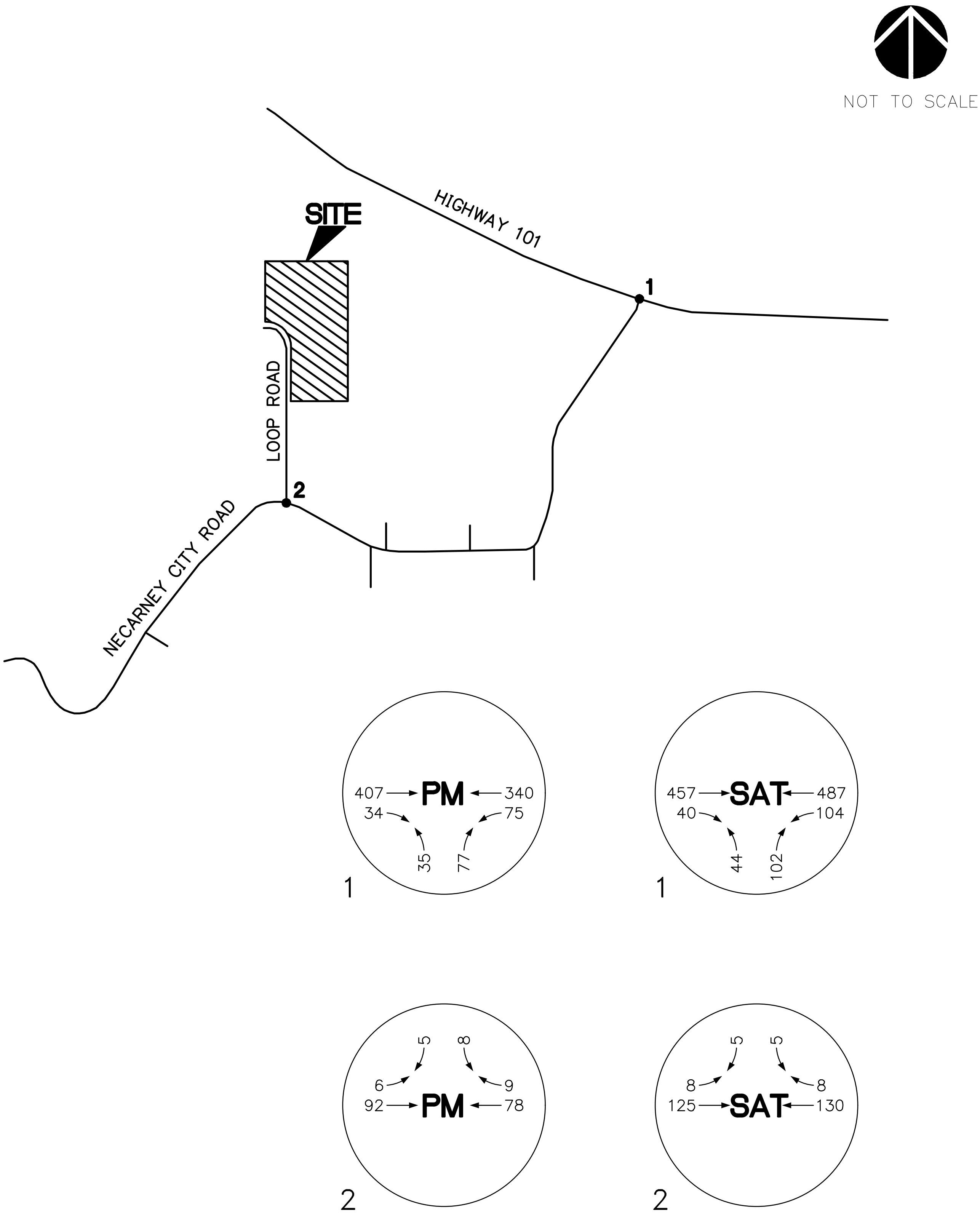
SATURDAY PEAK HOUR

Enter – 15
Exit – 10
Total – 25



Portland 503.224.9560 · Vancouver 360.695.7879 · Seattle 206.749.9993 www.mcknze.com Architecture · Interiors Planning · Engineering	DATE: 11.13.2024 DRAWN BY: CNL CHECKED BY: BTA JOB NO: 216045400	PRIMARY TRIP DISTRIBUTION + TRAFFIC ASSIGNMENT – PM + SATURDAY PEAK HOUR MANZANITA PINES MANZANITA, OREGON	FIGURE 9

MACKENZIE.



Portland 503.224.9560 Vancouver 360.695.7879 Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering

MACKENZIE.

DATE: 11.13.2024
DRAWN BY: CNL
CHECKED BY: BTA
JOB NO: 216045400

2026 POST-DEVELOPMENT TRAFFIC VOLUMES - PM + SATURDAY PEAK HOUR

MANZANITA PINES
MANZANITA, OREGON

FIGURE 10

APPENDIX B.

SCOPING MATERIAL

MACKENZIE.

August 12, 2024

City of Manzanita
Attention: Walt Wendolowski
167 S 5th Street
Manzanita, OR 97130

Re: Oregon Coast Development Traffic Analysis
Traffic Impact Analysis Scope of Work
Project Number 2160454.11

Dear Mr. Wendolowski:

We have prepared this scoping assessment in response to your City Scoping letter dated May 23, 2024, for the affordable housing project to be constructed north of Necarney City Road along a new street, Loop Road. This proposed scope is more similar to recent traffic studies we prepared in the City.

STUDY AREA

The study area should be based on the trip impact at each intersection. To assess what impact is expected, we have prepared this assessment of trip generation and distribution. In general, ODOT requires analysis when impacts are 50 peak hour trips or more at an intersection, and some jurisdictions require analysis with impacts of 10 or more peak hour trips, unless there are known safety or capacity concerns.

We are providing trip generation and distribution estimates to determine the expected impact at each intersection recommended in the letter to be included in the study area.

Trip Generation

Trip estimates were developed based on the Institute of Transportation Engineer's Trip Generation Manual, 11th Edition for the affordable housing Land Use. Trip estimates for the proposed 60 units are 30 trips in the AM peak hour, 28 Trips in the weekday PM peak hour, and 289 daily as noted in Table 1.

Table 1 - Trip Generation

ITE Code	Land Use	Size		AM Peak Hour			PM Peak Hour			Daily
				In	Out	Total	In	Out	Total	
223	Affordable Housing (Income Limit)	60	DU	9	21	30	15	13	28	289

Trip Distribution

The following distribution of trips to the roadway network is proposed, based on similar studies for residential development and review of existing traffic volume patterns.

- 5% to/from Nehalem Bay State Park
- 20% to/from Central Manzanita
- 25% to/from the north on Highway 101
- 50% to/from the south on Highway 101

Trip Assignment

Based on the above generation and distribution of the project trips, Table 2 presents the estimated peak hour assignment at each of the intersections noted in the City's scoping letter.

Table 2 – Trip Assignment

Intersection	Trip Distribution	Trip Assignment
Necarney City Road/Highway 101	75%	23
Necarney City Road/Loop Road	100%	30
Necarney City Road/Meadows Drive	25%	8
Necarney City Road/Classic Street	25%	8
Highland Drive/Classic Street	20%	6
Classic Street/Dorcas Lane	20%	6
Classic Street/Laneda Avenue	20%	6
Laneda Avenue/Highway101	25%	8

Study Area Intersections

The following intersections are recommended for study based on the impact of 10 or more peak hour trips as noted in Table 2.

- Highway 101/Necarney City Road
- Necarney City Road/Loop Road

The intersection of Necarney City Road/Meadows Drive will only see an increase of up to eight trips, and no trips are expected to turn to or from Meadows Drive – only through trips on Necarney City Road.

The intersections on Classic Street at Highland Drive, Dorcas Lane, Laneda Avenue have all been reviewed by recent traffic studies and found to operate at acceptable levels and the addition of less than 10 peak hour trips is not expected to result in a significant change in operation.

TRAFFIC ANALYSIS SCOPE

The traffic analysis will follow City and ODOT standards and include the following elements.

Existing Traffic Counts

New counts will be conducted or obtained at the recommended study areas for the Weekday PM Peak Hour. This will involve acquiring and/or collecting turning movement count data for passenger vehicles, heavy vehicles, pedestrians, and bicycles to accurately understand the existing conditions.

Seasonal Adjustment per ODOT standards for Hwy 101 intersections.

A seasonal adjustment will be applied to traffic counts along Highway 101 as needed, depending on the date of the Counts. The ATR Characteristic Table Method and Seasonal Trend Method indicate that August is the peak time of the year for Highway 101.

Background Growth

Similar to recent studies prepared in Manzanita, we propose to apply a 1% growth rate per year for the study area intersections. Data from ODOT's 2040 Future Volumes Table from 0.2 miles north of Manzanita and 0.2 miles south of Laneda show less than 1% of growth, so 1% is a conservative estimate.

In-Process Trips

We are aware of the following projects which may need to be included as in-process with trips included in the pre-development traffic volume estimates at the study area intersections.

- Manzanita Lofts – 24 units off Dorcas Street
- Heron's Rest – 26 units on S 3rd Street
- Nehalem Bay State Park – expansion of existing facilities

Please confirm this list to be included and note if there are others recently approved.

Safety Review

We will present an evaluation of crashes at the study area intersections for the most recent five years of data available, and review sight distance availability in accordance with the AASHTO Policy on Geometric Design of Highways and Streets.

Analysis Methodology

This TIA will be prepared per *ODOT's Analysis and Procedures Manual, Version 2* and Synchro/SimTraffic software to analyze intersection operation and queuing.

Please let us know if you have any questions or comments on the proposed scope.

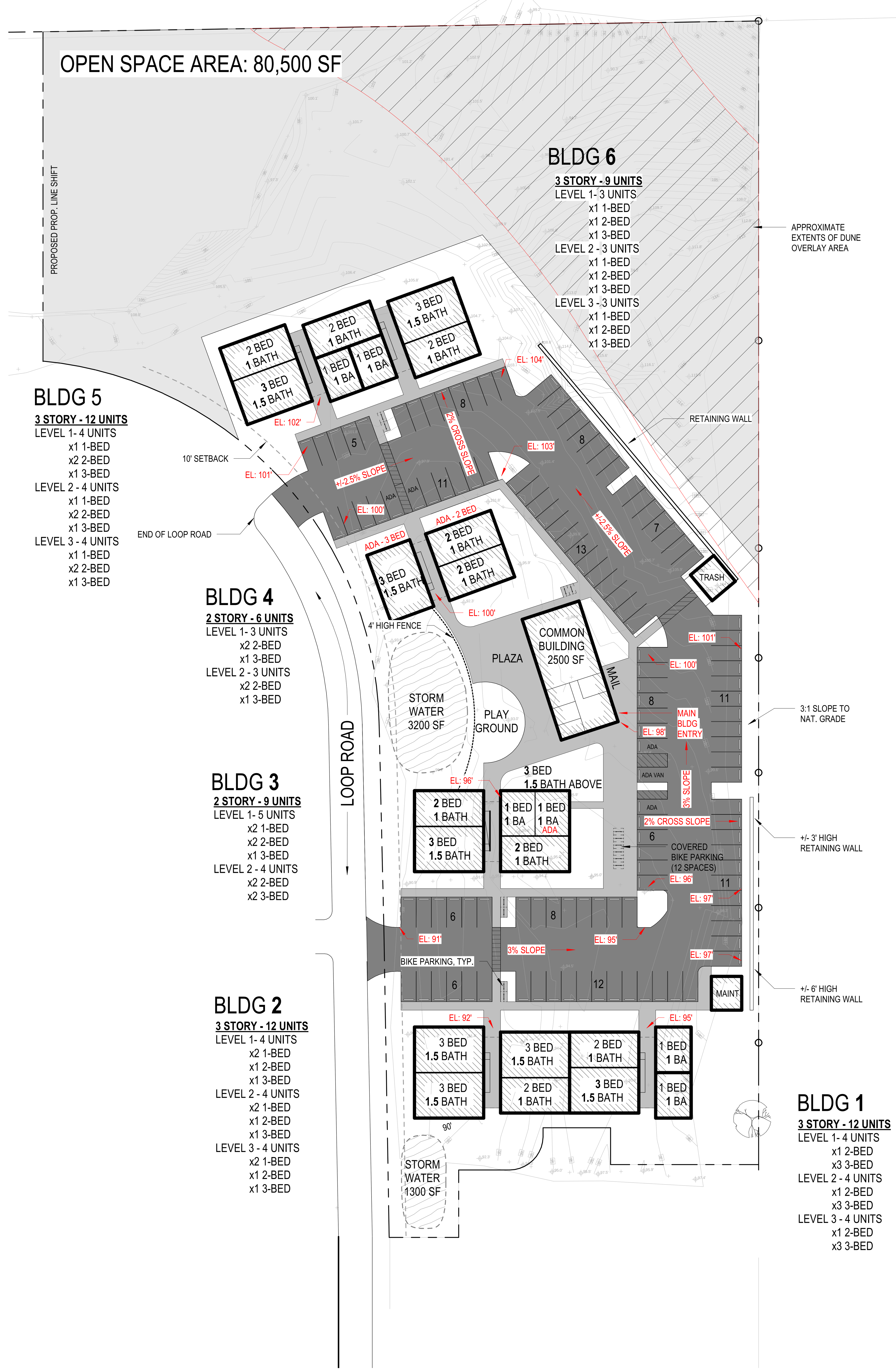
Sincerely,

Brent Ahrend, PE
Associate Principal | Traffic Engineer

Enclosure(s): Attachment A – Site Plan
Attachment B – Trip Distribution Figure

c: Benjamin Pray – Home First
Jim Pentz – Pine Grove Properties Inc
Ralph Henderson – Mackenzie

Attachment A



SD07 1 PROPOSED SITE PLAN_05-13-2024
SCALE: 1" = 40'-0"

SR/R ZONING
6.5 UNITS/AC BY RIGHT
13 UNITS/AC CLUSTERED (REQ. 40% OS)

PHASE I
60 UNITS / 13 UNITS per acre = 4.6 ACRES REQUIRED (200,376sf)
PROPOSED SITE AREA: 4.6ac (200,500sf)

40% OPEN SPACE = 1.8 ACRES (80,150 SF)
PROPOSED OPEN SPACE: 80,500 SF

60 UNITS

x14	1-BED (558)	7,812
x23	2-BED (884)	20,332
x23	3-BED (1116)	25,668
	TOTAL	53,812

120 PARKING SPACES

2 :1.0 RATIO

COMMON BUILDING
2500 SF

IMPERVIOUS AREAS

DRIVE AISLE:	38,000 SF
COMMON BLDG:	2,500 SF
BUILDINGS:	20,200 SF
PED PATHS:	13,500 SF
ACCESSORY STRUC:	3,000 SF
TOTAL:	77,200 SF

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

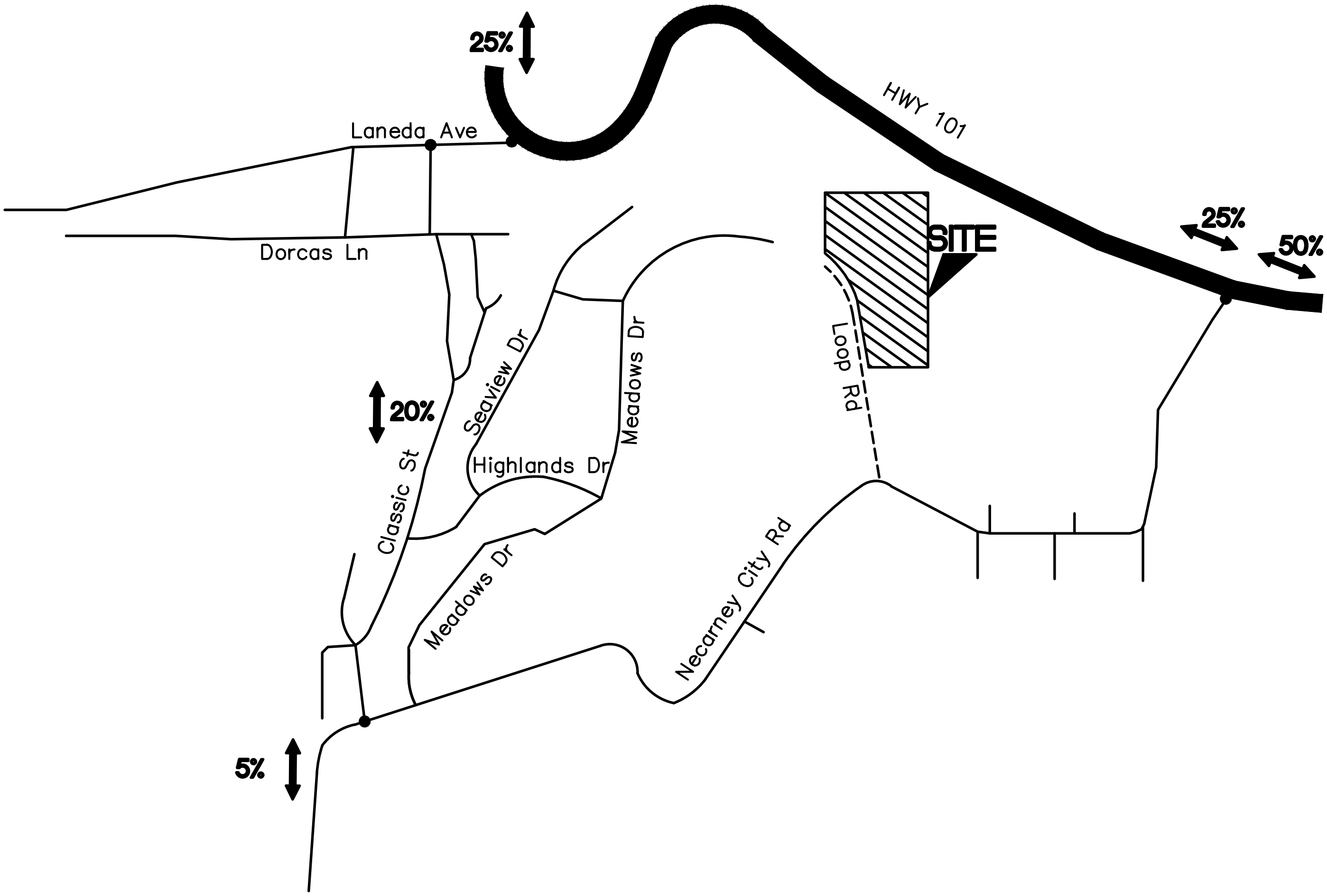
MANZANITA PINES
PROJECT ADDRESS

CLIENT : HFD/GLD

SITE PLAN
SD07

PRINTED : 5/13/2024 5:00:37 PM

ORIGINAL SHEET SIZE : 22"x34"



Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993

www.mackenzie.inc

Architecture ▪ Interiors
Planning ▪ Engineering

MACKENZIE.

DATE: 08.01.2024
DRAWN BY: FMS
CHECKED BY: BTA
JOB NO: 2160454.11

TRIP DISTRIBUTION

OREGON COAST DEVELOPMENT
MANZANITA, OR

FIGURE 1

321 SW 4th Ave., Suite 400
Portland, OR 97204
503.248.0313
lancastermobley.com

October 2, 2024

Scott Gebhart
City of Manzanita
543 Laneda Avenue
Manzanita, OR 97130

Dear Scott,

At your request, I have reviewed the development plan for the proposed workforce housing on the 12.54 Pine Grove Properties site that was recently annexed into the City of Manzanita. I understand that the applicant is proposing the first of two development phases, with the first phase being 60 dwelling units and the second phase being 68 dwelling units, for a total of 128 units at buildout.

Transportation Impact Study

It is recommended that a Transportation Impact Study (TIS) be conducted and submitted as part of the land use application. This letter provides a detailed scope of work for the applicant. The TIS should be prepared by a professional engineer registered in Oregon with specific experience in transportation engineering.

Trip Generation & Distribution

Project-generated trips should be calculated based on the 11th Edition of the *Trip Generation Manual*, published by the Institute of Transportation Engineers (ITE). If other trip generation rates or information are used, they should first be reviewed and approved by the City of Manzanita.

The distribution of project-generated trips should be assigned to the surrounding roadway network based on the traffic count data as well as anticipated trip origins and destinations and expected travel routes to and from the site. Access to the site will be only via Necarney City Road on the eastern edge of the Manzanita city limits. The TIS should quantify the number of trips that will travel to and from the east toward Highway 101 and the number of trips that will travel to and from the west to Manzanita and Highway 101 at Laneda Avenue. Local destinations in and near Manzanita should also be identified.

Project Study Area

Based on the anticipated trip generation and distribution, traffic counts and a full operational analysis shall be required at the intersection of Necarney City Road and the new site access location. Traffic counts shall be conducted at these intersections during typical weekday conditions during the evening peak hours (4:00 to 6:00 PM) as well as the Saturday afternoon peak (noon to 3:00 PM).

The operational analysis of the study-area intersection shall include left-turn lane warrants to determine the potential need for an eastbound left-turn lane on Necarney City Road, as well as an examination of sight distance. Requirements for intersection and stopping sight distances shall be based on the standards in the 7th Edition of *A Policy on Geometric Design of Highways and Streets*, published by AASHTO.

It is recognized that only the first phase of development is proposed at this time, but it is recommended that the applicant examine conditions with the site at full build out to ensure that the new intersection is constructed in a manner that can accommodate the long-term demands of the site. This will help avoid future modifications to the intersection.

If you have any questions regarding this scope of work, please do not hesitate to call.

Sincerely,

Todd E. Mobley, PE
Principal

Clara Layton

From: Todd Mobley <todd@lancastermobley.com>
Sent: Tuesday, October 29, 2024 10:56 AM
To: Clara Layton
Cc: Brent Ahrend; Scott Gebhart
Subject: Re: Manzanita Workforce Housing TIA Scoping Letter
Attachments: Traffic Counts - 45411.pdf; 11LTR-City of Manzanita-Traffic Scoping-240812.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Hi Clara,

I have inserted my comments below in red. Thanks for sending this along and let me know if you have any questions.

-Todd

Todd E. Mobley, PE

Principal

lancaster mobley

1130 SW Morrison St, Suite 318 | Portland, OR 97205

P: 503-248-0313 C: 503-319-9811
Website: lancastermobley.com

Offices: Portland, OR | Bend, OR | Vancouver, WA

On Thu, Oct 24, 2024 at 3:46 PM Clara Layton <CLayton@mcknze.com> wrote:

> Good afternoon!
>
> I'm forwarding on Brent's scoping letter, and a few questions:
>
> - Our traffic counter equipment was vandalized and we have counts until 2:45 PM. Will that work? Counts attached.

It looks like you captured the peak, so I think that should be fine.

- Your scoping letter didn't include mention of any in-process projects. Can you confirm that we should include the following: Manzanita Lofts, Heron's Rest, and possible trips from the expansion in Nehalem Bay State Park? Do you have any further information about the expansion?

Your list is accurate, but there have also been some other smaller projects that didn't do traffic studies, so I would suggest a growth rate in addition to the in-process trips. The 1% you suggest below seems reasonable for this. As for the State Park, their master plan was just approved last month by Tillamook County. My understanding is that the immediate projects at the park will be maintenance and not expansion, but the master plan does include new campsites, more parking at the marina, and associated park upgrades. ODOT told Parks that they wouldn't generate more than 50 peak hour or 500 daily trips so they didn't need a traffic study. Arielle in Region 2 Traffic provided some trip generation info and helped them respond to some opposition testimony. That information is here:

https://www.tillabook.org/sites/default/files/fileattachments/community_development/project/95710/materials_provided_by_applicant_at_july_11_2024_hearing_nehalem_bay_state_park.pdf

I would recommend adding trips for the park expansion as in-process.

- Can you approve a growth rate of 1% per year? We're calculating a seasonal adjustment factor based on Coastal Destination.

This is acceptable.

- We had Necarney City Rd/Pine Ridge Ln counted to determine trip distribution as the closest intersection with a comparable development. The count is helpful for roadway volumes, but we're finding the gated community trip distribution inconsistent with our assumptions. We'll keep crunching the numbers, let us know what you think.

The count data you have at Pine Ridge shows something close to a 60/40 split with the majority out Necarney to 101. Google shows the fastest route from the site to points along 101, even points to the north, is via Necarney. That might be, but it is probably more dependent on the perception of local drivers about where it is easier to turn left onto the highway. A gated community might have a different distribution than workforce housing, but I would expect the workforce housing might have a heavier split into Manzanita than the Pine Ridge neighborhood since most local employment would be in Manzanita proper.

I'll let you and Brent sort out the analysis, but those are my thoughts on the distribution. You might also say a few things in the TIA about sensitivity because I suspect small changes to the distribution percentages won't give you different results and findings overall.

Clara Layton EIT
D 971-254-9496

Transportation Planning
Professional Licenses & Certifications

Disclaimer

Mackenzie.

ARCHITECTURE ▪ INTERIORS ▪ STRUCTURAL, CIVIL, AND TRAFFIC ENGINEERING
LAND USE AND TRANSPORTATION PLANNING ▪ LANDSCAPE ARCHITECTURE
PORTLAND, OR | VANCOUVER, WA | SEATTLE, WA www.MACKENZIE.inc

APPENDIX C.

TRANSIT INFORMATION

Fares/ Tarifas

Each Way, Per Zone/
Ida o vuelta, por zona................................$1.50

Zone 1: Hobsonville Point (S. of Garibaldi) to Sand Lake Rd (N. of Hemlock)
Zone 2: Clatsop County Line to Hobsonville Point (S. of Garibladi)
Zone 3: Sand Lake Rd (N. of Hemlock) to Lincoln County Line
Lincoln County Zone: Starts at Lincoln County Line

Clatsop County Zone: Starts at Clatsop County Line

Child Fares/ Tarifas Para Niños

First Child/ Primer Niño (0-4)....................FREE
Additional Child/ Niño adicional (0-4)...1/2 Fare
Child/ Niño (5-11)..................................1/2 Fare
(When traveling with a full fare adult/ Al viajar con un adulto que paga la tarifa completa)

Monthly Pass/ Pase de Un Mes

Regular/ Regular...$40
Reduced/ Descuento.....................................$30
Reduced fares offered for age 60+, children, & individuals with verifiable short or long term disability/ Se ofrecen tarifas con descuento para mayores de 60 años, niños y personas con discapacidades de corto o largo plazo comprobables

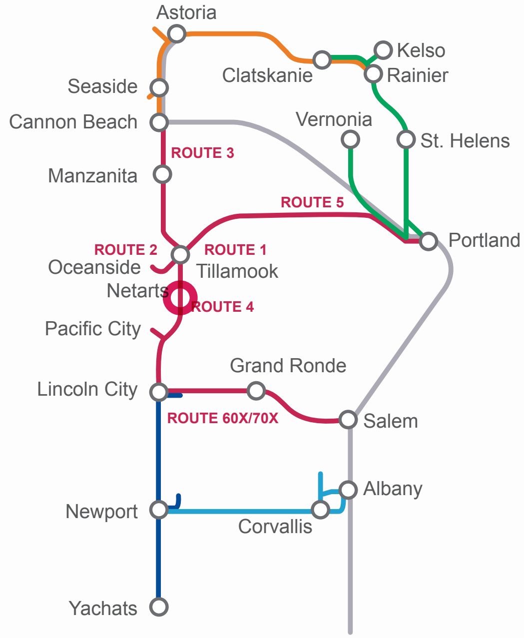
No Bus Service/ No Hay Servicio de Autobuses

New Years Day/ Año Nuevo
Thanksgiving Day/ Día de Acción de Gracias
Christmas Day/ Navidad

Route & Schedule Info/ Información de Rutas y Horarios

800-815-8283
www.TillamookBus.com
800-735-2700/TTY

NWCONNECTOR
NWCONNECTOR.ORG



NWCONNECTOR Visitor Pass/ Pase Para Visitantes
3 Days/ 3 Días $25
7 Days/ 7 Días $30
(includes a round trip to Portland or Salem and unlimited travel on NWConnector routes/ Incluye un viaje redondo a Portland o Salem y viajes ilimitados en las rutas de NWConnector)

CONNECTING SERVICES/ SERVICIOS DE CONEXIÓN

Lincoln County Transit
nwconnector.org | 541-265-4900

Sunset Empire Transportation District
nwconnector.org | 503-861-7433

Point Bus
oregon-point.com | 1-888-846-4183

Greyhound
greyhound.com | 1-800-231-2222

Amtrak
amtrak.com | 1-800-872-7245

Tri-Met
trimet.org | 503-238-7433

ROUTE/ RUTA 3
Tillamook - Cannon Beach

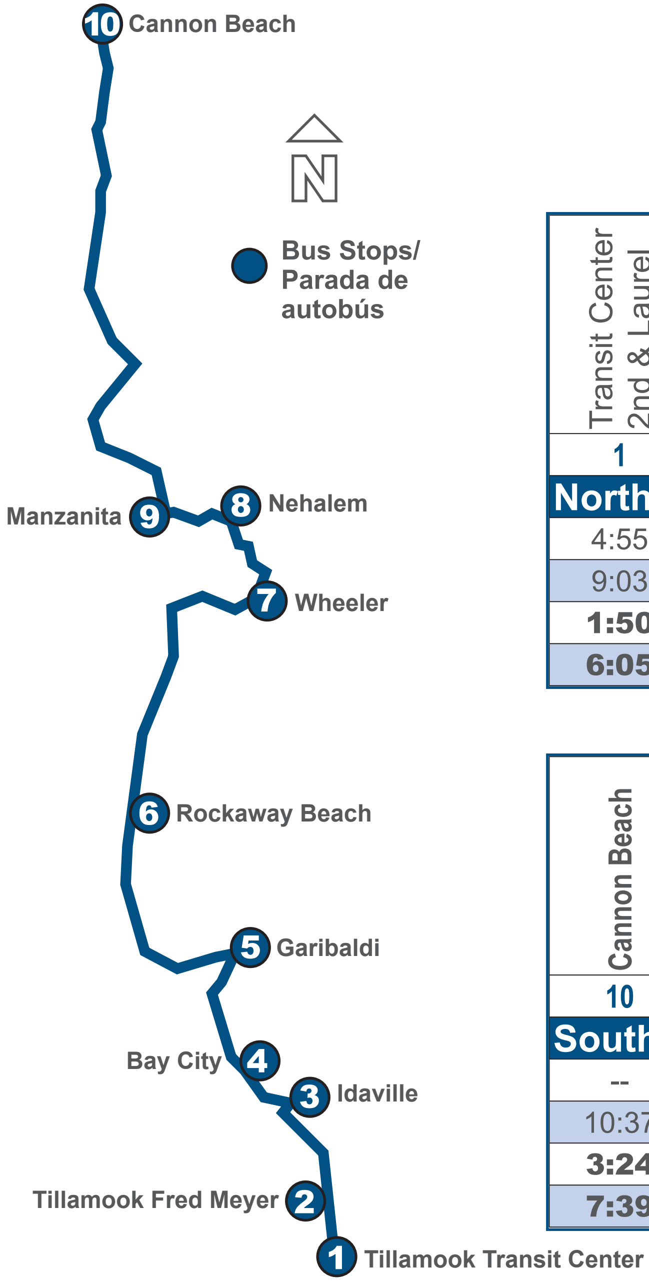
Effective January 23, 2022
A partir del 23 de enero de 2022

Tillamook County Transportation District

ROUTE/ RUTA 3
Tillamook - Cannon Beach

SERVICE OPERATES 7 DAYS A WEEK
EL SERVICIO OPERA LOS 7 DÍAS DE LA SEMANA

@TillamookBus



transit

FOR REAL TIME BUS INFO, DOWNLOAD THE TRANSIT APP TODAY!/
PARA OBTENER INFORMACIÓN SOBRE LOS AUTOBUSES EN TIEMPO REAL, DESCARGUE LA APLICACIÓN TRANSIT.

Transit Center 2nd & Laurel	Tillamook Fred Meyer	Idaville	Bay City	Garibaldi	Rockaway Beach	Wheeler	Nehalem	Manzanita	Cannon Beach
1	2	3	4	5	6	7	8	9	10
Northbound									
4:55	5:00	5:06	5:09	5:17	5:27	5:45	5:53	5:59	--
9:03	9:08	9:14	9:17	9:25	9:35	9:53	10:01	10:07	10:27
1:50	**1:55**	**2:01**	**2:04**	**2:12**	**2:22**	**2:40**	**2:48**	**2:54**	**3:14**
6:05	**6:10**	**6:16**	**6:19**	**6:27**	**6:37**	**6:55**	**7:03**	**7:09**	**7:29**

Bold/ Negritas = PM

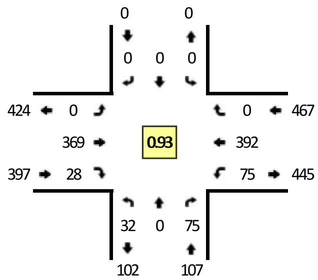
Cannon Beach	Manzanita	Nehalem	Wheeler	Rockaway Beach	Garibaldi	Bay City	Idaville	Tillamook Fred Meyer	Transit Center 2nd & Laurel
10	9	8	7	6	5	4	3	2	1
Southbound									
--	6:09	6:15	6:23	6:41	6:51	6:59	7:02	7:08	7:13
10:37	10:57	11:03	11:11	11:29	11:39	11:47	11:50	11:56	**12:01**
3:24	**3:44**	**3:50**	**3:58**	**4:16**	**4:26**	**4:34**	**4:37**	**4:43**	**4:48**
7:39	**7:59**	**8:05**	**8:13**	**8:31**	**8:41**	**8:49**	**8:52**	**8:58**	**9:03**

Bold/ Negritas = PM

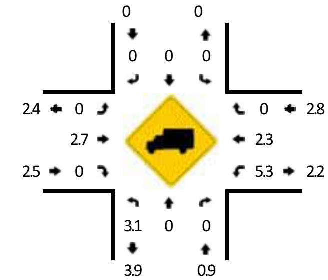
APPENDIX D.

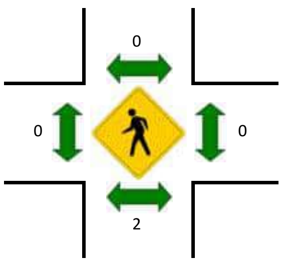
TRAFFIC COUNT SUMMARIES

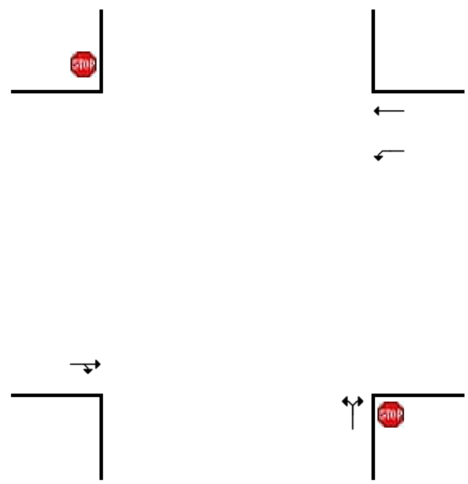
LOCATION: Necarney City Rd -- Oregon Coast Hwy
QC JOB #: 16790002
CITY/STATE: Bayside Gardens, OR
DATE: Sat, Oct 12 2024

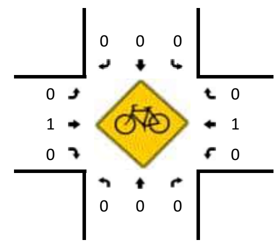


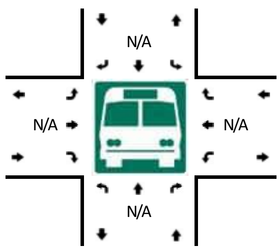
Peak-Hour: 1:15 PM -- 2:15 PM
Peak 15-Min: 1:15 PM -- 1:30 PM

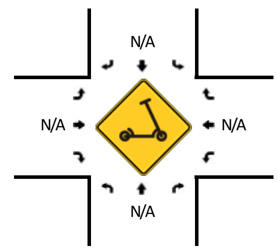










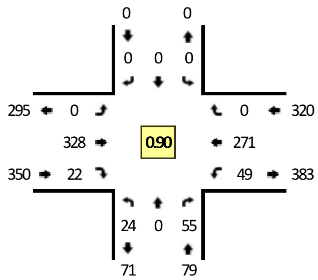


15-Min Count Period Beginning At	Necarney City Rd (Northbound)				Necarney City Rd (Southbound)				Oregon Coast Hwy (Eastbound)				Oregon Coast Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
12:00 PM	6	0	18	0	0	0	0	0	0	83	9	0	11	85	0	0	212	
12:15 PM	8	0	25	0	0	0	0	0	0	81	7	0	10	91	0	0	222	
12:30 PM	7	0	16	0	0	0	0	0	0	92	7	0	18	85	0	0	225	
12:45 PM	8	0	22	0	0	0	0	0	0	84	8	0	13	106	0	0	241	900
1:00 PM	6	0	14	0	0	0	0	0	0	89	9	0	17	80	0	0	215	903
1:15 PM	13	0	19	0	0	0	0	0	0	97	5	0	22	103	0	1	260	941
1:30 PM	4	0	19	0	0	0	0	0	0	100	8	0	13	84	0	0	228	944
1:45 PM	9	0	21	0	0	0	0	0	0	80	5	0	18	90	0	0	223	926
2:00 PM	6	0	16	0	0	0	0	0	0	92	10	0	21	115	0	0	260	971
2:15 PM	6	0	25	0	0	0	0	0	0	89	6	0	13	101	0	0	240	951
2:30 PM	5	0	10	0	0	0	0	0	0	85	4	0	15	95	0	0	214	937
2:45 PM	5	0	19	0	0	0	0	0	0	86	6	0	21	95	0	0	232	946

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	52	0	76	0	0	0	0	0	0	388	20	0	88	412	0	4	1040
Heavy Trucks	4	0	0		0	0	0		0	12	0		4	0	0		20
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

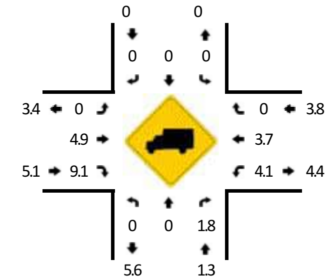
Comments:

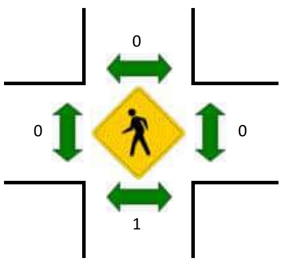
LOCATION: Necarney City Rd -- Oregon Coast Hwy **QC JOB #:** 16790001
CITY/STATE: Bayside Gardens, OR **DATE:** Thu, Oct 10 2024

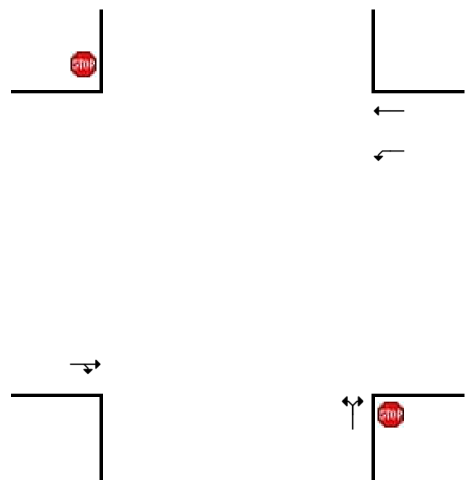


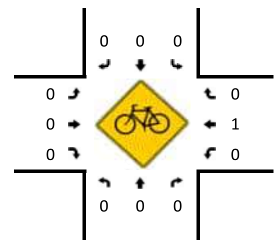
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:00 PM -- 4:15 PM

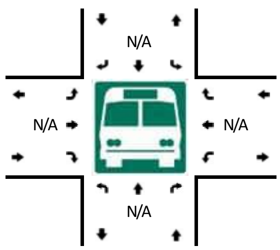
TRUE DATA TO IMPROVE MOBILITY

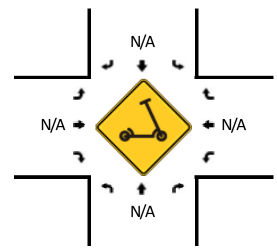












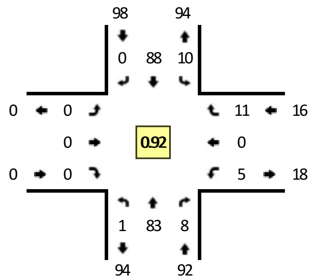
15-Min Count Period Beginning At	Necarney City Rd (Northbound)				Necarney City Rd (Southbound)				Oregon Coast Hwy (Eastbound)				Oregon Coast Hwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	0	12	0	0	0	0	0	0	90	6	0	12	84	0	0	207	
4:15 PM	11	0	12	0	0	0	0	0	0	90	4	0	14	69	0	0	200	
4:30 PM	7	0	17	0	0	0	0	0	0	92	4	0	14	63	0	0	197	
4:45 PM	3	0	14	0	0	0	0	0	0	56	8	0	9	55	0	0	145	749
5:00 PM	2	0	11	0	0	0	0	0	0	74	6	0	11	71	0	0	175	717
5:15 PM	2	0	10	0	0	0	0	0	0	78	2	0	7	48	0	0	147	664
5:30 PM	3	0	8	0	0	0	0	0	0	63	2	0	10	54	0	0	140	607
5:45 PM	3	0	8	0	0	0	0	0	0	69	6	0	12	67	0	0	165	627

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	0	48	0	0	0	0	0	0	360	24	0	48	336	0	0	828
Heavy Trucks	0	0	0		0	0	0		0	28	0		4	8	0		40
Buses																	
Pedestrians		4				0				0				0			4
Bicycles	0	0	0		0	0	0		0	0	0		0	4	0		4
Scooters																	

Comments:

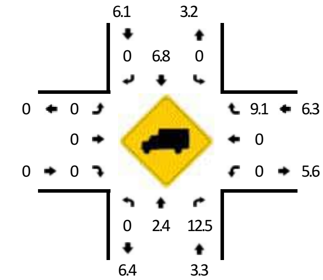
Report generated on 10/24/2024 8:40 AM SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

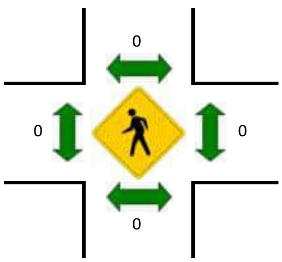
LOCATION: Necarney City Rd -- Pine Ridge Ln | **QC JOB #:** 16790006
CITY/STATE: Bayside Gardens, OR | **DATE:** Sat, Oct 12 2024

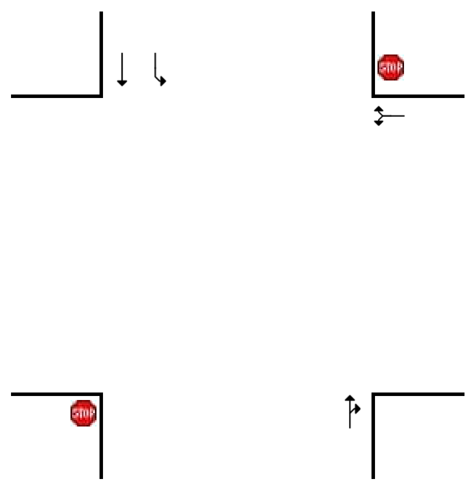


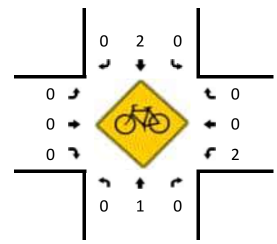
Peak-Hour: 1:15 PM -- 2:15 PM
Peak 15-Min: 1:15 PM -- 1:30 PM

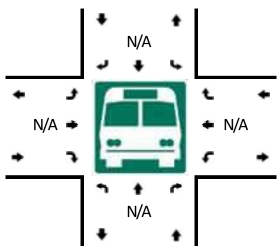
TRUE DATA TO IMPROVE MOBILITY

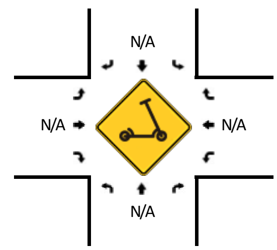












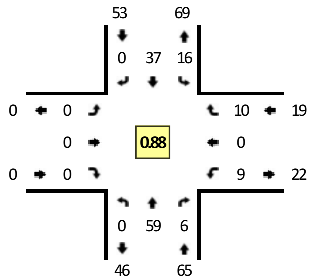
15-Min Count Period Beginning At	Necarney City Rd (Northbound)				Necarney City Rd (Southbound)				Pine Ridge Ln (Eastbound)				Pine Ridge Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
11:30 AM	0	16	2	0	4	17	0	0	0	0	0	0	4	0	3	0	46	
11:45 AM	0	14	2	0	3	15	0	0	0	0	0	0	3	0	3	0	40	
12:00 PM	0	16	3	0	1	13	0	0	0	0	0	0	4	0	4	0	41	
12:15 PM	0	24	5	0	3	23	0	0	0	0	0	0	1	0	1	0	57	184
12:30 PM	0	17	2	0	0	24	0	0	0	0	0	0	2	0	3	0	48	186
12:45 PM	0	25	3	0	6	18	0	0	0	0	0	0	2	0	2	0	56	202
1:00 PM	0	14	4	0	2	22	0	0	0	0	0	0	1	0	3	0	46	207
1:15 PM	0	22	2	0	3	27	0	0	0	0	0	0	0	0	2	0	56	206
1:30 PM	0	17	3	1	2	21	0	0	0	0	0	0	2	0	3	0	49	207
1:45 PM	0	24	1	0	3	14	0	0	0	0	0	0	2	0	3	0	47	198
2:00 PM	0	20	2	0	2	26	0	0	0	0	0	0	1	0	3	0	54	206
2:15 PM	0	18	5	0	4	16	0	0	0	0	0	0	3	0	5	0	51	201

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	88	8	0	12	108	0	0	0	0	0	0	0	0	8	0	224
Heavy Trucks	0	4	4		0	12	0		0	0	0		0	0	0		20
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	4	0		0	4	0		0	0	0		0	0	0		8
Scooters																	

Comments:

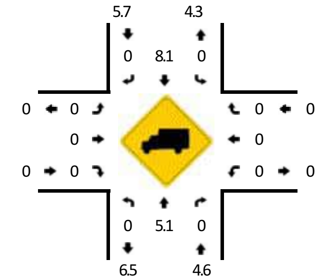
Type of peak hour being reported: System-wide Peak | Method for determining peak hour: Total Entering Volume

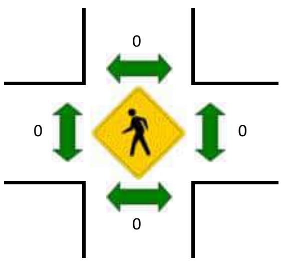
LOCATION: Necarney City Rd -- Pine Ridge Ln **QC JOB #:** 16790005
CITY/STATE: Bayside Gardens, OR **DATE:** Thu, Oct 10 2024

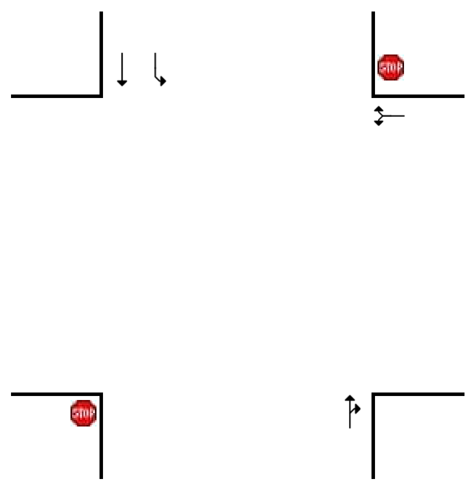


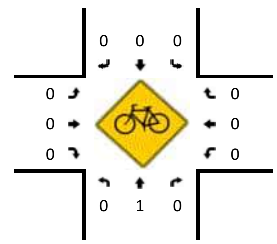
Peak-Hour: 4:00 PM -- 5:00 PM
Peak 15-Min: 4:30 PM -- 4:45 PM

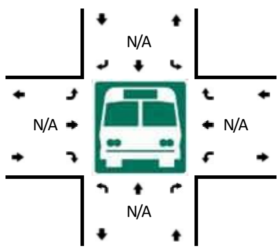
TRUE DATA TO IMPROVE MOBILITY

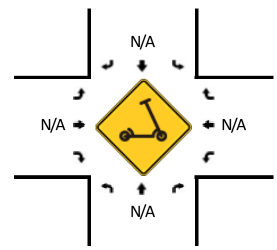












15-Min Count Period Beginning At	Necarney City Rd (Northbound)				Necarney City Rd (Southbound)				Pine Ridge Ln (Eastbound)				Pine Ridge Ln (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	16	1	0	5	11	0	0	0	0	0	0	3	0	1	0	37	
4:15 PM	0	11	2	0	2	8	0	0	0	0	0	0	4	0	3	0	30	
4:30 PM	0	20	2	0	7	7	0	0	0	0	0	0	1	0	2	0	39	
4:45 PM	0	12	1	0	2	11	0	0	0	0	0	0	1	0	4	0	31	137
5:00 PM	0	7	4	0	3	9	0	0	0	0	0	0	1	0	4	0	28	128
5:15 PM	0	9	1	0	3	6	0	0	0	0	0	0	1	0	2	0	22	120
5:30 PM	0	5	1	0	4	6	0	0	0	0	0	0	1	0	2	0	19	100
5:45 PM	0	6	1	0	6	10	0	0	0	0	0	0	0	0	1	0	24	93

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	80	8	0	28	28	0	0	0	0	0	0	4	0	8	0	156
Heavy Trucks	0	4	0		0	0	0		0	0	0		0	0	0		4
Buses																	
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scooters																	

Comments:

Report generated on 10/24/2024 8:40 AM | SOURCE: Quality Counts, LLC (http://www.qualitycounts.net) 1-877-580-2212

APPENDIX E.

