Public Hearing

May 16, 2022 at 6:00 pm
210 East 4th Street, La Center, WA 98629

Public Hearing: Lockwood Meadows Subdivision
Preliminary Plat, Variance, Critical Areas Permit, Legal Lot Determination, Mitigated SEPA DNS, Road Modification, and Public Hearing: Type III Review

Hearings Examiner: Joe Turner

Applicant: Susanna S. Hung

Hearing Materials:

Exhibit A – Application Materials

19. Critical Areas Report
20. Preliminary Plans
21. Offsite Features

Exhibit B – SEPA

1. Mitigated DNS Notice and Checklist
2. Combined SEPA Comments
3. Mitigated DNS Notice Final

Staff Report & Recommendations

Lockwood Meadows Subdivision: Type III

Preliminary Plat, Variance, Critical Areas Permit, Legal Lot Determination, SEPA MDNS, and Road Modification

(#2020-004-SUB/VAR/CAR/SEPA) May 9, 2022

PROPOSAL:	Preliminary plat of one parcel totaling 20.00 gross acres to create 71 single-family detached residential lots, a park and trail, public streets and utilities. Reviews for a variance, critical areas permit, legal lot determination, SEPA MDNS, and road modification apply.
LOCATION:	▪ 2000 NE Lockwood Creek Road, La Center, WA 98629 ▪ #94 of Section 2 T4NR1E, 20A, PIN: 20911300
HEARING:	The La Center Hearing Examiner will conduct a public hearing on May 16, 2022 beginning at 6:00 PM at La Center City Hall, 210 East 4th Street, La Center, WA
APPLICABLE STANDARDS	La Center Municipal Code (LCMC) Title 12, Streets, sidewalks and public ways; Title 13, Public Utilities; Title 18.320, Stormwater Ordinance; Title 18, Development Code: Type III Procedure, 18.30.100; Notices, 18.30.120, Low Density Residential (LDR-7.5, 18.130; Parks and Open Space, 18.147, Urban Holding District (UH-10), 18.190; Subdivision Provisions, 18.210; Legal Lot Determinations, 18.225; Monumentation, Survey, and Drafting Standards, 18.230; Supplementary Development Standards, 18.245; Variances, 18.260; Off-Street Parking and Loading Requirements, 18.280; Outdoor Lighting, 18.282; Critical Areas, 18.300; Environmental Policy, 18.310; Stormwater and Erosion Control, 18.320; Native Plant List, 18.340; Tree Protection, 18.350; Archeological Resource Protection, 18.360.
RECOMMENDATION:	**APPROVAL,** subject to conditions

I. CONTACT LIST

APPLICANT

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OWNERS

Same as applicant

APPLICANT'S REPRESENTATIVE

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II. OVERVIEW

The project site is located in the eastern side of La Center north of Lockwood Creek Road and comprises one parcel totaling 20.00 acres. The applicant is proposing to subdivide the site to create 71 lots for detached single-family residences in Low Density Residential (LDR-7.5) zone. There are category IV wetlands (Wetland A and Wetland B) located on the site. The applicant is proposing to fill Wetland A (a small, low quality wetland) as allowed under 18.300.090(5)(d). All lots would be 7,500 square feet or larger with the exception of five lots (33-37) which will use the density transfer provisions under LCMC 18.130.080 and LCMC 18.300.130 to reduce lot sizes to 6,000 square feet. The applicant will preserve Wetland B and it's buffer with Tract C of the development. The applicant also proposes to preserve the 40-inch Oregon White Oak at the southwest corner of the site, which is a priority habitat and regulated as a critical area by the City. However, the applicant is proposing to impact the Oregon White Oak dripline requiring that they file a critical areas permit and propose mitigation for the tree.

The applicant is providing a 20,134 square-foot publicly accessible park in Tract B of the development in compliance with the park and open space standards of LCMC 18.147 which require that residential developments exceeding 40 dwelling units provide 0.25 acres of park space for each 40 units in excess of 40 units. The 71-unit development requires a 0.19-acre park and the proposed park is 0.46 acres and is adjacent to the 0.71-acre wetland tract. In addition, the applicant is providing a trail and open spaces tract in the midblock connection in Tract A that is 0.25 acres. Together these open spaces total 1.42 acres of parks and open space.

The applicant is proposing a system of public streets to serve the lots. The site would be accessed from existing public streets within the Country Hills Estates development including stub streets at East 4th Street, East Upland Avenue, and East White Oak Avenue. East 4th Street connects to NE Lockwood Creek Road via East Spruce Street. In addition, the applicant is proposing half street improvements along NE 24th Avenue, providing a second access to NE Lockwood Creek Road. The applicant is requesting a road modification to LCMC 12.10.210 to allow intersection spacing to exceed the maximum intersection spacing standard of 500 feet for East 4th Street and East 5th Street. The applicant is providing a mid-block pedestrian connection between East 4th and East 5th streets.

Figure 1 – Project Location

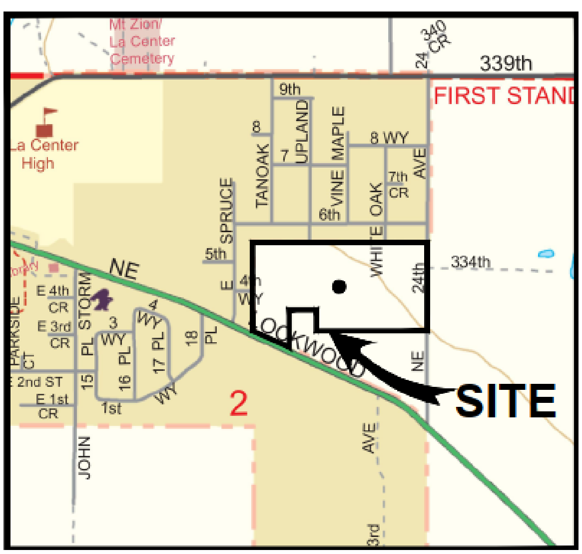
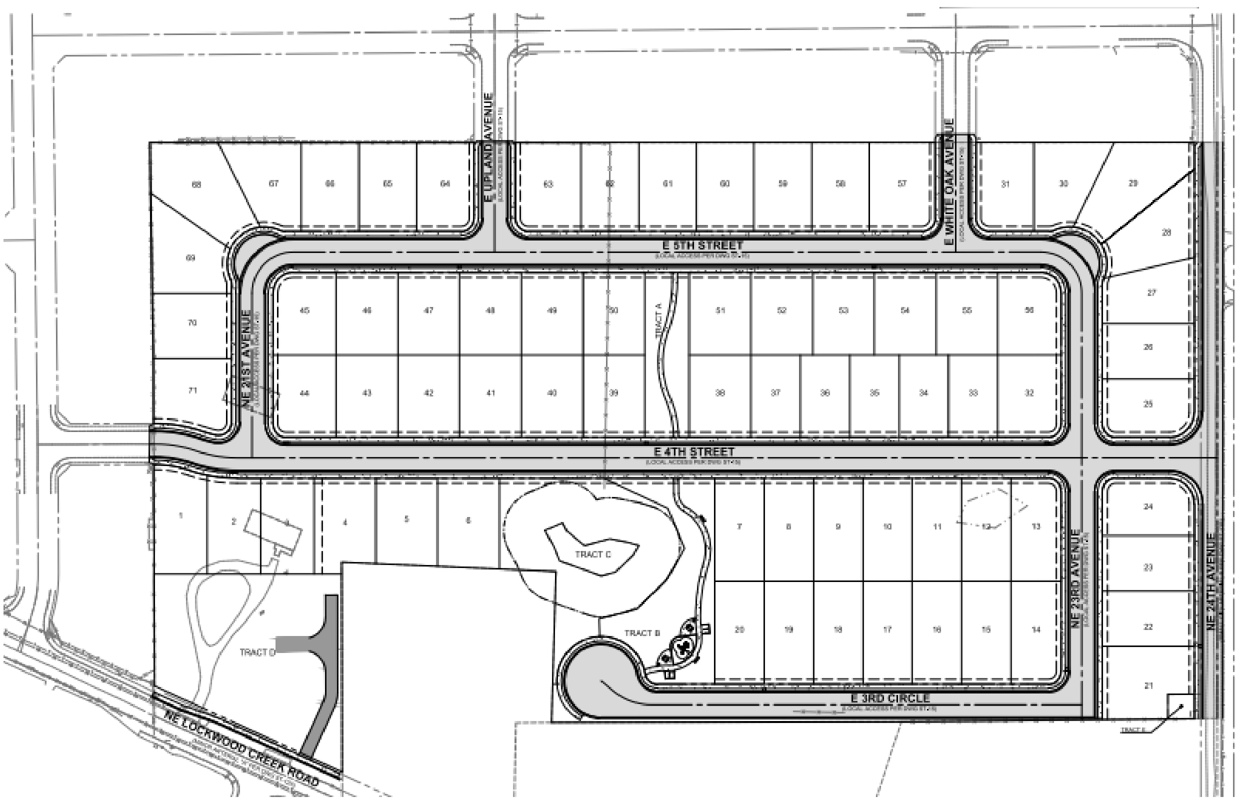


Figure 2 – Subject Site

Each lot will be served by public utilities including sanitary sewer (City of La Center) and potable water (Clark Public Utilities).

The application requests reviews for the preliminary subdivision, a road modification, legal lot determination, SEPA, and critical areas review for wetland areas.

Figure 3 – Proposed Preliminary Plat



III. REVIEW

III. A Jurisdiction

The site is within La Center City limits and is zoned Low Density Residential (LDR-7.5). The City of La Center provides sanitary sewer service and public streets. Clark Public Utilities provides potable water service. The project is within the La Center School District and the Clark County Fire and Rescue Fire District 11 service area.

III.B Public Notice

On May 6, 2022, The Columbian published legal notice of the land use application, SEPA DNS, and public hearing scheduled for May 16, 2022. The Department of Ecology entered the SEPA Checklist and MDNS in the Ecology SEPA Register on February 28, 2022. (Ecology SEPA # 202201881.) The notice of application and SEPA comment period closed on March 14, 2022 and the City received comments from three citizens (Exhibit B).

Mr. Paul Jones and Mrs. Mary Jones

Mr. Paul Jones and Mrs. Mary Jones provided comments on March 10, 2022 (Exhibit B). A summary of their comments is as follows:

- Mr. and Mrs. Jones value the trees on the site and trust the City will do its due diligence to preserve the beauty of the area, but understand that development is inevitable.
- The Jones's would like 30-60-foot setbacks between the trees/ditch area and the new subdivision and want a "greenbelt walkway" in the subdivision.
- The Jones's asked where the 0.46-acre park will be.
- The Jones's asked where the wetland and buffer within Tract C would be located, how large the buffer would be and what that would mean.
- The Jones's asked if there would be a bridge into the new subdivision over the northern ditch at East White Oak Avenue.
- The Jones's asked how the banks at the back of the properties within the Heritage County Estates Subdivision would be protected along the northern boundary of the site.
- Expressed concerns with increasing maximum building coverage through a variance.
- Expressed concern with number of additional homes and increasing traffic.
- Asked what improvements would need to be made on 24th Avenue to accommodate traffic.

Response: The applicant inventoried 47 trees of 5 inches or larger on the site and is proposing to remove four of those trees. The applicant will plant 220 new trees along streets and within the proposed park and open space areas.

The applicant proposes to eliminate the ditch with grading of lots to match the existing slope. The lots along the north boundary of Lockwood Meadows will abut the lots at the south boundary of Heritage Country Estates. Subsurface drainage will be required to alleviate any groundwater that could result from differences in grade.

The 0.46-acre park will be located on the southwest side of the site between East 4th Street and East 3rd Circle.

The Tract C with the wetland and buffer that will be preserved are also located on the southwest side of the site. LCMC Table 18.300.090(5)(i)(i) requires a 50-foot buffer for category IV wetlands with high intensity uses (residential uses) adjacent to them. The applicant is providing a 50-foot buffer. Guidance from the Department of Ecology suggests this buffer width is sufficient to maintain the existing wetland functions.

There will not be bridge over the ditch at the northern boundary of the site since the ditch will be eliminated.

Staff are recommending denial of the applicant's variance request to increase maximum building lot coverage and maximum impervious surface coverage because it does not meet the City's variance criteria. See section responses to LCMC 18.260 of this staff report. of this staff report.

The applicant is proposing a number of lots which falls within the density requirements of the LDR-7.5 zone which requires a minimum of four dwelling units per net acre. A net acre is defined to exclude public rights-of-way, private streets, public utility easements, public parks, and undeveloped critical areas and required buffers. The gross site area is 20.00 acres. Rights-of-way total 4.96 acres, the public park will be 0.46 acres, and the Tract C wetland and buffer is 0.71 acres resulting in a net acreage of 13.87 acres. Withy 71 proposed lots, the applicant is providing 5.1 units per acre slightly above the minimum of 4 units per net acre.