SEASONAL ADJUSTMENT CALCULATIONS

SEASONAL TREND TABLE (Updated: 11/08/2023)

TREND	1-Jan	15-Jan	1-Feb	15-Feb	1-Mar	15-Mar	1-Apr	15-Apr	1-May	15-May	1-Jun	15-Jun	1-Jul	15-Jul	1-Aug	15-Aug	1-Sep	15-Sep	1-Oct	15-Oct	1-Nov	15-Nov	1-Dec	15-Dec	Seasonal Trend Peak Period Factor
INTERSTATE URBANIZED	1.0869	1.1041	1.0688	1.0335	1.0182	1.0028	0.9995	0.9962	0.9901	0.9840	0.9641	0.9443	0.9502	0.9562	0.9510	0.9458	0.9575	0.9692	0.9791	0.9891	1.0107	1.0324	1.0532	1.0739	0.9443
INTERSTATE NONURBANIZED	1.2459	1.2915	1.2286	1.1657	1.0907	1.0158	1.0059	0.9960	0.9728	0.9496	0.9128	0.8760	0.8650	0.8540	0.8612	0.8684	0.8905	0.9126	0.9488	0.9850	1.0336	1.0822	1.1717	1.2612	0.8540
COMMUTER	1.0905	1.0986	1.0636	1.0285	1.0162	1.0038	0.9959	0.9879	0.9814	0.9749	0.9631	0.9512	0.9614	0.9717	0.9608	0.9500	0.9548	0.9595	0.9634	0.9673	1.0090	1.0507	1.0733	1.0958	0.9500
COASTAL DESTINATION	1.2064	1.1715	1.1234	1.0753	1.0545	1.0337	1.0372	1.0407	1.0216	1.0024	0.9586	0.9147	0.8760	0.8372	0.8371	0.8370	0.8678	0.8985	0.9578	1.0170	1.0730	1.1290	1.1823	1.2357	0.8370
COASTAL DESTINATION ROUTE	1.3937	1.2897	1.2245	1.1594	1.1247	1.0901	1.0911	1.0921	1.0516	1.0111	0.9493	0.8875	0.8172	0.7469	0.7455	0.7440	0.7916	0.8391	0.9274	1.0158	1.1126	1.2094	1.3193	1.4291	0.7440
AGRICULTURE	1.4537	1.4624	1.3705	1.2786	1.2139	1.1492	1.1207	1.0923	1.0075	0.9226	0.8742	0.8258	0.8348	0.8439	0.8422	0.8405	0.7976	0.7547	0.8073	0.8598	1.0041	1.1484	1.3339	1.5194	0.7547
RECREATIONAL SUMMER	1.6049	1.5814	1.4924	1.4034	1.3208	1.2382	1.2380	1.2377	1.0939	0.9500	0.8669	0.7839	0.7392	0.6945	0.7065	0.7185	0.7404	0.7624	0.8468	0.9311	1.1270	1.3230	1.5054	1.6879	0.6945
RECREATIONAL SUMMER WINTER	1.0075	0.9570	0.9184	0.8799	0.9701	1.0603	1.0675	1.0747	1.0843	1.0939	1.0045	0.9151	0.8244	0.7336	0.7795	0.8254	0.9368	1.0482	1.1794	1.3105	1.4969	1.6833	1.3470	1.0108	0.7336
RECREATIONAL WINTER**	0.8059	0.6710	0.6475	0.6240	0.7462	0.8685	0.9307	0.9928	1.1496	1.3064	1.2173	1.1282	0.9996	0.8709	0.9526	1.0342	1.1225	1.2108	1.4061	1.6013	1.9826	2.3639	1.6332	0.9026	0.6240
SUMMER	1.2374	1.2352	1.1733	1.1114	1.0786	1.0459	1.0330	1.0202	0.9851	0.9500	0.9160	0.8819	0.8660	0.8501	0.8561	0.8620	0.8891	0.9161	0.9430	0.9698	1.0525	1.1352	1.2002	1.2653	0.8501
SUMMER < 2500	1.2836	1.2576	1.1943	1.1310	1.1011	1.0712	1.0448	1.0184	0.9633	0.9082	0.8861	0.8641	0.8609	0.8578	0.8695	0.8813	0.8874	0.8936	0.9165	0.9394	1.0500	1.1607	1.2535	1.3463	0.8578

*** Seasonal Trend Table factors are based on previous year ATR data. The table is updated yearly.**
*** Grey shading indicates months were seasonal factor is greater than or less than 30%**

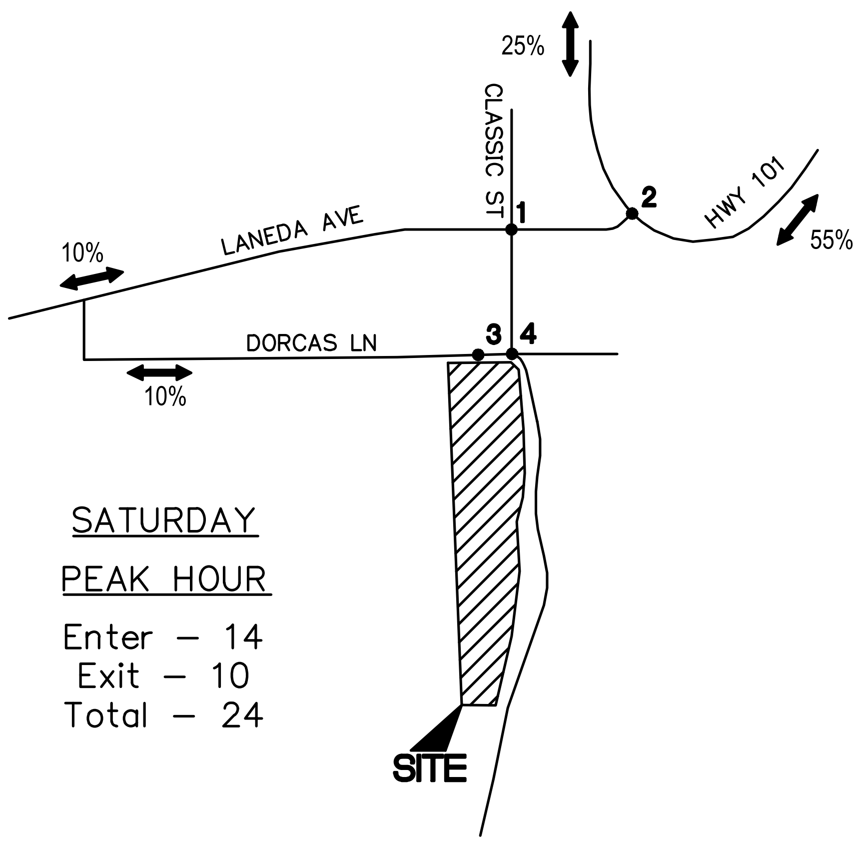
****Use Recreation Winter Trend with Caution! ATR site was down for most of of 2022 due to loop issues and was estimated while the site was down**

Seasonal Adjustment Factor (October 10th):	1.19

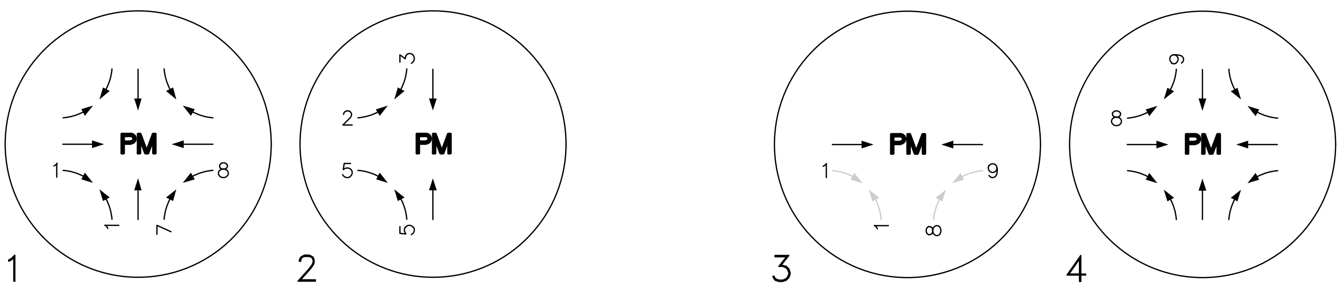
APPENDIX F.

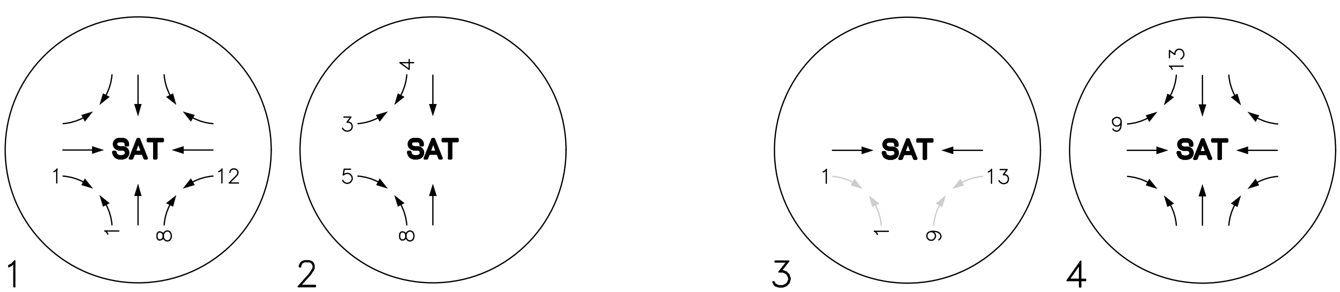
IN-PROCESS TRIPS

NOT TO SCALE



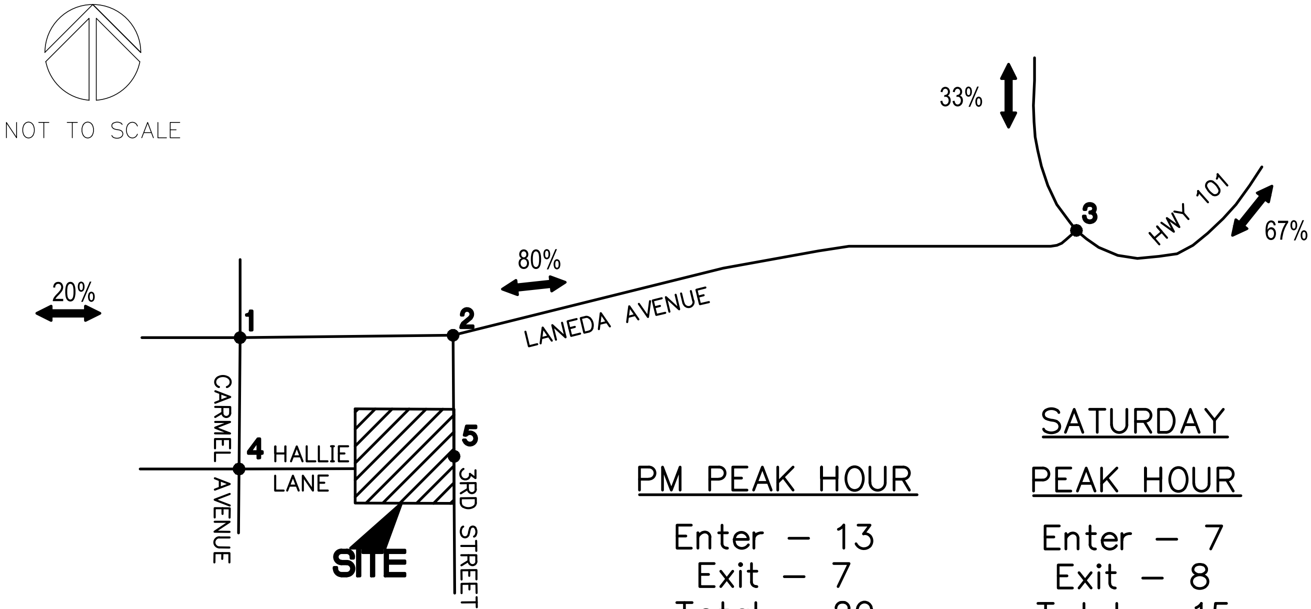
SATURDAY	
PM PEAK HOUR	PEAK HOUR
Enter – 10	Enter – 14
Exit – 9	Exit – 10
Total – 19	Total – 24





Portland 503.224.9560 / Vancouver 360.695.7879 / Seattle 206.749.9993 / www.mcknze.com / Architecture ▪ Interiors / Planning ▪ Engineering	DATE: 4.27.2023 / DRAWN BY: CNL / CHECKED BY: BTA / JOB NO: 222012000	PRIMARY TRIP DISTRIBUTION + ASSIGNMENT - PM + SATURDAY PEAK HOURS / MANZANITA LOFTS / MANZANITA, OREGON	FIGURE 8

MACKENZIE.

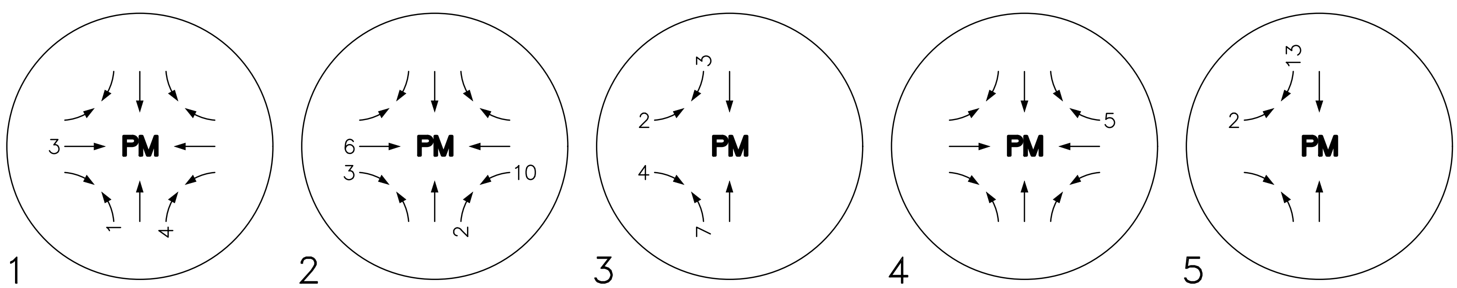


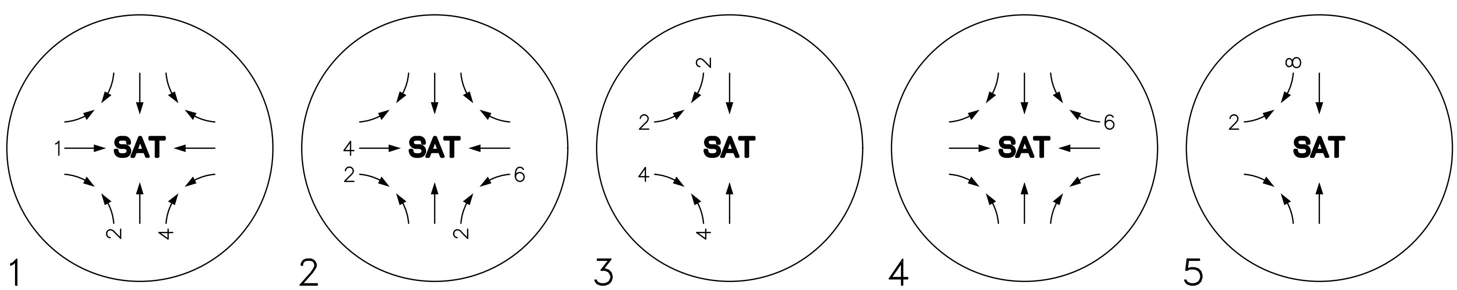
PM PEAK HOUR

Enter – 13
Exit – 7
Total – 20

SATURDAY PEAK HOUR

Enter – 7
Exit – 8
Total – 15





Portland 503.224.9560 | Vancouver 360.695.7879 | Seattle 206.749.9993
www.mcknze.com
Architecture ▪ Interiors
Planning ▪ Engineering
MACKENZIE.

DATE: 9.21.2022
DRAWN BY: CNL
CHECKED BY: JTJ
JOB NO: 222019400

PRIMARY TRIP DISTRIBUTION + ASSIGNMENT -

HERON'S REST
MANZANITA, OREGON

FIGURE 8

ODOT REVISED Trip Generation Analysis

Received from Arielle Childress by email 7.11.2024, 3:21 PM

					Rates					Total Trips					In/Out Trips					
					Weekday			Weekend		Weekday			Weekend		Weekday				Weekend	
ITE Code	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Daily Rate	AM Peak Rate	PM Peak Rate	Daily Rate	Peak Rate	Daily Trips	AM Peak Trips	PM Peak Trips	Daily Trips	Peak Trips	AM Trips In	AM Trips Out	PM Trips In	PM Trips Out	Peak Trips In	Peak Trips Out
							Existing Use Totals													
416	Campground/RV Park	Acre(s)	21	Avg		0.48	0.98				10	21			4	6	14	7		
420	Marina	Berth(s)	32	Avg	2.41	0.07	0.21	2.61	0.22	78	2	7	84	7	1	1	4	3	3	4
									Proposed Use Totals	78	12	28	84	7	5	7	18	10	3	4

JOHNSON Tracy * OPRD

From: CHILDRESS Arielle <Arielle.CHILDRESS@odot.oregon.gov>
Sent: Thursday, July 11, 2024 3:20 PM
To: JOHNSON Tracy * OPRD
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Here's the table as a picture. If it doesn't print properly from within the email you should be able to easily place into a word doc.

					Rates					Total Trip		
					Weekday			Weekend		Weekday		
ITE Code	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Daily Rate	AM Peak Rate	PM Peak Rate	Daily Rate	Peak Rate	Daily Trips	AM Peak Trips	PM Peak Trips
					Existing Use Totals							
416	Campground/RV Park	Acre(s)	21	Avg		0.48	0.98				10	21
420	Marina	Berth(s)	32	Avg	2.41	0.07	0.21	2.61	0.22	78	2	7
					Proposed Use Totals					78	12	28

Arielle Childress, P.E. (she/her/hers)
Traffic Analysis Engineer

ODOT Region 2
455 Airport Rd. SE, Bldg. B, Salem, OR 97031
(971) 208-1290

From: JOHNSON Tracy * OPRD <Tracy.JOHNSON@oprd.oregon.gov>
Sent: Thursday, July 11, 2024 3:13 PM
To: CHILDRESS Arielle <Arielle.CHILDRESS@odot.oregon.gov>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Hi again,
I have a huge favor to ask. Could you please pdf the table and send it as an attachment? It isn't printing correctly within the body of the email text.

Thanks,

Tracy Johnson, PLA | Senior Project Manager
OPRD | Central Park Services – Park Improvement, Engineering Division
971.283.6805

From: CHILDRESS Arielle <Arielle.CHILDRESS@odot.oregon.gov>
Sent: Thursday, July 11, 2024 2:47 PM
To: Cassandra Dobson <CDobson@parametrix.com>; VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <Tracy.JOHNSON@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Cassandra,

Please see responses below in red. A note on LUC 411 (Public Park), it doesn't provide daily weekday trips when using Dail Trail Users as the independent variable. It only provides data for Saturday and Sunday. It also only has one data point so I caution against using it. Therefore, I applied LUC 420 (Marina) instead.

- Are the empty rows for total trips and in/out trips for campground/RV park (highlighted below) intentionally empty, or is there data that should be shown there? No daily weekday data is available for this land use. A very rough way to estimate is assume the PM peak hour is 10% of daily traffic, but this is a very general traffic assumption and not specific to your land use. This translates to the Campground/RV park having 210 daily trips with the total proposed uses having 288 daily trips. If it's absolutely necessary you can modify the table below as I embedded it as a table, and not a picture.
- Is it possible to show the total trips from the proposed improvements as "proposed use totals" rather than "existing use totals" to make it clear that they are trips resulting from the proposed changes? I've moved the trip generation down into the "proposed use" section.
- It appears that the analysis included both Marina (420) and Public Park (411) codes to analyze trips from the new boat ramp parking spaces – is it possible to revise the analysis to include one or the other? As it stands now, both are included in the total trips measurements, which means we are accounting for the new parking lot traffic twice in the calculations. Please see the request from the original email copied below – we were hoping to provide two alternative codes to measure the trips from the parking lot based on which ODOT felt was most appropriate, rather than adding the trips from both methods. LUC 420 (Marina) provides better data than the public park for the variables provided, therefore I'm going to just apply LUC 420

					Rates					Total Trip		
					Weekday			Weekend		Weekday		
ITE Code	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Daily Rate	AM Peak Rate	PM Peak Rate	Daily Rate	Peak Rate	Daily Trips	AM Peak Trips	PM Peak Trips
							Existing Use Totals					
416	Campground/RV Park	Acre(s)	21	Avg		0.48	0.98				10	21
420	Marina	Berth(s)	32	Avg	2.41	0.07	0.21	2.61	0.22	78	2	7

	Proposed Use Totals	78	12	28

Please let me know if you need anything else. I only work until 3:30 PM if you need a response back by today.

Thanks!

Arielle Childress, P.E. (she/her/hers)
Traffic Analysis Engineer
ODOT Region 2
455 Airport Rd. SE, Bldg. B, Salem, OR 97031
(971) 208-1290

From: Cassandra Dobson <CDobson@parametrix.com>
Sent: Thursday, July 11, 2024 1:56 PM
To: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <Tracy.JOHNSON@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>; CHILDRESS Arielle <Arielle.CHILDRESS@odot.oregon.gov>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Thank you Z! If the traffic team is able to answer our questions today, we would greatly appreciate it.

From: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Sent: Thursday, July 11, 2024 1:50 PM
To: Cassandra Dobson <CDobson@parametrix.com>
Cc: JOHNSON Tracy * OPRD <tracy.johnson@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>; CHILDRESS Arielle <Arielle.CHILDRESS@odot.oregon.gov>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Hello Cassandra,
I know it is late. I took time of recently and was very busy after that.
I have forwarded your questions to the traffic people. Who could answer your questions better than me.
Thank you
Z

Zdenek "Z" Vymazal, PE, PLS
Development Review Coordinator (Area 1)
ODOT – Region 2

455 Airport Rd. SE, Bldg. B
Salem, OR 97301
(971)-345-1318 Cell/Office
zdenek.g.vymazal@odot.oregon.gov
Hours: 6:30 AM to 3:00 PM Monday – Friday

From: Cassandra Dobson <CDobson@parametrix.com>
Sent: Thursday, July 11, 2024 1:13 PM
To: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <Tracy.JOHNSON@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes
Importance: High

Hello Z,

I just left you a voicemail, but wanted to follow up again on the below request. Is it possible to receive a response to our questions below before tonight's public hearing so that we may submit them to the record?

Thank you so much for your time, please let me know if you have any questions.

Cass

From: Cassandra Dobson
Sent: Tuesday, July 9, 2024 8:55 AM
To: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <tracy.johnson@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Hello Z,

I wanted to reach out to follow up on the below request. Please let us know if you have any questions or need any additional information at this time.

Thank you!

Cass

From: Cassandra Dobson
Sent: Tuesday, July 2, 2024 4:20 PM
To: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <tracy.johnson@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Good afternoon Z,

Thank you again for taking the time earlier this year to review potential traffic impacts from our proposed improvements at Nehalem Bay State Park. We have submitted our application for a Conditional Use Master Plan to Tillamook County and will have a public hearing with their Planning Commission next Thursday. During the application review, we have received some questions on ODOT's analysis (below) and are hoping that you may be able to help us address them. If at all possible, it would be wonderful if we could get responses to these questions and any necessary revisions to the analysis no later than **end of day, Wednesday, July 10th** so that we may incorporate them into our presentation at the Planning Commission meeting on the 11th. I know we have a short week this week due to the holiday, so we are very appreciative of any assistance you can provide in that time.

Our questions are as follows:

- Are the empty rows for total trips and in/out trips for campground/RV park (highlighted below) intentionally empty, or is there data that should be shown there?
- Is it possible to show the total trips from the proposed improvements as "proposed use totals" rather than "existing use totals" to make it clear that they are trips resulting from the proposed changes?
- It appears that the analysis included both Marina (420) and Public Park (411) codes to analyze trips from the new boat ramp parking spaces – is it possible to revise the analysis to include one or the other? As it stands now, both are included in the total trips measurements, which means we are accounting for the new parking lot traffic twice in the calculations. Please see the request from the original email copied below – we were hoping to provide two alternative codes to measure the trips from the parking lot based on which ODOT felt was most appropriate, rather than adding the trips from both methods.

Thank you very much for your help! Please let us know if you have any questions.

Best,

Cass

- **Marina (420) or Public Park (411)** for the 32 new boat ramp parking spaces proposed.
    - If using Marina (420) – 32 "berths" to represent the 32 boat trailer parking spaces
    - If using Public Park (411) – 96 "daily trail users", conservatively assuming an average of 3 boat ramp users for each of the 32 new parking spaces

					Rates					Total Trips					In/Out Trips				
					Weekday			Weekend		Weekday			Weekend		Weekday				Weeke
ITE Code	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Daily Rate	AM Peak Rate	PM Peak Rate	Daily Rate	Peak Rate	Daily Trips	AM Peak Trips	PM Peak Trips	Daily Trips	Peak Trips	AM Trips In	AM Trips Out	PM Trips In	PM Trips Out	Peak Trips In
416	Campgrounc/RV Park	Acre(s)	21	Avg		0.48	0.98				10	21			4	6	14	7	
420	Marina	Berth(s)	32	Avg	2.41	0.07	0.21	2.61	0.22	78	2	7	84	7	1	1	4	3	3
411	Pubic Park	Acre(s)	96	Avg	0.78	0.02	0.11	1.96	0.28	76	2	11	190	27	1	1	6	5	15
							Existing Use Totals			164	14	39	274	34	6	8	24	15	18
							Proposed Use Totals												

CHANGE OF USE EVALUATION

From: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Sent: Thursday, January 11, 2024 11:01 AM
To: Cassandra Dobson <CDobson@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Hello Cassandra,

After reviewing the new data for the proposed development (See attachment snipp), the number of peak trips will not increase to reach fifty (50) trips or more and average daily trip will not increase by five hundred (500) trips or more from the property's prior use as stated in OAR Ch734, Div51 (734-051-3020). It will not requires the Change of Use and such you do not need a traffic study for this proposed development.
However, because the proposed development will use local streets/ roads and is not connected directly to state highway, it is recommended to work with City of Manzanita (County?)on this and include them with you scopping/development work early.
Thank you

Z

Zdenek "Z" Vymazal, PE, PLS
Development Review Coordinator (Area 1)
ODOT – Region 2
455 Airport Rd. SE, Bldg. B
Salem, OR 97301
(971)-345-1318 Cell/Office
zdenek.g.vymazal@odot.oregon.gov
Hours: 5:30 AM to 2:00 PM Monday – Friday

					Rates					Total Trips			
					Weekday			Weekend		Weekday			W
ITE Code	Land Use Description	Independent Variable	No. of Units	Avg Rate or Eq	Daily Rate	AM Peak Rate	PM Peak Rate	Daily Rate	Peak Rate	Daily Trips	AM Peak Trips	PM Peak Trips	Dai Tri
416	Campground/RV Park	Acre(s)	21	Avg		0.48	0.98				10	21	
420	Marina	Berth(s)	32	Avg	2.41	0.07	0.21	2.61	0.22	78	2	7	84
411	Public Park	Acre(s)	96	Avg	0.78	0.02	0.11	1.96	0.28	76	2	11	19
									Existing Use Totals	154	14	39	27
									Proposed Use Totals				

CHANGE OF USE EVALU

From: VYMAZAL Zdenek G
Sent: Tuesday, January 2, 2024 2:06 PM
To: Cassandra Dobson <CDobson@parametrix.com>
Subject: RE: Nehalem Bay State Park Improvements ITE Codes

Happy New Year to you Casandra too.
Thank you

I and traffic people will look at your info and replay as soon as possible.
Z

Zdenek "Z" Vymazal, PE, PLS
Development Review Coordinator (Area 1)
ODOT – Region 2
455 Airport Rd. SE, Bldg. B
Salem, OR 97301
(971)-345-1318 Cell/Office
zdenek.g.vymazal@odot.oregon.gov
Hours: 5:30 AM to 2:00 PM Monday – Friday

From: Cassandra Dobson <CDobson@parametrix.com>
Sent: Tuesday, January 2, 2024 8:36 AM
To: VYMAZAL Zdenek G <Zdenek.G.VYMAZAL@odot.oregon.gov>
Cc: JOHNSON Tracy * OPRD <Tracy.JOHNSON@oprd.oregon.gov>; Jennifer Hughes <JHughes@parametrix.com>; Ryan Rudnick <RRudnick@parametrix.com>
Subject: Nehalem Bay State Park Improvements ITE Codes

Good morning Z, and Happy New Year!

Thank you again for taking the time to meet with us to discuss improvements to Nehalem Bay State Park. As discussed at that meeting, our team has looked into the ITE codes that we feel would best fit the proposed improvements. We would recommend use of the following ITE land use codes in peak hour trip generation calculations for the proposed park uses:

- **Campground/RV park (416)** for the proposed cabins and campsites, and trip generation based on either occupied campsites or acres
  - 68 occupied campsites (excluding 8 new hiker/biker sites, as there are inherently no vehicle trips associated with these campsites)
    - 6 new staff cabins (already permitted)
    - Up to 10 new cabins at cabin loop
    - Up to 12 new park & walk-in tent sites
    - Up to 40 new cabins/sites in future loop
  - 21 acres new campground development

New camping/cabin loop	+15 acres
New hiker/biker/tent	+5 acres
Old hiker biker	-1.5 acres
Alternate cabins	+2 acres

Staff cabins +0.5 acres

21 acres new campground development

- **Marina (420) or Public Park (411)** for the 32 new boat ramp parking spaces proposed.
  - If using Marina (420) – 32 "berths" to represent the 32 boat trailer parking spaces
  - If using Public Park (411) – 96 "daily trail users", conservatively assuming an average of 3 boat ramp users for each of the 32 new parking spaces

Please let us know if you have any questions or would like to discuss further. Thank you again!

Cass

APPENDIX G.

CRASH DATA

10/29/2024

TRANSPORTATION DATA SECTION - CRASH ANAYLYSIS AND REPORTING UNIT

CONTINUOUS SYSTEM CRASH LISTING

009: OREGON COAST

Highway 009 ALL ROAD TYPES, MP 43.85 to 43.95 01/01/2018 to 12/31/2022, Both Add and Non-Add mileage

1 - 4 of 4 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D M P R J S W E A U I C O E L G N H R D C S V L K	DATE DAY TIME LAT	COUNTY CITY URBAN AREA LONG	RD# FC COMPNT MLG TYP MILEPNT	CONN# FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V#	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE
00145	N N N N	05/25/2018	TILLAMOOK	1 02		ALLEY		N	N	CLR	S-1STOP	01	NONE 0	STRGHT											29
NONE		FR		MN 0		UN	(NONE)	STOP SIGN	N	DRY	REAR		PRVTE	E -W									000		00
N		2P		43.85		04			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	69	F	OR-Y		026	000		29
N		45 43 3.75	-123 54 59.6		000900100S00		(02)													OR<25					
												02	NONE 0	STOP											
													PRVTE	E -W									012		00
													PSNGR CAR		01	DRVR	INJC	17	F	OR-Y		000	000		00
																				OR<25					
												02	NONE 0	STOP											
													PRVTE	E -W									012		00
													PSNGR CAR		02	PSNG	INJC	00	Unk			000	000		00
00188	N N N N N N	06/24/2019	TILLAMOOK	1 02		ALLEY		N	N	CLR	S-1STOP	01	NONE 0	STRGHT											27,29
STATE		MO		MN 0		UN	(NONE)	NONE	N	DRY	REAR		PRVTE	S -N									000		00
N		5P		43.86		04			N	DAY	INJ		PSNGR CAR		01	DRVR	NONE	68	M	OR-Y		016,043	038		27,29
N		45 43 3.56	-123 54 58.95		000900100S00		(02)													OR<25					
												02	NONE 0	STOP											
													PRVTE	S -N									012		00
													PSNGR CAR		01	DRVR	INJB	39	F	OR-Y		000	000		00
																				OR<25					
												02	NONE 0	STOP											
													PRVTE	S -N									012		00
													PSNGR CAR		02	PSNG	INJB	00	F			000	000		00
00227	N Y N N N N	07/19/2018	TILLAMOOK	1 02		INTER	3-LEG	N	Y	CLR	FIX OBJ	01	NONE 0	TURN-L										053	08
STATE		TH		MN 0		S		STOP SIGN	N	DRY	FIX		PRVTE	E -S									000	053	00
N		9P		43.89		05	0		N	DUSK	INJ		PSNGR CAR		01	DRVR	INJB	45	M	OR-Y		001,081	088		08
N		45 43 3.07	-123 54 56.95		000900100S00															OR>25					
00273	N N N N	08/09/2021	TILLAMOOK	1 02		INTER	3-LEG	N	N	CLR	BIKE													110	32,27,02
COUNTY		MO		MN 0		W		NONE	N	DRY	TURN			-											
N		12P		43.89		05	0		N	DAY	INJ			STRGHT	01	BIKE	INJA	81	M		I XWLK	000	034	110	00
N		45 43 3.07	-123 54 56.94		000900100S00									N S											
												01	NONE 0	TURN-R											
													PRVTE	N -W									000		00
													PSNGR CAR		01	DRVR	NONE	68	F	OR-Y		052,016,027	038		32,27,02
																				OR<25					

TILLAMOOK COUNTY

NECARNEY CITY RD, MP -999.99 to 999.99, 01/01/2018 to 12/31/2022

1 - 4 of 4 Crash records shown.

SER# INVEST RD DPT UNLOC?	S D M P R J S W E A U I C O E L G N H R D C S V L K	DATE DAY TIME LAT	MILEPNT DIST FROM INTERSECT LONG	COUNTY ROADS FIRST STREET SECOND STREET LRS	RD CHAR DIRECT LOCTN	INT-TYPE (MEDIAN) LEGS (#LANES)	INT-REL TRAF- CONTL	OFFRD RNDBT DRVWY	WTHR SURF LIGHT	CRASH COLL SVRTY	V#	SPCL USE TRLR QTY OWNER TYPE	MOVE FROM TO	P#	PRTC TYPE	INJ SVRTY	A G E	S E X	LICNS RES	PED LOC	ERROR	ACT	EVENT	CAUSE
00120	N N N N	04/19/2021	0.03	NECARNEY CITY RD	INTER	CROSS	N	N	CLR	ANIMAL	01	NONE 9	STRGHT										035	12
NONE		MO			UN		UNKNOWN	N	UNK	OTH		N/A	W -E									000		00
N		5A			03	0		N	DAWN	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N		45 43 1.71	-123 54 57.94																UNK					
00054	N N N N	02/22/2019	0.09	NECARNEY CITY RD	STRGHT		N	Y	CLR	FIX OBJ	01	NONE 9	STRGHT										079	16
NO RPT		FR			UN	(NONE)	UNKNOWN	N	DRY	FIX		N/A	E -W									000		00
Y		6A			01			N	DAWN	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N		45 42 58.76	-123 55 .86			(02)													UNK					
00178	Y N N N N N	07/08/2022	0.24	NECARNEY CITY RD	CURVE		N	N	CLR	OVERTURN	01	NONE 0	STRGHT											01
COUNTY		FR			UN	(NONE)	NONE	N	DRY	NCOL		PRVTE	N -S									000		00
N		3P			03			N	DAY	INJ		MTRCYCLE		01	DRVR	INJA	66	M	OR-Y		047	017		01
N		45 42 52.14	-123 55 3.48			(02)													OR>25					
00473	Y N N N N N	12/22/2019	0.63	NECARNEY CITY RD	GRADE		N	Y	RAIN	FIX OBJ	01	NONE 9	STRGHT										128,079,010	27,01
COUNTY		SU			UN	(NONE)	UNKNOWN	N	WET	FIX		N/A	W -E									000		00
Y		1A			03			N	DARK	PDO		PSNGR CAR		01	DRVR	NONE	00	Unk	UNK		000	000		00
N		45 42 44.99	-123 55 31.77			(02)													UNK					

APPENDIX H.

OPERATIONS CALCULATIONS

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	390	26	58	322	29	65
Future Vol, veh/h	390	26	58	322	29	65
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	424	28	63	350	32	71

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	452	0	914	438
Stage 1	-	-	-	-	438	-
Stage 2	-	-	-	-	476	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1108	-	303	619
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	625	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1108	-	286	619
Mov Cap-2 Maneuver	-	-	-	-	412	-
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	589	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.29	13.29
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	536	-	-	1108	-
HCM Lane V/C Ratio	0.191	-	-	0.057	-
HCM Control Delay (s/veh)	13.3	-	-	8.4	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0.2	-

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	82	63	0	0	0
Future Vol, veh/h	0	82	63	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	89	68	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	68	0	-	0	158	68
Stage 1	-	-	-	-	68	-
Stage 2	-	-	-	-	89	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1533	-	-	-	834	995
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	934	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1533	-	-	-	834	995
Mov Cap-2 Maneuver	-	-	-	-	834	-
Stage 1	-	-	-	-	954	-
Stage 2	-	-	-	-	934	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1533	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	439	33	89	466	38	89
Future Vol, veh/h	439	33	89	466	38	89
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	477	36	97	507	41	97

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	513	0	1195	495
Stage 1	-	-	-	-	495	-
Stage 2	-	-	-	-	700	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1052	-	206	574
Stage 1	-	-	-	-	613	-
Stage 2	-	-	-	-	493	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1052	-	187	574
Mov Cap-2 Maneuver	-	-	-	-	318	-
Stage 1	-	-	-	-	613	-
Stage 2	-	-	-	-	447	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.41	16.05
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	463	-	-	1052	-
HCM Lane V/C Ratio	0.298	-	-	0.092	-
HCM Control Delay (s/veh)	16.1	-	-	8.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.2	-	-	0.3	-

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	112	117	0	0	0
Future Vol, veh/h	0	112	117	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	122	127	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	127	0	-	0	249	127
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	122	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1459	-	-	-	740	923
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	904	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1459	-	-	-	740	923
Mov Cap-2 Maneuver	-	-	-	-	740	-
Stage 1	-	-	-	-	899	-
Stage 2	-	-	-	-	904	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1459	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	407	31	69	340	32	72
Future Volume (Veh/h)	407	31	69	340	32	72
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	452	34	77	378	36	80
Pedestrians					1	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			487		1002	470
vC1, stage 1 conf vol					470	
vC2, stage 2 conf vol					532	
vCu, unblocked vol			487		1002	470
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			93		92	87
cM capacity (veh/h)			1065		459	593

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	486	77	378	116
Volume Left	0	77	0	36
Volume Right	34	0	0	80
cSH	1700	1065	1700	544
Volume to Capacity	0.29	0.07	0.22	0.21
Queue Length 95th (ft)	0	6	0	20
Control Delay (s/veh)	0.0	8.6	0.0	13.4
Lane LOS		A		B
Approach Delay (s/veh)	0.0	1.5		13.4
Approach LOS				B

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection						
Int Delay, s/veh	2.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	407	31	69	340	32	72
Future Vol, veh/h	407	31	69	340	32	72
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	9	4	4	2	2
Mvmt Flow	452	34	77	378	36	80

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	488	0	1002	470
Stage 1	-	-	-	-	470	-
Stage 2	-	-	-	-	531	-
Critical Hdwy	-	-	4.14	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.236	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1065	-	269	593
Stage 1	-	-	-	-	629	-
Stage 2	-	-	-	-	590	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1064	-	249	593
Mov Cap-2 Maneuver	-	-	-	-	380	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	547	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.46	14.22
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	505	-	-	1064	-
HCM Lane V/C Ratio	0.229	-	-	0.072	-
HCM Control Delay (s/veh)	14.2	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	92	78	0	0	0
Future Volume (Veh/h)	0	92	78	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	0	105	89	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	89				194	89
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	89				194	89
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1506				795	969

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	105	89	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1506	1700	1700
Volume to Capacity	0.00	0.05	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s/veh)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s/veh)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	8.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection						
Int Delay, s/veh	0					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	92	78	0	0	0
Future Vol, veh/h	0	92	78	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	5	8	2	2	2
Mvmt Flow	0	105	89	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	89	0	-	0	193	89
Stage 1	-	-	-	-	89	-
Stage 2	-	-	-	-	105	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1507	-	-	-	796	969
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	920	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1507	-	-	-	796	969
Mov Cap-2 Maneuver	-	-	-	-	796	-
Stage 1	-	-	-	-	935	-
Stage 2	-	-	-	-	920	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1507	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	457	37	99	487	42	99
Future Volume (Veh/h)	457	37	99	487	42	99
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	491	40	106	524	45	106
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			533		1249	513
vC1, stage 1 conf vol					513	
vC2, stage 2 conf vol					736	
vCu, unblocked vol			533		1249	513
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			90		88	81
cM capacity (veh/h)			1018		368	560

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	531	106	524	151
Volume Left	0	106	0	45
Volume Right	40	0	0	106
cSH	1700	1018	1700	485
Volume to Capacity	0.31	0.10	0.31	0.31
Queue Length 95th (ft)	0	9	0	33
Control Delay (s/veh)	0.0	8.9	0.0	15.7
Lane LOS		A		C
Approach Delay (s/veh)	0.0	1.5		15.7
Approach LOS				C

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	457	37	99	487	42	99
Future Vol, veh/h	457	37	99	487	42	99
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	2	5	2	3	2
Mvmt Flow	491	40	106	524	45	106

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	533	0	1250	513
Stage 1	-	-	-	-	513	-
Stage 2	-	-	-	-	737	-
Critical Hdwy	-	-	4.15	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.245	-	3.527	3.318
Pot Cap-1 Maneuver	-	-	1019	-	190	561
Stage 1	-	-	-	-	599	-
Stage 2	-	-	-	-	472	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1017	-	170	560
Mov Cap-2 Maneuver	-	-	-	-	300	-
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	422	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.51	17.21
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	445	-	-	1017	-
HCM Lane V/C Ratio	0.341	-	-	0.105	-
HCM Control Delay (s/veh)	17.2	-	-	9	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.5	-	-	0.3	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	125	130	0	0	0
Future Volume (Veh/h)	0	125	130	0	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	136	141	0	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	141				277	141
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	141				277	141
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1442				713	907

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	136	141	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1442	1700	1700
Volume to Capacity	0.00	0.08	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s/veh)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s/veh)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	10.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	125	130	0	0	0
Future Vol, veh/h	0	125	130	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	7	2	2	2
Mvmt Flow	0	136	141	0	0	0

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	141	0	-	0	277	141
Stage 1	-	-	-	-	141	-
Stage 2	-	-	-	-	136	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1442	-	-	-	713	907
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	891	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1442	-	-	-	713	907
Mov Cap-2 Maneuver	-	-	-	-	713	-
Stage 1	-	-	-	-	886	-
Stage 2	-	-	-	-	891	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1442	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s/veh)	0	-	-	-	0
HCM Lane LOS	A	-	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	-

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	407	34	75	340	35	77
Future Volume (Veh/h)	407	34	75	340	35	77
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	438	37	81	366	38	83
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			477		987	459
vC1, stage 1 conf vol					459	
vC2, stage 2 conf vol					528	
vCu, unblocked vol			477		987	459
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			92		92	86
cM capacity (veh/h)			1068		460	601

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	475	81	366	121
Volume Left	0	81	0	38
Volume Right	37	0	0	83
cSH	1700	1068	1700	549
Volume to Capacity	0.28	0.08	0.22	0.22
Queue Length 95th (ft)	0	6	0	21
Control Delay (s/veh)	0.0	8.6	0.0	13.4
Lane LOS		A		B
Approach Delay (s/veh)	0.0	1.6		13.4
Approach LOS				B

Intersection Summary			
Average Delay	2.2		
Intersection Capacity Utilization	47.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	407	34	75	340	35	77
Future Vol, veh/h	407	34	75	340	35	77
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	2	5	2	3	2
Mvmt Flow	438	37	81	366	38	83

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	476	0	985	458
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	527	-
Critical Hdwy	-	-	4.15	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.245	-	3.527	3.318
Pot Cap-1 Maneuver	-	-	1070	-	274	603
Stage 1	-	-	-	-	635	-
Stage 2	-	-	-	-	590	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1068	-	253	602
Mov Cap-2 Maneuver	-	-	-	-	382	-
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	546	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.56	14.23
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	510	-	-	1068	-
HCM Lane V/C Ratio	0.236	-	-	0.075	-
HCM Control Delay (s/veh)	14.2	-	-	8.6	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.9	-	-	0.2	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	92	78	9	8	5
Future Volume (Veh/h)	6	92	78	9	8	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	100	85	10	9	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	95				204	90
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	95				204	90
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1499				781	968

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	107	95	14
Volume Left	7	0	9
Volume Right	0	10	5
cSH	1499	1700	839
Volume to Capacity	0.00	0.06	0.02
Queue Length 95th (ft)	0	0	1
Control Delay (s/veh)	0.5	0.0	9.4
Lane LOS	A		A
Approach Delay (s/veh)	0.5	0.0	9.4
Approach LOS			A

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	20.6%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection						
Int Delay, s/veh	0.8					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	6	92	78	9	8	5
Future Vol, veh/h	6	92	78	9	8	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	7	2	2	2
Mvmt Flow	7	100	85	10	9	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	95	0	-	0	203	90
Stage 1	-	-	-	-	90	-
Stage 2	-	-	-	-	113	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1499	-	-	-	786	968
Stage 1	-	-	-	-	934	-
Stage 2	-	-	-	-	912	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1499	-	-	-	782	968
Mov Cap-2 Maneuver	-	-	-	-	782	-
Stage 1	-	-	-	-	930	-
Stage 2	-	-	-	-	912	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.45	0	9.33
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	110	-	-	-	845
HCM Lane V/C Ratio	0.004	-	-	-	0.017
HCM Control Delay (s/veh)	7.4	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	457	40	104	487	44	102
Future Volume (Veh/h)	457	40	104	487	44	102
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	491	43	112	524	47	110
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					3.5	
Percent Blockage					0	
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			536		1263	515
vC1, stage 1 conf vol					515	
vC2, stage 2 conf vol					748	
vCu, unblocked vol			536		1263	515
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)			2.2		3.5	3.3
p0 queue free %			89		87	80
cM capacity (veh/h)			1015		362	559

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	534	112	524	157
Volume Left	0	112	0	47
Volume Right	43	0	0	110
cSH	1700	1015	1700	481
Volume to Capacity	0.31	0.11	0.31	0.33
Queue Length 95th (ft)	0	9	0	35
Control Delay (s/veh)	0.0	9.0	0.0	16.1
Lane LOS		A		C
Approach Delay (s/veh)	0.0	1.6		16.1
Approach LOS				C

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	457	40	104	487	44	102
Future Vol, veh/h	457	40	104	487	44	102
Conflicting Peds, #/hr	0	2	2	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	3	2	5	2	3	2
Mvmt Flow	491	43	112	524	47	110

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	536	0	1262	515
Stage 1	-	-	-	-	515	-
Stage 2	-	-	-	-	747	-
Critical Hdwy	-	-	4.15	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.245	-	3.527	3.318
Pot Cap-1 Maneuver	-	-	1017	-	187	560
Stage 1	-	-	-	-	598	-
Stage 2	-	-	-	-	466	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1015	-	166	559
Mov Cap-2 Maneuver	-	-	-	-	295	-
Stage 1	-	-	-	-	597	-
Stage 2	-	-	-	-	415	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	1.58	17.63
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	440	-	-	1015	-
HCM Lane V/C Ratio	0.356	-	-	0.11	-
HCM Control Delay (s/veh)	17.6	-	-	9	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.6	-	-	0.4	-

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	8	125	130	8	5	5
Future Volume (Veh/h)	8	125	130	8	5	5
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	136	141	9	5	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	150				300	146
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	150				300	146
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	99
cM capacity (veh/h)	1431				688	902

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	145	150	10
Volume Left	9	0	5
Volume Right	0	9	5
cSH	1431	1700	780
Volume to Capacity	0.01	0.09	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s/veh)	0.5	0.0	9.7
Lane LOS	A		A
Approach Delay (s/veh)	0.5	0.0	9.7
Approach LOS			A

Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	125	130	8	5	5
Future Vol, veh/h	8	125	130	8	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	3	7	2	2	2
Mvmt Flow	9	136	141	9	5	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	150	0	-	0	299	146
Stage 1	-	-	-	-	146	-
Stage 2	-	-	-	-	153	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1431	-	-	-	692	901
Stage 1	-	-	-	-	882	-
Stage 2	-	-	-	-	875	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1431	-	-	-	688	901
Mov Cap-2 Maneuver	-	-	-	-	688	-
Stage 1	-	-	-	-	876	-
Stage 2	-	-	-	-	875	-

Approach	EB		WB		SB	
HCM Control Delay, s/v	0.45		0		9.68	
HCM LOS					A	

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	108	-	-	-	780
HCM Lane V/C Ratio	0.006	-	-	-	0.014
HCM Control Delay (s/veh)	7.5	0	-	-	9.7
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

APPENDIX I.

QUEUING ANALYSIS

Intersection: 1: Necarney City Rd & Highway 101

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	79	89
Average Queue (ft)	22	38
95th Queue (ft)	55	70
Link Distance (ft)		1129
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 2: Necarney City Rd & Loop Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Necarney City Rd & Highway 101

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	85	122
Average Queue (ft)	32	52
95th Queue (ft)	65	98
Link Distance (ft)		1129
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 2: Necarney City Rd & Loop Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Necarney City Rd & Highway 101

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	4	66	99
Average Queue (ft)	0	26	37
95th Queue (ft)	3	59	68
Link Distance (ft)	1178		1129
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 2: Necarney City Rd & Loop Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Necarney City Rd & Highway 101

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	89	143
Average Queue (ft)	35	60
95th Queue (ft)	71	116
Link Distance (ft)		1129
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 2: Necarney City Rd & Loop Rd

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Necarney City Rd & Highway 101

Movement	WB	NB
Directions Served	L	LR
Maximum Queue (ft)	71	131
Average Queue (ft)	26	44
95th Queue (ft)	58	89
Link Distance (ft)		1129
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	100	
Storage Blk Time (%)	0	
Queuing Penalty (veh)	0	

Intersection: 2: Necarney City Rd & Loop Rd

Movement	SB
Directions Served	LR
Maximum Queue (ft)	36
Average Queue (ft)	9
95th Queue (ft)	34
Link Distance (ft)	370
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: Necarney City Rd & Highway 101

Movement	EB	WB	NB
Directions Served	TR	L	LR
Maximum Queue (ft)	5	94	147
Average Queue (ft)	0	35	56
95th Queue (ft)	4	73	110
Link Distance (ft)	1178		1129
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		100	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		1	

Intersection: 2: Necarney City Rd & Loop Rd

Movement	EB	SB
Directions Served	LT	LR
Maximum Queue (ft)	14	35
Average Queue (ft)	1	9
95th Queue (ft)	9	35
Link Distance (ft)	1054	370
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1

SITE INFORMATION

DEVELOPED AREA: 119,636 SQ. FT.
OPEN SPACE AREA: 81,704 SQ. FT.

TOTAL AREA: 201,340 SQ. FT.

polyphon
ARCHITECTURE & DESIGN, LLC polyphon.com
4103 NE TILLAMOOK STREET | PORTLAND, OR 97212

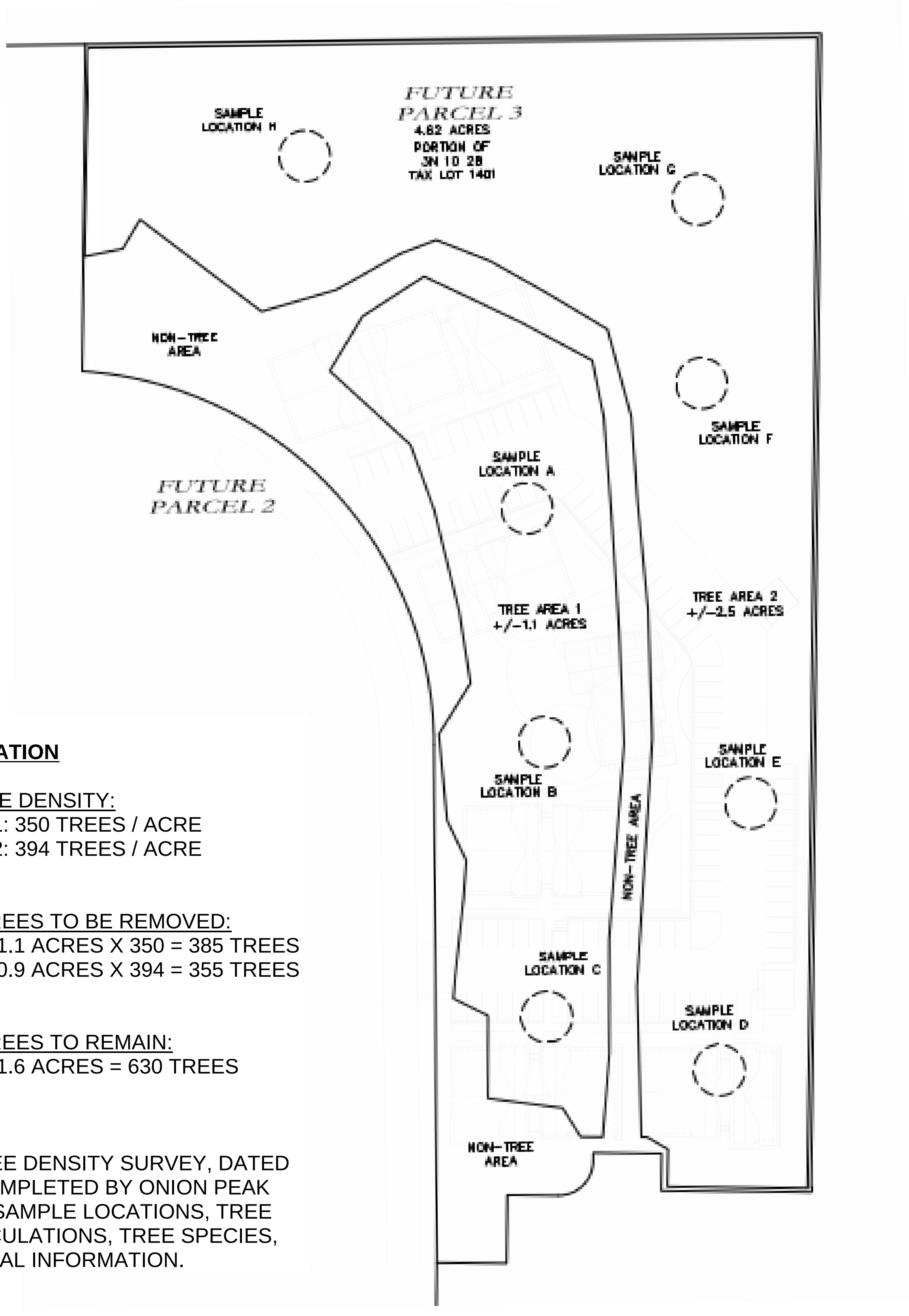
MANZANITA PINES

0 LOOP RD MANZANITA, OR

SITE AERIAL - TIMBER SURVEY

TS1

ORIGINAL SHEET SIZE: 8.5" x 11"



<u>TREE INFORMATION</u>

<u>AVERAGE TREE DENSITY:</u>
TREE AREA 1: 350 TREES / ACRE
TREE AREA 2: 394 TREES / ACRE

<u>PROPOSED TREES TO BE REMOVED:</u>
AREA 1 = +/- 1.1 ACRES X 350 = 385 TREES
AREA 2 = +/- 0.9 ACRES X 394 = 355 TREES

<u>PROPOSED TREES TO REMAIN:</u>
AREA 2 = +/- 1.6 ACRES = 630 TREES

<u>NOTE:</u>
REFER TO TREE DENSITY SURVEY, DATED 12-27-2024, COMPLETED BY ONION PEAK DESIGN, FOR SAMPLE LOCATIONS, TREE DENSITY CALCULATIONS, TREE SPECIES, AND ADDITIONAL INFORMATION.

NOTES

THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY OF THE SUBJECT PROPERTY. THE PURPOSE OF THIS MAP IS SHOW THE APPROXIMATE OUTLINE OF THE TREED AREA OF FUTURE PARCEL 3 (4.62 ACRES) ALONG WITH EIGHT SAMPLE LOCATIONS. SAID SAMPLE LOCATIONS WERE THEN USED TO CALCULATE THE APPROXIMATE NUMBER OF CONIFEROUS TREES PER ACRE ON THE SUBJECT PROPERTY. THE SUBJECT PROPERTY IS FUTURE PARCEL 3 THAT HAS BEEN APPROVED BY THE CITY OF MANZANITA AND CURRENTLY GOING THROUGH FINAL MONUMENTS AND PLATTING. THE EXTERIOR BOUNDARY SHOWN HEREON IS BASED ON SAID APPROVED PARTITION. TREES WERE COUNTED IN 30' DIAMETER SAMPLE LOCATIONS. THREE SAMPLE LOCATIONS WERE UTILIZED FOR TREE AREA 1 AND 5 LOCATIONS WERE UTILIZED FOR TREE AREA 2. THE TREE LINE AREA IS APPROXIMATE AND BASED ON AERIAL IMAGERY.

SAMPLE LOCATIONS

TREE AREA 1

LOCATION A – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

6"ø PINE:	5
8"ø PINE:	1
8"ø FIR:	1
TOTAL:	7

LOCATION B – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

6"ø PINE:	2
8"ø PINE:	1
10"ø FIR:	2
TOTAL:	5

LOCATION C – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

10"ø PINE:	3
12"ø PINE:	1
5"ø CEDAR:	1
TOTAL:	5

TREE AREA 2

LOCATION D – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

6"ø FIR:	1
6"ø HEMLOCK:	3
8"ø HEMLOCK:	2
12"ø HEMLOCK:	1
TOTAL:	7

LOCATION E – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

8"ø PINE:	1
6"ø HEMLOCK:	3
8"ø HEMLOCK:	2
TOTAL:	6

LOCATION F – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

6"ø PINE:	3
8"ø PINE:	2
TOTAL:	5

LOCATION G – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

6"ø PINE:	2
6"ø HEMLOCK:	1
8"ø HEMLOCK:	2
10"ø HEMLOCK:	1
6"ø CEDAR:	1
6"ø SPRUCE:	1
TOTAL:	8

LOCATION H – 30' DIAMETER SAMPLE SITE (CONIFEROUS TREES 6"ø OR GREATER).

10"ø PINE:	1
12"ø PINE:	1
6"ø HEMLOCK:	2
8"ø HEMLOCK:	1
24"ø HEMLOCK:	1
TOTAL:	6

TREE CALCULATIONS

TREE AREA 1

3 SAMPLE LOCATIONS @ 707 SQ. FT. EACH

17 TREES IN 2,121 SQ. FT.
= +/-350 TREES PER ACRE.

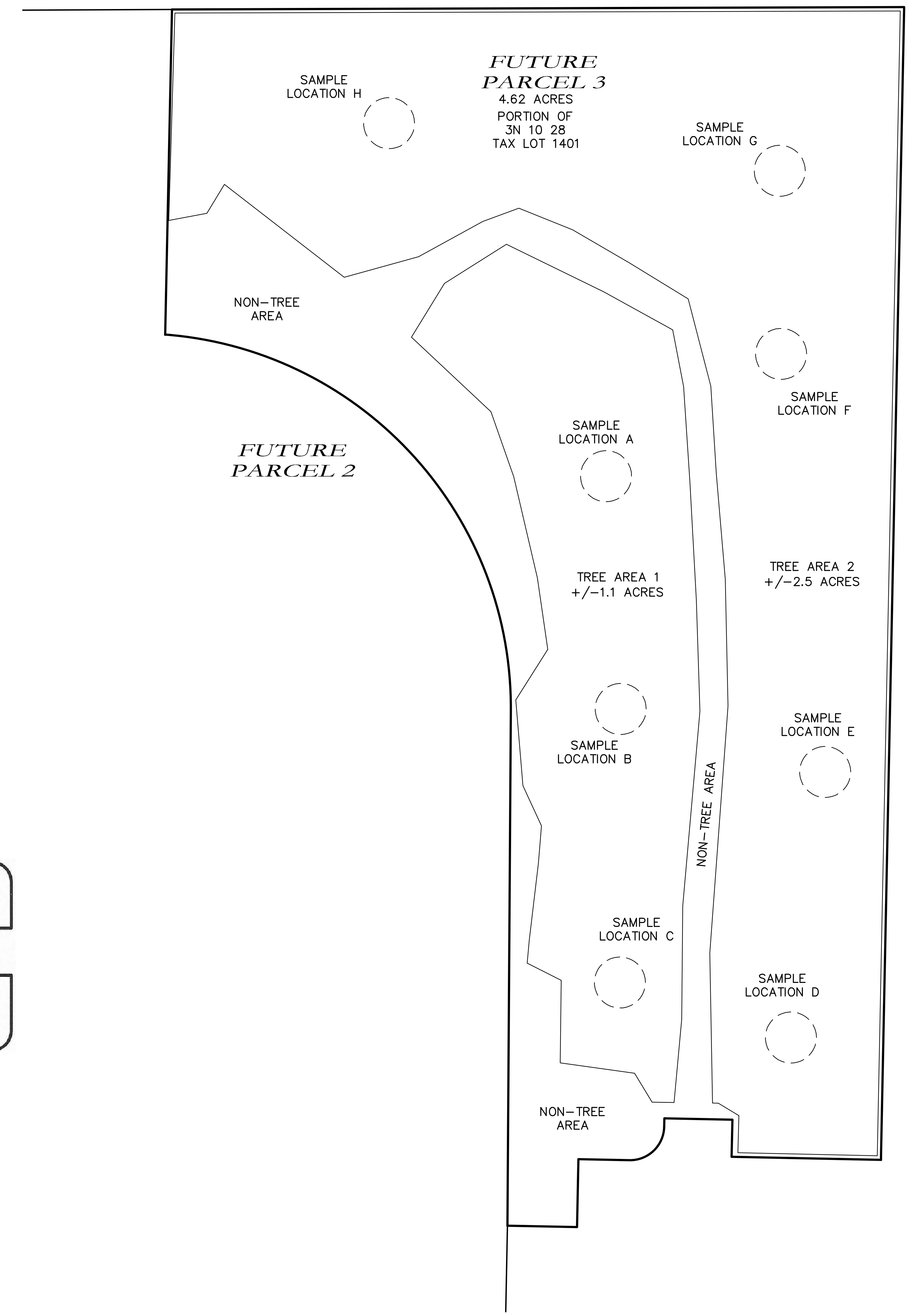
TREE AREA 2

5 SAMPLE LOCATIONS @ 707 SQ. FT. EACH

32 TREES IN 3,535 SQ. FT.
= +/-394 TREES PER ACRE.

N

SCALE:
1" = 60'



REGISTERED PROFESSIONAL LAND SURVEYOR
Erick M White
OREGON
APRIL 28, 2014
ERICK M. WHITE
78572
RENEWS 6/30/2026

TREE DENSITY SURVEY FOR:

MANZANITA PINES APARTMENTS

A PORTION OF 3N 10 28 TAX LOT 1401
(FUTURE PARCEL 3)

NW 1/4 OF THE SE 1/4, SECTION 28, T3N, R10W, W.M.
TILLAMOOK COUNTY
DECEMBER 27, 2024

ONION PEAK DESIGN
11460 EVERGREEN WAY
NEHALEM, OR 97131
(503) 440-4403

HOMEFIRST2412-TREE.DWG

MACKENZIE.

DRAINAGE REPORT

To
City of Manzanita

For
Highlands, Phase 8

Submitted
November 26, 2024

Project Number
2160454.08

MACKENZIE
Since 1960

RiverEast Center | 1515 SE Water Avenue, Suite 100, Portland, OR 97214
PO Box 14310, Portland, OR 97293 | T 503.224.9560 | www.mackenzie.inc

TABLE OF CONTENTS

ATTACHMENTS

I. INTRODUCTION

The purpose of this report is to provide engineering documentation and storm drainage calculations to support the Manzanita Pines development in the City of Manzanita, Oregon. This report demonstrates the proposed stormwater management facility system's compliance with The City of Manzanita and its current Construction Standards (April 2015).

Manzanita Pines was outside the limits of the original storm report. The existing site at the Manzanita Pines location is undeveloped land area consisting of wooded areas and occasional sand dunes. The Phase 1 through Phase 5 development has already been constructed.

The previous phases of the development consist of residential lots, new roadways, and associated storm, sanitary, water, and electric utilities. The Phase 1 and Phase 2 roadway – Highlands Drive – connects to Classic Street approximately 400 feet north of Ridge Road. Phase 1 and Phase 2 also included Seaview Drive, which is approximately 1,000 feet long.

The site was outside City of Manzanita city limits but has recently been incorporated into the City. The lots are now zoned as Special Residential Recreational area (SRR).

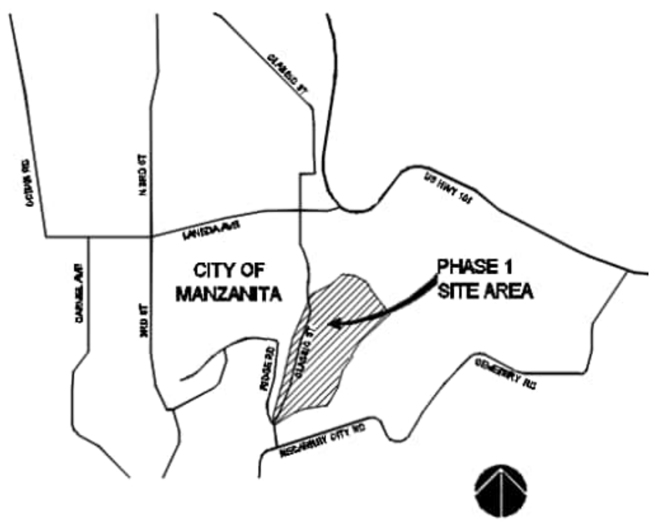


Figure 1: Vicinity Map

II. WATER QUALITY

The Natural Resources Conservation (NRCS) web service data exhibits the proposed Manzanita Pines development site soil consists of 100% Netarts fine sandy loam soil categorized under hydrologic soil group A. Based on the type of soil found at the site, two (2) infiltration ponds will be constructed with the project to meet the water quality requirements. These will be permanent ponds and will be located on the subject site.

The site has been broken up into two (2) drainage basins – Basin A and Basin B. Basin A is the majority of the site, and Basin B is the southern portion of the site. Pond A is sized to manage the stormwater collected from Basin A, and Pond B to manage storm drainage from Basin B.

The ponds will treat the collected stormwater by infiltrating the water through amended soil media and vegetation. See the basin map for basins and pond locations.

To size the infiltration ponds for Water Quality, one cubic foot of storage was provided for every 44 square feet (SF) of impervious surface developed per City of Manzanita storm requirements.

Basin A = 47,726 SF/44 = 1,084 cubic feet minimum.

Basin B = 28,590 SF/44 = 650 cubic feet minimum.

III. WATER QUANTITY

To meet City of Manzanita's water quantity requirement, two (2) separate infiltration ponds were designed to contain the 10-year storm event for the areas noted in Table 1 below.

All of Phases 1 through Phase 5 have already been built.

The total impervious area for Manzanita Pines North draining to the north pond = 47,726 SF.
The total impervious area for Manzanita Pine South draining to the south pond = 28,590 SF.

Table 1: Drainage Basins			
Drainage Basin	Area - Pervious (ft^2)	Area - impervious (ft^2)	Total Area (ft^2)
Basin A	30,682	47,726	78,408
Basin B	21,635	28,590	50,225

To size the infiltration ponds, one (1) cubic foot of storage was provided for every 44 square feet of impervious surface developed per City of Manzanita storm requirements. See calculations in WQ section above.

Table 2: Infiltration Ponds		
Drainage Basin	Required Storage Volume (CF)	Provided Storage Volume (CF)
Pond A	1084	2,438
Pond B	650	1,845

Based on the existing sandy soils, this water should all infiltrate from both ponds without any overflow. See the infiltration calculations in the appendices from Hydraflow. The infiltration calculations were based on a design infiltration rate of 20 inches per hour. The sandy soils infiltrate so fast that the measured infiltration rate was greater than 150 inches per hour.

Pond A has 12" of drain rock under the topsoil to provide additional storage and infiltration. Pond B does not have any rock underneath.

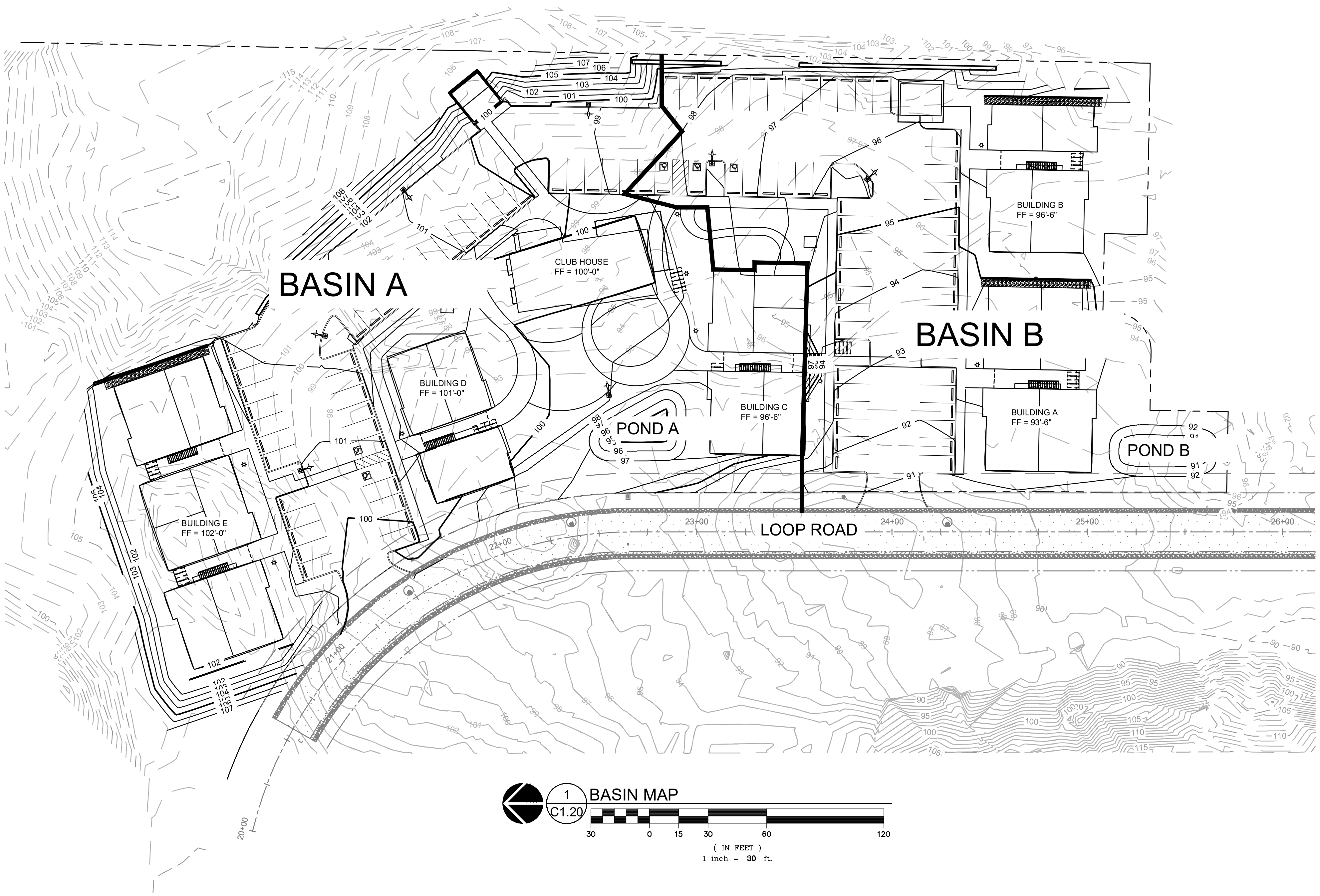
The pond sizes shown meet the infiltration requirements as listed the Hydraflow infiltration results.

IV. CONVEYANCE DESIGN

The rational method was used to size the storm pipes in the conveyance system. Sub-basins 1-6 are delineated and a 10-year storm runoff was used to analyze the proposed stormwater conveyance system. A time of concentration of 5.50 minutes and a runoff coefficient of 0.9 were assumed.

The conveyance system will be a maximum 12" pipe on site and a 12" pipe in Loop Road.

All the proposed roadways will have a uniform cross-slope of 2% towards a concrete gutter and rock overflow section. Catch basins are spaced out along the entire length of concrete gutter that will collect runoff from the various rights-of-way. There is not expected to be any drainage overflow, even up to the 50-year storm event; however, as with the previous phases, any overflow drainage beyond the maximum pond capacity will be dispersed via overland flow.



THE SURVEY INFORMATION SHOWN AS A BACKGROUND SCREEN ON THIS SHEET IS SHOWN FOR REFERENCE ONLY AND IS BASED ON A SURVEY BY: HICKMAN & ASSOCIATES DATE

M.

Architecture ▪ Interiors
Planning ▪ Engineering

Portland, OR
503.224.9560
Vancouver, WA
360.695.7879
Seattle, WA
206.749.9993
www.mackenzie.inc

MACKENZIE.

Client
ENCORE INVESTMENTS LLC.

Project
HIGHLANDS PHASE 8

REVISION SCHEDULE

Delta	Issued As	Issue Date

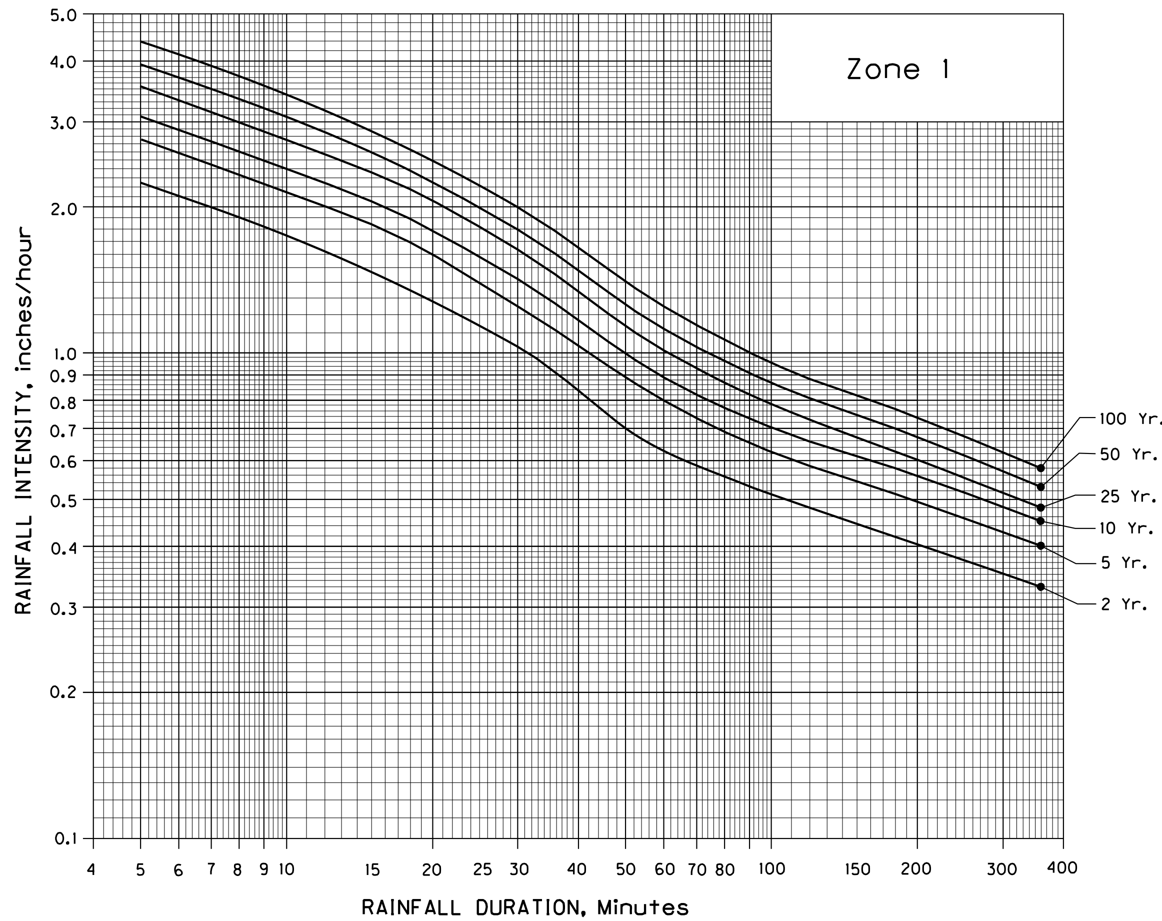
SHEET TITLE:
BASIN MAP

SHEET:
1

JOB NO. 2160454.08

PRELIMINARY ONLY
2160454004_DRAWINGS\CIVIL\PHASE 8\EXHIBITS\BASIN MAP.DWG C1.20 RJH 11/22/24 10:34 1:30

RAINFALL INTENSITY - DURATION - RECURRENCE INTERVAL CURVES



Hydraflow Table of Contents

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SBUH Runoff	------	-------	-------	-------	-------	-------	-------	1.888	-------	Basin A - Developed
2	SBUH Runoff	------	-------	-------	-------	-------	-------	-------	1.133	-------	Basin B
4	Reservoir	1	-------	-------	-------	-------	-------	-------	1.142	-------	A
5	Reservoir	2	-------	-------	-------	-------	-------	-------	0.570	-------	B

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SBUH Runoff	1.888	2	474	26,980	------	------	------	Basin A - Developed
2	SBUH Runoff	1.133	2	474	16,361	------	------	------	Basin B
4	Reservoir	1.142	2	490	26,980	1	96.56	1,899	A
5	Reservoir	0.570	2	496	16,360	2	92.34	1,660	B

Hydrograph Report

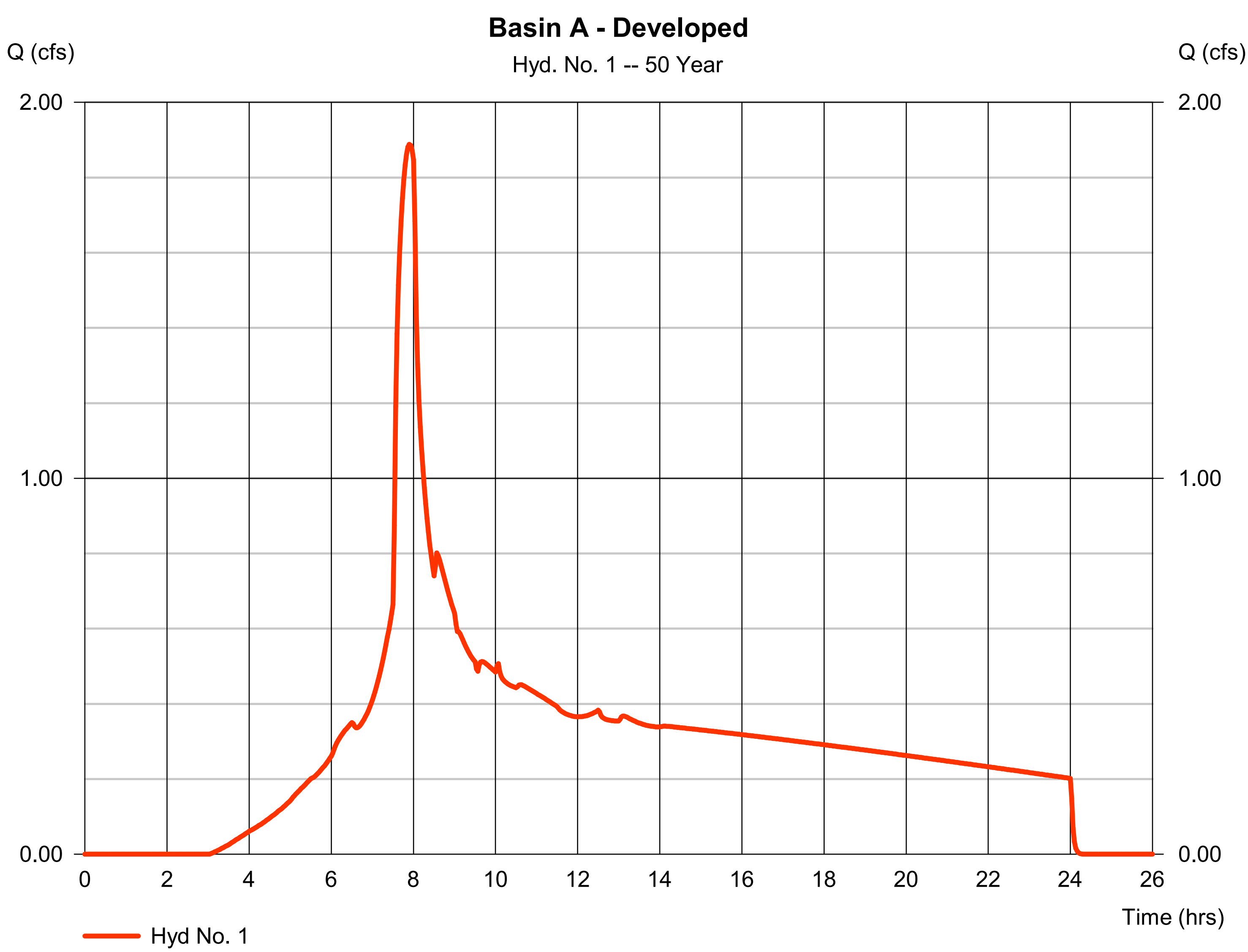
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 11 / 21 / 2024