The applicant completed a traffic study and memorandum (Exhibits P and O) showing that adequate site distance would be met at the East Spruce Avenue and Northeast 24th Avenue Intersections and Lockwood Creek Road. All intersections would continue to operate above level of service standards except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue. That intersection is already failing in the existing condition, and therefore the applicant will not be proposing or required to mitigate this intersection. This intersection will be mitigated by a new signal installed as part of the City's 4th Street Improvement project. The City reviewed the traffic study and agreed with the results.

The applicant is proposing half street improvements on NE 24th Avenue with travel lanes, sidewalk and landscape strips.

<u>Mr. Richard Oakley</u>

Mr. Richard Oakley provided emailed comments to the City on March 10, 2022.

- Mr. Oakley is concerned about increased traffic from the development and the new La Center Middle School. Mr. Oakley believes the development will generate traffic problems at the site location, through town, and east along Lockwood Creek Road. He asked whether a traffic study had been conducted.
- Mr. Oakley asked whether the ditch along the north side of the property is regulated under the "watershed act."
- Mr. Oakley asked what the easement situation will be along the northern border since the development is proposing major drainage along this border.
- Mr. Oakley expressed concern with the increases in maximum building coverage and maximum impervious surface area for each lot and with density.
- Mr. Oakley asked where the impact study is from the City

Response: The applicant produced a traffic study which was reviewed by City staff who agreed with the results of the study. The applicant completed a traffic study (Exhibits P and O) showing that adequate site distance would be met at the East Spruce Avenue and Northeast 24th Avenue Intersections and Lockwood Creek Road. All intersections would continue to operate above level of service standards except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue. The traffic report completed by the consultant designing the 4th Street widening improvements, projected a failing level of service in the year 2040. This intersection will be mitigated by a new signal installed as part of the City's 4th Street Improvement project.

The ditch along the northern property line is an artificial stormwater conveyance and is not classified as a stream that is protected by the City of La Center, the federal government, or the State of Washington.

The applicant proposes to eliminate the ditch with grading of lots to match the existing slope. The lots along the north boundary of Lockwood Meadows will abut the lots at the south boundary of Heritage Country Estates. Subsurface drainage may be required to alleviate any groundwater that could impact Lockwood Meadows lots, that could result from differences in grade. The subsurface drainage may be required to be placed in an easement on Lockwood Meadows Subdivision. The existing easement along the southern boundary of Heritage Country Estates is not proposed to be impacted by the Lockwood Meadows Subdivision.

Staff are recommending denial of the applicant's variance request to increase maximum building lot coverage and maximum impervious surface coverage because it does not meet the City's variance criteria.

The applicant is proposing a number of lots which falls within the density requirements of the LDR-7.5 zone which requires a minimum of four dwelling units per net acre. A net acre is defined to exclude public rights-of-way, private streets, public utility easements, public parks, and undeveloped critical areas and required buffers. The gross site area is 20.00 acres. Rights-of-way total 4.96 acres, the public park will be 0.46 acres, and the Tract C wetland and buffer is 0.71 acres resulting in a net acreage of 13.87 acres. Withy 71 proposed lots, the applicant is providing 5.1 units per acre slightly above the minimum of 4 units per net acre.

The City Engineer, consulting planner, and consulting traffic engineer who are all licensed professionals in their areas of expertise reviewed the applicant's submittal items and have determined that they meet the City's code or that the proposal can be conditioned to meet the City's code. The City assessed the applicant's submittal for impacts on the environment and public services.

Mr. Rick Kirkendall and Mrs. Ann Kirkendall

Mr. and Mrs. Kirkendall provided email comments on March 13, 2022.

- They expressed concern that so many new developments are being proposed and being approved by the City and do not believe that city infrastructure supports rapid growth.
- They commented that the new development has been approved.
- They asked how the increased traffic is being addressed and commented that the roads in La Center are "over traveled and need attention." Further, they are concerned about traffic in and out of the subdivision and are concerned about families with children during construction and once new families move in.
- They expressed concern about traffic increases on NE 24th Avenue adjacent to their property and that 24th Avenue is inadequate.
- They asked whether the large fir tree on the edge of the proposed development should be saved and whether "other trees in the areas" could be saved for birds, wildlife, and habitat.

- They asked about plans for the ditch and trees along the northern property line of the development (and south of Heritage Country Estates) and whether these could be preserved as a greenbelt and walkway.
- They asked about how the bank at south side of Heritage Country Estates (northern side of the property) would secured/protected to prevent erosion and whether there would be a setback from the bank.
- They commented that they are opposed to the proposed increase in maximum building lot coverage and maximum impervious surface area.
- They asked whether the homes in the new subdivision would match Heritage Country Estates in terms of size and value and whether there would be similar landscaping and covenants, conditions, and restrictions (CCRs).
- They commented that they appreciate the proposed park and that it is desirable to preserve the wetland

Response: Like all cities in Washington under the Growth Management Act, La Center is required to plan for and accommodate 20-years of growth. Newly proposed and approved growth must comply with the City's comprehensive plan and development regulations and cannot propose densities that exceed what the City has planned for and is obligated to accommodate as long as it falls within growth projections in the Comprehensive Plan. Developers are required to provide infrastructure including roads, utilities, and parks concurrent with development. Development cannot be approved if infrastructure is determined to be inadequate. For the subject site, the applicant is proposing a system of public roads onsite to accommodate vehicular traffic and existing roads offsite have been determined to be adequate and meet level of service standards to accommodate the subdivision with the exception of except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue which already falls below level of service standards and the applicant is not required to mitigate. This intersection will be mitigated by a new signal installed as part of the City's 4th Street Improvement project.

At the time of writing of this staff report, the new development has not been approved. The hearing examiner will make the final decision as to whether to approve, approve with conditions, or deny the proposed subdivision after the May 16 public hearing. Staff are recommending the proposal be approved because it meets all City standards.

The applicant produced a traffic study which was reviewed by the city agreed with the results of the study. The applicant completed a traffic study (Exhibits P and O) showing that adequate site distance would be met at the East Spruce Avenue and Northeast 24th Avenue Intersections and Lockwood Creek Road. All intersections would continue to operate above level of service standards except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue. That intersection is already failing in the existing condition, and therefore the applicant will not be proposing or required to mitigate this intersection. This intersection will be mitigated by a new signal installed as part of the City's 4th Street Improvement project.

The applicant will be required to provide flagging and traffic control during construction to meet WSDOT and city requirements and help protect pedestrians. Once construction is complete, traffic laws similar to those in residential developments throughout La Center will apply to vehicles including speed limits and stop controlled intersections. Intersections will have crosswalks for pedestrians and there will be a system of sidewalks along all streets in the development.

The applicant is required to improve NE 24th Avenue to accommodate additional traffic from the development to the City's "half-street" improvement standard which will include travel lanes, sidewalks, and planter strips.

The applicant's plans do not indicate whether they will be removing or preserving the large fir tree. In compliance with the City's code (LCMC 18.350), staff are recommending a condition of approval that will require the applicant provide a plan inventorying the trees on site, showing protection measures around trees that will be preserved, documenting the mitigation including newly planted trees to compensate for trees removed and obtaining a tree cutting permit prior to development. The Christmas trees on the site are considered an agricultural use and are not required to be protected. The applicant is not proposing to preserve the ditch or trees along the northern property line and is not required to provide a greenbelt in this location.

The applicant is proposing to grade the lots on the northern side of the site to match the bank grades. The bank will be preserved. The rear yard setback for the lots along the northern boundary of the site is 20 feet from the property line and would help protect the bank.

Staff are recommending denial of the applicant's variance request to increase maximum building lot coverage and maximum impervious surface coverage because it does not meet the City's variance criteria.

The applicant has not submitted plans for the homes on the lots and is not required to do so concurrent with the subdivision approval. The City does not have any requirements that homes match the homes in adjacent developments in terms of size or value. The applicant is not required to provide a landscape screen between the proposed subdivision and Heritage Country Estates. The applicant submitted a plan (Exhibit T) showing landscaping of the park and open space tracts and providing street trees in the planter strip along streets meeting the City's code requirements.

III.C Key Issues

The relevant issues to consider for a successful public hearing review include:

1. **Minimum lot area:** reduction in minimum lot area for five of the proposed lots (33-37) via a density transfer, per LCMC 18.130.020(1)(a), to account for critical areas on site.
2. **Maximum Building Lot Coverage and Maximum Impervious Surface Area:** The applicant is requesting increases to the building lot coverage requirement from 35 percent to 50 percent and for the maximum impervious surface area limit from 50 percent to 65 percent.
3. **Critical Areas:** There are two wetlands and a priority habitat Oregon white oak tree onsite. The applicant's plans show street improvements (sidewalk, road improvements, and landscape strip) within the tree's dripline. The applicant is conditioned to obtain a critical areas permit for the oak tree impacts prior to engineering plan approval.
4. **Road modification:** Two road modification requests to exceed maximum road spacing and to provide detached sidewalk on all streets.
5. **Tree preservation:** The applicant did not provide an inventory of trees on the site, a tree protection plan, and a mitigation plan in compliance with LCMC 18.350 to obtain a tree cutting permit and is being conditioned to provide these items and obtain a tree cutting permit prior to construction.

III.D Land Use Analysis

LCMC Title 18, Development Code.

LCMC 18.30 Procedures

A pre-application conference was held with the applicant and other interested parties on June 7, 2021. The application was deemed technically complete on February 15, 2022. The City publicly noticed the application on February 28, 2022 for 14 days and received three comments (see III.B of this staff report). The City released the staff report on May 9, 2022, seven days before the public hearing. Public hearings shall be conducted in accordance with the rules of procedure adopted by the hearings examiner. Public comments may be submitted either prior to or during the public hearing in writing or orally during the hearing. The City has not received any public comments on the proposal.

LCMC 18.130 (Low Density Residential District)

The applicant is proposing 71 lots for detached single-family residences. Detached single-family dwellings are a permitted use in the LDR-7.5 zone (LCMC 18.130.030). Buildings are limited to 35 feet in height. The applicant isn't proposing buildings at this time. A condition of approval will require that building height be met at time of building permit issuance.

The applicant is proposing a number of lots which falls within the density requirements of the LDR-7.5 zone which requires a minimum of four dwelling units per net acre. A net acre is defined to exclude public rights-of-way, private streets, public utility easements, public parks, and undeveloped critical areas and required buffers. The gross site area is 20.00 acres. Rights-of-way total 4.96 acres, the public park will be 0.46 acres, and the Tract C wetland and buffer is 0.71 acres resulting in a net acreage of 13.87 acres. With 71 proposed lots, the applicant is providing 5.1 units per acre meeting the minimum density requirements of the zone.

Lots within the LDR-7.5 zone must be a minimum of 7,500 square feet and a maximum of 11,000 square feet. Up to 10% of lots may be less than 7,500 square feet using the density transfer provisions of LCMC 18.130.080(2) and LCMC 18.300.130. The applicant is proposing that five lots (lots 33-37) or 7 percent of the lots be 6,000 square feet in compliance with the code because Wetland B and it's buffer which is approximately 31,025 square feet will be preserved. All lots fall within the minimum and maximum lot size requirements of the code.

Per LCMC 18.300.130(1)(c)(i), for LDR sites, the value of the density transfer is calculated by the gross area of a critical area that will be completely avoided, multiplied by the minimum number of units allowed per net acre in the LDR zone. The applicant is preserving Wetland B in Tract C of 31,025 square feet which is the equivalent of 0.71 acres; multiplied by 4 units per net acre means the applicant could transfer as many as three lots from this critical area to the rest of the site. The five reduced size lots (33-37) are 6,000 square feet and together total 30,000 square feet. This same area could otherwise be divided into four standard sized lots (30,000 square feet/7,500 square feet = four lots). Therefore, the applicant is transferring one lot from the preserved critical area (Wetland B) (5 proposed lots- 4 standard sized lots = 1 transferred lot) which is less than the three lots permitted to be transferred. Therefore, the applicant complies with the City's density transfer requirements.

Maximum building lot coverage and maximum impervious surface area are 35 percent and 50 percent, respectively, in the LDR-7.5 zone. The applicant requested that a variance be approved to allow a maximum building lot coverage of 50 percent and impervious surface area of 65 percent for every lot within the development. Staff is not recommending the variances be approved because they do not meet the variance criteria. Please see findings in response to LCMC 18.260 of this staff report. Therefore, a condition of approval will require that each lot meet the maximum building lot coverage and maximum impervious surface area prior to issuance of building permits.

The following table highlights the required lot dimension and setback standards for the LDR-7.5 zone.