Hyd. No. 1

Basin A - Developed

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.888 cfs
Storm frequency	= 50 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 26,980 cuft
Drainage area	= 1.800 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.80 min
Total precip.	= 6.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(1.100 x 98) + (0.700 x 49)] / 1.800



Hydrograph Report

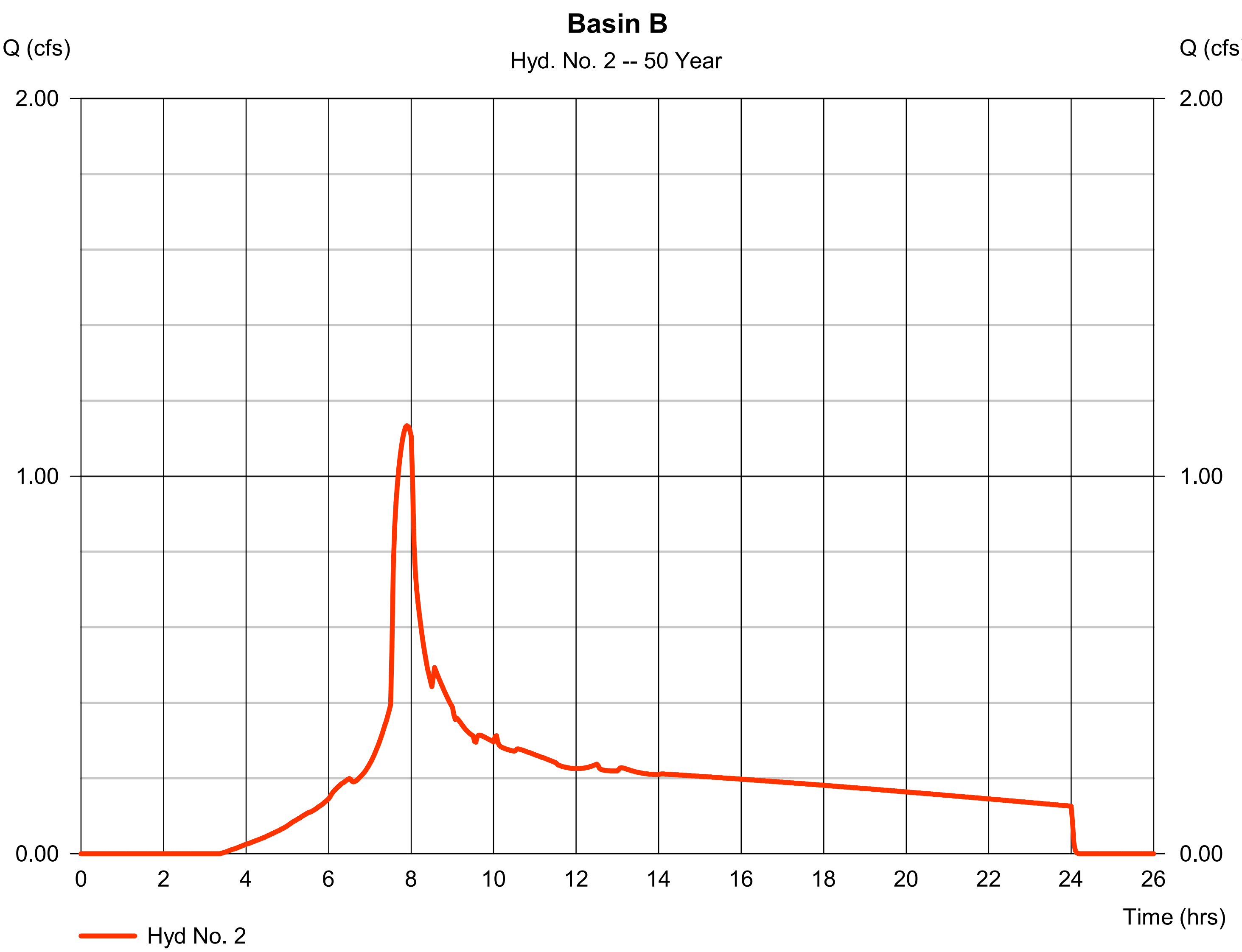
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 11 / 21 / 2024

Hyd. No. 2

Basin B

Hydrograph type	= SBUH Runoff	Peak discharge	= 1.133 cfs
Storm frequency	= 50 yrs	Time to peak	= 7.90 hrs
Time interval	= 2 min	Hyd. volume	= 16,361 cuft
Drainage area	= 1.150 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 2.00 min
Total precip.	= 6.50 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= n/a

* Composite (Area/CN) = [(0.660 x 98) + (0.490 x 49)] / 1.150



Hydrograph Report

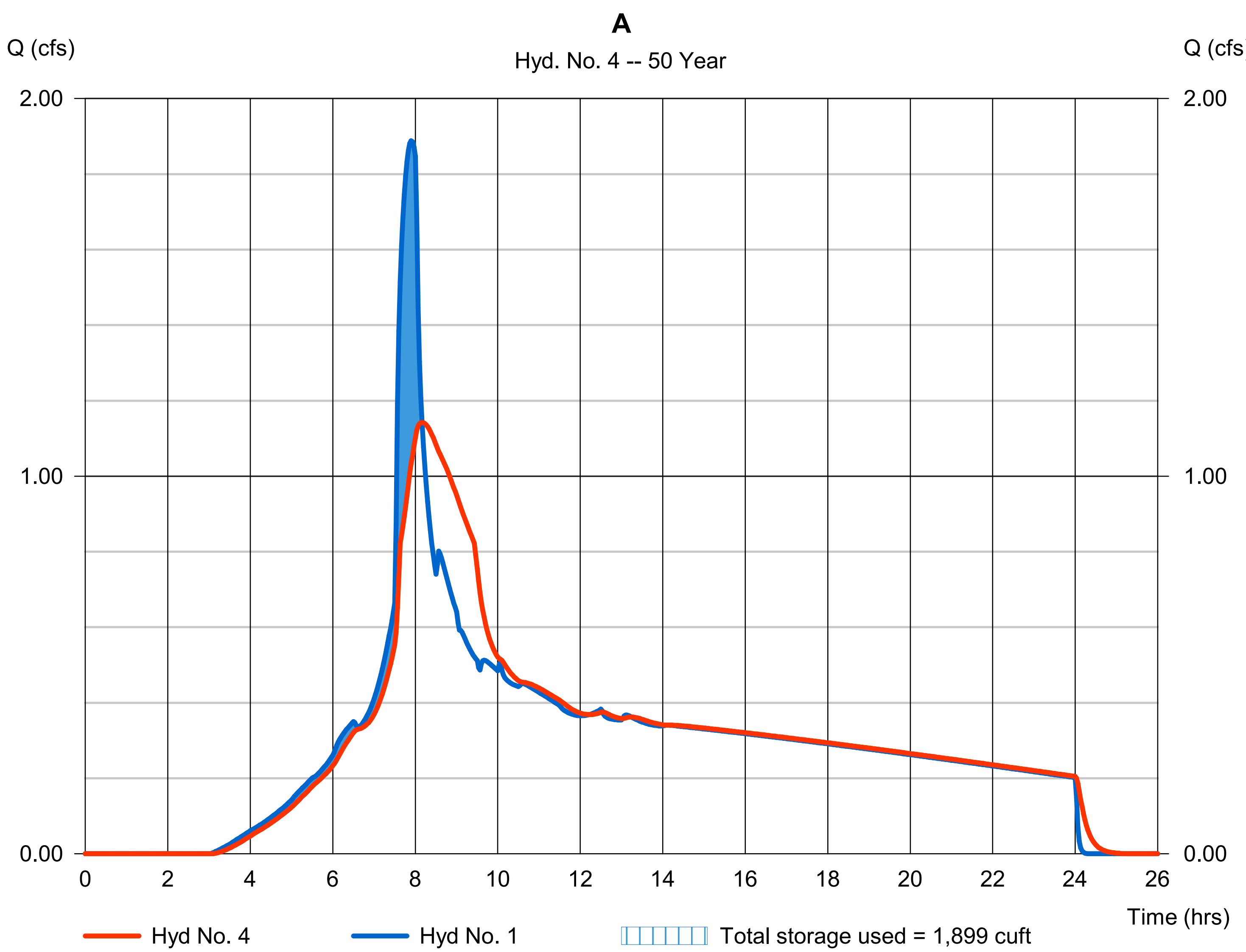
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 11 / 21 / 2024

Hyd. No. 4

A

Hydrograph type	= Reservoir	Peak discharge	= 1.142 cfs
Storm frequency	= 50 yrs	Time to peak	= 8.17 hrs
Time interval	= 2 min	Hyd. volume	= 26,980 cuft
Inflow hyd. No.	= 1 - Basin A - Developed	Max. Elevation	= 96.56 ft
Reservoir name	= Pond A	Max. Storage	= 1,899 cuft

Storage Indication method used.



Pond No. 1 - Pond A

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	92.00	n/a	0	0
1.00	93.00	n/a	451	451
2.50	94.50	n/a	1	452
3.00	95.00	n/a	164	616
3.50	95.50	n/a	360	976
4.00	96.00	n/a	374	1,350
4.50	96.50	n/a	479	1,829
5.00	97.00	n/a	609	2,438

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

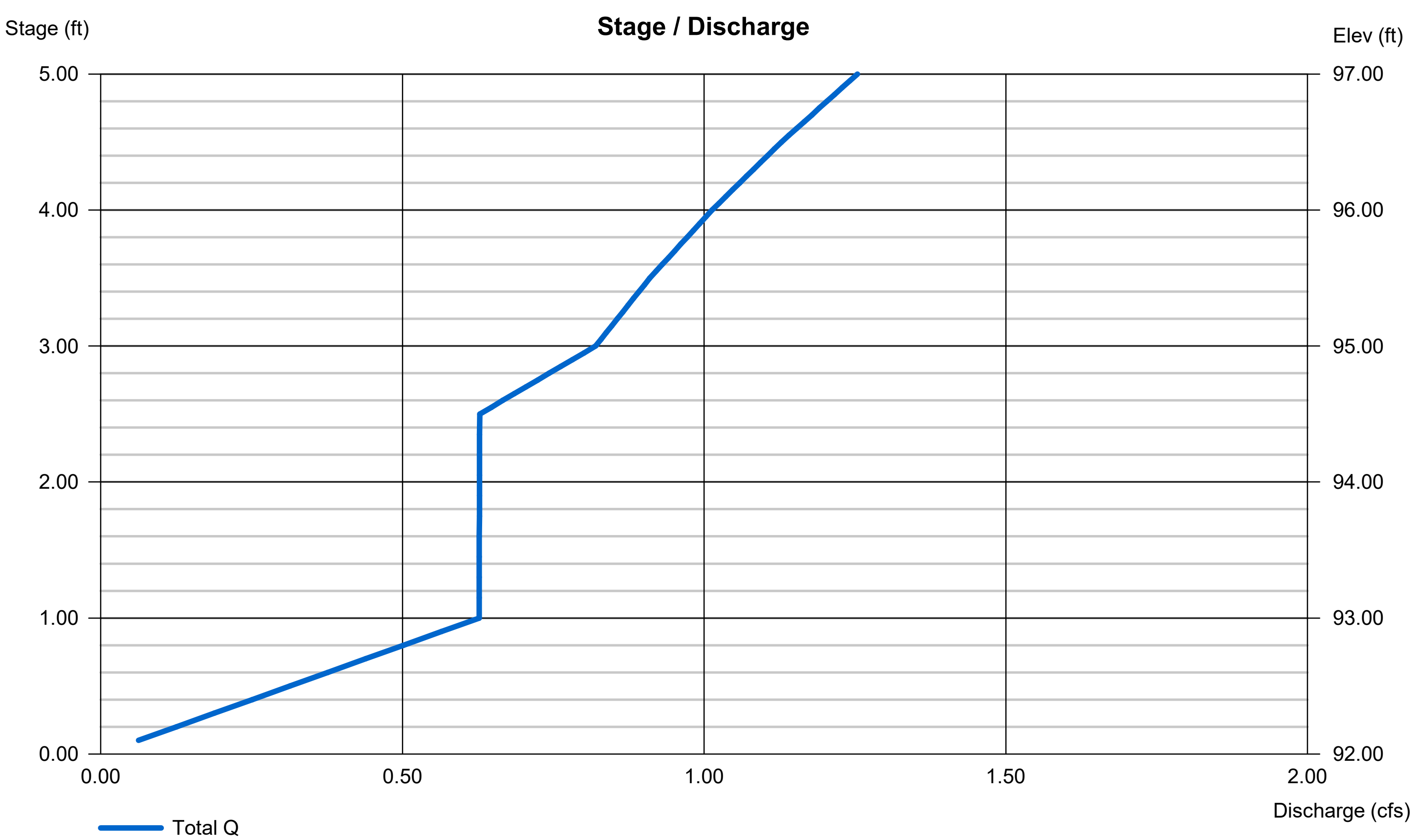
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydrograph Report

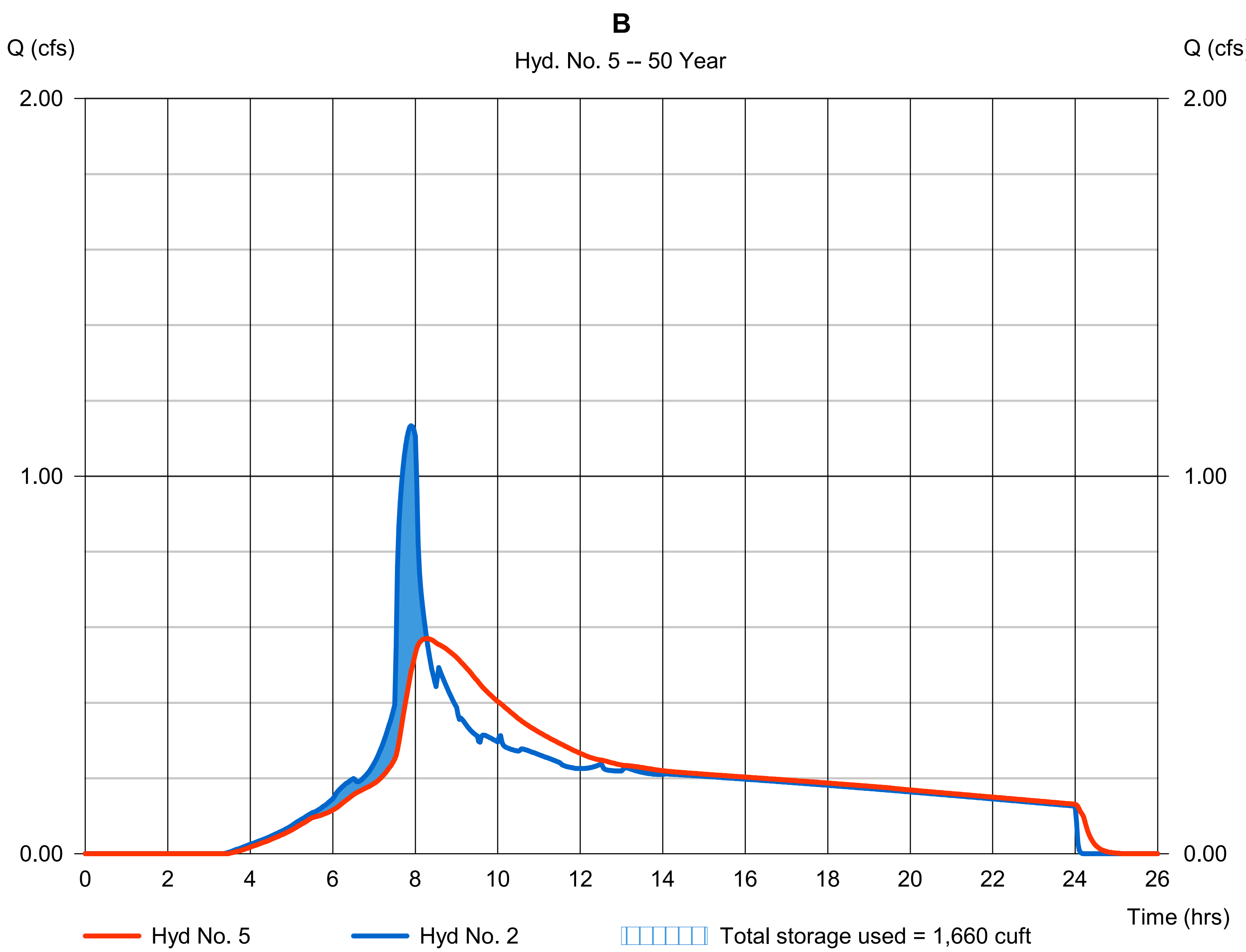
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 11 / 21 / 2024

Hyd. No. 5

B

Hydrograph type	= Reservoir	Peak discharge	= 0.570 cfs
Storm frequency	= 50 yrs	Time to peak	= 8.27 hrs
Time interval	= 2 min	Hyd. volume	= 16,360 cuft
Inflow hyd. No.	= 2 - Basin B	Max. Elevation	= 92.34 ft
Reservoir name	= Pond B	Max. Storage	= 1,660 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Pond B

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	89.50	n/a	0	0
0.50	90.00	n/a	68	68
1.00	90.50	n/a	146	214
1.50	91.00	n/a	238	452
2.00	91.50	n/a	343	795
2.50	92.00	n/a	460	1,255
3.00	92.50	n/a	590	1,845

Culvert / Orifice Structures

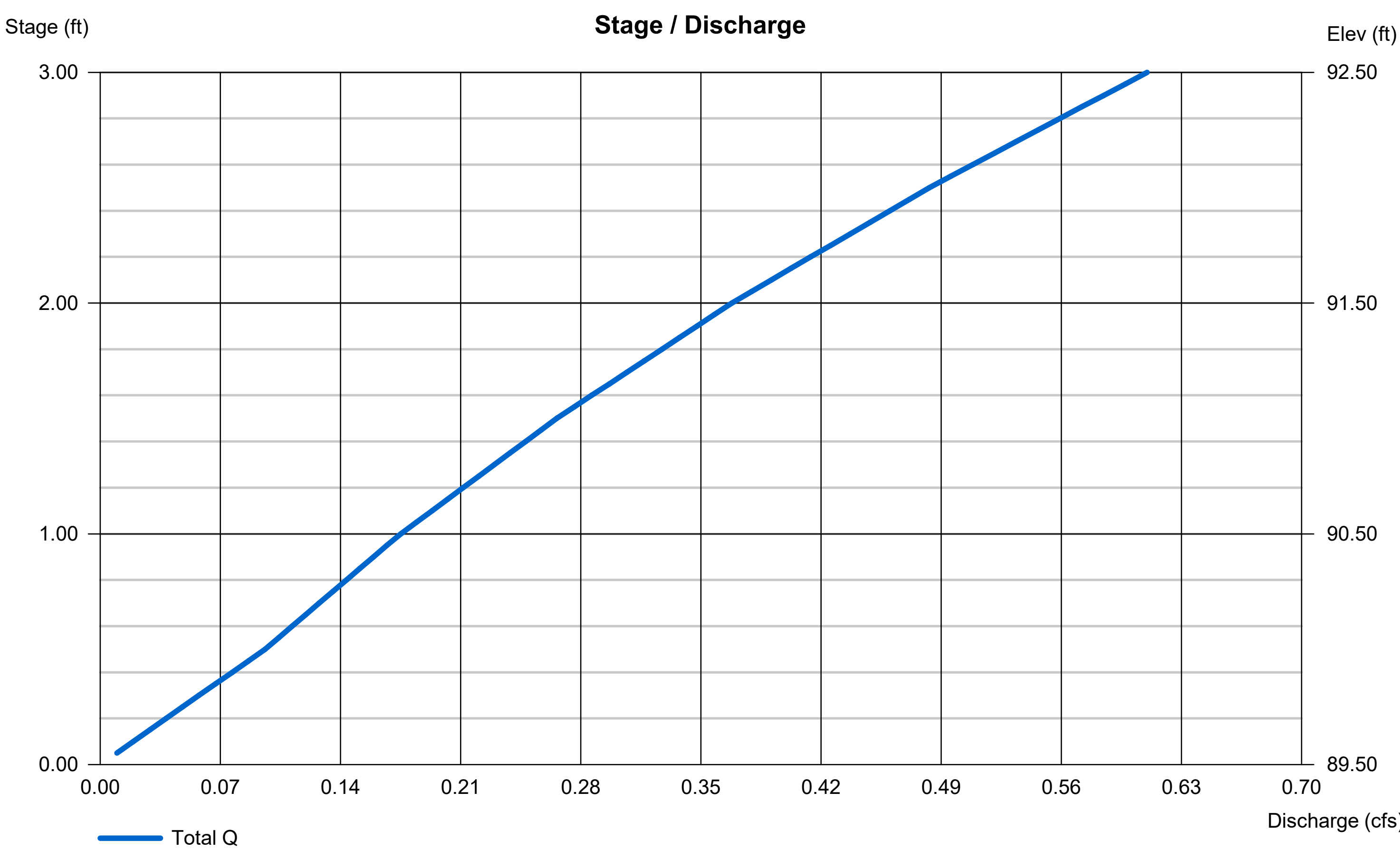
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 0.00	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= ---	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Thursday, 11 / 21 / 2024

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	6.9527	2.1000	0.6577	--------
3	0.0000	0.0000	0.0000	--------
5	9.9393	2.7000	0.6824	--------
10	10.2300	2.0000	0.6569	--------
25	11.8938	2.0000	0.6571	--------
50	13.7560	2.2000	0.6602	--------
100	15.0837	2.1000	0.6597	--------

File name: Portland IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1.92	1.35	1.07	0.91	0.79	0.71	0.65	0.59	0.55	0.52	0.49	0.46
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	2.47	1.75	1.40	1.18	1.03	0.92	0.83	0.77	0.71	0.66	0.62	0.59
10	2.85	2.00	1.59	1.34	1.17	1.05	0.95	0.88	0.82	0.76	0.72	0.68
25	3.31	2.32	1.85	1.56	1.36	1.22	1.11	1.02	0.95	0.89	0.83	0.79
50	3.74	2.64	2.10	1.78	1.55	1.39	1.26	1.16	1.08	1.01	0.95	0.90
100	4.14	2.91	2.32	1.96	1.71	1.53	1.39	1.28	1.19	1.11	1.05	0.99

Tc = time in minutes. Values may exceed 60.

Precip. file name: H:\Projects\220047300\Production\Calcs\Civil\Storm\CWS precipitation.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.25	2.50	0.00	3.10	3.45	3.90	6.50	4.50
SCS 6-Hr	0.53	1.05	0.00	1.25	1.55	1.70	1.80	1.90
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Report of Geotechnical Investigation HFD-GLD Manzanita Housing Tax Lot 1401 Tillamook County, Oregon

CGT Project Number G2305878

Prepared for

Rob Justus
Green Light - Home First, LLC
3050 SE Division Street, Suite 270
Portland, Oregon 97202

April 14, 2023

April 14, 2023

Rob Justus
Green Light - Home First, LLC
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Report of
Geotechnical Investigation
HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

Dear Rob Justus:

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our geotechnical investigation for the proposed HFD-GLD Manzanita Housing project. The site is located within the northeast portion of Tax Lot 1401 in Tillamook County, Oregon. We performed our work in general accordance with CGT Proposal GP23-017, dated February 16, 2023. Written authorization for our services was received on February 23, 2023.

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

REGISTERED PROFESSIONAL ENGINEER
70773PE
OREGON
Jan. 10, 2007
BRAD MICHAEL WILCOX
EXPIRES: 6/30/2024

Bento Nimo, E.I.T.
Geotechnical Project Manager
bnimo3@carlsontesting.com

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

Doc ID: G:\GEOTECH\PROJECTS\2023 Projects\G2305878 - HFD-GLD Manzanita Housing\G2305878 - GEO\008 - Deliverables\Report\G2305878.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 geotechnical investigation for the proposed HFD-GLD Manzanita Housing project. The site is located within the northeast portion of Tax Lot 1401 in Tillamook County, 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 HFD Partners (HFD) and project documents provided to us on February 6, 2023. The documents provided included a preliminary Site Plan, prepared by Polyphon Architecture & Design, LLC, and a marked up aerial image. Based on our review, we understand the project will include:

- Construction of a new common house and several new residential buildings at the site. Although no architectural plans have been provided, we anticipate the structures will be one to three stories, wood-framed, with slab on grade ground floors and/or post and beam ground floor construction (crawlspaces). The common house will incorporate a footprint of roughly 2,500 square feet, and the residential buildings will include a total of 60 units. No below-grade levels (basements) are anticipated for the proposed structures. For the purposes of this report, we have assumed maximum column, continuous wall, and uniform floor slab loads will be on the order of 50 kips, 4 kips per lineal foot (klf), and 150 pounds per square foot (psf), respectively.
- Construction of private driveways and parking areas to provide vehicular access to the new residential structures. We anticipate the new pavements will be surfaced with asphalt concrete (AC).
- Although no stormwater management plans have been provided, we understand stormwater collected from new impervious areas of the site will be disposed of, at least in part, via onsite infiltration. No details regarding the type or location of the proposed stormwater infiltration facility(ies) were available at the time of this assignment. Design of infiltration facility(s) will rest with others. Infiltration testing was requested at two locations at the site at a depth of 5 feet below ground surface (bgs).
- Although no grading plans have been provided, we anticipate permanent grade changes at the site will be relatively minimal, with maximum cuts and fills on the order of about 3 feet in depth.

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. CGT also subcontracted a private utility locator service to mark the locations of detectable private utilities within the same radius.
- Explore subsurface conditions at the site by advancing one hand auger boring to a depth of 10 feet bgs, and observing the excavation of nine test pits to depths of up to about 8½ feet bgs. Details of the subsurface investigation are presented in Appendix A.
- Conduct infiltration testing within two of the test pits. Results of the infiltration testing 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 recommendations for the Seismic Site Class, mapped maximum considered earthquake spectral response accelerations, and site seismic coefficients.
- Provide a qualitative evaluation of seismic hazards at the site, including earthquake-induced liquefaction, landsliding, and surface rupture due to faulting or lateral spread.
- Provide geotechnical recommendations for site preparation and earthwork.
- Provide geotechnical engineering recommendations for use in design and construction of shallow foundations, floor slabs, site retaining walls, and pavements.
- Provide this written report summarizing the results of our geotechnical investigation and recommendations for the project.

2.0 SITE DESCRIPTION

2.1 Site Geology

Based on available geologic mapping[1,2] of the area, the site is underlain by Quaternary sediments consisting of unconsolidated, alluvial and estuarine clay, silt, sand, and gravel deposited along rivers and streams. Nearby cross sections and well logs suggest the Quaternary sediments are about 20 to 30 feet thick in the vicinity of the site and are underlain by Oligocene to Miocene aged sedimentary rocks (Unit Toms). The sedimentary rocks unit consists of thin- to mass-bedded, gray, tuffaceous siltstone and claystone with localized sandstone and shale. This sedimentary rock unit is very thick, extending to depths up to 5,000 feet below the site surface.

2.2 Site Surface Conditions

The site is bordered to the north, south, and east by undeveloped properties, and to the west by a newer residential development (under construction). At the time of our field investigation, the site gently descended to the south, and was generally vegetated with grasses, shrubs, and scattered coniferous and deciduous trees. The northeast portion of the site was densely vegetated with coniferous and deciduous trees. 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 Subsurface Investigation & Laboratory Testing

Our subsurface investigation consisted of one hand auger boring (HA-1) and nine test pits (TP-1 through TP-9) completed at the site on March 31, 2023. The approximate exploration locations are shown on the Site Plan, attached as Figure 2. In summary, the explorations extended to depths ranging from about 5 to 10 feet bgs. 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 Subsurface Materials

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., Niem, A.R., MacLeod, N.S., Snavely, P.D., and Niem, W.A., 1983, Geologic Map of the West Half of the Vancouver 1ºx2º Quadrangle, Oregon: United States Geologic Survey, Open File Report, 83-59I, scale 1:250,000.

2 Schlicker, H.G., Deacon, R.J., Beaulieu, J.D., and Olcott, G.W., 1972, Environmental geology of the coastal region of Tillamook and Clatsop Counties: Oregon Department of Geology and Mineral Industries, Bulletin 74, scale 1:62,500.

Sandy Organic Soil (OL)

Sandy organic soil was encountered at the surface of boring HA-1 and each test pit, and extended to a depth of about ½ foot bgs. This soil was generally brown to dark brown, moist, and contained abundant roots up to ½ inch in diameter, and fine- to medium-grained sand.

Poorly Graded Sand (SP)

Poorly graded sand was encountered below the organic soil in HA-1 and each test pit. This soil was generally loose to medium (based on digging effort), light brown to brown with orange and gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter. Minor to severe caving was observed below about 4 to 7 feet bgs within HA-1 and TP-1 through TP-9. The poorly graded sand extended the full depths explored at the site, about 5 to 10 feet bgs.

2.3.3 Groundwater

Groundwater was not encountered within the depths explored at the site on March 31, 2023. To determine approximate regional groundwater levels in the area, we researched well logs available on the Oregon Water Resources Department (OWRD)[3] website for wells located within Section 28, Township 3 North, Range 10 West, Willamette Meridian. Our review indicated that groundwater levels in the area generally ranged from about 30 to 50 feet bgs. More shallow water zones were reported at depths of about 17 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.

3.0 SEISMIC CONSIDERATIONS

3.1 Seismic Design

Section 1613.2.2 of the 2022 Oregon Structural Specialty Code (2022 OSSC) requires that the determination of the seismic site class be in accordance with Chapter 20 of the American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures (ASCE 7-16). We have assigned the site as Site Class D ("Stiff Soil") based on geologic mapping and subsurface conditions encountered during our investigation.

Earthquake ground motion parameters for the site were obtained in accordance with the 2022 OSSC using the Seismic Hazards by Location calculator on the ATC website. The site Latitude 45.716955° North and Longitude 123.922144° West were input as the site location. The following table shows the recommended seismic design parameters for the site.

[3] Oregon Water Resources Department, 2023. Well Log Records, *accessed April 2023*, from OWRD web site: http://apps.wrd.state.or.us/apps/gw/well_log/.

Table 1 Seismic Ground Motion Values

Parameter		Value
Mapped Acceleration Parameters	Spectral Acceleration, 0.2 second (S_s)	1.271g
	Spectral Acceleration, 1.0 second (S_1)	0.668g
Coefficients (Site Class D)	Site Coefficient, 0.2 second (F_A)	1.000
	Site Coefficient, 1.0 second (F_V)[1]	1.700
Adjusted MCE Spectral Response Parameters	MCE Spectral Acceleration, 0.2 second (S_{MS})	1.271g
	MCE Spectral Acceleration, 1.0 second (S_{M1})	1.136g
Design Spectral Response Accelerations	Design Spectral Acceleration, 0.2 second (S_{DS})	0.847g
	Design Spectral Acceleration, 1.0 second (S_{D1})	0.757g
Seismic Design Category (Risk Category II)		D
[1] Value determined from 2022 OSSC Table 1613.2.3(2).		

3.2 Seismic Hazards

3.2.1 Liquefaction

In general, liquefaction occurs when deposits of loose/soft, saturated, cohesionless soils, generally sands and silts, are subjected to strong earthquake shaking. If these deposits cannot drain quickly enough, pore water pressures can increase, approaching the value of the overburden pressure. The shear strength of a cohesionless soil is directly proportional to the effective stress, which is equal to the difference between the overburden pressure and the pore water pressure. When the pore water pressure increases to the value of the overburden pressure, the shear strength of the soil approaches zero, and the soil can liquefy. The liquefied soils can undergo rapid consolidation or, if unconfined, can flow as a liquid. Structures supported by the liquefied soils can experience rapid, excessive settlement, shearing, or even catastrophic failure.

For fine-grained soils, susceptibility to liquefaction is evaluated based on penetration resistance and plasticity, among other characteristics. Criteria for identifying non-liquefiable, fine-grained soils are constantly evolving. Current practice to identify non-liquefiable, fine-grained soils is based on moisture content and plasticity characteristics of the soils[4,5,6]. The susceptibility of sands, gravels, and sand-gravel mixtures to liquefaction is typically assessed based on penetration resistance, as measured using SPTs, CPTs, or Becker Hammer Penetration tests (BPTs).

As indicated in Section 2.3.3 above, groundwater was not encountered within the depths explored at the site on March 31, 2023. Additionally, review of well logs available on the OWRD website for wells located within the vicinity of the site indicated that groundwater levels in the area generally ranged from about 30 to 50 feet bgs. Based on the lack of saturated conditions, static groundwater, etc., the soils encountered within our explorations are considered non-liquefiable. Based on our previous experience in the area, we do not anticipate liquefiable conditions are present at depths below those explored as part of this assignment.

---

4 Seed, R.B. et al., 2003. Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. Earthquake Engineering Research Center Report No. EERC 2003-06.

5 Bray, Jonathan D., Sancio, Rodolfo B., et al., 2006. Liquefaction Susceptibility of Fine-Grained Soils, Journal of Geotechnical and Geoenvironmental Engineering, Volume 132, Issue 9, September 2006.

6 Idriss, I.M., Boulanger, R.W., 2008. Soil Liquefaction During Earthquakes, Earthquakes Engineering Research Institute Monograph MNO-12.

3.2.2 Slope Instability

Review of the Statewide Landslide Information Database for Oregon (SLIDO), available at the DOGAMI website[7], shows no prehistoric or historic landslides on the project site. Pre-historic (over 150 years) landslides are mapped about 750 feet to the north of the site. No obvious signs of recent or on-going slope instability were observed at the site during our field investigation in March 2023. Recognizing the relatively gentle site grades, and provided the recommendations presented later in this report regarding grading are incorporated into design and development, the risk of seismically-induced landslides at the site is considered low.

3.2.3 Surface Rupture

3.2.3.1 Faulting

Although the site is situated in a region of the country with known active faults and historic seismic activity, no known faults exist on or immediately adjacent to the site. Therefore, the risk of surface rupture at the site due to faulting is considered negligible.

3.2.3.2 Lateral Spread

Surface rupture due to lateral spread can occur on sites underlain by liquefiable soils that are located on or immediately adjacent to slopes steeper than about 3 degrees (20H:1V), and/or adjacent to a free face, such as a stream bank or the shore of an open body of water. During lateral spread, the materials overlying the liquefied soils are subject to lateral movement downslope or toward the free face. Given the lack of liquefiable soils, the risk of surface rupture due to lateral spread is considered very low.

4.0 CONCLUSIONS

Based on the results of our field explorations and analyses, the site may be developed as described in Section 1.1 of this report, provided the recommendations presented in this report are incorporated into the design and development. Satisfactory subgrade support for planned shallow foundations, floor slabs, and pavements can be achieved by the native, near-surface, poorly graded sand (SP) or structural fill that is properly placed and compacted on that material during construction. The native poorly graded sand was encountered at depths of about ½-foot bgs in our explorations. Geotechnical recommendations for use in design and construction of the proposed project are presented in the following section of this report.

5.0 RECOMMENDATIONS

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

5.1.1 Stripping & Grubbing

Existing vegetation, topsoil, and rooted soils (OL) should be removed from within, and for a minimum 5-foot margin around, proposed building pad, structural fill, and pavement areas. Based on the results of our field

[7] Oregon Department of Geology and Mineral Industries, 2023. Statewide Landslide Information Database for Oregon (SLIDO), *accessed April 2023*, from DOGAMI web site: https://gis.dogami.oregon.gov/maps/slido/.

explorations, topsoil stripping depths are anticipated to be on the order of about ½ foot bgs. These materials may be deeper or shallower at locations away from the completed explorations. The geotechnical engineer's representative should provide recommendations for actual stripping depths based on observations during site stripping. Stripped surface vegetation and rooted soils should be transported off-site for disposal, or stockpiled for later use in landscaped areas.

Grubbing of trees should include the removal of the root mass and roots greater than ½ inch in diameter. Grubbed materials should be transported off-site for disposal. Root masses from larger trees may extend greater than 3 feet bgs. Where root masses are removed, the resulting excavation should be properly backfilled with structural fill in conformance with Section 5.4 of this report.

Any areas in which densely-rooted soils are encountered should be scarified to a minimum depth of 12 inches below the current (prepared) site grades using suitable earthwork equipment (such as "ripping" blades on a bulldozer). This should be performed within, and for a 5-foot margin around (where feasible), the proposed structural fill areas, building pads, and pavement areas. The purpose of this earthwork is to help remove any remaining large and/or heavy concentrations of tree roots. Where encountered, heavy concentrations of organics and/or roots in excess of 1 inch in diameter should be removed (processed) from the scarified subgrade. Following the root processing, the scarified subgrade should be moisture conditioned and compacted to at least 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor).

5.1.2 Test Pit Backfills

The test pits conducted at the site were loosely backfilled during our field investigation. Where test pits are located within finalized building, structural fill, or pavement areas, the loose backfill materials should be re-excavated. The resulting excavations should be backfilled with structural fill in conformance with Section 5.4 of this report.

5.1.3 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath the new buildings, pavements, 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.

5.1.4 Subgrade Preparation - Building Pads & Pavement Areas

After site stripping as recommended above, but prior to placement of structural fill or base rock, the prepared sandy subgrade soils should be surface compacted with suitable equipment (e.g. smooth drum roller). The subgrade soils should be compacted to not less than 90 percent of the material's maximum dry density as determined by ASTM D1557 (Modified Proctor). The geotechnical engineer or his representative should perform in-place density testing of the compacted subgrade to confirm proper compaction. If areas of soft soil or excessive yielding are identified, the affected material should be repaired as recommended by the geotechnical engineer or his representative.

5.1.5 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 <u>not</u> 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 poorly graded sand (SP) encountered at the site. As evidenced in several of the test pits, caving of excavations extending beyond depths of about 5 feet bgs should be expected.

5.2.3 Utility Trenches

Temporary trench cuts should stand near vertical to depths of approximately 4 feet in the native, poorly graded sand encountered near the surface of the site. As evidenced in several of the test pits, caving of trench cuts extending beyond depths of about 5 feet bgs should be expected. If groundwater seepage undermines the stability of the trench, or if sidewall caving 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.

5.2.4 Excavations Near Foundations

Excavations near footings should <u>not</u> extend within a 1½ horizontal to 1 vertical (1½H: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

Due to its very low concentration of fine-grained particles (i.e. silt or clay), the native poorly graded sand (SP) is not considered susceptible to disturbance from wet weather. However, sandy soils are susceptible to raveling under construction traffic and may result in loosening of the surface sands. If the soils become loose due to construction traffic, they should be moisture-conditioned (as necessary) and compacted to a well-keyed condition in accordance with Section 5.1.4 of this report.

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[8]. The geotechnical engineer's 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.

5.4.1 On-Site Soils – General Use

5.4.1.1 Poorly Graded Sand (SP)

Re-use of the on-site, relatively clean, poorly graded sand as structural fill is feasible, provided the material is kept clean of organics, debris, and particles larger than 1½ inches in diameter. If reused as structural fill, the material should be prepared in general accordance with Section 5.4.2 below.

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 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (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.

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

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	88% ASTM D1557 or pipe manufacturer's recommendation	85% ASTM D1557 or pipe manufacturer's recommendation
Above Pipe Zone	90% ASTM D1557	88% ASTM D1557
Within 3 Feet of Design Subgrade	90% ASTM D1557	88% ASTM D1557

1 Includes proposed buildings, pavement areas, structural fill areas, exterior 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 existing (native) 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

CGT 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. A representative from CGT should observe the benches, keyways, and associated subdrains, if needed, prior to placement of structural fill.

5.6 Shallow Foundations

5.6.1 Subgrade Preparation

Satisfactory subgrade support for shallow foundations can be obtained from the native, near-surface, poorly graded sand (SP), or new structural fill that is properly placed and compacted on that material during construction. Due to its generally loose near-surface relative density, the native sandy soils should be moisture-conditioned (as necessary) and surface compacted using suitable equipment (e.g. jumping jack compactor, vibrating plate compactor, etc.) until achieving a well-keyed condition.

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, excessively loose, organic-laden, 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.

5.6.2 Minimum Footing Width & Embedment

Minimum footing widths should be in conformance with the most recent Oregon Structural Specialty Code (OSSC). As a guideline, CGT recommends individual spread footings have a minimum width of 24 inches. For one-story, light-framed structures, we recommend continuous wall footings have a minimum width of 12 inches. Similarly, for two-story, light-framed structures, we recommend continuous wall footings have a minimum width of 15 inches. All footings should be founded at least 18 inches below the lowest, permanent adjacent grade for frost protection.

5.6.3 Horizontal Setback from Descending Slopes

Foundations constructed within or near descending slopes should be setback a minimum of 5 feet from the slope surface. This distance 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.

5.6.4 Bearing Pressure & Settlement

Footings founded as recommended above should be proportioned for a maximum allowable soil bearing pressure of 1,500 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. Differential settlements between adjacent columns and/or bearing walls should not exceed ½ inch. If an increased allowable soil bearing pressure is desired, the geotechnical engineer should be consulted.

5.6.5 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 0.40 may be used when calculating resistance to sliding for footings founded on the native sandy 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.

5.7 Rigid Retaining Walls

5.7.1 Footings

Retaining wall footings should be designed and constructed in conformance with the recommendations presented in Section 5.6, as applicable.

5.7.2 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.

5.7.3 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 ASTM D1557 (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.

5.7.4 Design Parameters & Limitations

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

Table 3 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 (β = 0 and δ = 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 (ϕ = 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.

5.8 Floor Slabs

5.8.1 Subgrade Preparation

Satisfactory subgrade support for slabs constructed on grade, supporting up to 150 psf area loading, can be obtained from the native, near-surface, poorly graded sand (SP), or new structural fill that is properly placed and compacted on that material during construction. Due to its generally loose near-surface relative density, the native sandy soils should be moisture-conditioned (as necessary) and surface compacted using suitable equipment (e.g. vibrating plate compactor, smooth drum roller, etc.) until achieving a well-keyed condition.

The geotechnical engineer's representative should observe floor slab subgrade soils to evaluate surface relative densities. If soft, excessively loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by CGT geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill as described in Section 5.4.2 of this report.

5.8.2 Crushed Rock Base

Concrete floor slabs should be supported on a minimum 4-inch-thick layer of crushed rock (base rock).

5.8.2.1 Conventional Base Rock

Floor slab base rock should consist of well-graded granular material (crushed rock) containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. Floor slab base rock should be placed in one lift and compacted to not less than 90 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor). We recommend "choking" the surface of the base rock with sand just prior to concrete placement. Choking means the voids between the largest aggregate particles are filled with sand, but does not provide a layer of sand above the base rock. Choking the base rock surface reduces the lateral restraint on the bottom of the concrete during curing. Choking the base rock also reduces punctures in vapor retarding membranes due to foot traffic where such membranes are used.

5.8.2.2 Gas Permeable Base Rock

Floor slab base rock in areas where radon gas mitigation is desired should consist of open-graded crushed rock containing no organic matter or debris, with all material passing through a 1-inch sieve, less than 10 percent passing the ½-inch sieve, no fines (0 percent passing the U.S. Standard No. 200 sieve), and a free void space of approximately 50 percent in accordance with Section 1811.2.1.1 of the 2022 OSSC.

CGT recommends that a minimum 10-mil polyethylene sheeting or equivalent material with equal or greater tensile strength, resistance to puncture, resistance to deterioration, and resistance to water-vapor transmission be placed on top of the gas-permeable base rock to act as a soil-gas-retarder. Placement and installation of this sheeting should be in conformance with that indicated in Section 1811.2.2 of the 2022 OSSC.

5.8.3 Design Considerations

For floor slabs constructed with a 4-inch thick base rock layer as recommended, an effective modulus of subgrade reaction of 200 pounds per cubic inch (pci) is recommended for the design of the floor slab. A higher effective modulus of subgrade reaction can be obtained by increasing the base rock thickness. Please contact the geotechnical engineer for additional recommendations if a higher modulus is desired. Floor slabs constructed as recommended will likely settle less than ½ inch. For general floor slab construction, slabs should be jointed around columns and walls to permit slabs and foundations to settle differentially.