Table 18.130.080
– Lot Coverage and Dimensions (feet)

District	*Minimum Lot Width*	*Minimum Lot Depth*	*Minimum Front Yard Setback*	*Minimum Side Yard Setback*	*Minimum Street Side Yard Setback*	*Minimum Rear Yard*
LDR-7.5	60	90	20	7.5	10	20

All lots will meet the minimum lot requirements of the zone. LCMC 18.40 defines "lot width" as "the horizontal distance measured at the building setback line between the two opposite side lot lines. Average lot width shall be the average of the front and rear lot lines." The applicant is not showing proposed building footprints at this time, but is depicting setback areas. Lots 27-30 and 68 are less than 60 feet at the front building setback line of 20 feet, but are far greater than 60 feet wide at the rear setbacks resulting in average lot widths that exceed 60 feet and meet the lot width requirement.

LCMC 18.130.100 that developments in the LDR-7.5 zone provide street trees spaced 30 feet on center in planter strips along each street frontage. Type, location, and planting method shall be approved by the public works director. The applicant's landscape plan (Exhibit T) shows street trees on all street frontages, but the trees do not meet the spacing requirement. A condition of approval will require that, prior to engineering approval, the applicant provide a final landscape plan with street trees spaced no greater than 30 feet on center and that specifies planting methods for these trees.

As **a condition of approval**, the applicant shall submit engineering, construction, final plat, and building permit documents in compliance with the preliminary plat documents unless otherwise modified by conditions of approval in this staff report or as approved by the City through subsequent approvals.

As **a condition of approval**, the applicant shall demonstrate that the maximum building coverage and maximum impervious surface area requirements are met prior to issuance of a building permit for each lot.

As a condition of approval. prior to engineering approval, the applicant shall provide a final landscape plan with street trees spaced no greater than 30 feet on center.

LCMC 18.147 Parks and Open Spaces

The purpose of this chapter is to ensure implementation of the 2017 La Center Parks, Recreation, and Open Space Master Plan (Parks Plan) in new residential development by requiring developers to dedicate, develop, and maintain family parks, trails, and open space based on the size of their development.

According to LCMC 18.147.020(1)(a), any development in an LDR-7.5 zoning district that includes 40 or more dwelling units must dedicate or develop parkland, open space, and/or trails. As only 71 lots are proposed, this applicant is obligated to dedicate or develop parkland, open space trails at the ratio of 0.25 acres for each 40 dwelling units after the first 40 dwelling units (see 18.147.030[1][a]). The applicant is required to provide 0.19 acres of parks. The applicant is providing a 0.46-acre park in Tract B meeting this requirement. Tract B is also adjacent to Tract C which is a 0.71-acre preserved wetland, buffer and open space. LCMC 18.147.030(1)(b)(xiii) allows for wetlands and other passive areas to be preserved and combined with passive areas to meet the park space requirements. The applicant is also providing a 0.24-acre open space and trail in Tract A.

LCMC 18.147.030(1)(b) contain park design standards which require that:

- Parks meet ADA accessibility regulations
- Parks be designed by a landscape architect
- Parks be one contiguous space
- The minimum contiguous park size be 0.25 acres
- Parks not be located on a street of minor collector or higher classification
- Parks be fronted by a road on 40 percent or more of their perimeter or a pedestrian pathway or other design element approved by the review authority to assure free and open public accessibility shall be established through a dedication or perpetual easement with a minimum width of 20 feet.
- Parks must have 75 percent of their area as usable active play areas and improved open space.
- Parks must contain certain amenities including: (1) paved pedestrian path (2) two sitting benches, one trash receptacle, one bike rack for six bikes, and one picnic table (all amenities to be provided per 0.25 acres) and one play structure for children ages 2-12.
- Undeveloped play space must be provided by live vegetation and have underground irrigation
- There be a low fence or vegetative barrier between abutting residential lots that is 3.5 to six feet high that is not fully sight obscuring
- Safety requirements of LCMC 18.147.030(1)(b)(xi) must be meet.
- Trail linkages be provided to the existing La Center and regional trail system.
- Passive open spaces such as wetlands shall be combined with active open spaces and improved with trails, where feasible.
- Parks must be completed prior to issuance of occupancy of the 25th dwelling unit.
- Parks must be dedicated or have public access easements.

The applicant's proposed park and open space in Tract B and the open space in Tract C meet or can be conditioned to meet the above requirements as follows:

- The applicant does not provide details on ADA accessibility for the park. A condition of approval will require that the applicant demonstrate that the park meets ADA accessibility requirements.
- The park is designed by Christopher Baumann, a registered Washington landscape architect.
- Tract B is 0.46 acres and Tract C is 0.71 acres which together total 1.17 acres exceeding the 0.25-acre minimum contiguous park size.
- The park is located on and accessed from a local road.
- The park perimeter is 855 feet. A road must front 40 percent of the park perimeter equivalent to 342 feet or a pedestrian pathway within an easement 20 feet wide must be provided. The park is fronted by road for 303 feet of its perimeter and does not meet the 40 percent road frontage

requirement. A condition of approval will require that the applicant place the park in a public access easement.

- More than 75 percent of Tract B is usable active play area and improved open space.
- Since Tract B is 0.46 acres, it must contain: four benches, two trash receptacles, two bike racks to accommodate six bikes each, two picnic tables and one play structure. The applicant's proposed park design shows two benches, two trash receptacles two bike racks for six bikes, two picnic tables, and one play structure. The proposed park must provide two more benches to meet these requirements and a condition of approval will require this.
- The undeveloped play area is mostly covered by seed or sod and trees and no irrigation is shown. However, there areas adjacent to the wetland buffer which are not vegetated, but should be. A condition of approval will require that applicant's final park plan show vegetation up to the edge of the wetland buffer and an underground irrigation system for all vegetated areas.
- The applicant's park plans do not show a low fence or vegetative barrier adjacent to lots 7 and 20. A condition of approval will require a low fence or vegetative barrier adjacent to these lots.
- The La Center Police Department reviewed the proposed park design (see Exhibit T) in conformance with LCMC 18.147.030(1)(b)(xi). A condition of approval will require: (1) lighting within the park Tract B and along the paths and within Tract A to deter criminal activity (2) all proposed trees must be limbed up to provide clear line of site along the pathways in Tracts A and B and (3) an address for the park for emergency response.
- The proposed park in Tract B and trail system will connect to the on-street trail system on Lockwood Creek Road via sidewalk connections to East 4th Street and East Spruce Avenue meeting the trail connection requirement.
- A condition of approval will require that the park be constructed prior to the 25th dwelling unit.
- As a previously stated condition of approval, the applicant shall place the park in a public access easement.

As **a condition of approval**, prior to engineering plan approval, the applicant shall demonstrate that the park meets ADA accessibility regulations.

As **a condition of approval**, the applicant shall place the park in a public access easement.

As **a condition of approval**, the applicant's final park plan must provide a minimum of four benches.

As **a condition of approval**, the applicant's final park plan must show vegetation up to the edge of the wetland buffer and an underground irrigation system for all vegetated areas.

As **a condition of approval**, the applicant's final park plan shall show a low fence or vegetative barrier where the park abuts residential lots.

As **a condition of approval**, prior to final engineering approval, the applicant shall provide a final park plan that: (1) provides lighting within the park Tract B and along the paths and within Tract A to deter criminal activity (2) contains maintenance notes that requires that all proposed trees with Tracts A and B must be limbed up to provide clear line of site along the pathways and (3) assigns an address for the park for emergency response.

As a **Condition of Approval**, the applicant shall complete the required park and trail improvements or provide the City with a bond or other financial security bond, in an amount of at least 125 percent of the estimated cost of construction of the Tract B improvements with surety and conditions satisfactory to the Public Work Department providing for and securing to the City the actual construction and installation of such improvements prior to final plat approval.

As **a condition of approval**, the applicant shall construct the park prior to the issuance of occupancy for the building permit of the 25th dwelling unit.

LCMC 18.190 Urban Holding District (UH-10)

The City applies the Urban Holding-10 overlay zone to protect lands identified within the city limits from premature development where capital facilities are inadequate to support development under the urban zoning designation. Development within this overlay zone has certain restrictions. The subject site was recently annexed into the City. This parcels contains the UH-10 designation. Per LCMC 18.190.060(2), the UH-10 overlay zone may be removed if adequate capital facilities, as defined in the capital facilities plan, are required as a condition of phased development approval. Public facilities for the subdivision are proposed, and the City public works staff will determine the adequacy of these facilities.

As a **Conditional of Approval**, all proposed public facilities must meet the requirements of the capital facilities plan and all City engineering standards prior to approval of engineering and construction plans for the development. Meeting this condition will remove the UH-10 designation from the two parcels.

LCMC 18.210 Subdivisions

A preliminary plat is subject to pre-application review (LCMC 18.210.010). A technically complete review of a plat application is subject to a Type I process. After a preliminary subdivision application is deemed to be technically complete, the review of the application for a preliminary plat approval is subject to a Type III review process (LCMC 18.210.020) with the City’s hearing examiner making the final decision.

The City conducted a pre-application conference for the proposed project on June 7, 2021 (2021-016-PAC). The City received an application for preliminary plat on February 1, 2022. The City found the application “technically complete” on February 15, 2022. The La Center Hearing Examiner will consider the preliminary plat application on May 16, 2022 at La Center City Hall beginning at 6:00 PM.

18.210.040 Approval criteria for a preliminary plat.

(1) The review authority shall approve a preliminary plat if he or she finds:
- *(a) The applicant has sustained the burden of proving that the application complies with the following regulations of the La Center Municipal Code to the extent relevant:*
  - *(i) Chapter 12.05 LCMC, Sidewalks, and Chapter 12.10 LCMC, Public and Private Road Standards;*
  - *(ii) Chapter 18.300 LCMC, Critical Areas;*
  - *(iii) Chapter 18.310 LCMC, Environmental Policy;*
  - *(iv) Chapter 18.320 LCMC, Stormwater and Erosion Control;*
  - *(v) Chapter 15.05 LCMC, Building Code and Specialty Codes;*
  - *(vi) Chapter 15.35 LCMC, School Impact Fees; and*
  - *(vii) LCMC Title 18, Development Code.*

LCMC 18.210.040(1) requires the La Center review authority to approve a preliminary plat if he or she finds:

(b) That the application can comply with those regulations by complying with certain conditions of approval, and those conditions are adopted; or that necessary adjustments, exceptions, modifications or variations have been approved or are required to be approved before the final plat is approved;
(c) The subdivision makes appropriate provision for parks, trails, potable water supplies and disposal of sanitary wastes; and
(d) The subdivision complies with Chapter 58.17 RCW.

Refer to the appropriate sections in this staff report that address the aforementioned chapters of the LCMC. Conditions of approval are outlined throughout the document and listed in Section IV of this staff report. A condition of approval will require that, prior to construction, the applicant obtain building permits in compliance with LCMC 15.05. A condition of approval will also require that the applicant pay all system development fees and park, traffic, and school impact fees in effect at the time of the building permit issuance.

As **a condition of approval**, the applicant shall obtain building permits in compliance with LCMC 15.05 prior to construction.

As **a condition of approval**, prior to the issuance of occupancy for building permits, the applicant shall pay all system development fees, park, school, and traffic impact fees in effect at the time.

LCMC 18.210.050 Expiration and extension of preliminary plat approval.
(1) Approval of a preliminary plat expires five years from the effective date of the decision approving it unless, within that time, an applicant files with the city clerk an application for a final plat for a subdivision or given phases of a subdivision or for an extension.

As a **condition of approval** the preliminary plat shall expire five years from the date of approval by the hearing examiner, unless an application for final plat is submitted or an extension is requested per LCMC 18.210.050(2) and (3).

As a **Condition of Approval**, prior to final plat approval, the Developer shall identify the setbacks for all lots on the face of the final plat. To minimize impacts to pedestrian safety and mobility, garage doors shall be setback a minimum of 20 feet from the interior edge of a sidewalk.

LCMC 18.225 Legal Lot Determinations

According to LCMC 18.225.010(2), the legal lot determination standards apply to all subdivision applications. Per 18.225.010(3)(a), the lot of record status may be formally determined as part of a development request for parcels that are not part of a platted land division and shall be reviewed by the City for compliance with the criteria standards of this section.

(4) Application and Submittal Requirements. The following shall be submitted with all applications for lot determination, or applications for other development review in which a lot determination is involved. Applicants are encouraged to submit material as necessary to demonstrate compliance with this section:
(a) Prior city/county short plat, subdivision, lot determination or other written approvals, if any, in which the parcel was formally created or determined to be a lot of record;
(b) Sales or transfer deed history dating back to 1969;
(c) Prior segregation request, if any;

(d) Prior recorded survey, if any;
(e) At the discretion of the applicant, any other information demonstrating compliance with criteria of this section.