5.8.4 Subgrade Moisture Considerations

Liquid moisture and moisture vapor should be expected at the subgrade surface. The recommended crushed rock base is anticipated to provide protection against liquid moisture. Where moisture vapor emission through the slab must be minimized, e.g. impervious floor coverings, storage of moisture sensitive materials directly on the slab surface, etc., a vapor retarding membrane or vapor barrier below the slab should be considered. Factors such as cost, special considerations for construction, floor coverings, and end use suggest that the decision regarding a vapor retarding membrane or vapor barrier be made by the architect and owner.

If a vapor retarder or vapor barrier is placed below the slab, its location should be based on current American Concrete Institute (ACI) guidelines, ACI 302 Guide for Concrete Floor and Slab Construction. In some cases, this indicates placement of concrete directly on the vapor retarder or barrier. Please note that the placement of concrete directly on impervious membranes increases the risk of plastic shrinkage cracking and slab curling in the concrete. Construction practices to reduce or eliminate such risk, as described in ACI 302, should be employed during concrete placement.

5.9 Pavements

5.9.1 Subgrade Preparation

Pavement subgrade preparation should be performed in general accordance with the recommendations presented in Section 5.1.4 above. Subgrade surfaces should be crowned (or sloped) for proper drainage in accordance with specifications provided by the project civil engineer.

5.9.2 Traffic Levels

Recognizing that traffic data has not been provided, CGT has considered three levels of traffic demand for review and design of pavement sections. We modeled the following three design cases (traffic levels) developed from the Asphalt Pavement Association of Oregon (APAO):

- *APAO Level I (Very Light):* This design case considers typical average daily truck traffic (ADTT) of 1 per day over 20 years. Among others, examples under this loading consist of passenger car parking stalls, residential driveways, and seasonal recreational roads.
- *APAO Level II (Light):* This design case considers typical ADTT of 2 to 7 per day over 20 years. Examples under this loading consist of residential streets and parking lots of less than 500 stalls.
- *APAO Level III (Low Moderate):* This design case considers typical ADTT of 7 to 14 per day over 20 years. Among others, examples under this loading consist of urban minor collector streets and parking lots with more than 500 stalls.

5.9.3 Input Parameters

Our asphalt concrete (AC) pavement section designs were based on the American Association of State Highway and Transportation Officials (AASHTO) 1993 "Design of Pavement Structures" manual. A number of design assumptions and variables were required in order to develop design sections for pavements proposed at the site. The following table presents the input parameters assumed for the design:

Table 4 Input Parameters Used in AC Pavement Design

Input Parameter	Design Value[1]	Input Parameter		Design Value[1]
Pavement Design Life	20 years	Resilient Modulus	Subgrade (Compacted Sand)[3]	10,000 psi
Annual Percent Growth	0 percent		Crushed Aggregate Base	20,000 psi
Initial Serviceability	4.2 initial	Structural Coefficient	Crushed Aggregate Base	0.10
Terminal Serviceability	2.5 terminal		Asphalt	0.42
Reliability	75 percent	Vehicle Traffic[4] (range in ESAL)	Level I (Very Light)	Less than 10,000
Standard Deviation	0.49		Level II (Light)	Less than 50,000
Drainage Factor[2]	1.0		Level III (Low Moderate)	Less than 100,000

1 If any of the above parameters are incorrect, please contact us so that we may revise our recommendations, if warranted.
2 Assumes good drainage away from pavement, base, and subgrade is achieved by proper crowning of subgrades.
3 Values based on experience with similar soils.
4 ESAL = Total 18-Kip equivalent single axle load. Refer to Section 5.9.2 for additional discussion. If actual traffic levels will be above those identified above, the geotechnical engineer should be consulted.

5.9.4 Recommended Minimum Sections

The following table presents the minimum AC pavement sections for the traffic loads indicated in the preceding table, based on the referenced AASHTO procedures.

Table 5 Recommended Minimum AC Pavement Sections

Material	Level I (Very Light Traffic)	Level II (Light Traffic)	Level III (Low Moderate Traffic)
Asphalt Pavement (inches)	3	3½	4
Crushed Aggregate Base (inches)	4	6	6
Subgrade Soils	Prepared in conformance with Section 5.6.1 of this report.		

5.9.5 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 5 percent material passing the U.S. Standard No. 200 Sieve. Aggregate base should be compacted to not less than 95 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor).

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).

5.10 Additional Considerations

5.10.1 Drainage

Subsurface drains, if incorporated, should be connected to the nearest storm drain, on-site infiltration system (to be designed by others) or other suitable discharge point. Paved surfaces and grading near or adjacent to the buildings should be sloped to drain away from the buildings. 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 foundation drains (if incorporated), retaining wall drains, or onto site slopes.

5.10.2 Expansive Potential

The near surface native soils consist of non-plastic sandy soils. 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 RECOMMENDED ADDITIONAL SERVICES

6.1 Design Review

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

6.2 Observation of Construction

Satisfactory earthwork, foundation, floor slab, 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 geotechnical engineer's representative attend a pre-construction meeting coordinated by the contractor and/or developer. The project geotechnical engineer's representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site Stripping and Grubbing
- Subgrade Preparation for Shallow Foundations, Retaining Walls, Structural Fills, Floor Slabs, and Pavements
- Compaction of Structural Fill, Retaining Wall Backfill, and Utility Trench Backfill
- Compaction of Base Rock for Floor Slabs and 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.

7.0 LIMITATIONS

We have prepared this report for use by the owner/developer 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.

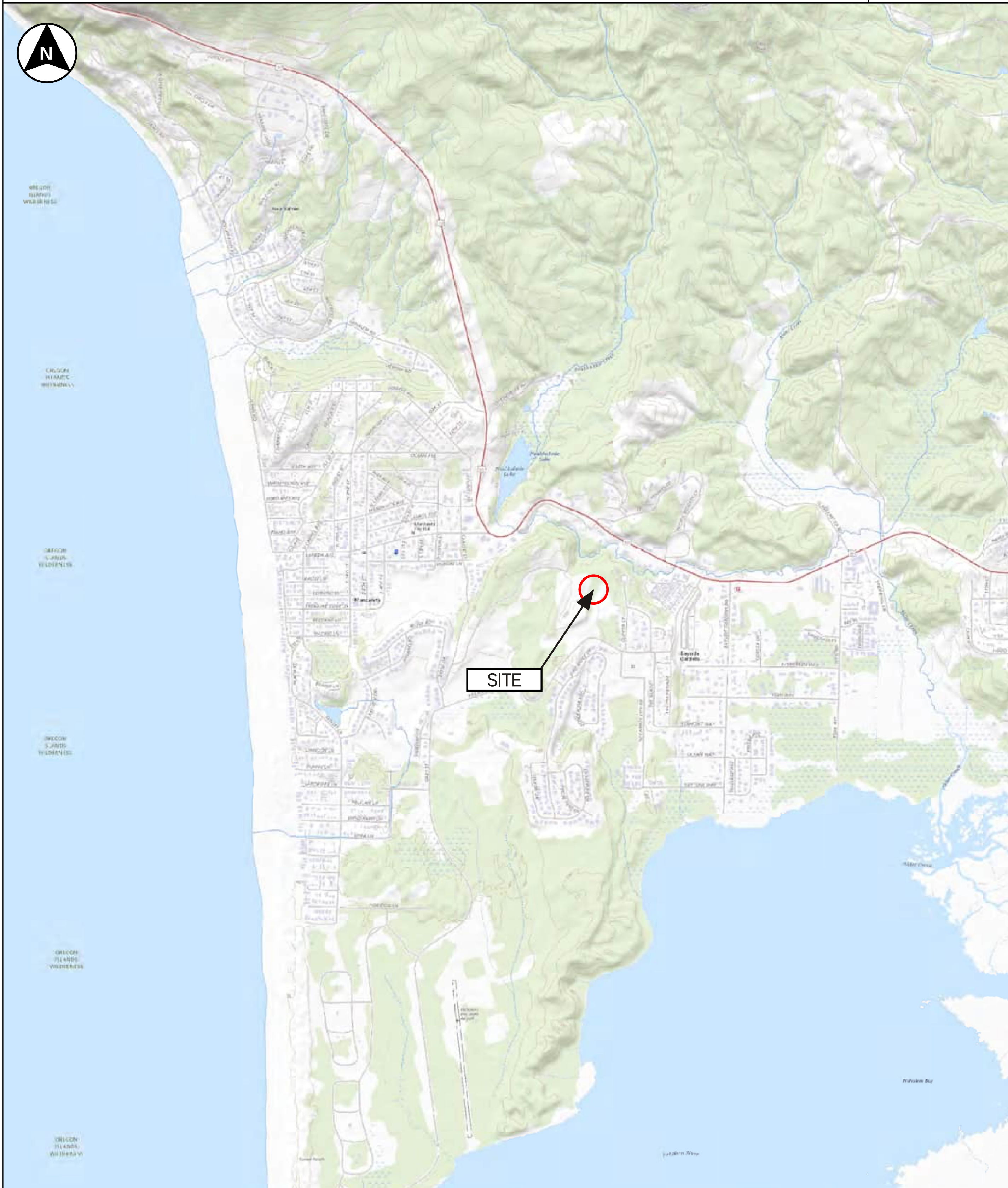
The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

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.

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

FIGURE 1

Site Location



CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by: BLN

USGS Topographic base map created with The National Map, 2022, at https://viewer.nationalmap.gov/advanced-viewer/

Township 3 North, Range 10 West, Section 28, Willamette Meridian

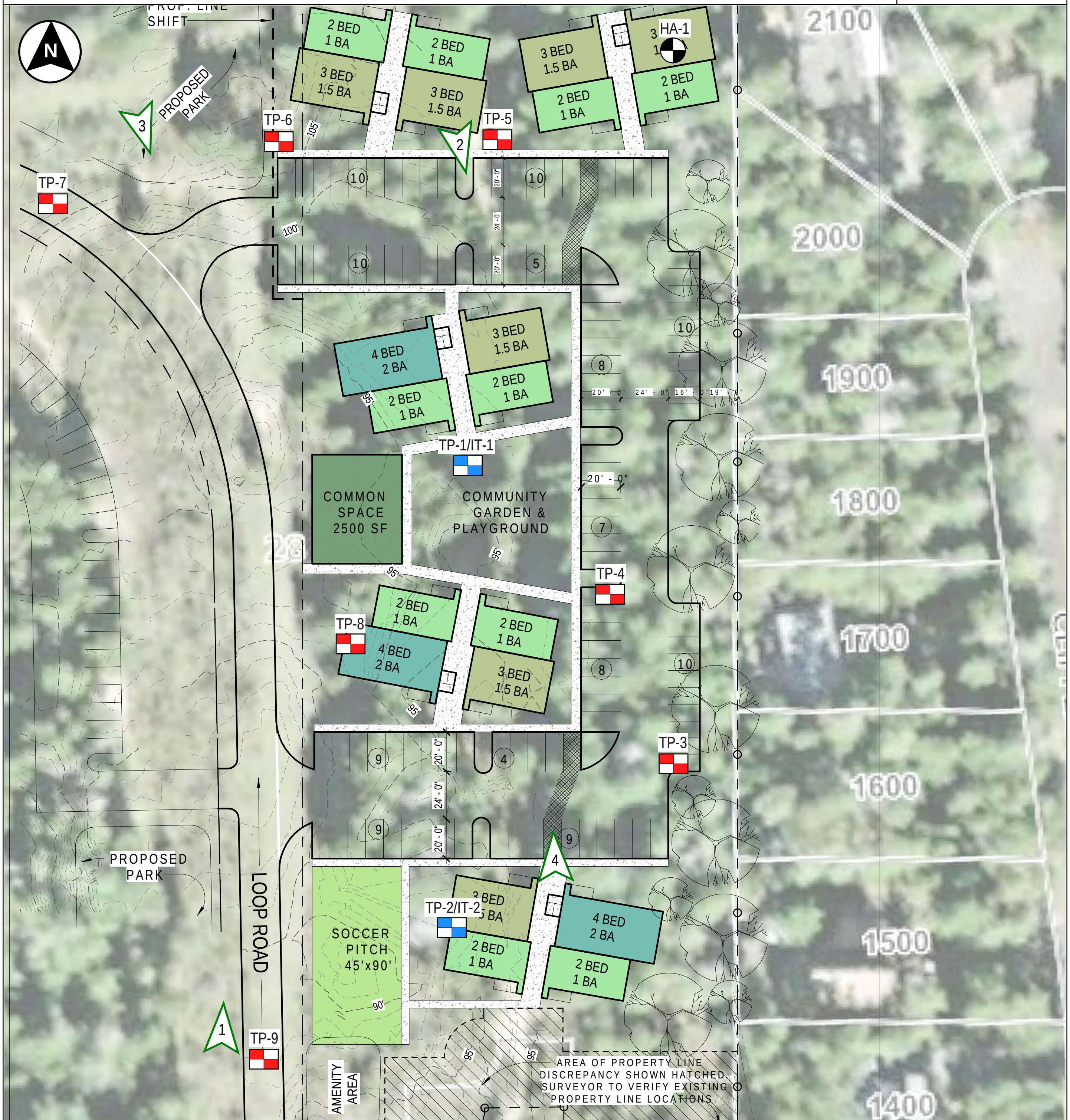
Latitude: 45.716955° North
Longitude: 123.922144° West

1 Inch = 2,000 feet

0 2000 4000

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

FIGURE 2
Site Plan



LEGEND

HA-1 Hand auger boring

TP-3 Test pit exploration

TP-1/IT-1 Test pit exploration and infiltration test

1 Orientation of site photographs shown on Figure 3

CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by:BN/BG

NOTES: Drawing based on observations made while on site and site plans provided by client. All locations are approximate.

1 Inch = 60 Feet

0 60 120

Photograph 1

Photograph 2

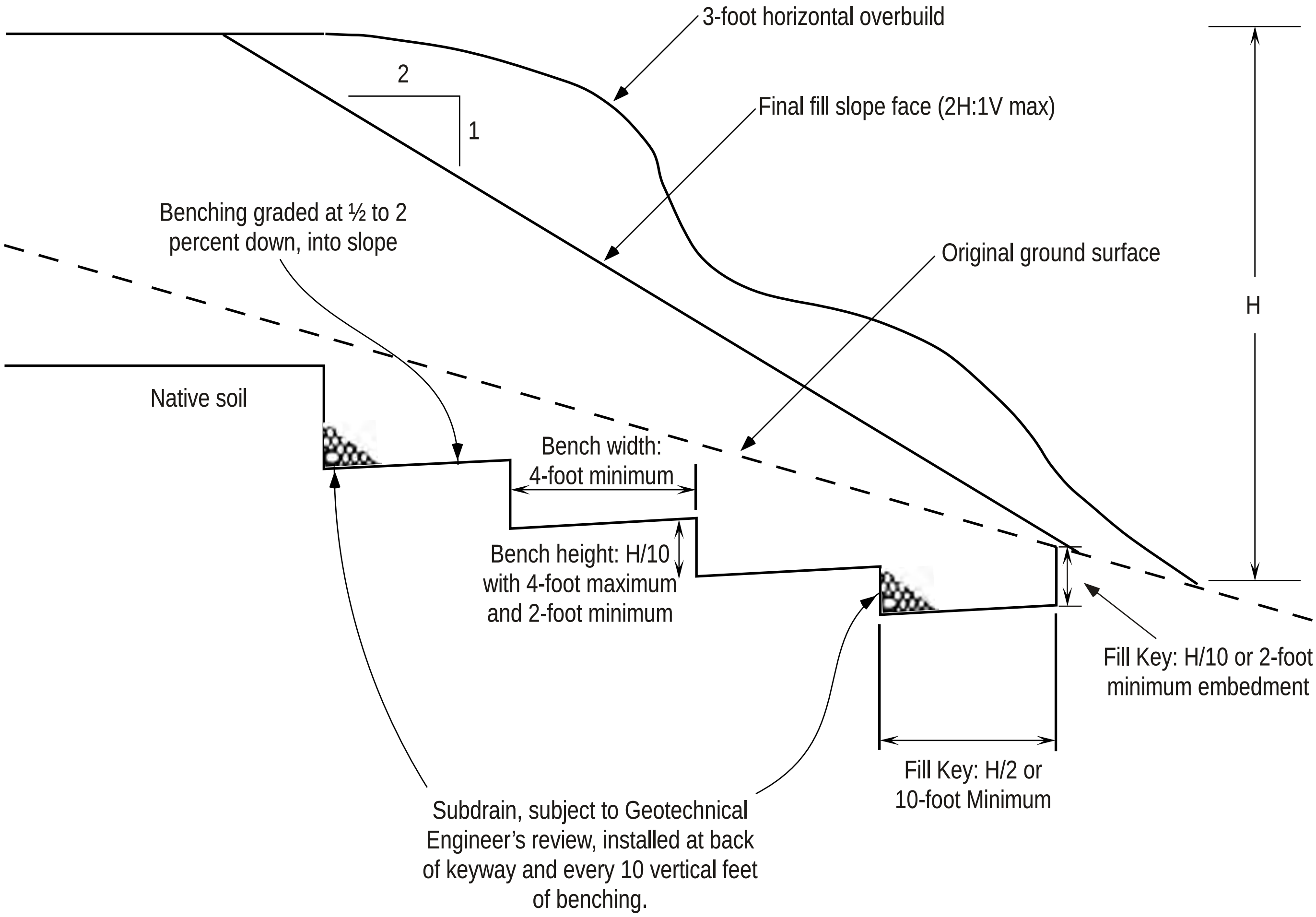
Photograph 3

Photograph 4

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

FIGURE 4

Fill Slope Detail



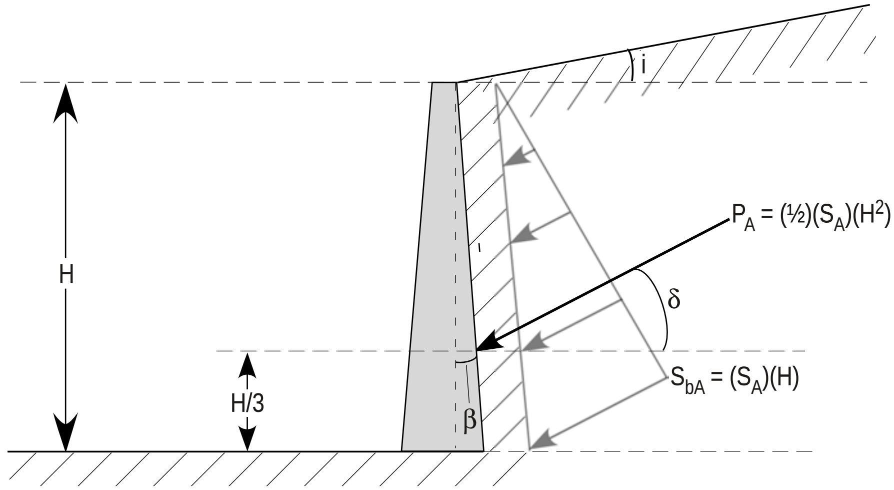
CARLSON CGT GEOTECHNICAL 503-601-8250

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

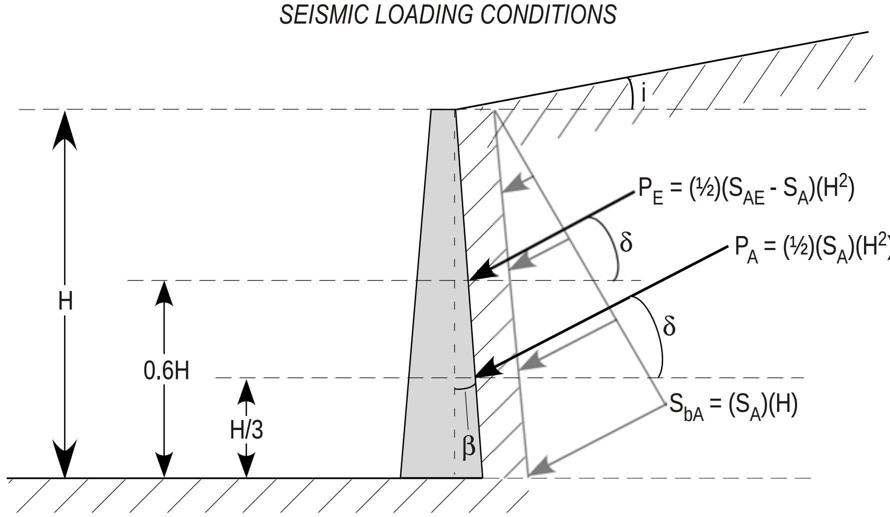
HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON ***Project Number G2305878***	**FIGURE 5** **Retaining Walls**

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

CARLSON CGT GEOTECHNICAL 503-601-8250

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].

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**

Appendix A: Subsurface Investigation and Laboratory Testing

HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

April 14, 2023

Prepared For:

Green Light - Home First, LLC
Attn: Rob Justus
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Prepared by
Carlson Geotechnical

A.1.0 SUBSURFACE INVESTIGATION

Our field investigation consisted of one hand auger boring and nine test pits completed at the site on March 31, 2023. The exploration locations are shown on the Site Plan, attached to the geotechnical report as Figure 2. The exploration locations were recorded in the office using desktop GIS software and located in the field using a cellular telephone, and are approximate (+/- 30 feet horizontally). Surface elevations indicated on the logs were estimated based on the topographic contours (by others) shown on the referenced Site Plan and are approximate. The attached figures detail the exploration methods (Figure A1), soil classification criteria (Figure A2), and present detailed logs of the explorations (Figure A3 through A12), as discussed below.

A.1.1 Hand Auger Borings

CGT advanced one hand auger boring (HA-1) to a depth of about 10 feet bgs. The boring was advanced using a manual, 3-inch-diameter hand auger. The hand auger boring was loosely backfilled with the excavated materials upon completion.

A.1.2 Test Pits

CGT observed the excavation of nine test pits (TP-1 through TP-9) at the site to depths of about 5 to 8½ feet bgs. The test pits were excavated using a John Deere 35G mini-excavator provided and operated by our excavation subcontractor, Doug Shepherd's Dirtworks of Keizer, Oregon. The test pits were loosely backfilled with the excavated materials upon completion.

A.1.3 In-Situ Testing

A.1.3.1 <u>Dynamic Cone Penetrometer Test</u>
In conjunction with the hand auger boring, we advanced one dynamic cone penetrometer test to a depth of 11 feet bgs. The test was performed using a Wildcat Dynamic Cone Penetrometer (WDCP) provided and operated by CGT. The WDCP test is described on the attached Exploration Key, Figure A1. Results of the WDCP test are provided on the log for boring HA-1.

A.1.3.2 <u>Infiltration Tests</u>
CGT performed two infiltration tests (IT-1 and IT-2) at the site within test pits TP-1 and TP-2, respectively, at a depth of about 5 feet bgs. Details regarding the test procedure and results of the tests are presented in Appendix B.

A.1.4 Material Classification & Sampling

Representative disturbed (grab) samples of the soils encountered were obtained at selected intervals within the test pits and hand auger boring. Qualified members 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 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.

A.1.5 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, Figure A3 through A12.

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:

- Ten moisture content determinations (ASTM D2216).
- Two percentage passing the U.S. Standard No. 200 Sieve tests (ASTM D1140).

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

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

FIGURE A1

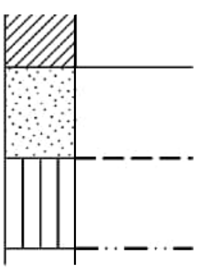
Exploration Key

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 })

CARLSON CGT GEOTECHNICAL 503-601-8250

All measurements are approximate.

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

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

CARLSON CGT GEOTECHNICAL 503-601-8250

References:

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.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

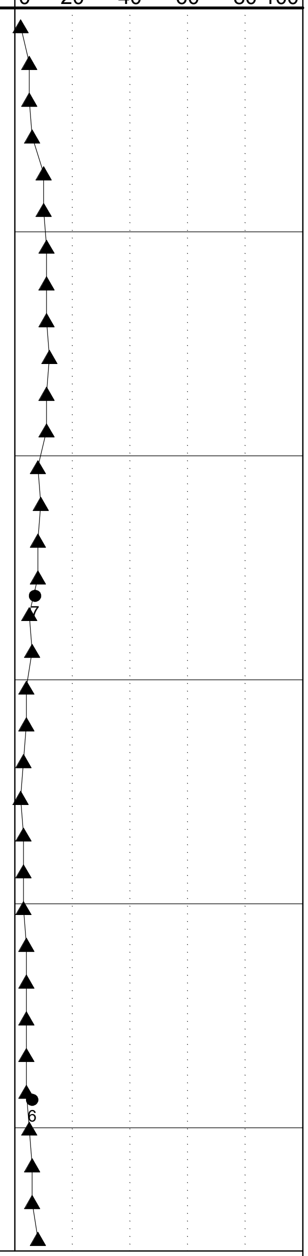
FIGURE A3

Boring HA-1

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 110 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Manual Hand Auger & WDCP
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Manual Hand Auger
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
					0					
		OL	**SANDY ORGANIC SOIL**: Loose, dark brown, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.					2, 5, 5		
		SP	**POORLY GRADED SAND**: Loose, tan with orange mottling, moist, and contained some rootlets within the upper 6 inches.					6, 10, 10		
108			Medium dense below about 2 feet bgs.		2			11, 11, 11, 12, 11, 11		
106			Loose below about 4 feet bgs		4			8, 9, 8		
						GRAB 1	100	8, 5, 6		
104			Minor caving below about 7 feet bgs.		6			4, 4, 3, 2, 3, 3		
102					8			3, 4, 4, 4, 4		
100					10	GRAB 2	100	4, 5, 6, 6, 8		
98			• Boring terminated at 10 feet bgs. • Minor caving encountered below about 7 feet bgs. • No groundwater encountered. • Boring loosely backfilled with excavated materials upon completion.							

▲ WDCP N_{60} VALUE ▲
PL ●MC LL
☐ FINES CONTENT (%) ☐
0 20 40 60 80 100



Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A4

Test Pit TP-1

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY AET
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter and fine- to medium-grained sand.		0						
92		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.		2	GRAB 1	100				
90			Light gray below about 3 feet bgs.		4						
			No roots below 4 feet bgs.			GRAB 2	100				1 ☐ ● 5
88											
86											
84											

- Test pit terminated a 5 feet bgs.
- Infiltration test conducted at 5 feet bgs. Refer to Appendix B for test results.
- No caving or groundwater encountered.
- Test pit loosely backfilled with excavated materials upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A5

Test Pit TP-2

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY AET
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Light gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**:*Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
92					2						
			Light gray with brown mottling below about 3 feet bgs.			GRAB 1	100				
90					4						
						GRAB 2	100				1 / 7
88			• Test pit terminated a 5 feet bgs. • Infiltration test conducted at 5 feet bgs. Refer to Appendix B for test results. • No caving or groundwater encountered. • Test pit loosely backfilled with excavated materials upon completion.								
86											
84											

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A6

Test Pit TP-3

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 98 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF **SURFACE** Sand
LOGGED BY BJG **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
98		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
96					2						
94					4						
			Minor caving below about 5 feet bgs.								
92					6						
			Severe caving below about 7 feet bgs.								
90					8	GRAB 1	100				MC: 6
88											

• Test pit terminated at 8 feet bgs due to caving.
• Minor to severe caving encountered below about 5 to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A7

Test Pit TP-4

CLIENT Green Light - Home First, LLC

PROJECT NAME HFD-GLD Manzanita Housing

PROJECT NUMBER G2305878

PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon

DATE STARTED 3/31/23 **GROUND ELEVATION** 96 ft

ELEVATION DATUM Topographic contours shown on Figure 2

WEATHER Rain, 50ºF **SURFACE** Sand

LOGGED BY BJG **REVIEWED BY** BMW

EXCAVATION CONTRACTOR Doug Shepherd Dirtworks

SEEPAGE ---

EQUIPMENT John Deer 35G with 18-inch wide smooth bucket

GROUNDWATER DURING DRILLING ---

EXCAVATION METHOD Test Pit

GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
					0						
		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.								
			POORLY GRADED SAND: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
94					2						
92		SP			4						
90					6	GRAB 1	100				MC 5
			Minor caving below about 6 feet bgs.								
			Severe caving below about 7 feet bgs.			GRAB 2	100				
88											
86											

- Test pit terminated at 7½ feet bgs due to caving.
- Minor to severe caving encountered below about 6 to 7 feet bgs.
- No groundwater encountered.
- Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A8

Test Pit TP-5

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 102 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
100					2						
98					4	GRAB 1	100				5
96			Moderate caving below about 5½ feet bgs.		6						
			Severe caving below about 7 feet bgs.			GRAB 2	100				5
94											
92											

• Test pit terminated at 7 feet bgs due to caving.
• Moderate to severe caving encountered below about 5½ to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A9

Test Pit TP-6

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
94		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets/roots up to ½-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
92					2						
90					4						
			Moderate caving below about 5 feet bgs.								
88					6						
						GRAB 1	100				● 5
			Severe caving encountered below about 7 feet bgs.								
86											
84											

- Test pit terminated at 7½ feet bgs due to severe caving.
- Moderate to severe caving encountered below 5 to 7 feet bgs.
- No groundwater encountered.
- Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A10

Test Pit TP-7

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 105 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF
SURFACE Sand
LOGGED BY AET
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
105		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
104		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
102					2						
100					4						
98			Severe caving below about 6½ feet bgs.		6						
					8	GRAB 1	100				MC: 6
96											

• Test pit terminated at 8½ feet bgs due to caving.
• Severe caving encountered below about 6½ feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

CGT EXPLORATION WITH WDCP DRAFT LOGS.GPJ 4/12/23 DRAFTED BY: BJG

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A11

Test Pit TP-8

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 100 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF **SURFACE** Sand
LOGGED BY AET **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
100		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ½-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
98					2						
96			Gray with brown mottling, and moderate caving below about 4 feet bgs.		4						
94					6	GRAB 1	100				MC: 5
92					8						
90											

• Test pit terminated at 8 feet bgs due to caving.
• Moderate caving encountered below about 4 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A12

Test Pit TP-9

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 90 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF **SURFACE** Sand
LOGGED BY AET **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
88		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.		2						
86			Gray with brown mottling below about 3 feet bgs.		4						
84			Moderate caving below about 5 feet bgs.		6	GRAB 1	100				6
82											
80											

• Test pit terminated at 6½ feet bgs due to caving.
• Moderate caving encountered below about 5 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Appendix B: Results of Infiltration Testing

HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

April 14, 2023

Prepared For:

Green Light- Home First, LLC
Attn: Rob Justus
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Prepared by
Carlson Geotechnical

B.1.0 INTRODUCTION

Our client requested two infiltration tests at the project site. The tests were performed in test pits TP-1 and TP-2 on the Site Plan, which is attached to the main report as Figure 2.

B.2.0 TEST PROCEDURE

Two infiltration tests (IT-1 and IT-2) were performed in general accordance with the Falling Head Infiltration Test method as described in Chapter 3 of the 1980 EPA Onsite Wastewater Treatment and Disposal Systems Design Manual (1980 EPA).

The tests were performed within prepared test pits TP-1 and TP-2, which were advanced to the infiltration test depth (5 feet bgs) with a John Deere 35G mini-excavator with a 2-foot-wide toothed bucket. Once the test pits were advanced to the infiltration test depth, a 6-inch diameter PVC pipe was pushed about 6 inches into the soil at the test depth to obtain a proper seal between the PVC pipe and surrounding soils. A thin layer of clean gravel was placed within each pipe to prevent scouring the soil with water during testing.

We attempted to soak the subsurface soils within TP-1 and TP-2 by pouring an approximate 12-inch column of water into the test pipes. The water infiltrated into the subsurface soils in less than 10 minutes. This was repeated a second time with similar results; therefore, we immediately proceeded with the infiltration test in general accordance with the referenced test method. We poured about 6 inches of water into each test pipe and recorded the time required for the water to completely infiltrate into the subsurface materials during each trial. We administered several trials in TP-1 and TP-2.

B.3.0 INFILTRATION TEST RESULTS

The following table presents the details, raw data, and calculated infiltration rates observed during testing. Please note that the calculated infiltration rates do not include any safety or correction factors.

Table B1 Results of Infiltration Test IT-1

Location:	See Figure 2	Date:	3-31-23	Exploration Number:	TP-1
Test Method:	1980 EPA Falling Head Test Method.	Inner Diameter of Pipe:	6 inches	Infiltration Test Depth:	5 feet
Soil at infiltration test depth:	Poorly Graded Sand (SP)				
Saturation Start Time:	11:28:00 a.m.	Excavation could not maintain head. Test pipe filled twice with 12 inches of water, and water completely drained out of test pipe within less than 10 minutes.			
Saturation End Time:	11:34:00 a.m.				

	Time	Time Interval (Minutes)	Measurement* (inches)	Drop in Water level* (inches)	Infiltration Rate** (inches per hour)	Remarks
Trial 1	11:36:00 a.m.	---	41½	---	---	Water level adjusted
	11:41:10 a.m.	5.2	47½	6	69.23	Trial 1 concluded
Trial 2	11:42:00 a.m.	---	41½	---	---	Water level adjusted
	11:45:58 a.m.	4.0	47½	6	90.00	Trial 2 concluded
Trial 3	11:47:00 a.m.	---	41½	---	---	Water level adjusted
	11:51:30 a.m.	4.5	47½	6	80.00	Trial 3 concluded
Trial 4	11:52:00 a.m.	---	41½	---	---	Water level adjusted
	11:56:48 a.m.	4.8	47½	6	75.00	Trial 4 concluded
Measured Infiltration Rate					**75 Inches per hour**	

* Measured to the nearest one-sixteenth of an inch using a measuring tape.

** Values calculated are raw (unfactored) rates.

Table B2 Results of Infiltration Test IT-2

Location:	See Figure 2	Date:	3-31-23	Exploration Number:	TP-2
Test Method:	1980 EPA Falling Head Test Method.	Inner Diameter of Pipe:	6 inches	Infiltration Test Depth:	5 feet
Soil at infiltration test depth:	Poorly Graded Sand (SP)				
Saturation Start Time:	10:23:00 a.m.	Excavation could not maintained head. Test pipe filled twice with 12 inches of water, and water completely drained out of test pipe within less than 10 minutes.			
Saturation End Time:	10:46:00 a.m.				

	Time	Time Interval (Minutes)	Measurement* (inches)	Drop in Water level* (inches)	Infiltration Rate** (inches per hour)	Remarks
Trial 1	10:46:00 a.m.	---	56¼	---	---	Water level adjusted
	10:51:10 a.m.	5.2	62¼	6	69.23	Trial 1 concluded
Trial 2	10:52:00 a.m.	---	56¼	---	---	Water level adjusted
	10:56:43 a.m.	4.7	62¼	6	76.60	Trial 2 concluded
Trial 3	10:58:00 a.m.	---	56¼	---	---	Water level adjusted
	11:02:53 a.m.	4.9	62¼	6	73.47	Trial 3 concluded
Trial 4	11:10:00 a.m.	---	56¼	---	---	Water level adjusted
	11:14:47 a.m.	4.8	62¼	6	75.00	Trial 4 concluded
Measured Infiltration Rate					**75 Inches per hour**	

* Measured to the nearest one-sixteenth of an inch using a measuring tape.

** Values calculated are raw (unfactored) rates.

B.4.0 DISCUSSION

As detailed above, the measured raw (unfactored) infiltration rate was 75 inches per hour at the tested locations and depth. Please note this infiltration rate does not include any safety or correction factors. We recommend the stormwater infiltration system designer consult the appropriate design manual in order to assign appropriate safety/correction factors to calculate the design infiltration rate for the proposed infiltration system.

Once the design is completed, we recommend the infiltration system design (provided by others) and location be reviewed by the geotechnical engineer. If the location and/or depth of the system change from what was indicated at the time of our fieldwork, additional testing may be recommended.

WETLAND DELINEATION / DETERMINATION REPORT COVER FORM

This form must be included with any wetland delineation report submitted to the Department of State Lands for review and approval. A wetland delineation report submittal is not "complete" unless the fully completed and signed report cover form and the required fee are submitted. Attach this form to the front of an unbound report or include a hard copy of the completed form with a CD/DVD that includes a single PDF file of the report cover form and report (minimum 300 dpi resolution) and submit to: **Oregon Department of State Lands, 775 Summer Street NE, Suite 100, Salem, OR 97301-1279.** A single PDF attachment of the completed cover from and report may be e-mailed to **Wetland_Delineation@dsl.state.or.us**. For submittal of PDF files larger than 10 MB, e-mail instructions on how to access the file from your ftp or other file sharing website. Fees can be paid by check or credit card. Make the check payable to the Oregon Department of State Lands. To pay the fee by credit card, call 503-986-5200.

☒ Applicant ☒ Owner Name, Firm and Address: **Encore Development Inc.** **Jim Pentz** **P. O. Box 6299** **Bend, Oregon 97708**	Business phone # **503-7800210** Mobile phone # (optional) E-mail: **jim@jptz.com**
☐ Authorized Legal Agent, Name and Address: **Same as above**	Business phone # Mobile phone # E-mail:

I either own the property described below or I have legal authority to allow access to the property. I authorize the Department to access the property for the purpose of confirming the information in the report, after prior notification to the primary contact.

Typed/Printed Name: Jim Pentz Signature:

Date: 4.12.17 . Special instructions regarding site access:

Project and Site Information (using decimal degree format for lat/long.enter centroid of site or start & end points of linear project)

Project Name: **Encore Wetland Determination**	Latitude: **45.71652**	Longitude: **123.92684**	
Proposed Use: **300 unit housing development**	Tax Map # **03N10W28 and 03N10W29D**		
Project Street Address (or other descriptive location): **East of Manzanita. Classic Street borders the study area to the west and Necarney City Road to the south.**	Township **03N** Range **10W**	Section **28/29D**	QQ
	Tax Lot(s) **1401, 100 and 2100**		
	Waterway: n/a	River Mile: n/a	
City: **Manzanita** County: **Tillamook**	NWI Quad(s): Nehalem, Oregon		

Wetland Delineation Information

Wetland Consultant Name, Firm and Address: **Christine McDonald** 6530 Weber Road Tillamook, OR 97141	Phone # **503-801-2243** Mobile phone # **same** E-mail: **contactchris100@gmail.com**

The information and conclusions on this form and in the attached report are true and correct to the best of my knowledge.

Consultant Signature: Christine McDonald | Date: **4.12.17**

Primary Contact for report review and site access is ☒ Consultant ☐ Applicant/Owner ☐ Authorized Agent

Wetland/Waters Present? ☐ Yes ☒ No | Study Area size: 71.60 | Total Wetland Acreage: **none**

Check Box Below if Applicable:	**Fees:**
☐ R-F permit application submitted	☒ Fee payment submitted **$ 419**
☐ Mitigation bank site	☐ Fee ($100) for resubmittal of rejected report
☐ Wetland restoration/enhancement project (not mitigation)	☐ No fee for request for reissuance of an expired report
☐ Industrial Land Certification Program Site	
☐ Reissuance of a recently expired delineation	
Previous DSL # Expiration date ____	

Other Information:	Y	N	
Has previous delineation/application been made on parcel?	☐	☒	If known, previous DSL #
Does LWI, if any, show wetland or waters on parcel?	☐	☒	

For Office Use Only

DSL Reviewer: ____________ Fee Paid Date: ____/____/____ DSL WD # ____________

Date Delineation Received: ___/___/___ DSL Project # ____________ DSL Site # ____________

1.0 Landscape Setting and Land Use (previous and current) *OAR141-090-0035 (7) (a)*

The 71.60-acre study area is located in Manzanita, Tillamook County, Oregon and consists of tax lot 100 T3NR10W section 29D, and all of tax lot 1401 and the southern third of tax lot 2100 in T3NR10W section 28 (see Figures 2A and 2B). The land is owned by Pine Grove Properties. All tax lots are accessible from Necarney City County Road to the south and/or Classic Street to the west.

The study area is located on gently to moderately sloping to rolling, stabilized coastal dunes. Slopes range from 0-40%. No water features are present. The land surface ranges in elevation from 50 to 160 feet (NAD 88).

Within the study area boundary, the Natural Resources Conservation Service (NRCS) has mapped the Netarts fine sandy loam, 5 to 30% slopes (11D), the Waldport fine sand, 3 to 15 percent slopes (9C) and the Haceta fine sand, 0-3% slopes (14A). The Netarts fine sandy loam comprises over 80% of the study area and is found on deep, well-drained soils that formed in eolian sand on marine terraces. The Waldport (9C) is found on recently stabilized dunes. Soils are deep, excessively drained and formed in sandy eolian material. The Heceta (14A) is mapped by the NRCS on the fringe of tax lot 2100. The Haceta is hydric soil and documented by NRCS as an inclusion within the Waldport (9C) soil mapping unit. According the NRCS, the Haceta soil develops on inter-dunal depressions and swales with poor soil drainage.

Vegetation within the study area is composed of forest and dune land plant communities, shrubs and pasture grasses. Vascular plant species found within the study area are included in Table 1.

Table 1. List of vascular plants observed within the study area, 2016.

Scientific Name	Common Name	Indicator Status	Native, Non-native, or Invasive
Agrostis exarata	Spiked Bentgrass	FACW	N
Agrostis capillaris	Colonial Bentgrass	FAC	NN
Alnus rubra	Red Alder	FAC	N
Ammophila arenaria	European Beachgrass	FACU	NN
Anthoxanthum odoratum	Sweet Vernal Grass	FAC	NN
Arcyostaphylos columbiana	Bristly Manzanita	N/L	N
Carex obnupta	Slough Sedge	OBL	N
Carex bolanderi	Bolander's Sedge		N
Cardionema ramosissimum	Sand Mat	N/L	NN
Cytisus scoparius	Scotch Broom	UPL/NL	I
Dryopteris espansa	Spreading Wood Fern	facw	N
Frangula purshiana	Cascara	FAC	N
Gaultheria shallon	Salal	FACU	N
Holcus lanatus	Common Velvetgrass	FAC	NN
Hypochaeris radicata	Hairy Cat's Ears	FACU	NN
Juncus effuses	Soft Rush	FACW	N
Leucanthemum vulgare	Ox-eye Daisy	FACU	NN/I
Picea sitchensis	Sitka Spruce	FAC	N
Myrica californica	California Wax Myrtyl	N/L	N

Scientific Name	Common Name	Indicator Status	Native, Non-native, or Invasive
Pinus contorta	Shore Pine	FAC	N
Poa annua	Annual Bluegrass	FAC	NN
Polystichum munitum	Sword Fern	FACU	N
Pseudotsuga menziesii	Douglas-fir	FACU	N
Pteridium aquilinum	Bracken Fern	FACU	N
Rubus armeniacus	Himalayan Blackberry	FAC	I
Rubus ursinus	California Dewberry	FACU	N
Rumex acetosella	Common Sheep Sorrel	FACU	NN
Sambucus racemosa	Red Elderberry	FACU	N
Spiraea douglasii	Hardhack	FACW	N
Thuja plicata	Western Red Cedar	FAC	N
Tsuga heterophylla	Western Hemlock	FACU	N
Vaccinium ovatum	Evergreen Huckleberry	FACU	N

Previous and current land uses
The lots are currently being used as forest and wildlife habitat, and for recreation.

Tax lot 100 and 2100 are within the Manzanita City urban growth boundary and zoned SRR. Lot 1401 is zoned R-2. Development plans are currently underway with roads, green space and a 300-unit housing development.

2.0 Site Alterations *OAR141-090-0035 (7) (c)*

In 1990, the Manzanita Golf Club developed plans to expand the golf course to the east. The expansion included all of the lots within the study area boundary. Potential green areas were cleared of vegetation to construct a driving range and 9-hole golf course; however the golf course was never constructed.