(5) Approval Criteria.
(a) Basic Criteria. Parcels which meet both of the following basic criteria are lots of record:
(i) Zoning. The parcel meets minimum zoning requirements, including lot size, dimensions and frontage width, in effect currently or at the time the parcel was created; and

(ii) Platting.
(A) The parcel was created through a subdivision or short plat recorded with Clark County; or
(B) The parcel is five acres or more in size and was created through any of the following:
(VII) The parcel was segregated at any time and is 20 acres or more in size;

The subject site meets the minimum requirements above to be considered a legal lot of record. The site is 20.00 acres, which exceeds the minimum lot size requirements of the LDR-7.5 zone. In addition, since the parcel is 20.00 acres it meets the platting requirements and is a legal lot of record.

LCMC 18.230 Monumentation, Survey, and Drafting Standards

- *18.230.010 Imprinted Monumentation*
- *18.230.020 Centerline Monumentation*
- *18.230.030 Property Line Monumentation*
- *18.230.040 Postmonumentation*
- *18.230.050 Postmonumentation Bonds*
- *18.230.060 Survey Standards*
- *18.230.070 Elevations or Vertical Information*
- *18.230.080 Preferred Scale Proportions*

All sections apply to the applicant’s development.

Chapter 18.230 Monumentation, Survey, and Drafting Standards
As a **Condition of Approval**, the applicant shall comply with all provisions regarding monumentation outlined in Chapter 18.230.

As a **Condition of Approval**, as outlined in LCMC 18.230.090, the final plat shall be drawn with ink upon three-millimeter Mylar film, or equivalent; said sheets are to be 30 inches by 21 inches, with a one-inch border on each side or as otherwise directed by the Clark County recording agency.

LCMC 18.240 Mitigation of Adverse Impacts

Chapter 18.240.010 Purpose
This chapter provides the City with the authority to require prospective developers to mitigate the direct impacts the City has specifically identified as a consequence of proposed development, and to make provisions for mitigation for impacts including, but not limited to, impacts upon the public health, safety and general welfare, for open spaces, drainage ways, streets, other public ways, parks, playgrounds, and sites for schools and school grounds.

Chapter 18.240.020 Determination of Direct Impacts

(1) Before any development is given the required approval or is permitted to proceed, the review authority shall determine all impacts, if any, that are a direct consequence of the proposed development and which require mitigation, considering but not limited to the following factors:

(a) Predevelopment versus post development demands upon city streets, drainage facilities, parks, playgrounds, recreation facilities, schools, police services, and other municipal facilities or services;

(b) Likelihood that a direct impact of a proposed development would require mitigation due to the cumulative effect of such impact when aggregated with the similar impacts of future development in the immediate vicinity of the proposed development;

(c) Size, number, condition and proximity of existing facilities to be affected by the proposed development;

(d) Nature and quantity of capital improvements reasonably necessary to mitigate specific direct impacts identified as a consequence of the proposed development;

(e) Likelihood that the users of the proposed development will benefit from any mitigating capital improvements;

(f) Any significant adverse environmental impacts of the proposed development;

(g) Consistency with the city's comprehensive plan;

(h) Likelihood of city growth by annexation into areas immediately adjacent to the proposed development;

(i) Appropriateness of financing necessary capital improvements by means of local improvement districts;

(j) Whether the designated capital improvement furthers the public health, safety or general welfare;

(k) Any other facts deemed by the review authority to be relevant.

(2) The cost of any investigations, analysis or reports necessary for a determination of direct impact shall be borne by the applicant. [Ord. 2006-17 § 1, 2006.]

Chapter 18.240.030 Mitigation of Direct Impacts

(1) The review authority shall review an applicant's proposal for mitigating any identified direct impacts and determine whether such proposal is an acceptable mitigation measure considering the cost and land requirements of the required improvement and the extent to which the necessity for the improvement is attributable to the direct impacts of the proposed development. Such developments will not be approved by the review authority until provisions have been made to mitigate identified direct impacts that are consequences of such development.

(2) The methods of mitigating identified direct impacts required as a condition to any development approval may include, but are not limited to, dedication of land to any public body and/or off-site improvements.

The proposed project has the potential to impact public services, traffic, critical areas, and other elements of the environment. Mitigations proposed by the applicant are reviewed in this staff report for conformance with applicable standards and any additional mitigations and conditions addressing said impacts are highlighted throughout this report. How the project impacts public facilities and mitigations to these impacts are addressed in the following sections of this staff report.

- **Parks:** Section III.E, 18.147
- **Sewer:** Section III.G
- **Water:** Section III.G

- **Stormwater:** Section III.G
- **Streets, sidewalks, and traffic:** Section III.G
- **Police, fire, and schools:** Section III.G
- **Street lighting:** Section III.G
- **Impact fees:** Section III.G

Chapter 18.245 Supplementary Development Standards

The standards in this chapter apply to development generally within the city of La Center. They can be used in any review process where applicable to evaluate or condition approval of an application.

According to the submitted narrative, no fences or hedges are proposed. As a **condition of approval**, if any fences or hedges are proposed prior to the final plat, the applicant must provide information to the extent as regulated by LCMC 18.245.020.

Each unit will have individual temporary storage for solid waste.

The applicant is proposing street lighting with the project and has submitted a preliminary lighting plan. LCMC 18.282 (Outdoor Lighting) also applies to the development. As a **condition of approval**, the applicant shall provide a photometric plan prior to final engineering plan approval showing how the proposed lights will not cause more than a one foot-candle measure at any property line in conformance with 18.245.040 and LCMC 18.282.

The site is zoned LDR-7.5 and properties to the north and west are zoned LDR-7.5. Lots to the immediate south are zoned R1-7.5 in Clark County and to the east are zoned Agriculture 20 also in Clark County. According to Table 18.245.060, LDR sites abutting other LDR sites and lots abutting Clark County lots do not require any landscape screening. Therefore, staff find that no landscape screening is required onsite.

LCMC 18.245.060(8) requires that ground-level exterior equipment be screened from adjoining property used or zoned for residential purposes or from an adjoining public road right-of way to at least an F2 or L3 standard, if visible. A condition of approval will require this be met.

LCMC 18.245.060(10) requires all landscaping be installed prior to issuance of occupancy or final inspection within six months after issuance of occupancy or final inspection if it would increase the likely survival of plants. A condition of approval will require this be met.

LCMC 18.245.060(11-16) contain plant material size and quality requirements. The applicant's final landscape plan must comply with these requirements.

LCMC 18.245.060(18) contains irrigation requirements. All required landscape areas including within the Tract B park, Tract A open space and trail, planter strip on along public roadways must meet the City's irrigation requirements.

As **a condition of approval**, ground-level exterior equipment such as air condition units, must be screened from view to an F2 or L3 standard prior to issuance of occupancy for each dwelling unit.

As **a condition of approval**, the applicant shall install all landscaping prior to issuance of final inspection for each dwelling unit or no more than six months after final inspection if it will increase plant survival.

As **a condition of approval**, the applicant's final landscape plan shall comply with the requirements of LCMC 18.245.060(11-16) prior to final plat approval.

As **a condition of approval**, all required landscape areas including within the Tract B park, Tract A open space and trail, and planter strip along public roadways must meet the City's irrigation requirements in LCMC 18.245.060(18).

LCMC 18.260 Variances

The applicant is applying for a variance to the maximum building lot coverage and maximum impervious surface area for all lots within the development. The code sets a maximum building lot coverage standard of 35 percent and an impervious surface maximum of 50 percent. The applicant is requesting to increase the maximum building lot coverage standard to 50 percent and the impervious surface maximum to 65 percent.

LCMC 18.260.040 contains approval criteria for variances. The applicant provided a narrative addressing the variance criteria. Staff do not believe the applicant has met the burden of proving the variance criteria and are recommending the variance be denied. A summary of the applicant's justification and staff's recommendation for denial of the variance follows each variance criterion.

(1) Unusual circumstances or conditions, such as size, shape or topography of a site, or the location of an existing legal development apply to the property and/or the intended use that do not generally apply to other properties in the vicinity or zone. An unusual circumstance could also include another obligation under a different municipal code section or a state or federal requirement;

The applicant states that the site is sloped and contains wetlands which is an unusual circumstance that does not generally apply to other properties in the vicinity or zone and that approving the variance will allow greater flexibility in building on slopes.

Staff does not agree that slopes and wetlands are common in La Center. The City is extensively covered by wetlands and slopes as shown on the City's wetlands and geologic hazards critical areas maps (see below). While staff acknowledges that increased building lot and impervious surface maximums would provide greater flexibility, staff does not believe wetlands and slopes are unusual conditions in the LDR-7.5 zone in La Center. Therefore, this variance criterion is not met.

Figure 4. La Center Geologic Hazards Map

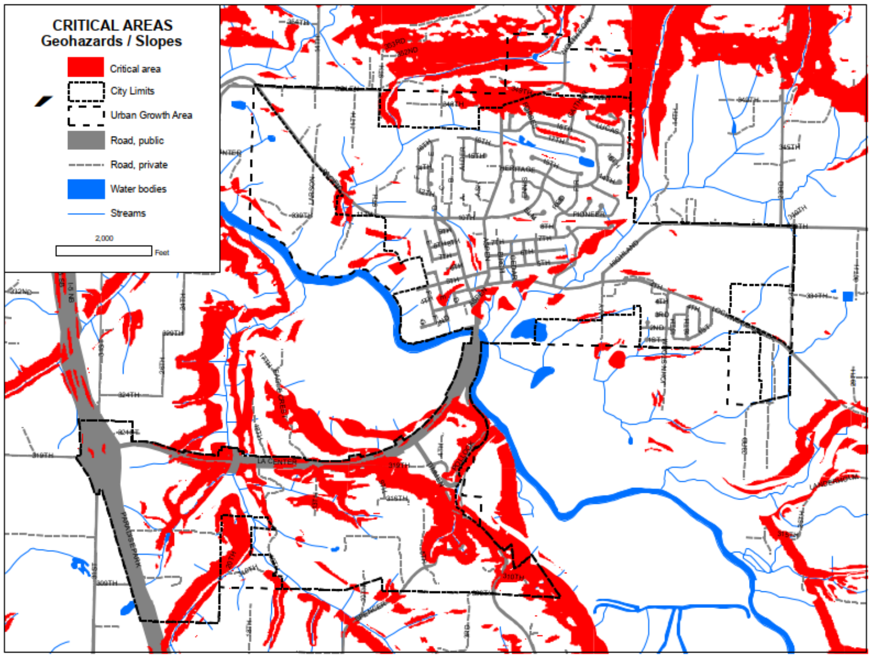
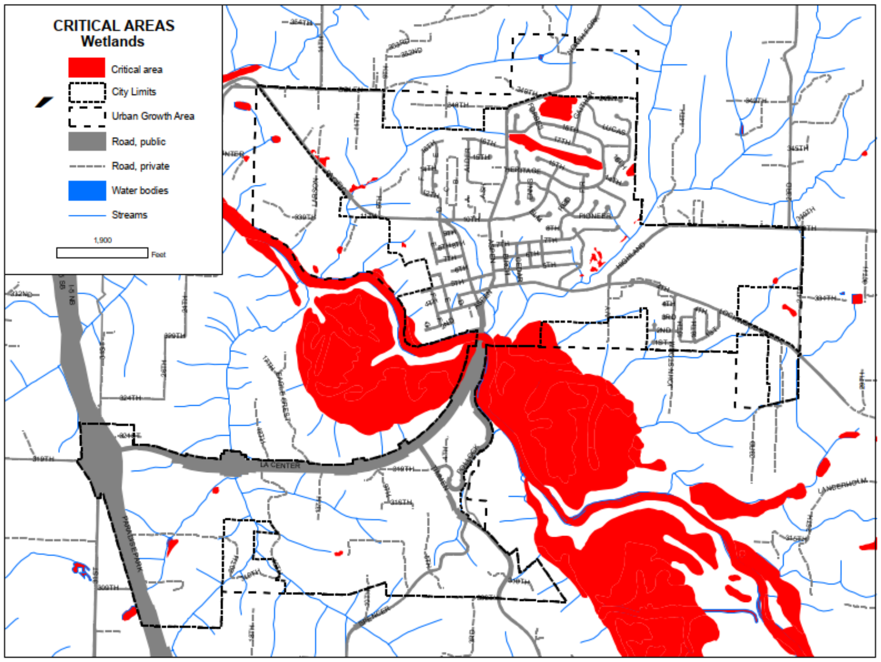


Figure 5. La Center Wetlands Map



(2) The unusual circumstance cannot be a result of actions taken by the applicant;

Slopes and wetlands are not a result of actions created by the applicant. However, as noted in response to variance criterion number 1, staff find that those are not unusual circumstances in La Center.

(3) The variance request is necessary for the preservation of a substantial property right of the applicant which is possessed by the owners of other properties in the vicinity or zone;

The applicant argues that many other Clark County jurisdictions including Clark County, Ridgefield, and Battle Ground have higher building lot coverage and impervious surface maximums and that La Center is an outlier in terms of having a lower building lot coverage and impervious surface maximum. The applicant further argues that this creates an unusual circumstance that affects the buildability of lots in La Center and that approval of the variance is necessary for preservation of a substantial property right as compared with surrounding jurisdictions.