A driving range for the Manzanita Golf Club was constructed in the southwest corner of the study area. Paved access and parking to the driving range are from Necarney City Road. The driving range is mowed and maintained by the Manzanita Golf Club. A small wooden rental shack was constructed near the parking area. No other building structures are present. A sewer pump station and wet well, power vaults and fiber optic vault can be found in the south west corner of the study area near Necarney City Road (See Figure 5). Construction of Necarney City Road may have altered wetlands to the south during construction. Classic Street was constructed in the mid 1990's.

Currently native and non-native vegetation commonly found on coastal sand dunes has re-established where the golf course was cleared for expansion. On steeper slopes we found forestland with an overstory of 20-30 year old Sitka Spruce, Western Red Cedar and Shore Pine. In non-forested areas open, native shrubs and patches of 30 to 35 year old scotch broom was observed with a herbaceous ground cover.

3.0. Precipitation Data and Analysis *OAR141-090-0035 (7)(i)*

Climate data from the Western Regional Climate Center RAW (RAW) data for the station in Tillamook were used for this study. No precipitation was recorded on the day of the site visit on February 25, 2017. Two weeks prior to the site visit in February 5.86 inches of precipitation was recorded at the RAW Station in Tillamook. Two weeks prior to the March 6, 2017 the RAW station recoded 5.28 inches of precipitation and .45 inches of precipitation on the day of the site visit. There was 3.46 inches of precipitation recorded two weeks prior to the April 11, 2017 site and .36 inches of precipitation recorded on the day of the site visit.

NRCS Wetland Climate Evaluation Database (WETS) for Tillamook Oregon was used to obtain the normal precipitation data. Table 2 compares the RAW data with the WETS data (1971-2000). The summary shows December 2016 to be within normal levels. January precipitation was below average, but within a 30% range of the average. February and March precipitation were above normal and higher than the 30% range of average precipitation. Climatic conditions were considered typical for this time of year for the data collected in February and March even though some variation in precipitation was noted. Because March precipitation was 60% higher than the average for this time of year, climatic conditions were considered atypical for the data collected in April.

Table 2. Monthly precipitation recorded by the Oregon Climate Data for Tillamook, Oregon compared with WETS data for Tillamook 1 W, Oregon (358494).

Month	RAWS Tillamook Precipitation (inches)	WETS average precipitation (inches)	Departure from normal (inches) and (%)
December, 2016	13.94	13.70	-.24(-2%)
January, 2017	8.34	13.08	-4.74(-36%)
February, 2017	14.94	10.79	+4.15(+38%)
March, 2017	15.84	9.90	+5.94(+60%)

4.0. Methods (site-specific methods for field investigation, determining wetland boundaries and geographic extent of other waters) *OAR141-090-0030, OAR141-090-0035 (7)(d-e), (g-h), (16)(a-b), (f), (d) or (g), (17), & (19-20)*

Field investigation was conducted on February 25, March 6, 2017 and April 11, 2017. Christine McDonald and Kurt Heckeroth evaluated the site using the Corps of Engineers *Wetland Delineation Manual: Western Mountains, Valleys and Coast Region* (May, 2010) supplement. The study area was walked extensively to locate areas mapped as wetland by the National Wetlands Inventory (NWI), and to locate inter-dunal swales and depressions in low-lying areas where wetlands are most likely to be present.

The Corps of Engineers 2010 manual provides technical criteria, field indicators, and recommended procedures to be used in determining whether an area is a jurisdictional wetland. For wetlands to exist, there must be a prevalence of hydrophytic vegetation, hydric soils, and wetland hydrology. Under normal circumstances, all three parameters must be present to satisfy the criteria for jurisdictional wetlands.

Seven sample plots document non-wetlands within the study area. The sample sites were chosen based on mapped NWI wetlands (Figure 4), presence of hydric soils mapped by the NRCS (Figure3), low-lying areas in the dune land, and sites representative of non-wetlands.

Hydric Soils
A hydric soil is a soil that remains wet long enough during the growing season to alter physical (redoximorphic) features of the soil. Due to saturation, flooding, or ponding, soils develop anaerobic conditions. This oxygen-deficient environment favors the growth and regeneration of hydrophytic vegetation. Soil color becomes altered as iron is reduced to a mobile form. Soils become oxidized and accumulate iron, or become reduced as a result of iron depletion. Wetland conditions also slow down the decomposition of organic material, thereby causing soil color to be very dark with a low soil chroma and high organic carbon content.

The wetland scientists analyzed soils collected from more than 30 soil pits by examining texture, moisture content, color, redoximorphic features, and structure. Sandy soils typical of the Haceta may have high organic carbon content, low values and hues, and/or redoximorphic features within 6-12 inches of the surface. Soils that met the hydric soil criteria were not found within the study area.

Hydrophytic Vegetation
Hydrophytic vegetation occurs in soils that are saturated for extended periods during the growing season and have adapted to wet soil conditions. More than 50% of the species must have a wetland indicator status of obligate wetland (OBL), facultative wetland (FACW), or facultative (FAC). Wetland scientists estimated vegetation cover visually at each sample point, identified all vascular plant species, and recorded the indicator status for each plant species from national wetland indicator lists. The 50/20 rule was used to determine dominance. The 2016 U.S. Army Corps of Engineers Plant List for the State of Oregon was used for this study.

Wetland Hydrology
Indications of wetland hydrology may include drainage patterns, sediment deposits, hydrogen sulfide odor, watermarks, oxidized root zones, saturation, high water table, or inundation. Wetland hydrology affects soil and vegetation by inundating soils or saturating soils to the surface for a significant length of time (5-12.5%) during the growing season.

Wetland scientist looked for the presence of oxidized root zones, presence of surface water, and the height of surface water, the water table, and saturation and/or moisture levels in the soil pits. Field personnel were able to observe surface water and water table levels following periods of precipitation. The higher than average precipitation in February and March, 2017 was taken into consideration when evaluating wetland hydrology indicators.

5.0. Description of All Wetlands and Other Non-Wetland Waters (their characteristics and boundaries, e.g. whether they extend offsite) *OAR141-090-0035 (2), (7)(b), & (17)*

No jurisdictional wetlands were observed within the study area boundary.

Non-wetlands are extensive on the level to hilly and undulating dunes and elevated terraces within the study area. Common shrubs and trees observed are Sitka Spruce, Western Hemlock, Douglas fir, Shore Pine, Western Red Cedar, Salal, Bristly Manzanita, Himalayan Blackberry, California Dewberry, and Evergreen Huckleberry. Herbaceous species commonly found are Colonial and Spiked Bentgrass, Annual Bluegrass, Common Sheep Sorrel, Hairy Cat's Ears, Velvetgrass, and Sand Mat. Other hydrophytic vegetation such as Slough Sedge or Hardhack was observed in small isolated clumps in low-lying areas.

Soils typically are deep, well-drained sands or loamy sands with brown to very dark brown surfaces, and light brown, brown or yellowish brown sandy subsurface horizons. Redoximorphic features were not found with a soil layer starting within 6 inches of the soil surface. Soil moisture levels were observed following periods of heavy precipitation. None of the soil pits observed had surface water, elevated ground water or saturation within 20 inches of the soil surface.

6.0 Deviation from LWI or NWI (if any, wetland determination data or explanation required.) *OAR141-090-0035 (16)(e)*

A Local Wetland Inventory (LWI) does not exist for the City of Manzanita. The National Wetlands Inventory (NWI) mapped Palustrine Forested Seasonally Flooded Coniferous (PFOC) along the southern fringe of the study area, and Palustrine Emergent and Scrub Shrub Seasonally Flooded (PEM/SSC) wetlands in lot 100 west of Classic Street (Figure 4). The NWI maps are generated primarily on the basis of interpretation of color infrared photography (scale of 1:58,000) with limited ground-trothing or site-specific data.

This study found that the NWI overestimated forest, scrub-shrub and emergent wetlands within the study area boundary. The study area was walked extensively and soil pits dug to examine soils and hydrology. No jurisdictional wetlands or waterways were documented within the study area. Sample data points SP-1 and SP-6 document non-wetland areas mapped as wetland by the NWI.

7.0 Mapping Method (including mapping precision estimate) *OAR141-090-0035 (7)(f), (11), (12), (13), (18), & (22)*

Christine McDonald and Kurt Heckeroth flagged sample points representing non-wetlands with blue pin flags and blue flagging. The study area boundary and non-wetland sample points were then professionally land surveyed by Onion Peak Design. The estimated accuracy is +/- 0.05 feet. A Topcon HIPER SR GPS RECEIVER WITH TOPCON TESLA DATA COLLECTOR was used for the survey.

8.0 Additional Information (i.e., if needed to establish state jurisdiction) *OAR141-085-0015 (1-7), OAR141-090-0030 (2), OAR141-090-0035 (6)(c), (16)(c), & (21)*

None

9.0 Results and Conclusions of the Investigation *OAR141-090-0035 (7)(j)*

Jurisdictional wetlands within the 71.60-acre study area (Figure 5) were not documented or found by Christine McDonald and Kurt Heckeroth. Within the study area boundary, areas identified as non-wetlands have well to excessively-drained soils typical of the Waldport or Netarts soils. No evidence of hydric soils was found starting within 6 inches of the soil surface at the lowest elevation within the study area or within the Haceta map unit. The site was observed during the growing season after prolonged periods of higher than average precipitation; however there was no evidence of an elevated water table or saturation starting within 12 inches of the soil surface.

Dominant species observed include Sitka Spruce, Western Hemlock, Douglas-fir, Shore Pine, Western Red Cedar, Salal, Bristly Manzanita, Himalayan Blackberry, California Wax Myrtyl, Evergreen Huckleberry, Colonial Bentgrass, Annual Bluegrass, Common Sheep Sorrel, Velvet grass, and Hairy Cat's Ears.

10.0 Required Disclaimer *OAR141-090-0035 (7)(k)*

This report documents the investigation, best professional judgment, and conclusions of the investigators. It is correct and complete to the best of our knowledge. It should be considered a Preliminary Jurisdictional Determination of wetlands and other waters and used at your own risk unless it has been reviewed and approved in writing by the Oregon Department of State Lands in accordance with OAR 141-090-0005 through 141-090-0055.

References

- Cowardin, L. M., V. Carter, P. C. Golet, and E. T. LaRoe, 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 147 p., plates.

- Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region (May 2010), U. S. Army Corps of Engineer Waterways Experiment Station, Vicksburg, MS.

- NRCS National Water and Climate Center WETS data available online at http://www.wcc.nrcs.usda.gov/climate/wetlands.htm

- Oregon Climate Data for the Tillamook Station available online at www.ocs.edu/oregon-climate-dataRAWS

- Natural Resource Conservation Service, National Cooperative Soil Survey, Web Soil Survey 1.1, available online at http://websoilsurvey.nrcs.usda.gov

- USDA, Natural Resources Conservation Service, Hydric Soil List available online at http://www.or.nrcs.gov/pnw_soil/ordata.html

- Munsell Color, 1990. Munsell Color Charts. Macbeth Division of Kollmorgen Corporation. Baltimore, MD

- Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List*: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X

Figure 1. Encore Wetland Determination
Lot 100
Lot 1401
Study Area
NECARNEY CITY ROAD
USGS 10 Foot Contour LIDAR Map
0
250
500
1,000 Feet
Tillamook County GIS

Figure 2a:Tax Lot Map

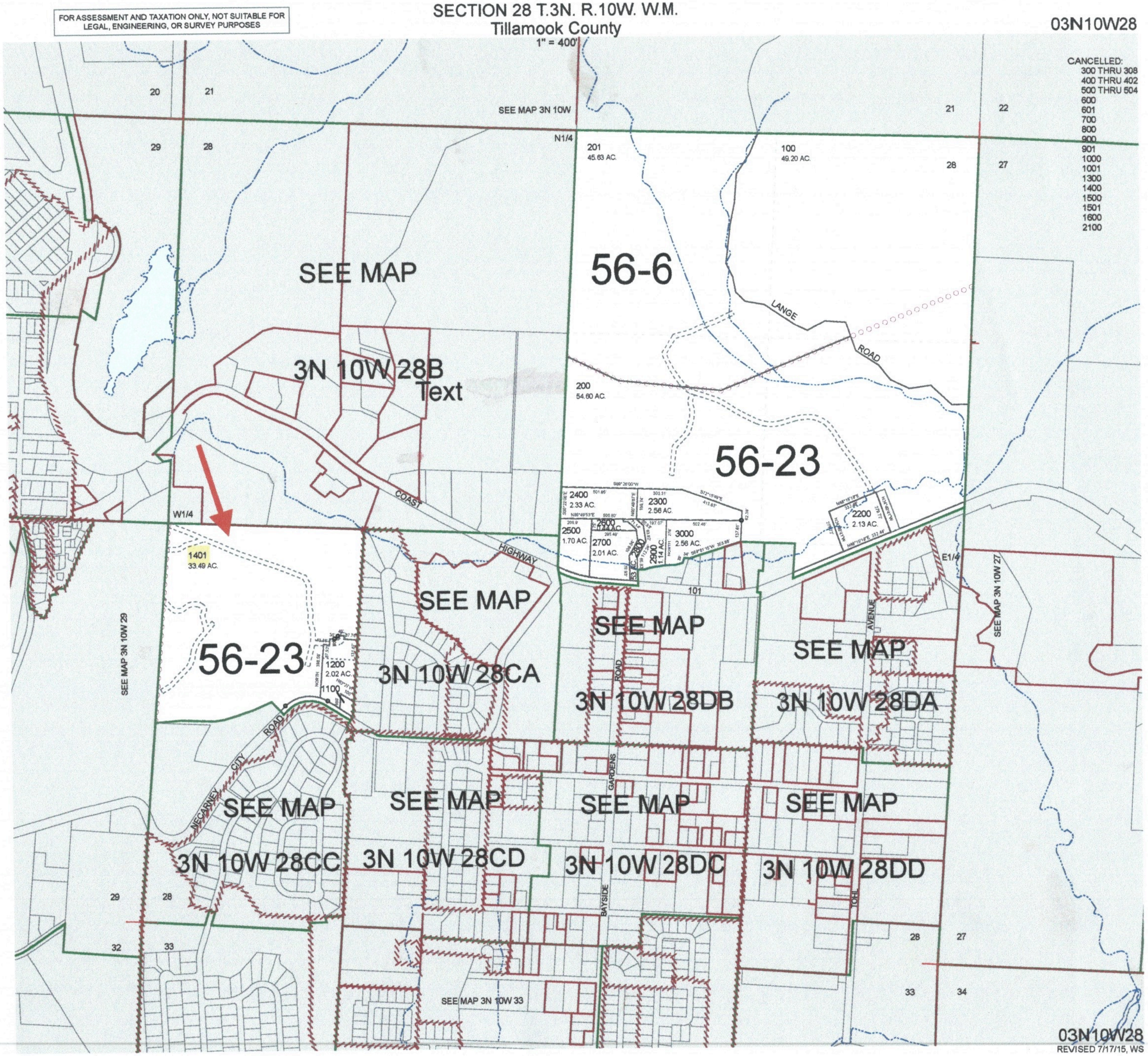
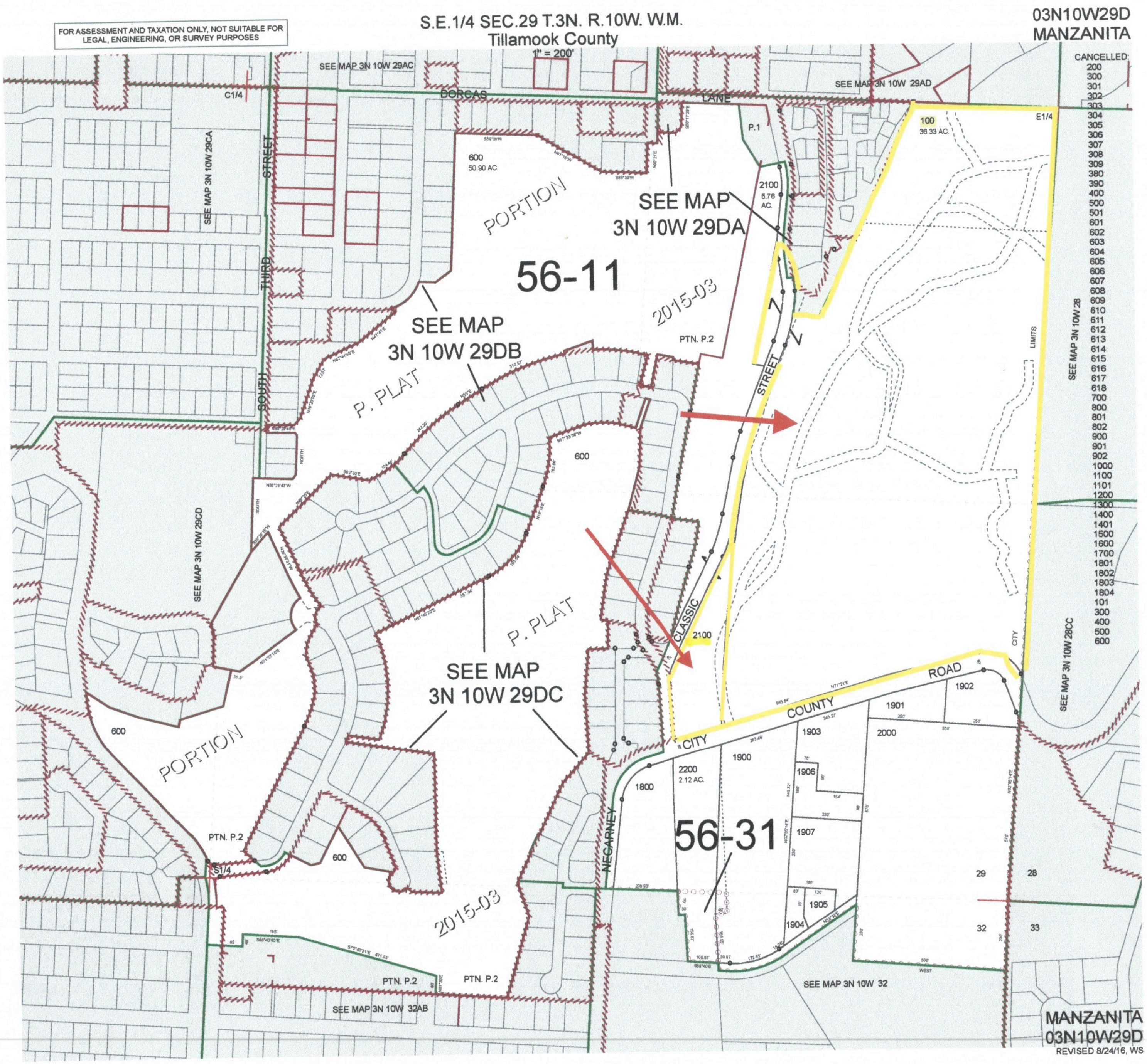
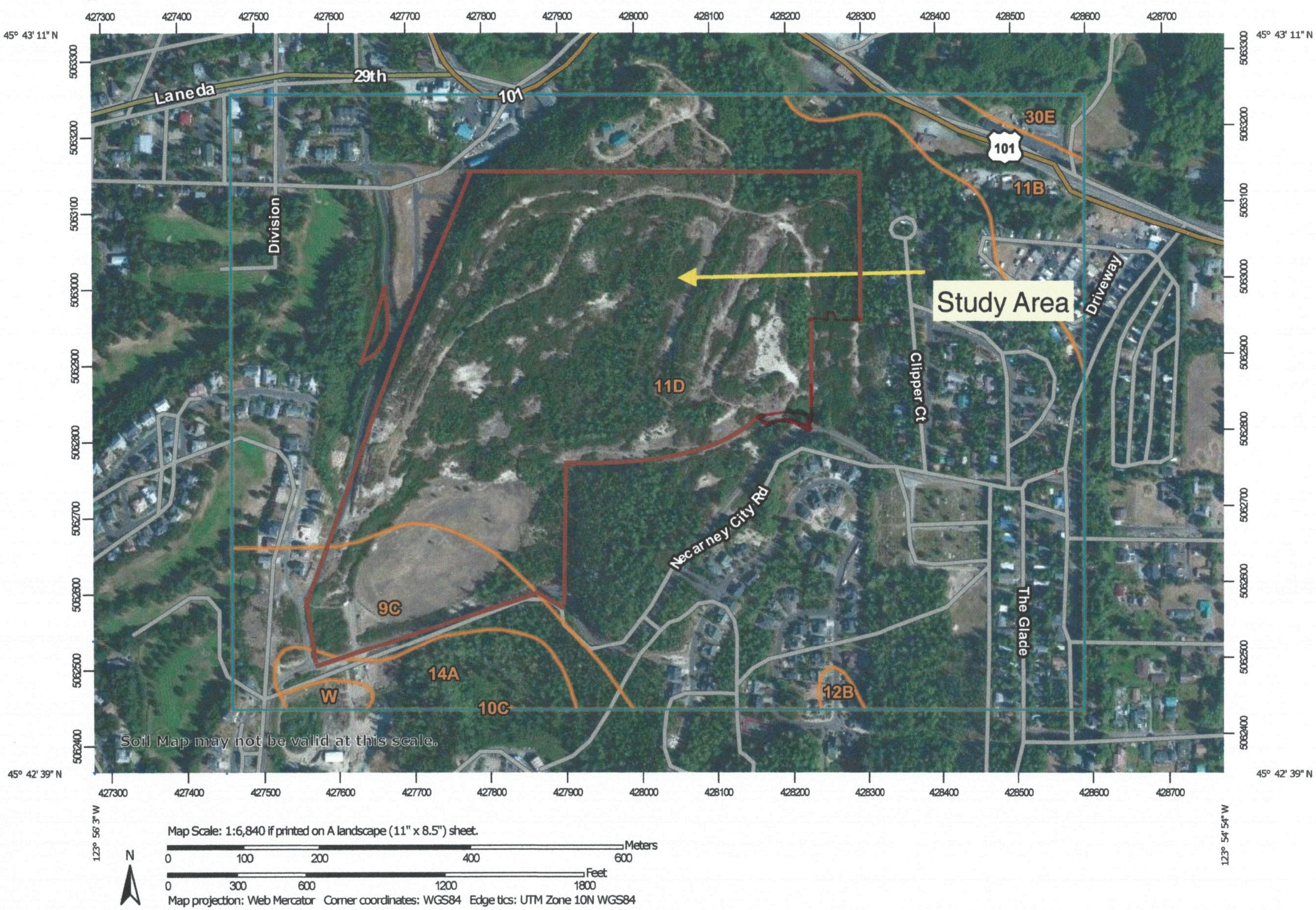


Figure 2b:
Tax Lot Map



Soil Map—Tillamook County, Oregon
(Figure 3. **Encore Wetland Determination**



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Tillamook County, Oregon
Survey Area Data: Version 8, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 9, 2011—Sep 4, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

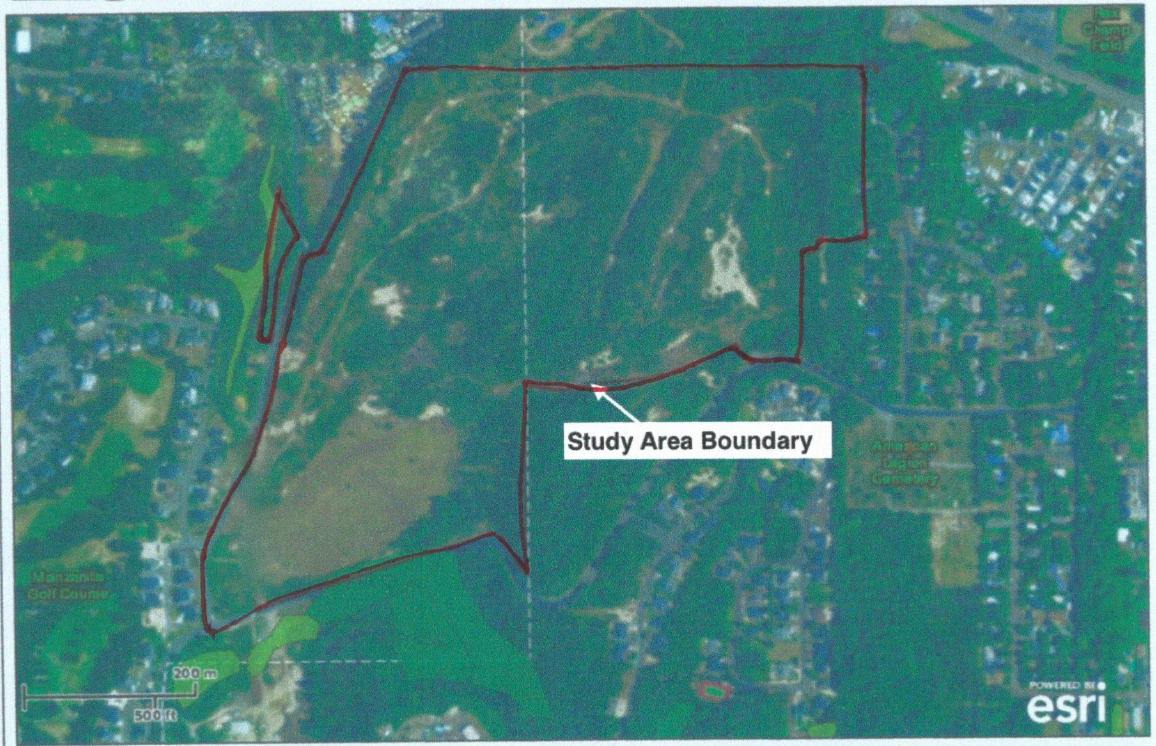
Tillamook County, Oregon (OR057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
9C	Waldport fine sand, 3 to 15 percent slopes	16.3	7.2%
10C	Waldport fine sand, thin surface, 3 to 12 percent slopes	0.0	0.0%
11B	Netarts fine sandy loam, 0 to 5 percent slopes	10.7	4.7%
11D	Netarts fine sandy loam, 5 to 30 percent slopes	189.1	83.5%
12B	Yaquina loamy fine sand, 0 to 5 percent slopes	0.6	0.3%
14A	Heceta fine sand, 0 to 3 percent slopes	7.0	3.1%
30E	Templeton-Ecola medial silt loams, 30 to 60 percent slopes	2.0	0.9%
W	Water	1.0	0.4%
Totals for Area of Interest		**226.5**	**100.0%**

U.S. Fish and Wildlife Service

National Wetlands Inventory

Figure 4. NWI Map

Feb 24, 2017



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

Riparian Status

- Digital Data

User Remarks:

Encore Investment LLC

NOTES

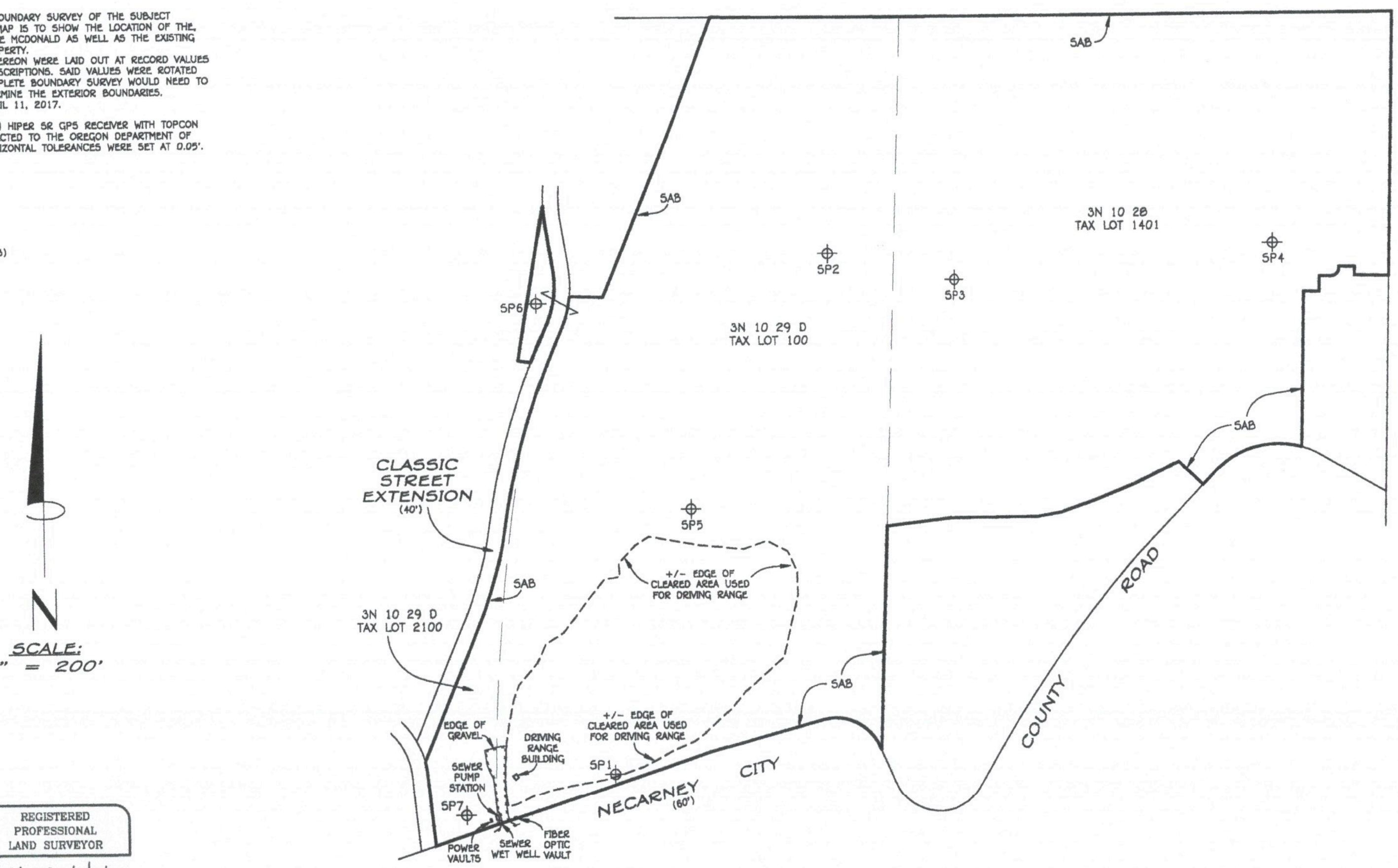
THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY OF THE SUBJECT PROPERTIES. THE PURPOSE OF THIS MAP IS TO SHOW THE LOCATION OF THE SAMPLE POINTS AS FLAGGED CHRISTINE MCDONALD AS WELL AS THE EXISTING IMPROVEMENTS ON THE SUBJECT PROPERTY.
THE EXTERIOR BOUNDARIES SHOWN HEREON WERE LAID OUT AT RECORD VALUES FROM PREVIOUS MAPS AND LEGAL DESCRIPTIONS. SAID VALUES WERE ROTATED TO MATCH THE LOCAL DATUM. A COMPLETE BOUNDARY SURVEY WOULD NEED TO BE PERFORMED TO DIFINITIVELY DETERMINE THE EXTERIOR BOUNDARIES.
FIELD WORK WAS COMPLETED ON APRIL 11, 2017.

DATA WAS ACQUIRED USING A TOPCON HIPER SR GPS RECEIVER WITH TOPCON TESLA DATA COLLECTOR WHILE CONNECTED TO THE OREGON DEPARTMENT OF TRANSPORATION ORGN NETWORK. HORIZONTAL TOLERANCES WERE SET AT 0.05'.

LEGEND

SP — SAMPLE POINT

STUDY AREA BOUNDARY (SAB)



REGISTERED PROFESSIONAL LAND SURVEYOR

Erick M White

OREGON
APRIL 28, 2014
ERICK M. WHITE
78572

RENEWS 6/30/2018

ONION PEAK DESIGN
PO BOX 326
NEHALEM, OR 97131
(503) 368-6102
FAX (503) 368-6102

"ORANGE" #A2017
ENCORE1704-EX.DWG

FIGURE 5 PROJECT MAP:

ENCORE INVESTMENTS, LLC

3N 10 29D TAX LOT 100,
3N 10 28 TAX LOT 1401 &
A PORTION OF 3N 10 29 D TAX LOT 2100
SW 1/4 SECTION 28 & SE 1/4 SECTION 29, T3N, R10W, W.M.
TILLAMOOK COUNTY
APRIL 11, 2017

Appendix A

Wetland Determination Data Forms

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: February 25, 2017
Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-1
Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 32, T3N R10W 29D Lot 100
Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): linear Slope (%): 2
Subregion (LRR): A Lat: 45.71288 Long: 123.92903 Datum: NAD 83
Soil Map Unit Name: 9C- Waldport fine sand, 3-15% slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No __ (If no, explain in Remarks.)
Are Vegetation __, Soil __, or Hydrology __ significantly disturbed? Are "Normal Circumstances" present? Yes X No __
Are Vegetation __, Soil __, or Hydrology __ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Sample plot is in lowest point of lot 100 nearest Necarney Boulevard. Sample point is on the south edge of the driving range. NFW mapped PFOC wetlands mostly n the south side of Necarney Rd. with a very small portion north of Necarney. We dug several soil pits in this area and did not find wetlands. Precipitation is near normal levels for this time of year, 5.38 inches of precipitation in the previous two weeks.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus contorta*	10	D	FAC
2.			
3.			
4.			
	10 = Total Cover		
Sapling/Shrub Stratum (Plot size: 20')			
1. *Cystis scoparius*	20	D	N/L
2. *Rubus aremeniacus*	5	D	FAC
3.			
4.			
5.			
	25 = Total Cover		
Herb Stratum (Plot size: 10')			
1. *Poa annua*	30	D	FAC
2. *Carex bolanderi*	1		FACU
3. *Hypochaeris radicata*	T		FACU
4. *Rumex acetsosella*	10		FACU
5. *Agrostis exarata*	15	D	FAC
6. *Holcus lanatus*	2		FAC
7. *Erigeron glaucus*	<1		FACU
8. *Pteridium aquilinum*	T		FACU
9. *Cardionema ramosissima*	1		N/L
10.			
11.			
	58 = Total Cover		
Woody Vine Stratum (Plot size: 20')			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes x No __

Remarks: *Carex obnupta* outside of plot near the road. Plot is on the driving range and mowed regularly.
**
.
50/20 rule used to determine dominance.

SOIL

Sampling Point: SP-1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 4/3	100					Loamy sand	
4-20+	10YR 5/3	100					sand	

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Good drainage typical of the Waldport.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table.

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: February 25, 2017
Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-2
Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 32, T3N R10W 29D Lot 100
Landform (hillslope, terrace, etc.): Dune terrace Local relief (concave, convex, none): Linear/concave Slope (%): 3
Subregion (LRR): A Lat: 45.71652 Long: 123.92684 Datum: NAD 83
Soil Map Unit Name: 11D- Netarts fine sandy loam 5-30% slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Sample plot is behind the gate east of Classic Street and about 60 feet south of a the dirt trail. Sunny to overcast today. Precipitation is near normal levels for this time of year, 5.86 inches of precipitation in the previous two weeks. Blue flagging and pin flag mark location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus contorta*	30	D	FAC
2.			
3.			
4.			
	10	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Cytisus scoparius*	20	D	UPL/NL
2. *Rubus aremeniacus*	1		FAC
3. *Vacinium ovatum*	15	D	FACU
4.			
5.			
	36	= Total Cover	
Herb Stratum (Plot size: 10')			
1. *Rumex acetsosella*	25	D	FACU
2. *Holcus lanatus*	<1		FAC
3. *Hypochaeris radicata*	40	D	FACU
4. *Agrostis capillaris*	10		FAC
5. *Leucanthemum vulgare*	1		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	76	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 80 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes X No ___

Remarks: Photos north and south. More scotch broom to the south.

.

50/20 rule used to determine dominance.

SOIL

Sampling Point: SP-2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4	7.5YR 2.5/2	100					Loamy sand	
4-20+	10YR 5/4	100					sand	

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

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

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Good drainage typical of the Netarts.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table.

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: February 25, 2017
Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-3
Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 28, T3N R10W Lot 1401
Landform (hillslope, terrace, etc.): Dune terrace slope Local relief (concave, convex, none): concave Slope (%): 7
Subregion (LRR): A Lat: 45.71645 Long: 123.92551 Datum: NAD 83
Soil Map Unit Name: 11D- Netarts fine sandy loam 5-30% slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

	Yes	No
Hydrophytic Vegetation Present?		x
Hydric Soil Present?		X
Wetland Hydrology Present?		X

Is the Sampled Area within a Wetland? Yes ___ No x

Remarks: Sample plot is in the forest in a dune swale. Precipitation is near normal levels for this time of year, 5.86 inches of precipitation in the previous two weeks. Blue flagging and pin flag mark location.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. *Pinus contorta*	20	D	FAC
2. *Pseudotsuga menziesii*	1		FACU
3. *Tsuga heterophylla*	20	D	FACU
4.			
	41	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Myrica californica*	1		UPL/NL
2. *Vacinium ovatum*	50	D	FACU
3. *Gaultheria shallon*	20	D	FACU
4. *Arctostaphylos columbiana*	2		UPL/NL
5.			
	73	= Total Cover	
Herb Stratum (Plot size: 10')			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
10.			
11.			
	0	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 30%litter

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 25 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No x

Remarks: Photos north and south. A few snags in the plot.

50/20 rule used to determine dominance.

SOIL

Sampling Point: SP-3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
.5-0	Litter/organic							7.5YR 2.5/2
0-3	7.5YR 2.5/2	100					Loamy sand	
4-20+	7.5YR 5/3	10					sand	Weak albic
	7.5YR 6/4	90						

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

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

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Good drainage typical of the Netarts.. Lots of roots.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table.

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: February 25, 2017
Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-4
Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 32, T3N R10W 29D Lot 1401
Landform (hillslope, terrace, etc.): Dune terrace Local relief (concave, convex, none): concave Slope (%): 3
Subregion (LRR): A Lat: 45.71656 Long: 123.92226 Datum: NAD 83
Soil Map Unit Name: 11D- Netarts fine sandy loam 5-30% slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ~~x~~	No X
Hydric Soil Present?	Yes ___	No X
Wetland Hydrology Present?	Yes ___	No X

Is the Sampled Area within a Wetland? Yes ___ No x

Remarks: Sample plot is in the dune swale closest to the east lot line Flatter area has been logged and Scotch broom has reestablished. Sloping due has native forest vegetation. Sunny to overcast today. Precipitation is near normal levels for this time of year, 5.86 inches of precipitation in the previous two weeks. Blue flagging and pin flag mark location.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Pinus contorta*	10	D	FAC
2. *Pseudotsuga menziesii*	10	D	FACU
3. *Thuja plicata*	10	D	FAC
4.			
	30	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Arctostaphylos columbiana*	3		UPL/NL
2. *Cytisus scoparius*	50	D	UPL/NL
3. *Vacinium ovatum*	5		FACU
4. *Gaultheria shallon*	25	D	FACU
5.			
	83	= Total Cover	
Herb Stratum (Plot size: 10')			
1. *Hypocharis radicata*	1	D	FACU
2. *Agrostis capillaris*	70		FaC
3. *Pteridium aquilinum*	40	D	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	121	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum 40% litter

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 7 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 43 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No x

Remarks: Photos east and west. The PTAQ and Agrostis is mostly litter from last year.

50/20 rule used to determine dominance.

SOIL

Sampling Point: SP-4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
1.5-0	Litter/organic							mosses
0-5	10YR 4/3	100					sand	Wavy boundary
5-21+	7.5YR 5/4	10					sand	

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

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

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Soils indicate disturbance from previous land clearing. Good soil drainage typical of the Netarts.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no indication of saturation or water table in soil profile

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: February 25, 2017
Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-5
Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 32, T3N R10W 29D Lot 1401
Landform (hillslope, terrace, etc.): Dune terrace Local relief (concave, convex, none): concave Slope (%): 2
Subregion (LRR): A Lat: 45.71481 Long: 123.92810 Datum: NAD 83
Soil Map Unit Name: 11D- Netarts fine sandy loam 5-30% slopes NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No ___ (If no, explain in Remarks.)
Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

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

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

Remarks: Sample plot is in closed depression above the driving range. Looks like an excavated area to create a berm for driving range. Scotch broom has reestablished as dominate species in disturbed areas. Site disturbance is older than 5 years and normal circumstances are present. Sunny to overcast today. Precipitation is near normal levels for this time of year, 5.86 inches of precipitation in the previous two weeks. Blue flagging

VEGETATION – Use scientific names of plants.

Stratum / Species	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1. *Pinus contorta*	5	D	FAC
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Arctostaphylos columbiana*	15	D	UPL/NL
2. *Cytisus scoparius*	45	D	UPL/NL
3.			
4.			
5.			
	60	= Total Cover	
Herb Stratum (Plot size: 10')			
1. *Agrostius capillaris*	50	D	FAC
2. *Holcus lanatus*	5		FAC
3. *Dryopteris espansa.*	1		FACW
4. *Hypocharis radicata*	1		FACU
5. *Moneywort spp.*	2		N/L
6. *Rumex acetosella*	1		FACU
7.			
8.			
9.			
10.			
11.			
	60	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1. *Rubus ursinus*	20	D	FACU
2.			
	20	= Total Cover	

% Bare Ground in Herb Stratum 40% litter

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 40 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No x

Remarks: Photos east and west.

50/20 rule used to determine dominance.

Sampling Point: SP-5

SOIL

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 5/2	100					sand	Some organics 10%
2-21+	7.5YR 5/4	100					sand	

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) (**except MLRA 1**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Soils indicate disturbance from recreation development.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table.

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: March 6, 2017

Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-6

Investigator(s): C. McDonald, K. Heckeroth Section, Township, Range: Section 32, T3N R10W 29D Lot 100

Landform (hillslope, terrace, etc.): Base of dune slope Local relief (concave, convex, none): linear Slope (%): 3

Subregion (LRR): A Lat: 45.71618 Long: 123.92970 Datum: NAD 83

Soil Map Unit Name: 11D- Netarts fine sandy loam 5-30% slopes NWI classification: N/A

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

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

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

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

Remarks: Sample plot is located west of Classic Street. NWI mapped PEM wetlands in this area. We did not document wetlands within the study area boundary. Erick White marked the southwest corner and where the lot line intersects Classic Street to the north. A long steep dune slope east of Classic Street has some erosion at the base of the slope. Historic vegetation has been cleared and reestablished as a mix of native and non-native shrubs and herbs. Site disturbance is older than 5 years and normal circumstances are present. Overcast with light covering of snow/hail on the ground. Precipitation is near normal levels for this time of year, 5.28 inches of precipitation in the previous two weeks. Blue flagging.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30')			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Sambucus racemosa*	5		UPL
2. *Cytisus scoparius*	30	D	UPL/NL
3. *Gaultheria shallon*	1		FACU
4. *Rubus armenicus*	30	D	FAC
5. *Rhamnus pershiana*	5		FACU
	71	= Total Cover	
Herb Stratum (Plot size: 10')			
1. *Agrostius capillaris*	40	D	FAC
2. *Juncus effusus*	1		FACW
3. *Polystichum munitum*	1		FACU
4. *Epilobium angustifolium*	1		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	53	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1. *Rubus ursinus*	50	D	FACU
2.			
	50	= Total Cover	

% Bare Ground in Herb Stratum 20% litter

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	2	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	50	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	
FACW species	2	x 2 =	4
FAC species	70	x 3 =	210
FACU species	52	x 4 =	228
UPL species	35	x 5 =	175
Column Totals:	164	(A)	617

Prevalence Index = B/A = 3.76

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes ___ No x

Remarks: Photos north to Classic Street and south to lot corner with pink flagging.

50/20 rule used to determine dominance.

SOIL

Sampling Point: SP-6

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-5	7.5YR 2.5/1	100					LS	
5-9	7.5YR 4/3	70					sand	
	7.5YE 3/2	30						
9-20	7.5YR 4/4	100					sand	

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

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

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

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall. Soil has been disturbed. Found charcoal from historic clearing and burning. I looked for splotching in the second horizon but did not find them. Water table is well below 6-12" even during high precipitation periods.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

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

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: Over 5 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table with 24 inches of surface.

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

Project/Site: Encore Wetland Determination City/County: Manzanita/Tillamook Sampling Date: April 11, 2017

Applicant/Owner: Jim Pentz State: OR Sampling Point: SP-7

Investigator(s): C. McDonald Section, Township, Range: Section 32, T3N R10W 29D Lot 2100

Landform (hillslope, terrace, etc.): Sloping dunes Local relief (concave, convex, none): linear Slope (%): 3-5

Subregion (LRR): A Lat: 45.71264 Long: 123.93040 Datum: NAD 83

Soil Map Unit Name: 14A- Haceta fine sand 0-5% slopes NWI classification: N/A

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

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

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

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

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

Remarks: Sample plot is located west of Classic Street in tax lot 2100. NRCS mapped the Haceta in this area, which is a hydric soil. Soils are well-drained and no evidence of ponding, saturation or high water table was observed even though precipitation was above average for this time of year. Site disturbance from land clearing and road construction is older than 5 years and normal circumstances are present. Precipitation above average levels for February and March. 3.46 inches of precipitation in the previous two weeks. Hydrologic conditions are considered non-typical. Blue flagging.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30')	Absolute % Cover	Dominant Species?	Indicator Status
1. *Thuja plicata*	5	D	FAC
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 20')			
1. *Vaccinium ovatum*	5		FACU
2. *Cytisus scoparius*	7	D	UPL/NL
3. *Gaultheria shallon*	5		FACU
4. *Rubus armenicus*	10	D	FAC
5.			
	27	= Total Cover	
Herb Stratum (Plot size: 10')			
1. *Agrostius capillaris*	25	D	FAC
2. *Carex obnupta*	15		OBL
3. *Hypocharis radicata*	10		FACU
4. *Anthoxanthum odoratum*	25	D	FAC
5. *Holcus lanatus*	8		FAC
6.			
7.			
8.			
9.			
10.			
11.			
	83	= Total Cover	
Woody Vine Stratum (Plot size: 20')			
1. *Rubus ursinus*	10	D	FACU
2.			
	10	= Total Cover	

% Bare Ground in Herb Stratum 10

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

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

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

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

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

Hydrophytic Vegetation Present? Yes x No ___

Remarks: Photos south to Necarney City Road and north towards Classic Street
Changes in vegetation from sloping dune to interdune. Sample plot location chosen because of the soils mapped in the area and the dominance of hydrophytic vegetation. 10% litter.

SOIL

Sampling Point: SP-7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/2	100					LS	
3-11	7.5YR 5/4	100					sand	
11-17	7.5YR 4/4	100					sand	

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

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

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10)
___ Red Parent Material (TF2)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

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

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No x

Remarks: Soil is moist from recent rainfall and well drained.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

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

Wetland Hydrology Present? Yes ___ No x

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

Remarks: 2.81 inches of rain in the last 2 weeks. Soil is well-drained and no sign of saturation or water table with 18 inches of surface.

Appendix B. Encore Wetland Determination Photographs

B

Figure 1. Landscape view of the northeast from SP-1 at the driving range in lot 100 (P-1)

Figure 2. SP-2 looking northwest from edge of plot (P-2).

Appendix B. Encore Wetland Determination Photographs

Figure 3. View of forest north from SP-3. (P-3).

Figure 4. SP-5 looking west to the berm behind the driving range (P-4).

Appendix B. Encore Wetland Determination Photographs

Figure 5. Landscape view from lot 1401 ridge looking north (P-5)

Figures 6. Lot 100 west of Classic Street. At SP-6 looking south (P-6).

Appendix B.   Encore Wetland Determination Photographs

Figure 7. View of tax lot 2100 from edge of Necarney City Road looking north with SP-7 flag in the mid ground (P-7).

NOTES

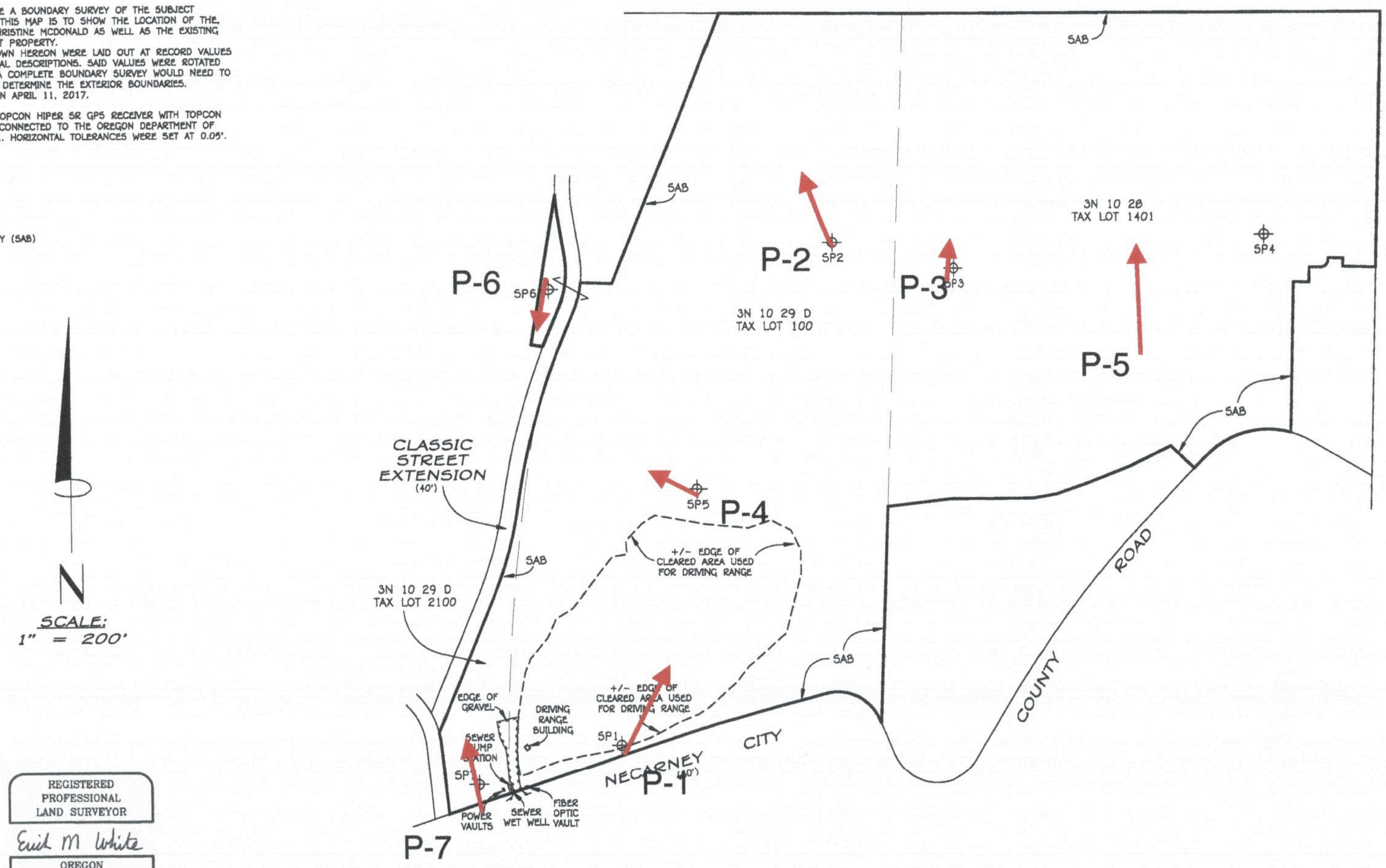
THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY OF THE SUBJECT PROPERTIES. THE PURPOSE OF THIS MAP IS TO SHOW THE LOCATION OF THE SAMPLE POINTS AS FLAGGED CHRISTINE MCDONALD AS WELL AS THE EXISTING IMPROVEMENTS ON THE SUBJECT PROPERTY.
THE EXTERIOR BOUNDARIES SHOWN HEREON WERE LAID OUT AT RECORD VALUES FROM PREVIOUS MAPS AND LEGAL DESCRIPTIONS. SAID VALUES WERE ROTATED TO MATCH THE LOCAL DATUM. A COMPLETE BOUNDARY SURVEY WOULD NEED TO BE PERFORMED TO DIFINITIVELY DETERMINE THE EXTERIOR BOUNDARIES.
FIELD WORK WAS COMPLETED ON APRIL 11, 2017.

DATA WAS ACQUIRED USING A TOPCON HIPER SR GPS RECEIVER WITH TOPCON TESLA DATA COLLECTOR WHILE CONNECTED TO THE OREGON DEPARTMENT OF TRANSPORATION ORGN NETWORK. HORIZONTAL TOLERANCES WERE SET AT 0.05'.

LEGEND

SP SAMPLE POINT

STUDY AREA BOUNDARY (SAB)



REGISTERED
PROFESSIONAL
LAND SURVEYOR

Erick M White

OREGON
APRIL 28, 2014
ERICK M. WHITE
78572

RENEWS 6/30/2018

Figure 6. Photo Point Location & Direction

ENCORE
INVESTMENTS, LLC

3N 10 29D TAX LOT 100,
3N 10 28 TAX LOT 1401 &
A PORTION OF 3N 10 29 D TAX LOT 2100
SW 1/4 SECTION 28 & SE 1/4 SECTION 29, T3N, R10W, W.M.
TILLAMOOK COUNTY
APRIL 11, 2017

ONION PEAK
DESIGN
PO BOX 326
NEHALEM, OR 97131
(503) 368-6102
FAX (503) 368-6102

"DRANGE" #A2017
ENCORE1704-EX.DWG

Report of Geotechnical Investigation HFD-GLD Manzanita Housing Tax Lot 1401 Tillamook County, Oregon

CGT Project Number G2305878

Prepared for

Rob Justus
Green Light - Home First, LLC
3050 SE Division Street, Suite 270
Portland, Oregon 97202

April 14, 2023

April 14, 2023

Rob Justus
Green Light - Home First, LLC
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Report of
Geotechnical Investigation
HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

Dear Rob Justus:

Carlson Geotechnical (CGT), a division of Carlson Testing, Inc. (CTI), is pleased to submit this report summarizing the results of our geotechnical investigation for the proposed HFD-GLD Manzanita Housing project. The site is located within the northeast portion of Tax Lot 1401 in Tillamook County, Oregon. We performed our work in general accordance with CGT Proposal GP23-017, dated February 16, 2023. Written authorization for our services was received on February 23, 2023.

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

REGISTERED PROFESSIONAL ENGINEER
70773PE
OREGON
Jan. 10, 2007
BRAD MICHAEL WILCOX
EXPIRES: 6/30/2024

Bento Nimo, E.I.T.
Geotechnical Project Manager
bnimo3@carlsontesting.com

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

Doc ID: G:\GEOTECH\PROJECTS\2023 Projects\G2305878 - HFD-GLD Manzanita Housing\G2305878 - GEO\008 - Deliverables\Report\G2305878.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 geotechnical investigation for the proposed HFD-GLD Manzanita Housing project. The site is located within the northeast portion of Tax Lot 1401 in Tillamook County, 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 HFD Partners (HFD) and project documents provided to us on February 6, 2023. The documents provided included a preliminary Site Plan, prepared by Polyphon Architecture & Design, LLC, and a marked up aerial image. Based on our review, we understand the project will include:

- Construction of a new common house and several new residential buildings at the site. Although no architectural plans have been provided, we anticipate the structures will be one to three stories, wood-framed, with slab on grade ground floors and/or post and beam ground floor construction (crawlspaces). The common house will incorporate a footprint of roughly 2,500 square feet, and the residential buildings will include a total of 60 units. No below-grade levels (basements) are anticipated for the proposed structures. For the purposes of this report, we have assumed maximum column, continuous wall, and uniform floor slab loads will be on the order of 50 kips, 4 kips per lineal foot (klf), and 150 pounds per square foot (psf), respectively.
- Construction of private driveways and parking areas to provide vehicular access to the new residential structures. We anticipate the new pavements will be surfaced with asphalt concrete (AC).
- Although no stormwater management plans have been provided, we understand stormwater collected from new impervious areas of the site will be disposed of, at least in part, via onsite infiltration. No details regarding the type or location of the proposed stormwater infiltration facility(ies) were available at the time of this assignment. Design of infiltration facility(s) will rest with others. Infiltration testing was requested at two locations at the site at a depth of 5 feet below ground surface (bgs).
- Although no grading plans have been provided, we anticipate permanent grade changes at the site will be relatively minimal, with maximum cuts and fills on the order of about 3 feet in depth.

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. CGT also subcontracted a private utility locator service to mark the locations of detectable private utilities within the same radius.
- Explore subsurface conditions at the site by advancing one hand auger boring to a depth of 10 feet bgs, and observing the excavation of nine test pits to depths of up to about 8½ feet bgs. Details of the subsurface investigation are presented in Appendix A.
- Conduct infiltration testing within two of the test pits. Results of the infiltration testing 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 recommendations for the Seismic Site Class, mapped maximum considered earthquake spectral response accelerations, and site seismic coefficients.
- Provide a qualitative evaluation of seismic hazards at the site, including earthquake-induced liquefaction, landsliding, and surface rupture due to faulting or lateral spread.
- Provide geotechnical recommendations for site preparation and earthwork.
- Provide geotechnical engineering recommendations for use in design and construction of shallow foundations, floor slabs, site retaining walls, and pavements.
- Provide this written report summarizing the results of our geotechnical investigation and recommendations for the project.

2.0 SITE DESCRIPTION

2.1 Site Geology

Based on available geologic mapping[1,2] of the area, the site is underlain by Quaternary sediments consisting of unconsolidated, alluvial and estuarine clay, silt, sand, and gravel deposited along rivers and streams. Nearby cross sections and well logs suggest the Quaternary sediments are about 20 to 30 feet thick in the vicinity of the site and are underlain by Oligocene to Miocene aged sedimentary rocks (Unit Toms). The sedimentary rocks unit consists of thin- to mass-bedded, gray, tuffaceous siltstone and claystone with localized sandstone and shale. This sedimentary rock unit is very thick, extending to depths up to 5,000 feet below the site surface.

2.2 Site Surface Conditions

The site is bordered to the north, south, and east by undeveloped properties, and to the west by a newer residential development (under construction). At the time of our field investigation, the site gently descended to the south, and was generally vegetated with grasses, shrubs, and scattered coniferous and deciduous trees. The northeast portion of the site was densely vegetated with coniferous and deciduous trees. 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 Subsurface Investigation & Laboratory Testing

Our subsurface investigation consisted of one hand auger boring (HA-1) and nine test pits (TP-1 through TP-9) completed at the site on March 31, 2023. The approximate exploration locations are shown on the Site Plan, attached as Figure 2. In summary, the explorations extended to depths ranging from about 5 to 10 feet bgs. 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 Subsurface Materials

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., Niem, A.R., MacLeod, N.S., Snavely, P.D., and Niem, W.A., 1983, Geologic Map of the West Half of the Vancouver 1ºx2º Quadrangle, Oregon: United States Geologic Survey, Open File Report, 83-59I, scale 1:250,000.

2 Schlicker, H.G., Deacon, R.J., Beaulieu, J.D., and Olcott, G.W., 1972, Environmental geology of the coastal region of Tillamook and Clatsop Counties: Oregon Department of Geology and Mineral Industries, Bulletin 74, scale 1:62,500.

Sandy Organic Soil (OL)

Sandy organic soil was encountered at the surface of boring HA-1 and each test pit, and extended to a depth of about ½ foot bgs. This soil was generally brown to dark brown, moist, and contained abundant roots up to ½ inch in diameter, and fine- to medium-grained sand.

Poorly Graded Sand (SP)

Poorly graded sand was encountered below the organic soil in HA-1 and each test pit. This soil was generally loose to medium (based on digging effort), light brown to brown with orange and gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter. Minor to severe caving was observed below about 4 to 7 feet bgs within HA-1 and TP-1 through TP-9. The poorly graded sand extended the full depths explored at the site, about 5 to 10 feet bgs.

2.3.3 Groundwater

Groundwater was not encountered within the depths explored at the site on March 31, 2023. To determine approximate regional groundwater levels in the area, we researched well logs available on the Oregon Water Resources Department (OWRD)[3] website for wells located within Section 28, Township 3 North, Range 10 West, Willamette Meridian. Our review indicated that groundwater levels in the area generally ranged from about 30 to 50 feet bgs. More shallow water zones were reported at depths of about 17 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.

3.0 SEISMIC CONSIDERATIONS

3.1 Seismic Design

Section 1613.2.2 of the 2022 Oregon Structural Specialty Code (2022 OSSC) requires that the determination of the seismic site class be in accordance with Chapter 20 of the American Society of Civil Engineers Minimum Design Loads for Buildings and Other Structures (ASCE 7-16). We have assigned the site as Site Class D ("Stiff Soil") based on geologic mapping and subsurface conditions encountered during our investigation.

Earthquake ground motion parameters for the site were obtained in accordance with the 2022 OSSC using the Seismic Hazards by Location calculator on the ATC website. The site Latitude 45.716955° North and Longitude 123.922144° West were input as the site location. The following table shows the recommended seismic design parameters for the site.

[3] Oregon Water Resources Department, 2023. Well Log Records, *accessed April 2023*, from OWRD web site: http://apps.wrd.state.or.us/apps/gw/well_log/.

Table 1 Seismic Ground Motion Values

Parameter		Value
Mapped Acceleration Parameters	Spectral Acceleration, 0.2 second (S_s)	1.271g
	Spectral Acceleration, 1.0 second (S_1)	0.668g
Coefficients (Site Class D)	Site Coefficient, 0.2 second (F_A)	1.000
	Site Coefficient, 1.0 second (F_V)[1]	1.700
Adjusted MCE Spectral Response Parameters	MCE Spectral Acceleration, 0.2 second (S_{MS})	1.271g
	MCE Spectral Acceleration, 1.0 second (S_{M1})	1.136g
Design Spectral Response Accelerations	Design Spectral Acceleration, 0.2 second (S_{DS})	0.847g
	Design Spectral Acceleration, 1.0 second (S_{D1})	0.757g
Seismic Design Category (Risk Category II)		D

[1] Value determined from 2022 OSSC Table 1613.2.3(2).

3.2 Seismic Hazards

3.2.1 Liquefaction

In general, liquefaction occurs when deposits of loose/soft, saturated, cohesionless soils, generally sands and silts, are subjected to strong earthquake shaking. If these deposits cannot drain quickly enough, pore water pressures can increase, approaching the value of the overburden pressure. The shear strength of a cohesionless soil is directly proportional to the effective stress, which is equal to the difference between the overburden pressure and the pore water pressure. When the pore water pressure increases to the value of the overburden pressure, the shear strength of the soil approaches zero, and the soil can liquefy. The liquefied soils can undergo rapid consolidation or, if unconfined, can flow as a liquid. Structures supported by the liquefied soils can experience rapid, excessive settlement, shearing, or even catastrophic failure.

For fine-grained soils, susceptibility to liquefaction is evaluated based on penetration resistance and plasticity, among other characteristics. Criteria for identifying non-liquefiable, fine-grained soils are constantly evolving. Current practice to identify non-liquefiable, fine-grained soils is based on moisture content and plasticity characteristics of the soils[4,5,6]. The susceptibility of sands, gravels, and sand-gravel mixtures to liquefaction is typically assessed based on penetration resistance, as measured using SPTs, CPTs, or Becker Hammer Penetration tests (BPTs).

As indicated in Section 2.3.3 above, groundwater was not encountered within the depths explored at the site on March 31, 2023. Additionally, review of well logs available on the OWRD website for wells located within the vicinity of the site indicated that groundwater levels in the area generally ranged from about 30 to 50 feet bgs. Based on the lack of saturated conditions, static groundwater, etc., the soils encountered within our explorations are considered non-liquefiable. Based on our previous experience in the area, we do not anticipate liquefiable conditions are present at depths below those explored as part of this assignment.

[4] Seed, R.B. et al., 2003. Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework. Earthquake Engineering Research Center Report No. EERC 2003-06.

[5] Bray, Jonathan D., Sancio, Rodolfo B., et al., 2006. Liquefaction Susceptibility of Fine-Grained Soils, Journal of Geotechnical and Geoenvironmental Engineering, Volume 132, Issue 9, September 2006.

[6] Idriss, I.M., Boulanger, R.W., 2008. Soil Liquefaction During Earthquakes, Earthquakes Engineering Research Institute Monograph MNO-12.

3.2.2 Slope Instability

Review of the Statewide Landslide Information Database for Oregon (SLIDO), available at the DOGAMI website[7], shows no prehistoric or historic landslides on the project site. Pre-historic (over 150 years) landslides are mapped about 750 feet to the north of the site. No obvious signs of recent or on-going slope instability were observed at the site during our field investigation in March 2023. Recognizing the relatively gentle site grades, and provided the recommendations presented later in this report regarding grading are incorporated into design and development, the risk of seismically-induced landslides at the site is considered low.

3.2.3 Surface Rupture

3.2.3.1 Faulting

Although the site is situated in a region of the country with known active faults and historic seismic activity, no known faults exist on or immediately adjacent to the site. Therefore, the risk of surface rupture at the site due to faulting is considered negligible.

3.2.3.2 Lateral Spread

Surface rupture due to lateral spread can occur on sites underlain by liquefiable soils that are located on or immediately adjacent to slopes steeper than about 3 degrees (20H:1V), and/or adjacent to a free face, such as a stream bank or the shore of an open body of water. During lateral spread, the materials overlying the liquefied soils are subject to lateral movement downslope or toward the free face. Given the lack of liquefiable soils, the risk of surface rupture due to lateral spread is considered very low.

4.0 CONCLUSIONS

Based on the results of our field explorations and analyses, the site may be developed as described in Section 1.1 of this report, provided the recommendations presented in this report are incorporated into the design and development. Satisfactory subgrade support for planned shallow foundations, floor slabs, and pavements can be achieved by the native, near-surface, poorly graded sand (SP) or structural fill that is properly placed and compacted on that material during construction. The native poorly graded sand was encountered at depths of about ½-foot bgs in our explorations. Geotechnical recommendations for use in design and construction of the proposed project are presented in the following section of this report.

5.0 RECOMMENDATIONS

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

5.1.1 Stripping & Grubbing

Existing vegetation, topsoil, and rooted soils (OL) should be removed from within, and for a minimum 5-foot margin around, proposed building pad, structural fill, and pavement areas. Based on the results of our field

---

[7] Oregon Department of Geology and Mineral Industries, 2023. Statewide Landslide Information Database for Oregon (SLIDO), *accessed April 2023*, from DOGAMI web site: https://gis.dogami.oregon.gov/maps/slido/.

explorations, topsoil stripping depths are anticipated to be on the order of about ½ foot bgs. These materials may be deeper or shallower at locations away from the completed explorations. The geotechnical engineer's representative should provide recommendations for actual stripping depths based on observations during site stripping. Stripped surface vegetation and rooted soils should be transported off-site for disposal, or stockpiled for later use in landscaped areas.

Grubbing of trees should include the removal of the root mass and roots greater than ½ inch in diameter. Grubbed materials should be transported off-site for disposal. Root masses from larger trees may extend greater than 3 feet bgs. Where root masses are removed, the resulting excavation should be properly backfilled with structural fill in conformance with Section 5.4 of this report.

Any areas in which densely-rooted soils are encountered should be scarified to a minimum depth of 12 inches below the current (prepared) site grades using suitable earthwork equipment (such as "ripping" blades on a bulldozer). This should be performed within, and for a 5-foot margin around (where feasible), the proposed structural fill areas, building pads, and pavement areas. The purpose of this earthwork is to help remove any remaining large and/or heavy concentrations of tree roots. Where encountered, heavy concentrations of organics and/or roots in excess of 1 inch in diameter should be removed (processed) from the scarified subgrade. Following the root processing, the scarified subgrade should be moisture conditioned and compacted to at least 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (Modified Proctor).

5.1.2 Test Pit Backfills

The test pits conducted at the site were loosely backfilled during our field investigation. Where test pits are located within finalized building, structural fill, or pavement areas, the loose backfill materials should be re-excavated. The resulting excavations should be backfilled with structural fill in conformance with Section 5.4 of this report.

5.1.3 Existing Utilities & Below-Grade Structures

All existing utilities at the site should be identified prior to excavation. Abandoned utility lines beneath the new buildings, pavements, 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.

5.1.4 Subgrade Preparation - Building Pads & Pavement Areas

After site stripping as recommended above, but prior to placement of structural fill or base rock, the prepared sandy subgrade soils should be surface compacted with suitable equipment (e.g. smooth drum roller). The subgrade soils should be compacted to not less than 90 percent of the material's maximum dry density as determined by ASTM D1557 (Modified Proctor). The geotechnical engineer or his representative should perform in-place density testing of the compacted subgrade to confirm proper compaction. If areas of soft soil or excessive yielding are identified, the affected material should be repaired as recommended by the geotechnical engineer or his representative.

5.1.5 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 poorly graded sand (SP) encountered at the site. As evidenced in several of the test pits, caving of excavations extending beyond depths of about 5 feet bgs should be expected.

5.2.3 Utility Trenches

Temporary trench cuts should stand near vertical to depths of approximately 4 feet in the native, poorly graded sand encountered near the surface of the site. As evidenced in several of the test pits, caving of trench cuts extending beyond depths of about 5 feet bgs should be expected. If groundwater seepage undermines the stability of the trench, or if sidewall caving 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.

5.2.4 Excavations Near Foundations

Excavations near footings should not extend within a 1½ horizontal to 1 vertical (1½H: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

Due to its very low concentration of fine-grained particles (i.e. silt or clay), the native poorly graded sand (SP) is not considered susceptible to disturbance from wet weather. However, sandy soils are susceptible to raveling under construction traffic and may result in loosening of the surface sands. If the soils become loose due to construction traffic, they should be moisture-conditioned (as necessary) and compacted to a well-keyed condition in accordance with Section 5.1.4 of this report.

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[8]. The geotechnical engineer's 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.

5.4.1 <u>On-Site Soils – General Use</u>

5.4.1.1 Poorly Graded Sand (SP)

Re-use of the on-site, relatively clean, poorly graded sand as structural fill is feasible, provided the material is kept clean of organics, debris, and particles larger than 1½ inches in diameter. If reused as structural fill, the material should be prepared in general accordance with Section 5.4.2 below.

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 <u>Imported Granular Structural Fill – General Use</u>

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 90 percent of the material's maximum dry density, as determined in general accordance with ASTM D1557 (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 <u>Trench Base Stabilization Material</u>

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.

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

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	88% ASTM D1557 or pipe manufacturer's recommendation	85% ASTM D1557 or pipe manufacturer's recommendation
Above Pipe Zone	90% ASTM D1557	88% ASTM D1557
Within 3 Feet of Design Subgrade	90% ASTM D1557	88% ASTM D1557

1 Includes proposed buildings, pavement areas, structural fill areas, exterior 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 existing (native) 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

CGT 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. A representative from CGT should observe the benches, keyways, and associated subdrains, if needed, prior to placement of structural fill.

5.6 Shallow Foundations

5.6.1 Subgrade Preparation

Satisfactory subgrade support for shallow foundations can be obtained from the native, near-surface, poorly graded sand (SP), or new structural fill that is properly placed and compacted on that material during construction. Due to its generally loose near-surface relative density, the native sandy soils should be moisture-conditioned (as necessary) and surface compacted using suitable equipment (e.g. jumping jack compactor, vibrating plate compactor, etc.) until achieving a well-keyed condition.

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, excessively loose, organic-laden, 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.

5.6.2 Minimum Footing Width & Embedment

Minimum footing widths should be in conformance with the most recent Oregon Structural Specialty Code (OSSC). As a guideline, CGT recommends individual spread footings have a minimum width of 24 inches. For one-story, light-framed structures, we recommend continuous wall footings have a minimum width of 12 inches. Similarly, for two-story, light-framed structures, we recommend continuous wall footings have a minimum width of 15 inches. All footings should be founded at least 18 inches below the lowest, permanent adjacent grade for frost protection.

5.6.3 Horizontal Setback from Descending Slopes

Foundations constructed within or near descending slopes should be setback a minimum of 5 feet from the slope surface. This distance 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.

5.6.4 Bearing Pressure & Settlement

Footings founded as recommended above should be proportioned for a maximum allowable soil bearing pressure of 1,500 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. Differential settlements between adjacent columns and/or bearing walls should not exceed ½ inch. If an increased allowable soil bearing pressure is desired, the geotechnical engineer should be consulted.

5.6.5 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 0.40 may be used when calculating resistance to sliding for footings founded on the native sandy 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.

5.7 Rigid Retaining Walls

5.7.1 Footings

Retaining wall footings should be designed and constructed in conformance with the recommendations presented in Section 5.6, as applicable.

5.7.2 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.

5.7.3 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 ASTM D1557 (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.

5.7.4 Design Parameters & Limitations

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

Table 3 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 (β = 0 and δ = 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 (ϕ = 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.

5.8 Floor Slabs

5.8.1 Subgrade Preparation

Satisfactory subgrade support for slabs constructed on grade, supporting up to 150 psf area loading, can be obtained from the native, near-surface, poorly graded sand (SP), or new structural fill that is properly placed and compacted on that material during construction. Due to its generally loose near-surface relative density, the native sandy soils should be moisture-conditioned (as necessary) and surface compacted using suitable equipment (e.g. vibrating plate compactor, smooth drum roller, etc.) until achieving a well-keyed condition.

The geotechnical engineer's representative should observe floor slab subgrade soils to evaluate surface relative densities. If soft, excessively loose, or otherwise unsuitable soils are encountered, they should be over-excavated as recommended by CGT geotechnical representative at the time of construction. The resulting over-excavation should be brought back to grade with imported granular structural fill as described in Section 5.4.2 of this report.

5.8.2 Crushed Rock Base

Concrete floor slabs should be supported on a minimum 4-inch-thick layer of crushed rock (base rock).

5.8.2.1 Conventional Base Rock

Floor slab base rock should consist of well-graded granular material (crushed rock) containing no organic matter or debris, have a maximum particle size of ¾ inch, and have less than 5 percent material passing the U.S. Standard No. 200 Sieve. Floor slab base rock should be placed in one lift and compacted to not less than 90 percent of the material’s maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor). We recommend “choking” the surface of the base rock with sand just prior to concrete placement. Choking means the voids between the largest aggregate particles are filled with sand, but does not provide a layer of sand above the base rock. Choking the base rock surface reduces the lateral restraint on the bottom of the concrete during curing. Choking the base rock also reduces punctures in vapor retarding membranes due to foot traffic where such membranes are used.

5.8.2.2 Gas Permeable Base Rock

Floor slab base rock in areas where radon gas mitigation is desired should consist of open-graded crushed rock containing no organic matter or debris, with all material passing through a 1-inch sieve, less than 10 percent passing the ½-inch sieve, no fines (0 percent passing the U.S. Standard No. 200 sieve), and a free void space of approximately 50 percent in accordance with Section 1811.2.1.1 of the 2022 OSSC.

CGT recommends that a minimum 10-mil polyethylene sheeting or equivalent material with equal or greater tensile strength, resistance to puncture, resistance to deterioration, and resistance to water-vapor transmission be placed on top of the gas-permeable base rock to act as a soil-gas-retarder. Placement and installation of this sheeting should be in conformance with that indicated in Section 1811.2.2 of the 2022 OSSC.

5.8.3 Design Considerations

For floor slabs constructed with a 4-inch thick base rock layer as recommended, an effective modulus of subgrade reaction of 200 pounds per cubic inch (pci) is recommended for the design of the floor slab. A higher effective modulus of subgrade reaction can be obtained by increasing the base rock thickness. Please contact the geotechnical engineer for additional recommendations if a higher modulus is desired. Floor slabs constructed as recommended will likely settle less than ½ inch. For general floor slab construction, slabs should be jointed around columns and walls to permit slabs and foundations to settle differentially.

5.8.4 Subgrade Moisture Considerations

Liquid moisture and moisture vapor should be expected at the subgrade surface. The recommended crushed rock base is anticipated to provide protection against liquid moisture. Where moisture vapor emission through the slab must be minimized, e.g. impervious floor coverings, storage of moisture sensitive materials directly on the slab surface, etc., a vapor retarding membrane or vapor barrier below the slab should be considered. Factors such as cost, special considerations for construction, floor coverings, and end use suggest that the decision regarding a vapor retarding membrane or vapor barrier be made by the architect and owner.

If a vapor retarder or vapor barrier is placed below the slab, its location should be based on current American Concrete Institute (ACI) guidelines, ACI 302 Guide for Concrete Floor and Slab Construction. In some cases, this indicates placement of concrete directly on the vapor retarder or barrier. Please note that the placement of concrete directly on impervious membranes increases the risk of plastic shrinkage cracking and slab curling in the concrete. Construction practices to reduce or eliminate such risk, as described in ACI 302, should be employed during concrete placement.

5.9 Pavements

5.9.1 Subgrade Preparation

Pavement subgrade preparation should be performed in general accordance with the recommendations presented in Section 5.1.4 above. Subgrade surfaces should be crowned (or sloped) for proper drainage in accordance with specifications provided by the project civil engineer.

5.9.2 Traffic Levels

Recognizing that traffic data has not been provided, CGT has considered three levels of traffic demand for review and design of pavement sections. We modeled the following three design cases (traffic levels) developed from the Asphalt Pavement Association of Oregon (APAO):

- *APAO Level I (Very Light):* This design case considers typical average daily truck traffic (ADTT) of 1 per day over 20 years. Among others, examples under this loading consist of passenger car parking stalls, residential driveways, and seasonal recreational roads.
- *APAO Level II (Light):* This design case considers typical ADTT of 2 to 7 per day over 20 years. Examples under this loading consist of residential streets and parking lots of less than 500 stalls.
- *APAO Level III (Low Moderate):* This design case considers typical ADTT of 7 to 14 per day over 20 years. Among others, examples under this loading consist of urban minor collector streets and parking lots with more than 500 stalls.

5.9.3 Input Parameters

Our asphalt concrete (AC) pavement section designs were based on the American Association of State Highway and Transportation Officials (AASHTO) 1993 "Design of Pavement Structures" manual. A number of design assumptions and variables were required in order to develop design sections for pavements proposed at the site. The following table presents the input parameters assumed for the design:

Table 4 Input Parameters Used in AC Pavement Design

Input Parameter	Design Value[1]	Input Parameter		Design Value[1]
Pavement Design Life	20 years	Resilient Modulus	Subgrade (Compacted Sand)[3]	10,000 psi
Annual Percent Growth	0 percent		Crushed Aggregate Base	20,000 psi
Initial Serviceability	4.2 initial	Structural Coefficient	Crushed Aggregate Base	0.10
Terminal Serviceability	2.5 terminal		Asphalt	0.42
Reliability	75 percent	Vehicle Traffic[4] (range in ESAL)	Level I (Very Light)	Less than 10,000
Standard Deviation	0.49		Level II (Light)	Less than 50,000
Drainage Factor[2]	1.0		Level III (Low Moderate)	Less than 100,000

1. If any of the above parameters are incorrect, please contact us so that we may revise our recommendations, if warranted.
2. Assumes good drainage away from pavement, base, and subgrade is achieved by proper crowning of subgrades.
3. Values based on experience with similar soils.
4. ESAL = Total 18-Kip equivalent single axle load. Refer to Section 5.9.2 for additional discussion. If actual traffic levels will be above those identified above, the geotechnical engineer should be consulted.

5.9.4 Recommended Minimum Sections

The following table presents the minimum AC pavement sections for the traffic loads indicated in the preceding table, based on the referenced AASHTO procedures.

Table 5 Recommended Minimum AC Pavement Sections

Material	Level I (Very Light Traffic)	Level II (Light Traffic)	Level III (Low Moderate Traffic)
Asphalt Pavement (inches)	3	3½	4
Crushed Aggregate Base (inches)	4	6	6
Subgrade Soils	Prepared in conformance with Section 5.6.1 of this report.		

5.9.5 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 5 percent material passing the U.S. Standard No. 200 Sieve. Aggregate base should be compacted to not less than 95 percent of the material's maximum dry density as determined in general accordance with ASTM D1557 (Modified Proctor).

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).

5.10 Additional Considerations

5.10.1 Drainage

Subsurface drains, if incorporated, should be connected to the nearest storm drain, on-site infiltration system (to be designed by others) or other suitable discharge point. Paved surfaces and grading near or adjacent to the buildings should be sloped to drain away from the buildings. 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 foundation drains (if incorporated), retaining wall drains, or onto site slopes.

5.10.2 Expansive Potential

The near surface native soils consist of non-plastic sandy soils. 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 RECOMMENDED ADDITIONAL SERVICES

6.1 Design Review

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

6.2 Observation of Construction

Satisfactory earthwork, foundation, floor slab, 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 geotechnical engineer's representative attend a pre-construction meeting coordinated by the contractor and/or developer. The project geotechnical engineer's representative should provide observations and/or testing of at least the following earthwork elements during construction:

- Site Stripping and Grubbing
- Subgrade Preparation for Shallow Foundations, Retaining Walls, Structural Fills, Floor Slabs, and Pavements
- Compaction of Structural Fill, Retaining Wall Backfill, and Utility Trench Backfill
- Compaction of Base Rock for Floor Slabs and 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.

7.0 LIMITATIONS

We have prepared this report for use by the owner/developer 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.

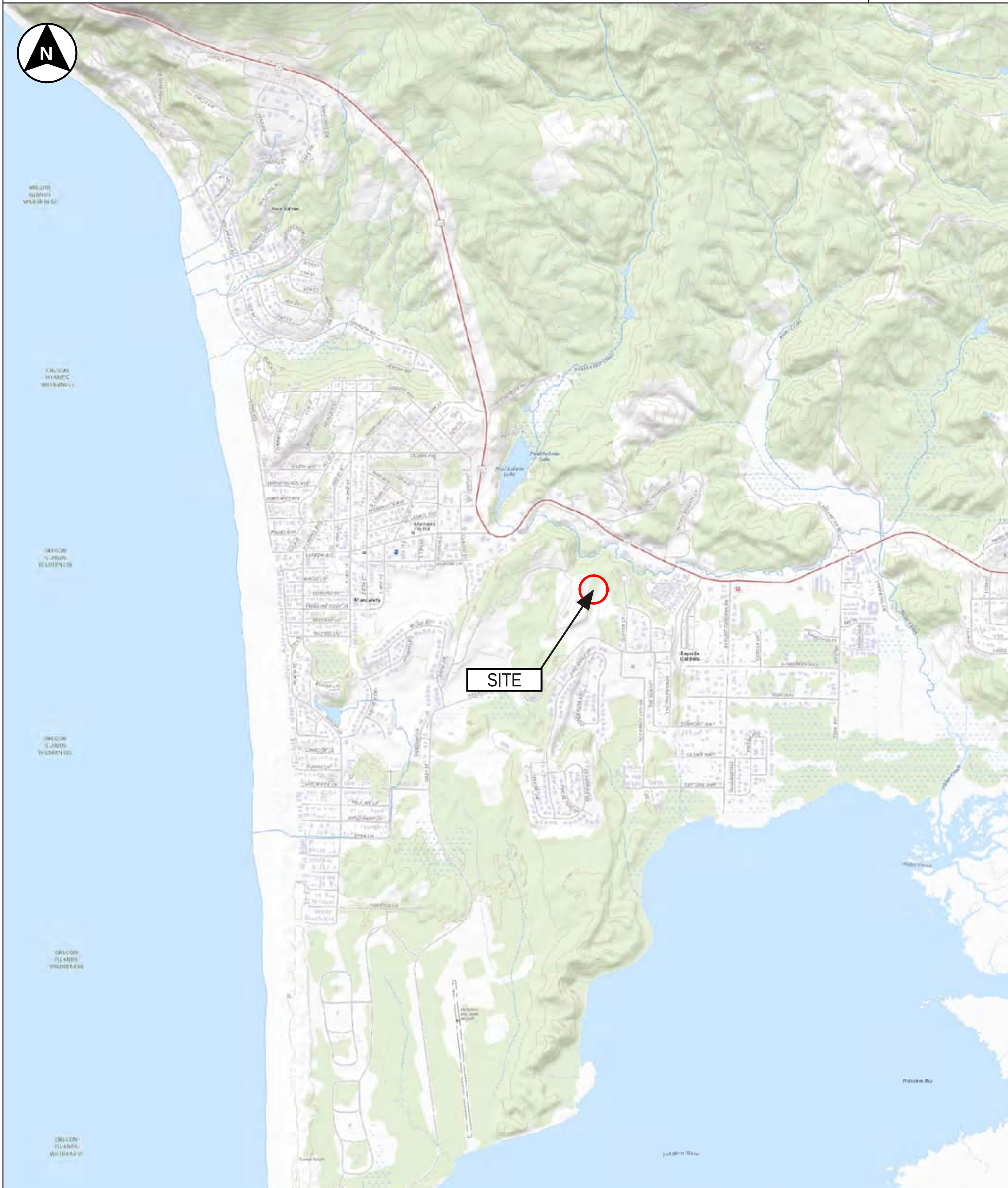
The scope of our services does not include services related to construction safety precautions, and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

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.

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

FIGURE 1

Site Location



CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by: BLN

USGS Topographic base map created with The National Map, 2022, at https://viewer.nationalmap.gov/advanced-viewer/

Township 3 North, Range 10 West, Section 28, Willamette Meridian

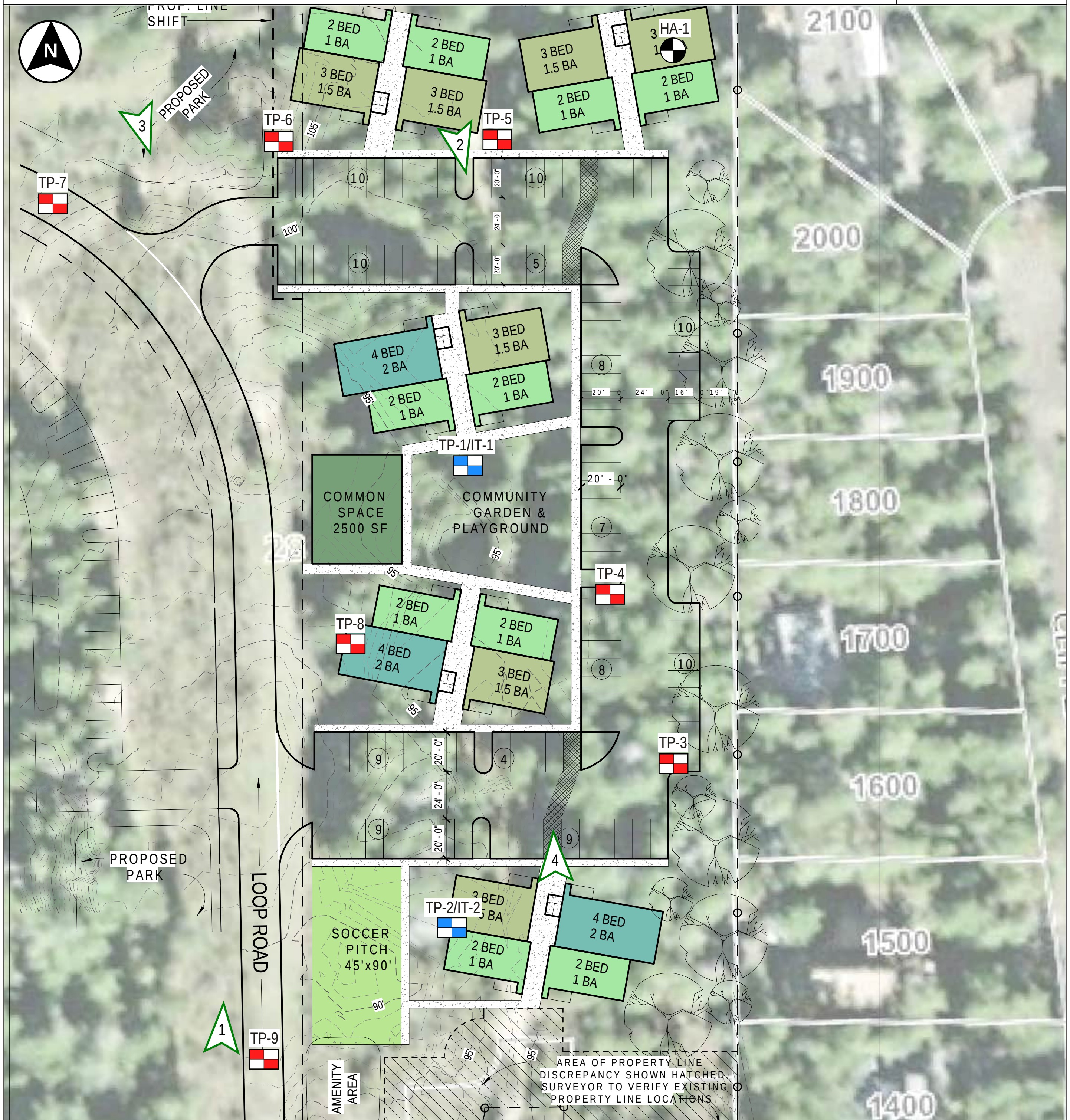
Latitude: 45.716955° North
Longitude: 123.922144° West

1 Inch = 2,000 feet

0 2000 4000

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

FIGURE 2
Site Plan



LEGEND

HA-1 Hand auger boring

TP-3 Test pit exploration

TP-1/IT-1 Test pit exploration and infiltration test

1 Orientation of site photographs shown on Figure 3

CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by:BN/BG

NOTES: Drawing based on observations made while on site and site plans provided by client. All locations are approximate.