While it is true that other jurisdictions have higher building lot coverage and impervious surface maximums than La Center, the variance process is from La Center's regulations and the criteria address property rights of applicants in the "vicinity and zone." Staff assert that the vicinity are properties located within La Center and the zone is the LDR-7.5 in La Center. A comparison to other jurisdictions, although informative for a potential future code change, is not a basis for granting a variance since all jurisdictions will have different regulations. Therefore, this variance criterion is not met.

(4) The variance request is the least necessary to relieve the unusual circumstances or conditions identified in subsection (1) of this section;

The applicant argues that the requested increase in building lot coverage and imperious surface maximums is the least necessary in light of the standards of other jurisdictions as well as addressing buildability on slopes.

The applicant is requesting a blanket increase in the maximum building lot coverage and maximum impervious surface area across the entire development. The standards of other jurisdictions are acknowledged, but aren't a reason for increasing building lot coverage and impervious surface area maximums in La Center. Slopes on the site range from 0-25 percent according to Clark County Maps Online. Steeper slopes are in the northeastern portion of the site where the range is 10-25 percent. Wetlands are located in the east central and southwest side of the site. The applicant will fill one wetland and the other wetland will be contained within Tract C so this should have no affect on the building lot and impervious surface maximum. Therefore, the request for a blanket variance for increasing building lot and impervious surface maximum across the whole site is not the least necessary to relieve the unusual circumstance.

(5) Any impacts resulting from the variance are mitigated to the extent practical; and

The applicant states that the only impact from increasing building lot and impervious surface coverage is on stormwater and that this issue is addressed in the stormwater plan and report. In staff's opinion, increasing the building lot and impervious surface maximums would also have impacts on the aesthetics of the subdivision making it appear that homes are bunched closer together on small lots, a look which would be inconsistent with other LDR-7.5 subdivisions in La Center. It also potentially requires more grading, vegetation removal, and impact to existing slopes. While increased stormwater runoff can be addressed through an appropriately designed stormwater system, the applicant is not proposing to address impacts to the aesthetics of the subdivision resulting from having larger homes on the same size lots. Therefore, this variance criterion is not met.

(6) The granting of the variance will not be materially detrimental to the public welfare, or injurious to the property or improvements in the vicinity and zone in which the property is situated.

Staff find that the requested variance would not be materially detrimental to the public welfare, or injurious to the property or improvements in the vicinity and zone where the property is situated. However, other variance criteria are not met.

Based on the analysis above, staff find that the variance criteria are not met and recommend denial.

LCMC 18.280 Off-Street Parking and Loading Requirements

Each dwelling unit shall be provided with at least two (3) off-street parking spaces per LCMC Table 18.280.010 for developments of four or more units.

The narrative states that “each future home will provide at least 3 off-street parking spaces within garage and/or driveway areas.” As a **Condition of Approval**, the applicant shall provide each dwelling unit prior to building permit approval with at least three (3) off-street parking spaces per LCMC Table 18.280.010.

III.E Critical Areas Review / SEPA Analysis

LCMC 18.300, Critical Areas

Mapped critical areas on the site by Clark County include wetlands, fish and wildlife habitat conservation areas (Type Ns stream and riparian habitat and priority oak habitat), geologic hazards (seismic hazards), and a Category II critical aquifer recharge area (CARA). However, according to the applicant’s critical areas report (Exhibit S), the mapped type Ns stream does not occur onsite because there are no signs of flowing water nor a defined bed or channel. In addition, according to the applicant’s geotechnical site investigation (Exhibit J), in the opinion of Columbia West Engineering, Inc., there are no geologic hazards (seismic hazards onsite). Finally, although category II CARAs are mapped critical areas, LCMC 18.300.090(1) only protects category I CARAs. Therefore, the only critical areas onsite are wetlands and fish and wildlife habitat conservation areas (priority oak habitat) and their buffers.

1) Fish and Wildlife Habitat Conservation Areas

Priority Habitat (Oregon White Oak)

A 40-inch diameter Oregon white oak is located in the far southwestern corner of the site adjacent to NE Lockwood Road and is considered priority habitat by the applicant’s consultant, ELS, and by WDFW. WDFW considers individual Oregon white oak trees to be priority habitat when found to be particularly valuable to wildlife (i.e. contains many cavities, has a large diameter at breast height, is used by priority species, or has a large canopy. Priority habitats and species require a 300-foot buffer or a threshold based upon consultation with WDFW (see LCMC 18.300.090(2)(a). The applicant corresponded with WDFW biologist Isaac Holowitz (see appendix D of the critical areas report in Exhibit S) who concurred that the oak’s dripline is adequate to protect it.

The approximate dripline/buffer of the priority habitat Oregon white oak is shown on sheet 2 of 10 in the critical areas report in Exhibit S and is also shown on sheets 3,5, and 7 of the applicant’s plans in Exhibit T. The oak’s canopy extends into the existing NE Lockwood Road improvements area, so there are already impacts within the tree’s buffer. The applicant is proposing road improvements along Lockwood Creek Road including travel way improvements, sidewalk, and planter strip within the dripline of the tree. The applicant did not provide information regarding amount of newly proposed impacts within the tree’s dripline or information on how the impacts to the oak tree would be mitigated so staff could not review the oak tree impacts for compliance with the City’s critical areas ordinance. A condition of approval will require that the applicant submit and obtain approval of a critical areas permit for impacts to the Oak tree and buffer prior to engineering plan approval.

As **a condition of approval**, the applicant shall obtain a critical areas permit for impacts to the oak tree and buffer prior to engineering document approval in compliance with all applicable provisions of LCMC 18.300.090(2) including submittal of a critical areas report and mitigation plan.

2) Wetlands

The applicant completed a wetland delineation as part of their critical areas report (Exhibit S) which documents two wetlands onsite: Wetland A of 0.05 acres and Wetland B of 0.08 acres. Both are Category IV wetlands with required 50-foot buffers under LCMC Table 18.300.090(5)(i)(i)-1. Category IV wetlands are the lowest quality wetland. Wetland A is an exempt wetland because it is under the provisions of 18.300.090(5)(d) because it is less than 4,000 square feet, not associated with a riparian area or shorelines, is not part of a wetland mosaic, does not score 5 or more points for habitat, does not contain priority habitat or federally listed species or habitat. Because Wetland A is exempt the applicant is proposing to fill it and is not required to demonstrate how they are avoiding impacts, but is still required to fully mitigate for this wetland. Impacts to wetlands are subject to the review criteria in LCMC 18.300.090(5)(k) which requires an approved mitigation or enhancement plan. The applicant is proposing to mitigate for impacts to Wetland A by purchasing credits at the East Fork Lewis Mitigation Bank which is in the same watershed as where the impact will occur. The applicant will purchase 0.0425 credits from the bank at a ratio 0.85:1 for the 0.05 acres of impact that will occur. LCMC 18.300.090(5)(k) also requires that:

- The proposed activity will not cause significant degradation of groundwater or surface water quality or fish and wildlife habitat
- The proposed activity shall not comply with all state, local, and federal laws, including those related to sediment control, pollution control, floodplain restrictions, stormwater management and on-site wastewater disposal; and
- Wetland and wetland buffer impacts shall be avoided or substantially minimized consistent with the mitigation sequencing criteria.

The applicant's bank use plan anticipates that there will be a functional lift from purchasing credits at the bank as compared with preserving Wetland A onsite. Therefore, staff find that the applicant's bank use plan addresses these criteria. As mentioned, Wetland A is an exempt wetland and impacts to it are not required to be mitigated. In addition, the City's critical areas ordinance allows for offsite wetland mitigation under LCMC 18.300.090(5)(o). A condition of approval will require that the applicant purchase the mitigation credits from the bank prior to issuance of a grading permit and provide documentation of this purchase to the City.

Wetland B is a regulated wetland and subject to the City's critical areas ordinance. The applicant's project narrative indicates they are preserving Wetland B within Tract C and is not proposing to impact the wetland or buffer. However, the applicant's grading plans show grading within the buffer of Wetland B. Since the applicant's bank use plan (Exhibit R) does not propose mitigation for impacts to the Wetland B buffers, staff are assuming that the grading is a mistake. A condition of approval will require that the applicant's final approved grading plans not include impacts to the buffer of Wetland B or that the applicant apply for a critical areas permit for impacts to the buffer. A condition of approval will require that the buffer of Wetland B is marked both during and after construction. The applicant is also required to record a conservation covenant and to reference this conservation covenant on the face of the final plat.

As **a condition of approval,** the applicant shall purchase credits for impacts to Wetland A and provide documentation of this purchase to the City prior to issuance of a grading permit.

As **a condition of approval**, the applicant's final approved grading plans shall not include impacts to the buffer of Wetland B or, if impacts are proposed, the applicant must apply and receive approval for a critical areas permit for impacts to the buffer.

As **a condition of approval,** the applicant shall mark the buffer of Wetland B during and throughout construction in compliance with LCMC 18.300.090(5)(q)(iii). Following construction, the applicant shall mark the buffer permanently along the upland boundary of the wetland buffer in compliance with LCMC 18.300.090(5)(q)iv). The permanent marking may consist of logs, a tree or hedge row, fencing and small signs at an interval of one per lot or every 50 feet, whichever is less worded substantially as follows: "Wetland and Buffer – Please Retain in a Natural State."

As **a condition of approval**, the applicant shall record a conservation covenant in a form approved by the city attorney in conformance with LCMC 18.300.090(5)(q)(v).

As **a condition of approval**, the applicant shall include the boundary of the wetland and it buffer and a reference to the recorded conservation covenant on the face of the final plat.

Chapter 18.310 LCMC Environmental Policy

The Applicant submitted a SEPA Checklist. The City reviewed the checklist and relevant materials, including an archaeological pre-determination report, and the Responsible Official issued an optional Mitigated Determination of Non-Significance (MDNS) Threshold Determination in conformance with Washington Administrative Code 197-11-355 on February 28, 2022. The City filed the MDNS on May 4, 2022. The City published notice of the MDNS in Ecology SEPA Register. SEPA mitigation measures are incorporated in Section IV.C of this staff report for reference # 202201881.

LCMC 18.340 Native Plant List

Response: All property owners throughout the city are required to avoid the use of plants from the nuisance plan list and shall not landscape with any plants on the prohibited plant list. The applicant's preliminary landscape plan (Exhibit T) does not include any nuisance or prohibited species. As a **Condition of Approval**, the final Landscape Plan, once submitted, shall avoid the use of plants from the nuisance plant list and the prohibited plants list per Table 18.340.040(3) and Table 18.340.040(4).

LCMC 18.350 Tree Protection

Response: The site contains an unspecified number of trees that generally fall into two categories: (1) native trees and (2) evergreen trees from the site's prior use as a Christmas tree farm. The Christmas tree farm meets the City's definition of "Agricultural uses" and therefore staff have interpreted that the Christmas trees are not subject to the City's tree protection ordinance, but all other trees onsite which are greater than 5 inches are regulated.

The applicant states in their project narrative that they will be removing a total of four trees on the site. However, their plans do not meet the requirements of the City tree protection ordinance, because they do not have a tree protection plan which meets the requirements of 18.350.060 including documenting all trees onsite; and the applicant has not responded to the approval criteria for a tree removal permit in LCMC 18.350.080. A condition of approval will require that the applicant file a tree removal permit meeting the requirements of LCMC 18.350 prior to engineering document approval.

As a **Condition of Approval**, the applicant shall apply for a Type II tree removal permit, per 18.350.070(2) and meeting the approval criteria of 18.350.080, prior to soil disturbance or removal of any trees regulated under LCMC 18.350.

As a **Condition of Approval**, any trees proposed for removal shall be identified on the plan and shall be flagged in the field consistent with LCMC 18.350.060 so that the City can verify trees to be removed and preserved consistent with 18.350.070(3). In addition, the applicant shall install construction fencing around trees to remain so they are not inadvertently removed and grading does not occur within their root zones.

As a **Condition of Approval,** trees regulated by chapter 18.350 that are proposed to be removed shall be mitigated consistent with LCMC 18.350.

LCMC 18.360 Archeological Resource Protection

Response: According to the Clark County Maps Online archaeological predictive model, the subject site is located in areas containing a moderate and moderate high risk of encountering archaeological resources. Per 18.360.030(12), an archeological predetermination is required for projects which will have a high impact defined to include excavation of 12 inches below the ground surface and more than 10,000 square feet in moderate and moderate high-risk areas. The applicant's proposal will include excavation of more than 12 inches below grade for construction of roads and utilities which exceed 10,000 square feet in area and for grading on some areas of the site. Therefore, an archeological predetermination is required for the proposed project.

An archeological predetermination report was completed by Archaeological Services LLC and included in the submittal package. A flake fragment was identified in one of the shovel test pits, but is considered isolated. Given the isolated nature of the find, it is the archaeologists opinion that no further archaeological work is necessary in association with the proposed project aside from adherence to an inadvertent discovery plan. A condition of approval will require that the applicant implement an inadvertent discovery plan, as recommended.