1 Inch = 60 Feet

0 60 120

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON Project Number G2305878	FIGURE 3 Site Photographs

Photograph 1

Photograph 2

Photograph 3

Photograph 4

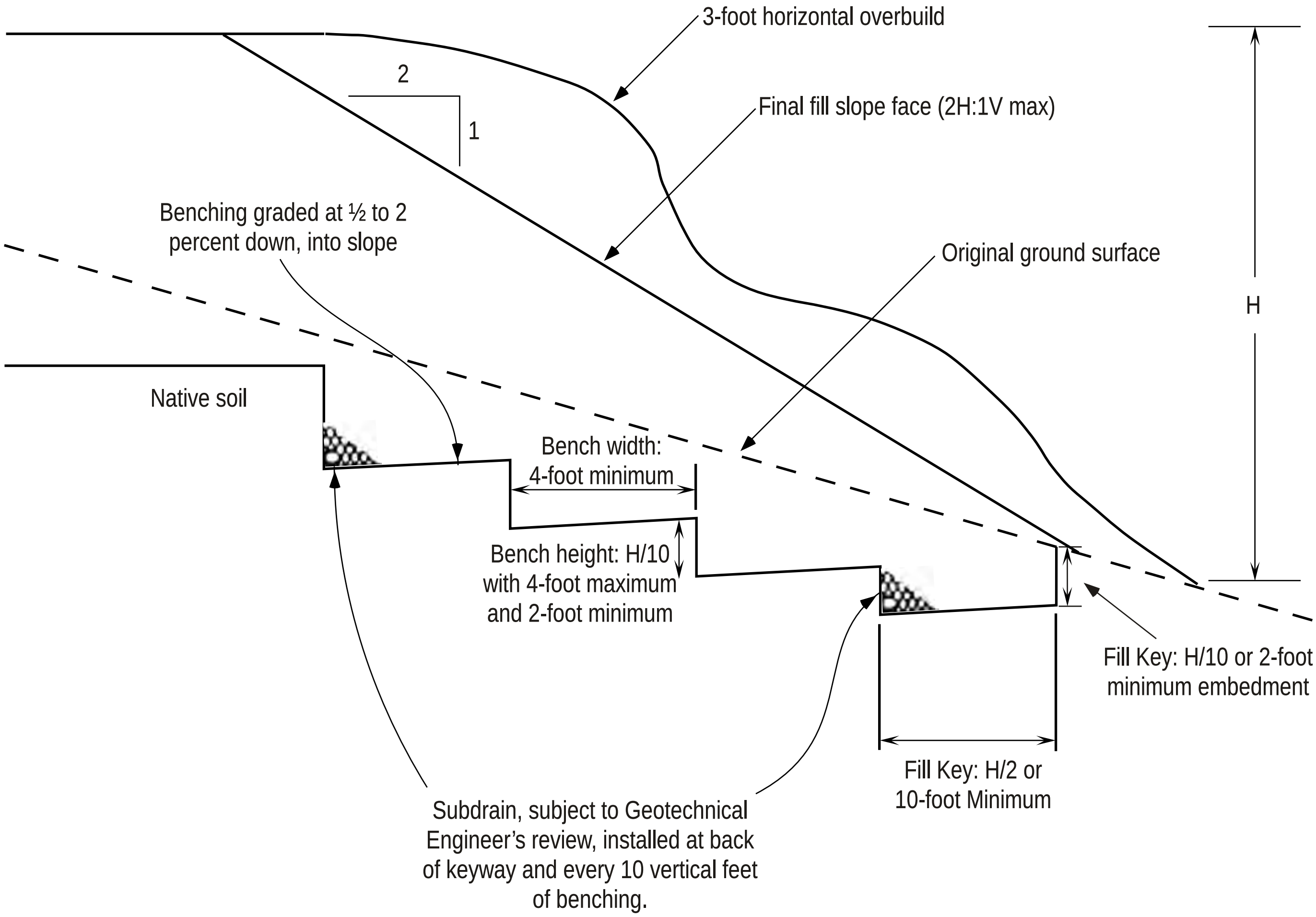
CARLSON CGT GEOTECHNICAL 503-601-8250

Drafted by: BJG

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

FIGURE 4

Fill Slope Detail

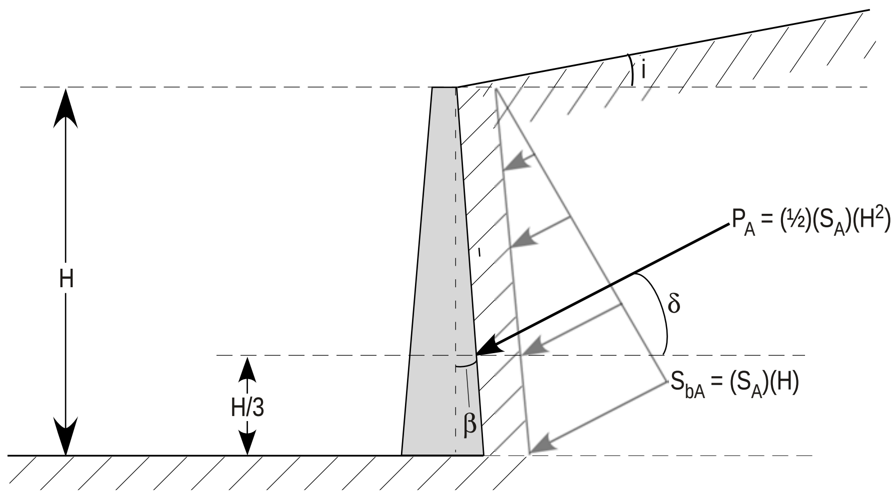


CARLSON CGT GEOTECHNICAL 503-601-8250

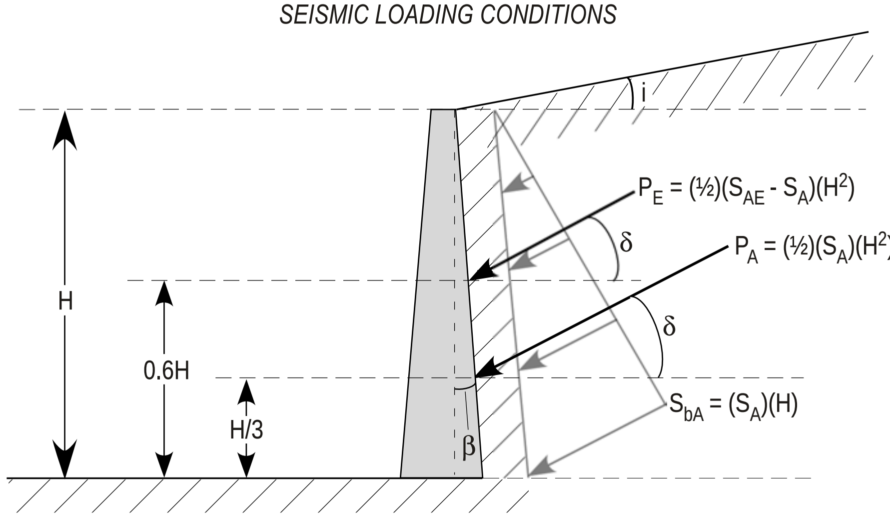
NOTE: Surfaces to receive fill with slopes steeper than 5H:1V (horizontal:vertical) should be benched and keyed as shown.

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

CARLSON CGT GEOTECHNICAL 503-601-8250

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].

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**

Appendix A: Subsurface Investigation and Laboratory Testing

HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

April 14, 2023

Prepared For:

Green Light - Home First, LLC
Attn: Rob Justus
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Prepared by
Carlson Geotechnical

A.1.0 SUBSURFACE INVESTIGATION

Our field investigation consisted of one hand auger boring and nine test pits completed at the site on March 31, 2023. The exploration locations are shown on the Site Plan, attached to the geotechnical report as Figure 2. The exploration locations were recorded in the office using desktop GIS software and located in the field using a cellular telephone, and are approximate (+/- 30 feet horizontally). Surface elevations indicated on the logs were estimated based on the topographic contours (by others) shown on the referenced Site Plan and are approximate. The attached figures detail the exploration methods (Figure A1), soil classification criteria (Figure A2), and present detailed logs of the explorations (Figure A3 through A12), as discussed below.

A.1.1 Hand Auger Borings

CGT advanced one hand auger boring (HA-1) to a depth of about 10 feet bgs. The boring was advanced using a manual, 3-inch-diameter hand auger. The hand auger boring was loosely backfilled with the excavated materials upon completion.

A.1.2 Test Pits

CGT observed the excavation of nine test pits (TP-1 through TP-9) at the site to depths of about 5 to 8½ feet bgs. The test pits were excavated using a John Deere 35G mini-excavator provided and operated by our excavation subcontractor, Doug Shepherd's Dirtworks of Keizer, Oregon. The test pits were loosely backfilled with the excavated materials upon completion.

A.1.3 In-Situ Testing

A.1.3.1 Dynamic Cone Penetrometer Test

In conjunction with the hand auger boring, we advanced one dynamic cone penetrometer test to a depth of 11 feet bgs. The test was performed using a Wildcat Dynamic Cone Penetrometer (WDCP) provided and operated by CGT. The WDCP test is described on the attached Exploration Key, Figure A1. Results of the WDCP test are provided on the log for boring HA-1.

A.1.3.2 Infiltration Tests

CGT performed two infiltration tests (IT-1 and IT-2) at the site within test pits TP-1 and TP-2, respectively, at a depth of about 5 feet bgs. Details regarding the test procedure and results of the tests are presented in Appendix B.

A.1.4 Material Classification & Sampling

Representative disturbed (grab) samples of the soils encountered were obtained at selected intervals within the test pits and hand auger boring. Qualified members 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 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.

A.1.5 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, Figure A3 through A12.

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:

- Ten moisture content determinations (ASTM D2216).
- Two percentage passing the U.S. Standard No. 200 Sieve tests (ASTM D1140).

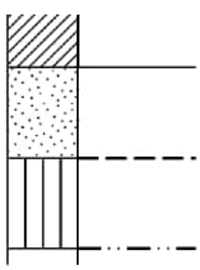
Results of the laboratory tests are shown on the exploration logs.

PL — MC — LL	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 })

CARLSON CGT GEOTECHNICAL 503-601-8250

All measurements are approximate.

HFD-GLD MANZANITA HOUSING - TILLAMOOK COUNTY, OREGON
Project Number G2305878

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 Medium Coarse	#200 - #40 (0.425 mm) #40 - #10 (2 mm) #10 - #4 (4.75 mm)
Gravel	Fine Coarse	#4 - 0.75 inch 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

CARLSON CGT GEOTECHNICAL 503-601-8250

References:

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.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

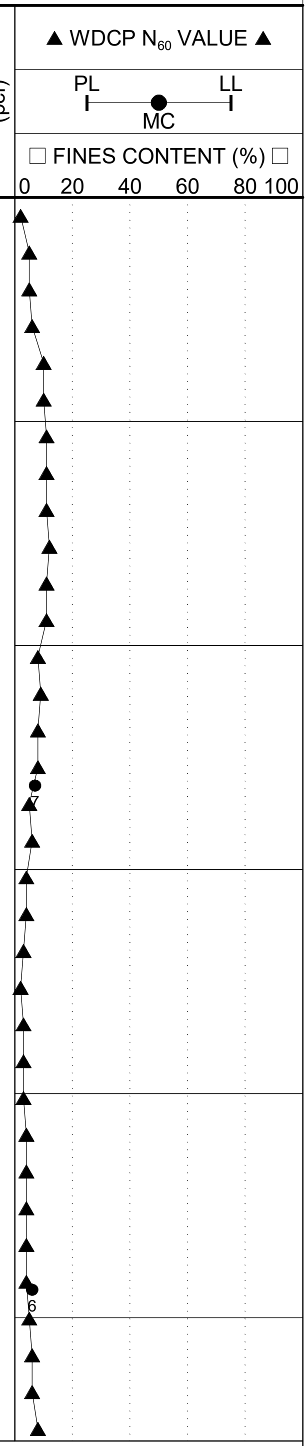
FIGURE A3

Boring HA-1

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 110 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
DRILLING CONTRACTOR CGT
SEEPAGE ---
EQUIPMENT Manual Hand Auger & WDCP
GROUNDWATER DURING DRILLING ---
DRILLING METHOD Manual Hand Auger
GROUNDWATER AFTER DRILLING ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)
110		OL	**SANDY ORGANIC SOIL**: Loose, dark brown, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0				
		SP	**POORLY GRADED SAND**: Loose, tan with orange mottling, moist, and contained some rootlets within the upper 6 inches.						
108			Medium dense below about 2 feet bgs.		2				
106			Loose below about 4 feet bgs		4				
						GRAB 1	100		
104					6				
			Minor caving below about 7 feet bgs.						
102					8				
100					10	GRAB 2	100		
98			• Boring terminated at 10 feet bgs. • Minor caving encountered below about 7 feet bgs. • No groundwater encountered. • Boring loosely backfilled with excavated materials upon completion.						

WDCP N_{60} VALUE (top to bottom, from 0 to 10 feet): 2, 5, 5, 6, 10, 10, 11, 11, 11, 12, 11, 11, 8, 9, 8, 8, 5, 6, 4, 4, 3, 2, 3, 3, 3, 4, 4, 4, 4, 4, 5, 6, 6, 8



Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A4

Test Pit TP-1

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF **SURFACE** Sand
LOGGED BY AET **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter and fine- to medium-grained sand.		0						
			POORLY GRADED SAND: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
92					2	GRAB 1	100				
		SP	Light gray below about 3 feet bgs.								
90			No roots below 4 feet bgs.		4						
						GRAB 2	100				1 ☐ ● 5
88			• Test pit terminated a 5 feet bgs. • Infiltration test conducted at 5 feet bgs. Refer to Appendix B for test results. • No caving or groundwater encountered. • Test pit loosely backfilled with excavated materials upon completion.								
86											
84											

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A5

Test Pit TP-2

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF **SURFACE** Sand
LOGGED BY AET **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
		OL	**SANDY ORGANIC SOIL**: Light gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**:*Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
92					2						
		SP	Light gray with brown mottling below about 3 feet bgs.			GRAB 1	100				
90					4						
						GRAB 2	100				1 / 7

• Test pit terminated a 5 feet bgs.
• Infiltration test conducted at 5 feet bgs. Refer to Appendix B for test results.
• No caving or groundwater encountered.
• Test pit loosely backfilled with excavated materials upon completion.

88

86

84

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A6

Test Pit TP-3

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 98 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
					0						
		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.								
			POORLY GRADED SAND: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
96					2						
94		SP			4						
			Minor caving below about 5 feet bgs.								
92					6						
			Severe caving below about 7 feet bgs.								
90					8	GRAB 1	100				MC: 6
88											

• Test pit terminated at 8 feet bgs due to caving.
• Minor to severe caving encountered below about 5 to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A7

Test Pit TP-4

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 96 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
96		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
94					2						
92					4						
90					6	GRAB 1	100				MC 5
			Minor caving below about 6 feet bgs.								
			Severe caving below about 7 feet bgs.			GRAB 2	100				
88											
86											

• Test pit terminated at 7½ feet bgs due to caving.
• Minor to severe caving encountered below about 6 to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A8

Test Pit TP-5

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 102 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 50ºF
SURFACE Sand
LOGGED BY BJG
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
102		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
100					2						
98					4	GRAB 1	100				● 5
96			Moderate caving below about 5½ feet bgs.		6						
			Severe caving below about 7 feet bgs.			GRAB 2	100				● 5

• Test pit terminated at 7 feet bgs due to caving.
• Moderate to severe caving encountered below about 5½ to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

94

92

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A9

Test Pit TP-6

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 94 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF **SURFACE** Sand
LOGGED BY BJG **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Brown, moist, and contained some rootlets/roots up to ½-inch in diameter, and fine- to medium-grained sand.		0						
			POORLY GRADED SAND: *Loose*, tan with orange mottling, moist, and fine- to medium-grained.								
92					2						
90		SP			4						
			Moderate caving below about 5 feet bgs.								
88					6						
						GRAB 1	100				MC 5
			Severe caving encountered below about 7 feet bgs.								
86											
84											

• Test pit terminated at 7½ feet bgs due to severe caving.
• Moderate to severe caving encountered below 5 to 7 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A10

Test Pit TP-7

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 105 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF
SURFACE Sand
LOGGED BY AET
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL MC LL / ☐ FINES CONTENT (%) ☐ 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
104		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
102					2						
100					4						
98			Severe caving below about 6½ feet bgs.		6						
					8	GRAB 1	100				MC: 6
96											

• Test pit terminated at 8½ feet bgs due to caving.
• Severe caving encountered below about 6½ feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A11

Test Pit TP-8

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23
GROUND ELEVATION 100 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF
SURFACE Sand
LOGGED BY AET
REVIEWED BY BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ / 0 20 40 60 80 100
		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ½-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
98					2						
96			Gray with brown mottling, and moderate caving below about 4 feet bgs.		4						
94					6	GRAB 1	100				● 5
92					8						
90											

- Test pit terminated at 8 feet bgs due to caving.
- Moderate caving encountered below about 4 feet bgs.
- No groundwater encountered.
- Test pit loosely backfilled with excavated material upon completion.

Carlson Geotechnical
A Division of Carlson Testing, Inc.
www.carlsontesting.com

FIGURE A12

Test Pit TP-9

CLIENT Green Light - Home First, LLC
PROJECT NAME HFD-GLD Manzanita Housing
PROJECT NUMBER G2305878
PROJECT LOCATION Tax Lot 1401, Manzanita, Oregon
DATE STARTED 3/31/23 **GROUND ELEVATION** 90 ft
ELEVATION DATUM Topographic contours shown on Figure 2
WEATHER Rain, 49ºF **SURFACE** Sand
LOGGED BY AET **REVIEWED BY** BMW
EXCAVATION CONTRACTOR Doug Shepherd Dirtworks
SEEPAGE ---
EQUIPMENT John Deer 35G with 18-inch wide smooth bucket
GROUNDWATER DURING DRILLING ---
EXCAVATION METHOD Test Pit
GROUNDWATER AFTER EXCAVATION ---

ELEVATION (ft)	GRAPHIC LOG	GROUP SYMBOL	MATERIAL DESCRIPTION	GROUNDWATER	DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	WDCP N_{60} VALUE	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	▲ WDCP N_{60} VALUE ▲ / PL — MC — LL / ☐ FINES CONTENT (%) ☐ (0 20 40 60 80 100)
90		OL	**SANDY ORGANIC SOIL**: Dark gray, moist, and contained abundant rootlets/roots up to ¼-inch in diameter, and fine- to medium-grained sand.		0						
		SP	**POORLY GRADED SAND**: *Loose*, brown with gray mottling, moist, fine- to medium-grained, and contained trace roots up to 1 inch in diameter.								
88					2						
			Gray with brown mottling below about 3 feet bgs.								
86					4						
			Moderate caving below about 5 feet bgs.								
84					6	GRAB 1	100				● 6
82											
80											

• Test pit terminated at 6½ feet bgs due to caving.
• Moderate caving encountered below about 5 feet bgs.
• No groundwater encountered.
• Test pit loosely backfilled with excavated material upon completion.

Appendix B: Results of Infiltration Testing

HFD-GLD Manzanita Housing
Tax Lot 1401
Tillamook County, Oregon

CGT Project Number G2305878

April 14, 2023

Prepared For:

Green Light- Home First, LLC
Attn: Rob Justus
3050 SE Division Street, Suite 270
Portland, Oregon 97202

Prepared by
Carlson Geotechnical

B.1.0 INTRODUCTION

Our client requested two infiltration tests at the project site. The tests were performed in test pits TP-1 and TP-2 on the Site Plan, which is attached to the main report as Figure 2.

B.2.0 TEST PROCEDURE

Two infiltration tests (IT-1 and IT-2) were performed in general accordance with the Falling Head Infiltration Test method as described in Chapter 3 of the 1980 EPA Onsite Wastewater Treatment and Disposal Systems Design Manual (1980 EPA).

The tests were performed within prepared test pits TP-1 and TP-2, which were advanced to the infiltration test depth (5 feet bgs) with a John Deere 35G mini-excavator with a 2-foot-wide toothed bucket. Once the test pits were advanced to the infiltration test depth, a 6-inch diameter PVC pipe was pushed about 6 inches into the soil at the test depth to obtain a proper seal between the PVC pipe and surrounding soils. A thin layer of clean gravel was placed within each pipe to prevent scouring the soil with water during testing.

We attempted to soak the subsurface soils within TP-1 and TP-2 by pouring an approximate 12-inch column of water into the test pipes. The water infiltrated into the subsurface soils in less than 10 minutes. This was repeated a second time with similar results; therefore, we immediately proceeded with the infiltration test in general accordance with the referenced test method. We poured about 6 inches of water into each test pipe and recorded the time required for the water to completely infiltrate into the subsurface materials during each trial. We administered several trials in TP-1 and TP-2.

B.3.0 INFILTRATION TEST RESULTS

The following table presents the details, raw data, and calculated infiltration rates observed during testing. Please note that the calculated infiltration rates do not include any safety or correction factors.

Table B1 Results of Infiltration Test IT-1

Location:	See Figure 2	Date:	3-31-23	Exploration Number:	TP-1
Test Method:	1980 EPA Falling Head Test Method.	Inner Diameter of Pipe:	6 inches	Infiltration Test Depth:	5 feet
Soil at infiltration test depth:	Poorly Graded Sand (SP)				
Saturation Start Time:	11:28:00 a.m.	Excavation could not maintain head. Test pipe filled twice with 12 inches of water, and water completely drained out of test pipe within less than 10 minutes.			
Saturation End Time:	11:34:00 a.m.				

	Time	Time Interval (Minutes)	Measurement* (inches)	Drop in Water level* (inches)	Infiltration Rate** (inches per hour)	Remarks
Trial 1	11:36:00 a.m.	---	41½	---	---	Water level adjusted
	11:41:10 a.m.	5.2	47½	6	69.23	Trial 1 concluded
Trial 2	11:42:00 a.m.	---	41½	---	---	Water level adjusted
	11:45:58 a.m.	4.0	47½	6	90.00	Trial 2 concluded
Trial 3	11:47:00 a.m.	---	41½	---	---	Water level adjusted
	11:51:30 a.m.	4.5	47½	6	80.00	Trial 3 concluded
Trial 4	11:52:00 a.m.	---	41½	---	---	Water level adjusted
	11:56:48 a.m.	4.8	47½	6	75.00	Trial 4 concluded
Measured Infiltration Rate					**75 Inches per hour**	

* Measured to the nearest one-sixteenth of an inch using a measuring tape.

** Values calculated are raw (unfactored) rates.

Table B2 Results of Infiltration Test IT-2

Location:	See Figure 2	Date:	3-31-23	Exploration Number:	TP-2
Test Method:	1980 EPA Falling Head Test Method.	Inner Diameter of Pipe:	6 inches	Infiltration Test Depth:	5 feet
Soil at infiltration test depth:	Poorly Graded Sand (SP)				
Saturation Start Time:	10:23:00 a.m.	Excavation could not maintained head. Test pipe filled twice with 12 inches of water, and water completely drained out of test pipe within less than 10 minutes.			
Saturation End Time:	10:46:00 a.m.				

	Time	Time Interval (Minutes)	Measurement* (inches)	Drop in Water level* (inches)	Infiltration Rate** (inches per hour)	Remarks
Trial 1	10:46:00 a.m.	---	56¼	---	---	Water level adjusted
	10:51:10 a.m.	5.2	62¼	6	69.23	Trial 1 concluded
Trial 2	10:52:00 a.m.	---	56¼	---	---	Water level adjusted
	10:56:43 a.m.	4.7	62¼	6	76.60	Trial 2 concluded
Trial 3	10:58:00 a.m.	---	56¼	---	---	Water level adjusted
	11:02:53 a.m.	4.9	62¼	6	73.47	Trial 3 concluded
Trial 4	11:10:00 a.m.	---	56¼	---	---	Water level adjusted
	11:14:47 a.m.	4.8	62¼	6	75.00	Trial 4 concluded
Measured Infiltration Rate					**75 Inches per hour**	

* Measured to the nearest one-sixteenth of an inch using a measuring tape.

** Values calculated are raw (unfactored) rates.

B.4.0 DISCUSSION

As detailed above, the measured raw (unfactored) infiltration rate was 75 inches per hour at the tested locations and depth. Please note this infiltration rate does not include any safety or correction factors. We recommend the stormwater infiltration system designer consult the appropriate design manual in order to assign appropriate safety/correction factors to calculate the design infiltration rate for the proposed infiltration system.

Once the design is completed, we recommend the infiltration system design (provided by others) and location be reviewed by the geotechnical engineer. If the location and/or depth of the system change from what was indicated at the time of our fieldwork, additional testing may be recommended.

MORGAN CIVIL ENGINEERING, INC.

PO Box 358, Manzanita, OR 97130

ph: 503-801-6016

www.morgancivil.com

December 18, 2024

Jim Pentz
Encore Investments, LLC
PO Box 6299
Bend, OR 97708 jim@jptz.com

Re: ***Evaluation of Manzanita Pines, Eastern Portion of Tax Lot 1401, Map 3N 10W 28, City of Manzanita, Tillamook County, Oregon***
Project #20-02-PD8

Dear Mr. Pentz:

At the request of Jerry Jones, I have completed an evaluation of the subject portion of the reference property. This investigation included a site inspection of the subject property with Jim Pentz.

I have walked the area to be developed as part of this investigation and reviewed the topography and soils in the area.

The area to be developed is outside of the hazard overlay zone and away from any steep slopes.

The planned development is to consist of roadways, parking lots, and homes. In my opinion, these improvements will not have a significant impact on the sand dunes.

All construction should follow typical methods and ordinances for construction on dune sand.

Should you have any questions regarding my investigation or this report, please contact me at jason@morgancivil.com or 503-801-6016.

Sincerely,

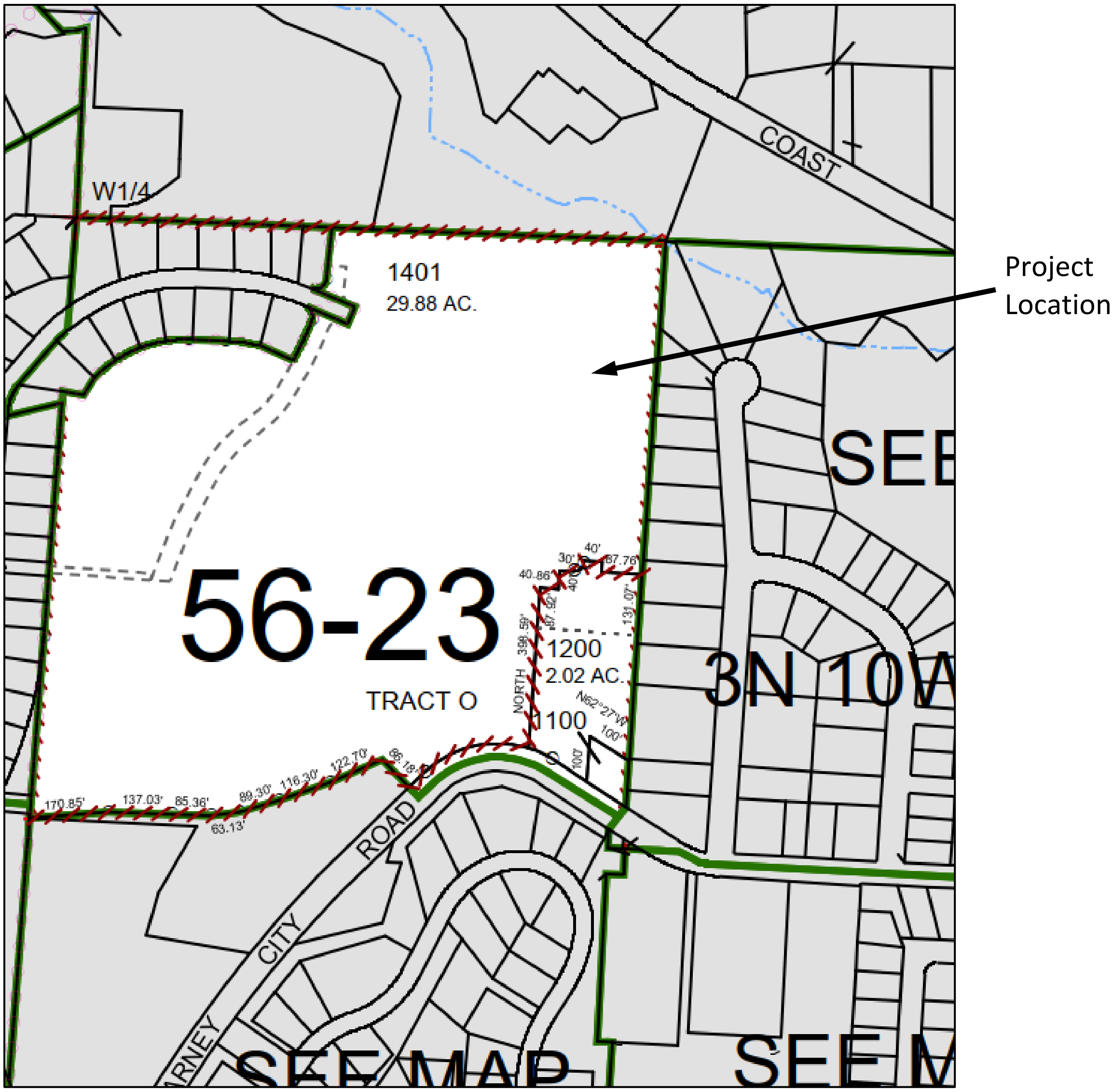
MORGAN CIVIL ENGINEERING, INC.

Jason R. Morgan, PE
Professional Engineer

RENEWAL DATE: DECEMBER 31, 2024

cc: jerryjones@macherco.com
Project File #20-02-PD8

<V:\20-02-PD8\reports\Manzanita Pines Evaluation.docx>



Eastern Portion of Tax Lot 1401, Map 3N 10W 28
City of Manzanita, Tillamook County, Oregon

Nehalem Bay Wastewater Agency

SEWER AVAILABILITY

Date: 11/12/2024

To: Tillamook County Building Department (Fax#503-842-1819)

From: Nehalem Bay Wastewater Agency

RE: Sewer Availability

As an Agent of Nehalem Bay Wastewater Agency, I confirm that sewer is available to the following lot within our service area boundary:

3N10 28 TL 1401

Owner of Record: Pine Grove Properties

Project Information: 4.63 acres/60 apartments/6 buildings

This letter shall not create a liability on the part of Nehalem Bay Wastewater Agency, or by an agent, or employee thereof, for the services described above.

Ashley Myers, Office Assistant
Nehalem Bay Wastewater Agency

Nehalem Bay Wastewater Agency is an equal opportunity provider

Tillamook County Fire Agencies

ONSITE Fire Apparatus Access and water Supply Driveway Inspection Form 2022 OFC REV 10.2024

Address/Location of Proposed Development: Manzanita Pines
Name: Jamie Loos **Contact Phone #**:323-533-2719 **Email**: jamisonloos@macherco.com
Total Square Footage of proposed structure: TBD Building Height: TBD Building Type: TBD Building Occ. Use: TBD
Reliable Water Source: **YES / NO** Existing Water Source Gallons or hydrant flow @20 PSI: ________ Water source type: TBD
Approved Fire Department connection from water source: **YES / NO** (For draft hydrant specifications, contact local FD)
Construction Requirements: Per current Oregon Fire Code Chapter 5 Access and Firefighting water supply is required for ALL structures

Step 1: Driveways shall meet the Oregon Revised Statue (ORS) 476 and the 2022 Oregon Fire Code (OFC), and/or County Road Standards.
Step 2: Provide the fire department/fire district with a detailed site plan including the road width, year around surface load, roadway grade, access distance, bridges (if applicable), structure construction type, square & cubic square footage of the structure, and water supply plan with information as noted below. REF. 2022 Oregon Fire Code Chpt. 5, Appendix B, C & D or (no reliable water supply) current NFPA 1142 standard.
Step 3: Bring this form to your local fire department to arrange a driveway inspection and approval for building official use.
Step 4: Fire service authority copies the form for the fire department/district records, provides a copy to the Building Official and Site contact.

☐ **Road Width:** Fire access roads shall have an unobstructed driving surface width of not less than 20 feet (Diagram 1-A). Surface width roads with fire hydrant minimum of 26 feet (Diagram 3-A) (OFC 503.2.1, D103.1). Wildland-Urban Interface areas 12 feet wide minimum for residential 1-2 family serving 5 homes or less (OFC D101.2). Additional width would be necessary for approved parking.

☐ **Vertical Clearance:** An unobstructed vertical clearance of not less than 13 feet 6 inches, including tree and brush obstructions shall be maintained. (Diagram 1-A) (OFC 503.2.1)

☐ **Surface and Load Capacities:** Fire access roads shall be of an all-weather surface with asphalt, concrete or other approved driving surface capable of supporting the imposed load of a fire apparatus weighing at least 75,000 pounds. (OFC D102.1) Proper drainage shall be provided and maintained to prevent run off damage. (OFC D103.7)

☐ **Grade:** Fire access road grade shall not exceed 10%. (OFC D103.2) **NOTE:** If the structure site is located on sloped property greater than 10%, contact your local fire official for input prior to driveway construction. (1-2 Family) - An approved NFPA 13 type fire sprinkler system may be an acceptable alternative when required slope cannot be met per Oregon Administrative Rule 918-480-0125. (Diagram 2-A)

☐ **Distance from Structure(s):** Fire access roads shall be within 150 feet of all portions of the exterior walls of the structure as measured from the approved fire access road. (OFC 503.1.1)

☐ **Dead End Roads and turnarounds:** An approved turnaround is required if the dead-end fire access road is greater than 150 feet. (Diagram 3-A) (OFC D103.4) Dead end fire access roads more than 500 feet in length shall have driving surface width of not less than 26 feet. (OFC D103.4) Rural: Fire access roads more than 200 feet may have an alternative method of turnouts every 150 feet or other fire official approved method. (Diagram 4-A) (OFC 503.1, D103.1 Ex. 3, 2018 IWUIC section 403.2.2)

N/A **Bridges:** The bridge shall be constructed and maintained in accordance with AASHTO HB-17. The bridge shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges. (OFC 503.2.6)

☐ **Gates:** Gates securing fire access roads shall comply with all of the following: Minimum unobstructed width shall be 20 feet without a center post or island. Gates shall be of the swinging or sliding type operated by one person. Knox Box Rapid Access System or other unlocking method shall be submitted for approval by the fire code official on all locking or coded gates. Electric gates (listed per UL 325) and automatic operated gates (listed per ASTM F2200) shall be equipped with a means of opening the gate by fire department personnel with approved emergency opening devices. (OFC 503.5, D103.5)

☐ **Address Sign:** A permanent address sign must be installed plainly visible and legible from the street or road fronting the property. Numbers shall be at least 4" in height and contrast with the background. Address signs may be acquired through your local Fire Department (larger size depends on the distance from the street). (OFC 505)

☐ **Water Supply:** An approved water supply capable of supplying the required fire flow for fire protection shall be provided to premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into the jurisdiction. Water Supply must be designed and maintained per current OFC or NFPA 1142 depending on location and type of water availability.

I certify construction of fire access & water supply for this development is completed and will be maintained per required fire code standards

Owner/Builder Signature: ______________________________ **Date:** ________________

This Section to Be Completed by Fire Official. Enforced by authority having jurisdiction under ORS 476 and OFC.
☐ **Not Approved:** Water Supply and Fire Access to the proposed development site is required during construction 2022 OFC 501.4, 507.1.
☒ **Conditional Approval:** Fire access to the proposed development site is temporarily suitable for access by fire service equipment/construction if approved for construction by the building department, however deficiencies exist and are required to be corrected prior to fire service approval. **RE-INPSECTION REQUIRED -SITE NOT YET APPROVED.**
Deficiencies: ☐ Width ☐ Vertical clearance ☐ Imposed weight load support ☐ Grade ☐ Turnaround ☐ Turnouts ☐ Gate issue ☐ Address Sign ☐ Water supply ☐ Other________________
☐ **Final Approval:** Water Supply and Fire Access to the proposed development site are satisfactory for access by fire department equipment.

Fire Official: *Daniel L Weitzel* Dan Weitzel **Fire Department:** Nehalem Bay Fire & Rescue Dist **Date:** 12/4/2024

Diagram 1-A Road Width and Vertical Clearance

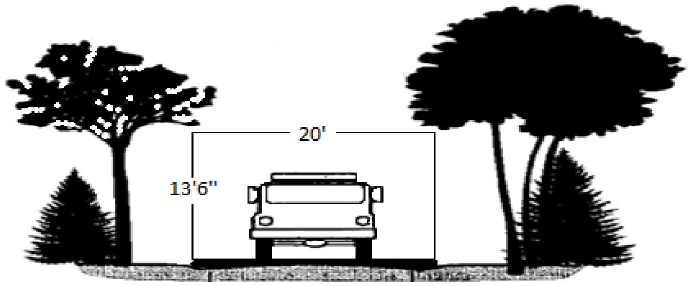


Diagram 2-A Grade Alternate

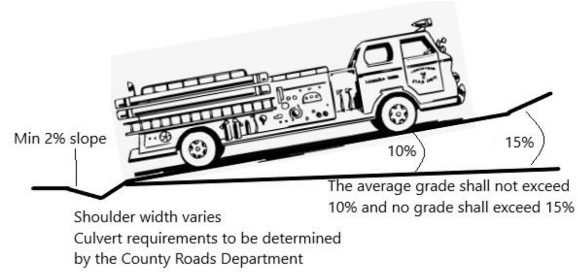


Diagram 3-A Turnarounds

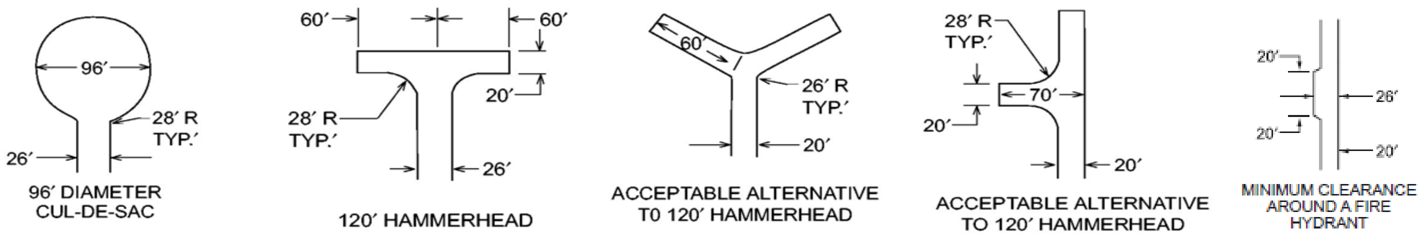


Diagram 4-Residential Turnouts

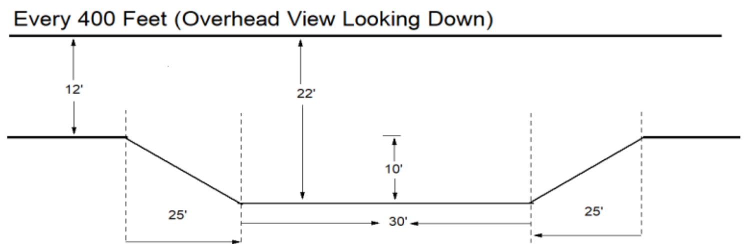
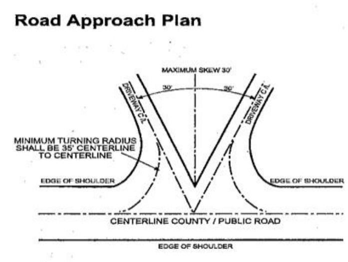


Diagram 5-



Urban Firefighting water supplies: For all structures in a competent water supply area, a water supply for fire suppression with an approved hydrant system/location shall be in place, flushed and operational prior to bringing combustible construction on site in accordance with current Oregon Fire Code Chapter 5, appendix B, C and D.

Rural Firefighting water supplies: For residential structures in rural district without a competent fire water system over 3,600 SQ FT, including garage and porches, and for all commercial properties, a water supply for fire suppression shall be provided in accordance with current NFPA 1142 standard on water supplies for suburban and rural firefighting prior to bringing combustible construction on site. **Note:** An approved NFPA 13 Automatic Fire Sprinkler System (or NFPA 13R/ 13D) may be an acceptable alternative to the required water supply.

Many existing driveways do not provide the needed emergency access, where delays or emergency response may be hindered because of improper or non-maintained emergency access. New or exterior dimension altered structures will be expected to fully meet and maintain current fire access and water supply code requirements. If the home site is located on sloped property, we recommend you determine site grade and contact your local fire official for input prior to driveway construction.

With the increase of structures in the rural area, the need for adequate fire department access is ever more critical. The risk of wildfire and other emergency incidents increases with structure density.

Consult with the fire code authority for any alternative methods or further options/exceptions within the Oregon Fire Code. Here is the link to the OFC https://www.oregon.gov/osp/programs/sfm/Pages/Fire_Codes.aspx

Tillamook County Fire Districts & Fire Departments		**<u>Oregon State Fire Marshal Office</u>**
Bay City Fire	503.377.0233	Shannon Miller, Deputy State Fire Marshal, 503.507.1897
Garibaldi Fire	503.322.3635	
Nehalem Bay Fire	503.368.7590	
Netarts/Oceanside Fire	503.842.1153	
Nestucca Fire & Rescue	503.392.3313	
Rockaway Beach Fire	503.355.2978	
Tillamook Fire District	503.842.7587	

CITY OF MANZANITA
P.O. Box 129, Manzanita,OR 97130-0129
Phone (503) 368-5343 | Fax (503) 368-4145 | TTY Dial 711
ci.manzanita.or.us

Date: 11 / 21 / 2024

To: *City of Manzanita Planning Department*

From: *City of Manzanita Public Works Department*

Re: *Water Availability*

Dear Sir

This letter is to inform you that water service is available to the following lot(s)

Township: 3N Range: 10 Section: 28 Tax Lot: 1401

at the above referenced location from the Manzanita Water system. The lot will require the service to be tapped to our main in Necarney City Road

This letter shall not create a liability on the part of City of Manzanita or by an officer, or employee thereof, for the services described above.

Signature and Title of Authorized Representative

cc: Property Owner