Based off of the information included in the submitted archeological predetermination, staff concludes that an archeological resource survey, as detailed in LCMC 18.360.090, is not required for the proposed project.

See Section IV for a condition of approval regarding inadvertent discovery of archeological or historical materials during project construction.

III.F Public Works and Engineering Analysis

Chapter 12.05 LCMC, Sidewalks' Chapter 12.10 LCMC, Public and Private Road Standards; Chapter 18.320 LCMC, Stormwater and Erosion Control; and Chapter 15.05 LCMC, Building Code and Specialty Codes, Chapter 15.35 LCMC, School Impact Fees;

Transportation Impact Analysis

The applicant conducted a transportation impact study for the Lockwood Meadows Subdivision, prepared by Charbonneau Engineering, dated August21, 2021. The proposed development will construct a 74-lot subdivision at 2000 NW Lockwood Creek Road. Access to the site is proposed from East Spruce Avenue and NE 24th Avenue. The proposed project is scheduled for completion in 2024.

The City of La Center has adopted mobility standards for transportation facilities during the highest one-hour period on an average weekday. The City's Transportation Capital Facilities Plan requires all un-signalized or roundabout controlled intersections must operate with a Level of Service (LOS) "E" or better.

The traffic impact analysis provided operations for existing (2021) and future (2024) conditions during the AM peak hour and PM peak hour at the following study intersections:

- Cedar Avenue and E. 4th Street
- John Storm Road and Lockwood Creek Road
- East Spruce Avenue and Lockwood Creek Road (two way stop)
- NE 24th Avenue and Lockwood Creek Road (two way stop)
- East 4th Street/NE Lockwood Creek Road/NE Highland Avenue/East Ivy Avenue (Mitigated in future)
- NE Timmen Road and La Center Road (two way stop)

The traffic study for Lockwood Meadows Subdivision has been prepared to determine the potential impacts at several study intersections along Lockwood Creek Road, East 4th Street, and La Center Road.

Development of the site includes 74 single-family homes. Trip generation is projected to be 699 daily trips with 55 AM peak hour trips and 73 PM peak hour trips. Intersection sight distance at the proposed access points on East Spruce Avenue and on NE 24th Avenue was reviewed in accordance with the AASHTO standards. A travel speed of 25 MPH on Spruce Street requires an intersection sight distance of 280 feet in both directions.

No restrictions to the sightlines are present on East Spruce Street and the sight distance standard is met. 24th Avenue, between Lockwood Creek Road and NE 339th Avenue, does not have a posted travel speed and the traffic speeds were gauged by performing test drives following local traffic. The speeds typically ranged from 35 MPH to 40 MPH. The AASHTO standard for the higher speed is 445 feet. The available intersection sight distance was measured to be 580 feet north of the access approach and in excess of 600 feet to the south. Therefore, the intersection sight distance standard is met. The analysis has determined that all of the study intersections except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue will operate at LOS `D` or better through the Year 2024 total traffic scenario.

The site access approaches to East Spruce Avenue and NE 24th Avenue will require stop sign control and stop bar pavement markings.

Chapter 12.10 -- Public and Private Road Standards
City of La Center Engineering Standards for Construction shall apply to all public road improvements unless modified by the director. LCMC 12.10.040.

General roadway and right-of-way standards shall apply and the applicant shall provide half street improvements per the Arterial “A” standard on Lockwood Creek Road, half street improvements along NE. 24th Avenue per the Rural Minor Collector Standard per LCMC 12.10.090.

The entire road section of E. 24th Avenue is subsiding and is experiencing subgrade failure. Due to added traffic from this subdivision, and construction vehicles that will access the site for this subdivision, the applicant will need to reconstruct the entire width of E. 24th Avenue to support these future vehicle loads. The applicant shall provide full street improvements on interior streets according to the City of La Center Local Access standard ST-15 In addition to the interior street improvements, street lights, street trees and per LCMC 12.10.190. All pedestrian path of travel in public right of way including; sidewalks, curb ramps and street pedestrian crossings shall comply with the American Disabilities Act.

The city will monitor the condition of the road prior to and during construction, and may require improvements to the entire width of the road following construction.

The applicant shall provide full street improvements on interior streets according to the City of La Center Local Access standard ST-15.

The development shall incorporate interior street improvements, street lights, street trees, and stormwater improvements per LCMC 12.10.190. Street lighting shall be LED and shall comply with the City Engineering Standards for the type and spacing of the lights.

For driveways to each lot the applicant will need to comply with maximum driveway width as shown on standard detail ST-4.

All pedestrian path of travel in public right of way including; sidewalks, curb ramps and street pedestrian crossings shall comply with the American Disabilities Act.

Fire hydrants shall be spaced per the IFC or as otherwise approved by the Fire District. The location of all the hydrants must be approved by the Fire District. The Fire District must approve access to all the lots per the IFC.

Clark Public Utilities must approve the water pipe system and service to all lots.

The final plat shall contain street names and addresses as provided by the City.

Monumentation shall be as directed by the City and shall be inside a cast iron monument case flush with the final street grade and shall be a brass cap, in a 30-inch-long pipe as set by the surveyor of record and shown on the final subdivision plat map.

Grading

The applicant shall submit final grading and erosion control permit as part of the subdivision plans showing the proposed contours on the plans.

The City Erosion Control Standards require that any activity disturbance over 500 SF must comply with the City standards. As part of these standards a construction stormwater permit is required from the Department of Ecology and an SWPPP will be necessary as part of the plan submittal to the City. All erosion control measures shall be designed, approved, installed and maintained consistent with Chapter 18.320 LCMC and the applicant’s Construction Stormwater Permit. Per the City Erosion Control Manual, from October 1 through April 30, no soils shall remain exposed for more than two (2) days. From May 1 through September 30, no soils shall remain exposed more than seven (7) days.

Site development earthwork for site grading and construction of sewer, storm drain, water and street systems shall be limited to the dry weather season between May 1 and October 31 with planting and seeding erosion control measures completed by October 1 to become established before the onset of wet weather.

Geotechnical Study.
A complete application will include a geotechnical study and report, prepared by a geotechnical engineer or geologist, licensed in the state of Washington. The report shall include at a minimum, testing to support the structural section of the roadway, site building construction, grading, retaining-wall design, as applicable, and subsurface drainage. LCMC 18.212.050.

The applicant shall follow all recommendations by the report prepared by Columbia West Engineering dated September 23rd, 2021.
These are as follows:

Over-excavation and stabilization of pipe trenches or other excavations with imported crushed aggregate or gabion rock may also be necessary to provide adequate subgrade support.

The Geotechnical Report discusses recommends subdrains be installed along cuts slopes. It also suggests that because of the springs and seeps, that a drainage channel or perforated pipes be installed to drain the soil. Figure 6 in the report shows the use of subsurface drain rock and perforated pipe below the edge of the pavement.

A subsurface drainage system will need to be proposed to mitigate this groundwater, seepage problem behind the lots, as well as along the proposed roads. The standard city street sections will need to be modified to drain potential groundwater that can impact the roads. In addition, Lockwood Creek Road has an existing roadside ditch that drains all property north. A drainage culvert and disposal of stormwater will need to be shown for this proposed widening. Connection to an approved outfall will need to be shown for this subsurface pipe.

Chapter 13.10 -- Sewer System Rules and Regulations
Connection to public sewer is required. LCMC 13.10. All work is to be performed by a duly licensed contractor in the City of La Center. LCMC 13.10.230. Work will be performed using an open trench method unless otherwise approved. LCMC 13.10.200. All costs associated with installing the side sewer shall be borne by the applicant. LCMC 13.10.110.

Per the City Engineering Standards, sanitary sewers should be designed to care for future loads that may reasonably be expected from full development upstream, consistent with the La Center Comprehensive Plan, Capital Facilities Plan, LCMC Title 13, and the Sewer Master Plan (General Sewer Plan).

The applicant is proposing to connect the sanitary sewer piping from the development to the existing gravity sewer in East 4th Way, to the west, that was constructed as part of the Heritage Country Estates Development. The applicant will need to verify the condition of existing 8-inch downstream sewer with video prior to connecting to the system.

Video inspection of the existing 8-inch gravity line must be performed verifying its structural integrity and ability to accommodate the developer’s preferred option. Should repairs be necessary in the existing

8-inch gravity line, the developer will perform such repairs using generally accepted methods at the developer's sole expense prior to connection or discharge from the development into the existing 8-inch gravity system.

Existing septic system must be abandoned or removed as necessary per Clark County Environmental Health permitting.

Chapter 18.320 (Stormwater and Erosion Control)

Chapter 18.320 (Stormwater and Erosion Control) Section 18.320.120 (1) LCMC states that ground-disturbing activities of more than 500 square feet are subject to the requirements of City of La Center Erosion Control Guidelines. Section 18.320.120 (2)(a) LCMC states that the creation of more than 2,000 square feet of impervious surface is subject to stormwater regulation. The applicant proposes to create new impervious interior streets in the subdivision. Per LCMC 18.320.210, treatment BMPs shall be sized to the treat the water quality design storm, defined as the six-month, 24-hour storm runoff volume. A Technical Information Report (TIR) will need to be submitted by the applicant and must comply with LCMC 18.320. The LCMC section 18.320.220 states that if surface water leaves the site, stormwater must be detained per LCMC. The design must meet the LCMC 18.320 and the 1992 Puget Sound Manual for the design of the system.

The existing wetland on Tract C currently is being recharged by stormwater water and subsurface flow from the north portion of the parcel. By constructing the lots north of the wetland, the storm flow to this wetland will be reduced or eliminated. In addition, the drainage from the lots north and east of this wetland appear to drain to the adjacent property. The applicant is proposing to connect some of the downspouts from homes north of Tract C to drain directly to the wetland. A flow spreader is proposed to disperse flow to the wetland. The critical area report will have to support the use of this wetland recharge.

The collection system shall be designed by the rational method using HEC-12 1984 edition standards for gutter and storm pipe capacity. As an alternate, WSDOT Hydraulics Manual can be used for inlet capacity design. The 100-year rainfall intensity must be used for pipe capacity design using the rational method.

Downspouts connections from the houses must connect directly into the site stormwater system. Laterals from the storm main in the street must be shown to serve each lot.

The applicant proposes to create new impervious interior streets in the subdivision. Per LCMC 18.320.210, treatment BMPs shall be sized to the treat the water quality design storm, defined as the six-month, 24-hour storm runoff volume.

A final Technical Information Report (TIR) will need to be submitted by the applicant and must comply with LCMC 18.320.

The collection system shall be designed by the rational method using HEC-12 1984 edition standards for gutter and storm pipe capacity. As an alternate, WSDOT Hydraulics Manual can be used for inlet capacity design. The 100-year rainfall intensity must be used for pipe capacity design using the rational method.

Downspouts connections from the houses must connect directly into the site stormwater system. Laterals from the storm main in the street must be shown to serve each lot.

Maintenance of Stormwater Facility

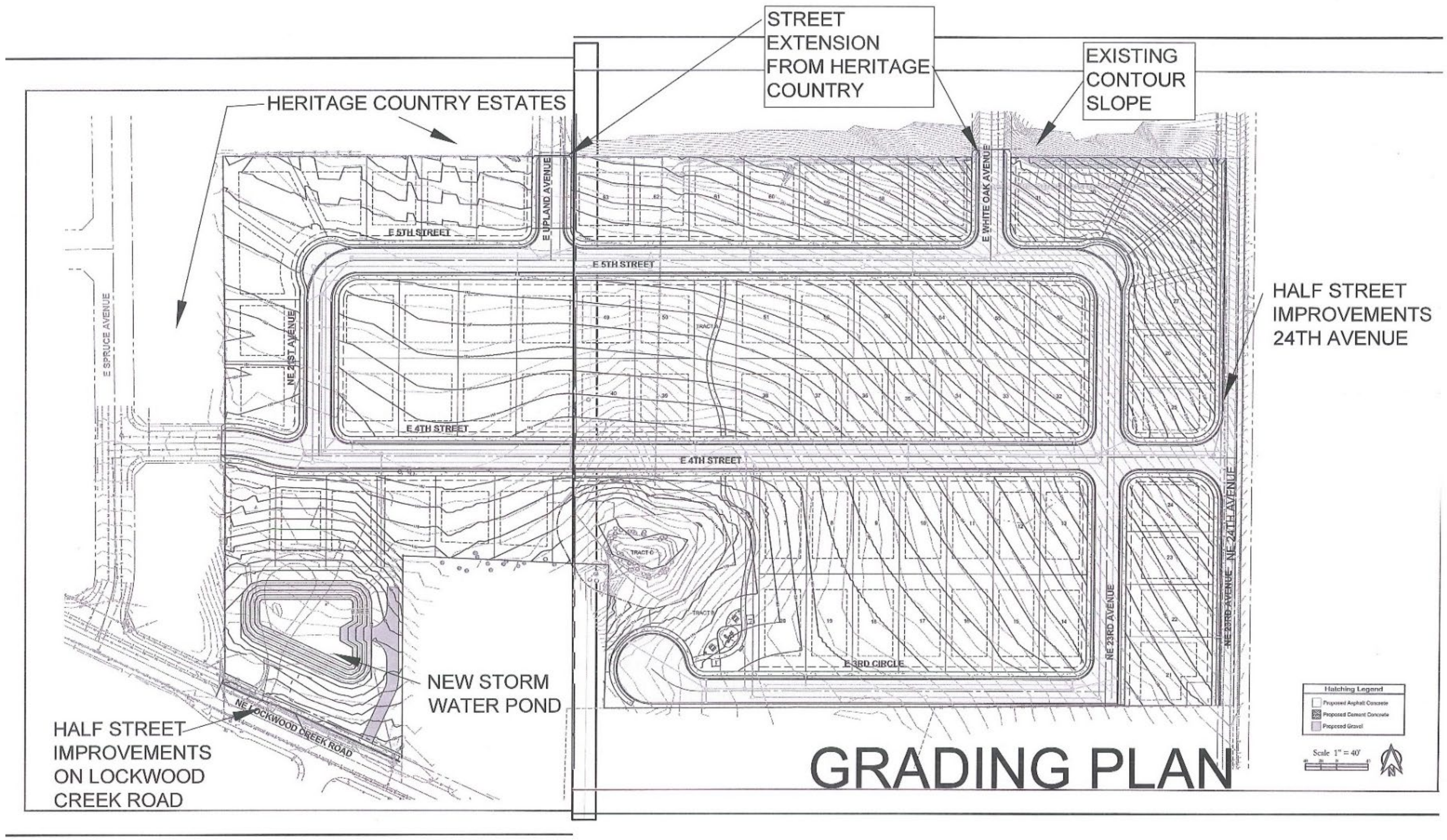
The applicant shall be responsible for maintenance of the stormwater facility until an HOA is established to maintain the facility. When the HOA assumes responsibility of the facility, the developer will establish monetary funding of a reserve fund, for maintenance of the stormwater facility, when at least 50 percent of development of the housing units has occurred or at minimum two years after completion and acceptance of the subdivision by the City, whichever is more. The applicant and future owners will be responsible for maintaining the stormwater facility. An operations manual must be submitted for City review approval for the maintenance of the facility in all cases. Adequate bonding is required to guarantee maintenance of the facility for a period of two years following final plat. The minimum bond amount shall be 10 percent of the construction cost of the stormwater facility. Stormwater facilities must be located in a separate tract.

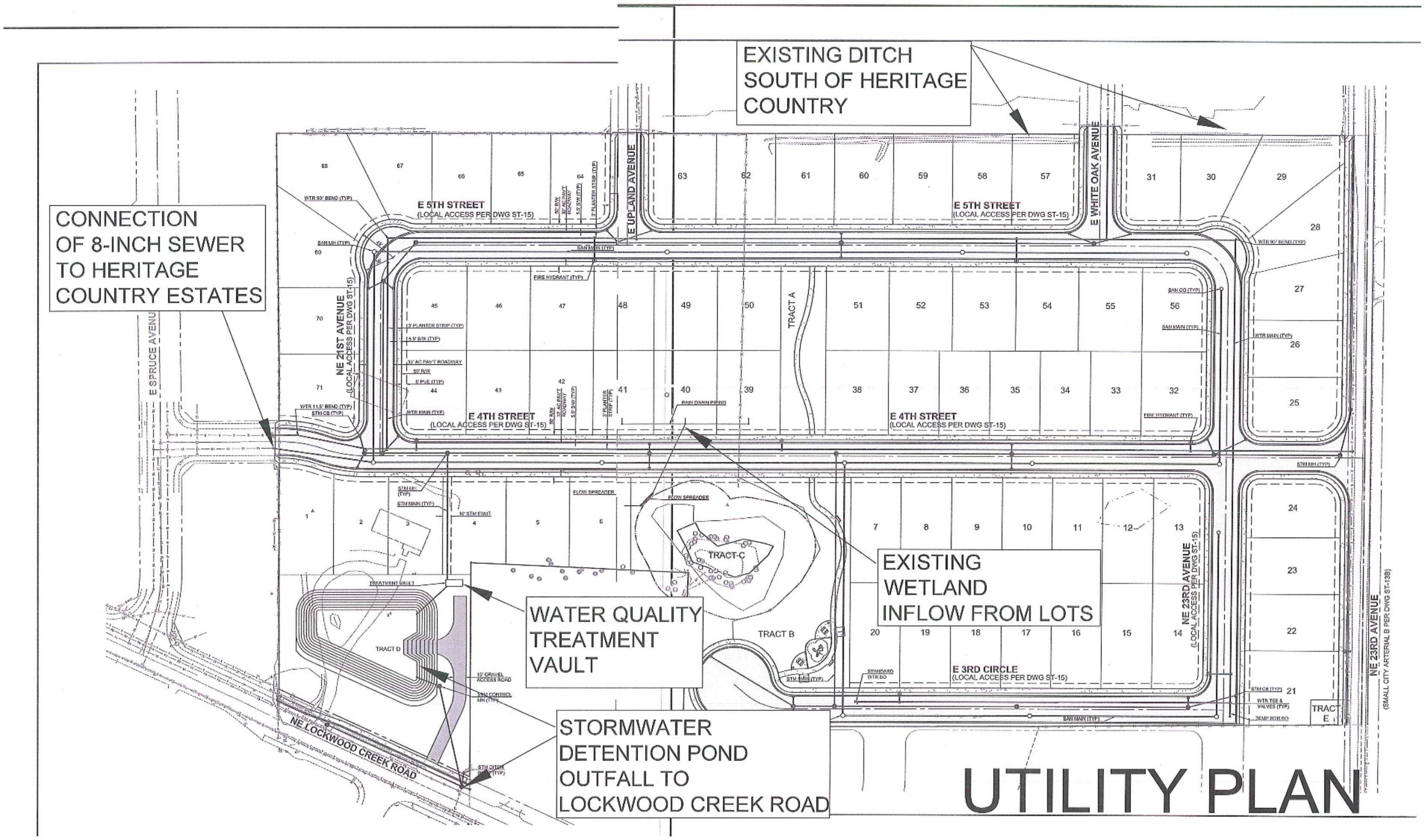
Prior to initiation of any construction or final plat approval, the developer shall demonstrate to the City's satisfaction the following.

1. The developer shall establish a homeowner's association (HOA) and Articles of Incorporation, By-laws and CC&Rs of the HOA shall reflect that the HOA's operation and maintenance costs for stormwater facilities shall be borne by the HOA. The applicant will provide a "Stormwater Covenant" that shall describe the scope of maintenance of the stormwater facility and it shall be recorded and incorporated in the CC&Rs.
2. The HOA shall be empowered to assess its members' fees to be reserved and used to reimburse the City for the operation and maintenance of the facilities, if enforcement becomes necessary.
3. The City shall have the right of a third-party enforcement to ensure that the HOA remains intact and collects the fees and the City shall have the right to recapture any fees and costs associated with enforcement actions. Further, the following language is to be placed on the face of the plat: The City shall be granted the right, but not the duty, to access and maintain the stormwater facility consistent with 18.320.230 LCMC.

Street Lighting

Street light design and installation is reviewed and approved by the City of La Center. Street lighting on local streets shall be Acorn full-cutoff, single-fixture on a black decorative fiberglass pole per the Engineering Standards. The applicant shall submit a photometric analysis along with the street light design to verify compliance with the Engineering Standards.


STREET EXTENSION FROM HERITAGE COUNTRY
EXISTING CONTOUR SLOPE
HERITAGE COUNTRY ESTATES
HALF STREET IMPROVEMENTS 24TH AVENUE
NEW STORM WATER POND
HALF STREET IMPROVEMENTS ON LOCKWOOD CREEK ROAD
E 5TH STREET
E 4TH STREET
E UPLAND AVENUE
E WHITE OAK AVENUE
E SPRUCE AVENUE
NE 21ST AVENUE
NE 23RD AVENUE
NE 24TH AVENUE
E 3RD CIRCLE
NE LOCKWOOD CREEK ROAD
GRADING PLAN



Chapter 15.35 LCMC, School Impact Fees;

As a **Condition of Approval,** for each dwelling the City shall assess and charge the builder School, Park and Traffic impact fees in effect at the time of building permit application.

IV. CONCLUSIONS & RECOMMENDATION

The review authority finds the applicant has sustained the burden of proving the application complies with the applicable provisions of the La Center Municipal Code. The subject application should be **APPROVED, SUBJECT TO THE FOLLOWING CONDITIONS.**

IV.A Planning Conditions

1. The applicant shall submit engineering, construction, final plat, and building permit documents in compliance with the preliminary plat documents unless otherwise modified by conditions of approval in this staff report or as approved by the City through subsequent approvals.

2. The applicant shall demonstrate that the maximum building coverage and maximum impervious surface area requirements are met prior to issuance of a building permit for each lot.

3. Prior to engineering approval, the applicant shall provide a final landscape plan with street trees spaced no greater than 30 feet on center.

4. Parks and Open Spaces

    a. Prior to engineering plan approval, the applicant shall demonstrate that the park meets ADA accessibility regulations.

    b. The applicant shall place the park in a public access easement.

    c. The applicant's final park plan must provide a minimum of four benches.

    d. The applicant's final park plan must show vegetation up to the edge of the wetland buffer and an underground irrigation system for all vegetated areas.

    e. The applicant's final park plan shall show a low fence or vegetative barrier where the park abuts residential lots.

    f. Prior to final engineering approval, the applicant shall provide a final park plan that: (1) provides lighting within the park Tract B and along the paths and within Tract A to deter criminal activity (2) contains maintenance notes that requires that all proposed trees with Tracts A and B must be limbed up to provide clear line of site along the pathways and (3) assigns an address for the park for emergency response

    g. The applicant shall complete the required park and trail improvements or provide the City with a bond or other financial security bond, in an amount of at least 125 percent of the estimated cost of construction of the Tract B improvements with surety and conditions satisfactory to the Public Work Department providing for and securing to the City the actual construction and installation of such improvements prior to final plat approval.

    h. The applicant shall construct the park prior to the issuance of the occupancy permit for the 25th dwelling unit.

5. The applicant shall obtain building permits in compliance with LCMC 15.05 prior to construction.

6. Prior to the issuance of building permit occupancy, the applicant shall pay all system development fees, park, school, and traffic impact fees in effect at the time.

7. The preliminary plat shall expire five years from the date of approval by the hearing examiner, unless an application for final plat is submitted or an extension is requested per LCMC 18.210.050(2) and (3).

8. Prior to final plat approval, the Developer shall identify the setbacks for all lots on the face of the final plat. To minimize impacts to pedestrian safety and mobility, garage doors shall be setback a minimum of 20 feet from the interior edge of a sidewalk.

9. The applicant shall comply with all provisions regarding monumentation outlined in Chapter 18.230.

10. As outlined in LCMC 18.230.090, the final plat shall be drawn with ink upon three-millimeter Mylar film, or equivalent; said sheets are to be 30 inches by 21 inches, with a one-inch border on each side or as otherwise directed by the Clark County recording agency.

11. If any fences or hedges are proposed prior to the final plat, the applicant must provide information to the extent as regulated by LCMC 18.245.020.

12. The applicant shall provide a photometric plan prior to final engineering plan approval showing how the proposed lights will not cause more than a one foot-candle measure at any property line in conformance with 18.245.040 and LCMC 18.282.

13. Ground-level exterior equipment such as air condition units, must be screened from view to an F2 or L3 standard prior to issuance of occupancy for each dwelling unit.

14. The applicant shall install all landscaping prior to issuance of final inspection for each dwelling unit or no more than six months after final inspection if it will increase plant survival.

15. The applicant's final landscape plan shall comply with the requirements of LCMC 18.245.060(11-16) prior to final plat approval.

16. All required landscape areas including within the Tract B park, Tract A open space and trail, and planter strip along public roadways must meet the City's irrigation requirements in LCMC 18.245.060(18).

17. The applicant shall provide each dwelling unit prior to building permit approval with at least three (3) off-street parking spaces per LCMC Table 18.280.010.

18. Critical areas

    a. The applicant shall obtain a critical areas permit for impacts to the oak tree and buffer prior to engineering document approval in compliance with all applicable provisions of LCMC 18.300.090(2) including submittal of a critical areas report and mitigation plan..

    b. The applicant shall purchase credits for impacts to Wetland A and provide documentation of this purchase to the City prior to issuance of a grading permit.

c. The applicant's final approved grading plans shall not include impacts to the buffer of Wetland B or, if impacts are proposed, the applicant must apply and receive approval for a critical areas permit for impacts to the buffer.

d. The applicant shall mark the buffer of Wetland B during and throughout construction in compliance with LCMC 18.300.090(5)(q)(iii). Following construction, the applicant shall mark the buffer permanently along the upland boundary of the wetland buffer in compliance with LCMC 18.300.090(5)(q)iv). The permanent marking may consist of logs, a tree or hedge row, fencing and small signs at an interval of one per lot or every 50 feet, whichever is less worded substantially as follows: "Wetland and Buffer – Please Retain in a Natural State."

e. The applicant shall record a conservation covenant in a form approved by the city attorney in conformance with LCMC 18.300.090(5)(q)(v).

f. The applicant shall include the boundary of the wetland and it buffer and a reference to the recorded conservation covenant on the face of the final plat.

19. The final Landscape Plan, once submitted, shall only include native plants approved for use in La Center per Table 18.340.040(2) within critical areas and buffers, avoid plants on the Nuisance List Table 18.340.040(3), and not use prohibited plants from Table 18.340.040(4).

20. Trees Protection
    a. As a Condition of Approval, the applicant shall apply for a Type II tree removal permit, per 18.350.070(2) and meeting the approval criteria of 18.350.080, prior to soil disturbance or removal of any trees regulated under LCMC 18.350.
    b. As a Condition of Approval, any trees proposed for removal shall be identified on the plan and shall be flagged in the field consistent with LCMC 18.350.060 so that the City can verify trees to be removed and preserved consistent with 18.350.070(3). In addition, the applicant shall install construction fencing around trees to remain so they are not inadvertently removed and grading does not occur within their root zones.
    c. As a Condition of Approval, trees regulated by chapter 18.350 that are proposed to be removed shall be mitigated consistent with LCMC 18.350.

21. Impact Fees. Each builder shall be assessed and shall pay the impact fees for schools, parks and transportation in effect at the time of building permit issuance. The applicant shall be credited impact fees for the existing residence onsite.

IV.B Public Works and Engineering Conditions

Public and Private Road Standards City of La Center Engineering Standards for Construction shall apply to all public road improvements unless modified by the director. LCMC 12.10.040. Lockwood Creek Road is classified as a Minor Arterial per the updated Capital Facilities Plan.

The city has designated Lockwood Creek Road as a Minor Collector "A" per the Engineering Standards. General roadway and right-of-way standards shall apply and provide half street improvements.

22. The applicant will need to adjust the sidewalk for widening so that it does not impact the existing White Oak tree adjacent to the property. East 24th Avenue is classified as a Minor Collector per the updated Capital Facilities Plan. The city has designated E. 24th Avenue as a Rural Minor Collector per the Engineering Standards. General roadway and right-of-way standards shall apply and provide half street improvements per LCMC 12.10.090.

23. The entire road section of E. 24th Avenue is subsiding and is experiencing subgrade failure. Due to added traffic from this subdivision, and construction vehicles that will access the site for this subdivision, the applicant will need to reconstruct the entire width of E. 24th Avenue to support these future vehicle loads. The applicant shall provide full street improvements on interior streets according to the City of La Center Local Access standard ST-15 In addition to the interior street improvements, street lights, street trees and per LCMC 12.10.190. All pedestrian path of travel in public right of way including; sidewalks, curb ramps and street pedestrian crossings shall comply with the American Disabilities Act.

24. The applicant will implement all recommendations from the Traffic Report from Charbonneau Engineering dated August 5th 2021. The applicant shall submit final grading and erosion control permit as part of the subdivision plans showing the proposed contours on the plans.

25. The City Erosion Control Standards require that any activity disturbance over 500 SF must comply with the city standards. As part of these standards a construction stormwater permit is required from the Department of Ecology and an SWPPP will be necessary as part of the plan submittal to the city. All erosion control measures shall be designed, approved, installed and maintained consistent with Chapter 18.320 LCMC and the applicant's Construction Stormwater Permit. Per the City Erosion Control Manual, from October 1 through April 30th, no soils shall remain exposed for more than two (2) days. From May 1st through September 30th, no soils shall remain exposed more than seven (7) days.

The applicant shall follow all recommendations by the report prepared by Columbia West Engineering dated September 23rd, 2021.
These are as follows:

26. Over-excavation and stabilization of pipe trenches or other excavations with imported crushed aggregate or gabion rock may also be necessary to provide adequate subgrade support.

The Geotechnical Report discusses recommends subdrains be installed along cuts slopes. It also suggests that because of the springs and seeps, that a drainage channel or perforated pipes be installed to drain the soil. Figure 6 in the report shows the use of subsurface drain rock and perforated pipe below the edge of the pavement. The SEPA included comments about drainage and seeping on the adjacent lots on the north and west sides of Lockwood Meadows proposed housing.

27. A subsurface drainage system will need to be proposed to mitigate this groundwater, seepage problem behind the lots, as well as along the proposed roads. The standard city street sections will need to be modified to drain potential groundwater that can impact the roads. In addition, Lockwood Creek Road has an existing roadside ditch that drains all property north. A drainage culvert and disposal of stormwater will need to be shown for this proposed widening. Connection to an approved outfall will need to be shown for this subsurface pipe.

LCMC 18.212.050. Chapter 13.10 -- Sewer System Rules and Regulations Connection to public sewer is required. LCMC 13.10. All work is to be performed by a duly licensed contractor in the City of La Center. LCMC 13.10.230. Work will be performed using an open trench method unless otherwise approved. LCMC 13.10.200. All costs associated with installing the side sewer shall be borne by the applicant. LCMC 13.10.110. Per the City Engineering Standards, sanitary sewers should be designed to care for future loads that may reasonably be expected from full development upstream, consistent with the La Center Comprehensive Plan, Capital Facilities Plan, LCMC Title 13, and the Sewer Master Plan (General Sewer Plan).

28. The applicant is proposing to connect the sanitary sewer piping from the development to the existing gravity sewer in East 4th Way, to the west, that was constructed as part of the Heritage Country Estates Development. The applicant will need to verify the condition of existing 8-inch downstream sewer with video prior to connecting to the system.

Chapter 18.320 (Stormwater and Erosion Control) Section 18.320.120 (1) LCMC states that ground-disturbing activities of more than 500 square feet are subject to the requirements of City of La Center Erosion Control Guidelines. Section 18.320.120 (2)(a) LCMC states that the creation of more than 2,000 square feet of impervious surface is subject to stormwater regulation. The applicant proposes to create new impervious interior streets in the subdivision. Per LCMC 18.320.210, treatment BMPs shall be sized to the treat the water quality design storm, defined as the six-month, 24-hour storm runoff volume. A Technical Information Report (TIR) will need to be submitted by the applicant and must comply with LCMC 18.320. The LCMC section 18.320.220 states that if surface water leaves the site, stormwater must be detained per LCMC. The design must meet the LCMC 18.320 and the 1992 Puget Sound Manual for the design of the system.

29. As part of the half street improvements for Lockwood Creek Road, the existing storm pipe culverts will need to be extended east to accommodate the new sidewalk and curb and gutter. The capacity of the existing roadside ditch is under insufficient and the condition may have to be assessed and upgraded to allow for stormwater from the development to be conveyed downstream.

30. The existing wetland on Tract B currently is being recharged by stormwater water and subsurface flow from the north portion of the parcel. By constructing the lots north of the wetland, the storm flow to this wetland will be reduced or eliminated. In addition, the drainage from the lots north and east of this wetland appear to drain to the adjacent property. The applicant is proposing to connect some of the downspouts from homes north of Tract C to drain

directly to the wetland. A flow spreader is proposed to disperse flow to the wetland. The critical area report will have to support the use of this wetland recharge.

The collection system shall be designed by the rational method using HEC-12 1984 edition standards for gutter and storm pipe capacity. As an alternate, WSDOT Hydraulics Manual can be used for inlet capacity design. The 100-year rainfall intensity must be used for pipe capacity design using the rational method.

31. Downspouts connections from the houses must connect directly into the site stormwater system. Laterals from the storm main in the street must be shown to serve each lot. Maintenance of Stormwater Facility The applicant shall be responsible for maintenance of the stormwater facility until an HOA is established to maintain the facility. When the HOA assumes responsibility of the facility, they will establish monetary funding of a reserve fund, for maintenance of the stormwater facility, when at least 50% of development of the housing units has occurred or at minimum 2-years after completion and acceptance of the subdivision by the City, whichever is more. The applicant and future owners will be responsible for maintaining the stormwater facility. An operations manual must be submitted for City review approval for the maintenance of the facility in all cases. Adequate bonding is required to guarantee maintenance of the facility for a period of two years following final plat. Stormwater facilities must be located in a separate tract. Prior to initiation of any construction or final plat approval, the developer shall demonstrate to the City's satisfaction that: 1. The developer shall establish a homeowner's association (HOA) and Articles of Incorporation, By-laws and CC&Rs of the HOA shall reflect that the HOA's operation and maintenance costs for stormwater facilities shall be borne by the HOA. The applicant will provide a "Stormwater Covenant" that shall describe the scope of maintenance of the stormwater facility and it shall be recorded and incorporated in the CC&Rs. 2. The HOA shall be empowered to access its members' fees to be reserved and used to reimburse the City for the operation and maintenance of the facilities, if enforcement becomes necessary. 3. The City shall have the right of a third-party enforcement to ensure that the HOA remains intact and collects the fees and the City shall have the right to recapture any fees and costs associated with enforcement actions. Further, the following language is to be placed on the face of the plat: The City shall be granted the right, but not the duty, to access and maintain the stormwater facility consistent with 18.320.230 LCMC.

32. Street Lighting Street light design and installation is reviewed and approved by the City of La Center. Street lighting on local streets shall be Acorn full cutoff single fixture on a black decorative fiberglass po0le and the frontage improvements will need to have Cobra Head LED light per the Engineering Standards. The applicant shall submit a Photometric analysis along with the street light design to verify compliance with the Engineering Standards.

IV.C SEPA (MDNS) Documentation and Mitigation Conditions

1. Earth: The applicant must comply with the design recommendations of the geotechnical site investigation by Columbia West Engineering, Inc. dated September 23, 2021.
2. Earth: All grading and filling of land must utilize only clean fill, i.e., dirt or gravel from an approved source;
3. Earth: All debris removed offsite must be disposed of at an approved location;
4. Air: The applicant is required to sprinkle the site with water during construction to reduce dust.
5. Air: The applicant shall use vehicles fitted with standard manufacturer's emission's control equipment to reduce construction-period emissions. Construction vehicles shall not be permitted to idle when not in use.
6. Air: The applicant shall use vehicles fitted with standard manufacturer's emission's control equipment to reduce construction-period emissions. Construction vehicles shall not be permitted to idle when not in use.
7. Water: The applicant must comply with the recommendations of the critical areas report (ELS, March 24, 2021) and the Bank Use Plan (ELS, November 2, 2021).
8. Water: The applicant must comply with the recommendations of the Preliminary Technical Information Report dated January, 2022.
9. Water: The applicant must use approved erosion control best management practices during construction.
10. Water: The applicant shall apply for and obtain all necessary state and federal permits (e.g. Section 404 authorization from the U.S. Army Corps of Engineers and Section 401 approval from the Washington Department of Ecology, as applicable, prior to filling Wetland A.
11. Water: A City stormwater permit and Stormwater Pollution Prevention Plan (SWPPP) shall be required for the proposed project and shall be approved prior to construction.
12. Plants: The applicant shall retain the priority habitat Oregon White oak or receive approval for a critical areas permit for impacts to the Oak's dripline and shall also plant street trees spaced 30-feet on center, and plant landscaping as required by LCMC 18.245.
13. Environmental Health: For the demolition of the existing house on site, in addition to any required asbestos abatement procedures, the contractor shall ensure that any other potentially dangerous or hazardous materials present, such as PCB-containing lamp ballasts, fluorescent lamps, and wall thermostats containing mercury, are removed prior to demolition.
14. Environmental Health (Noise): All construction equipment shall have muffled exhaust and construction activities are only permitted during City-approved construction hours. Contractors are required to comply with the maximum noise level provisions of WAC 173-60 during construction.
15. Light and Glare: The applicant shall comply with the requirements of LCMC 18.282 (Outdoor Lighting).
16. Recreation: The applicant shall comply with LCMC 18.147 (Parks and Open Space).
17. Recreation: The applicant is required to pay park impact fees prior to issuance of building permits.
18. Historic and cultural preservation: In the event any archaeological or historic materials are encountered during project activity, work in the immediate area (initially allowing for a 100' buffer; this number may vary by circumstance) must stop and the following actions taken:

a. Implement reasonable measures to protect the discovery site, including any appropriate stabilization or covering;

b. Take reasonable steps to ensure confidentiality of the discovery site; and,

c. Take reasonable steps to restrict access to the site of discovery.

The applicant shall notify the concerned Tribes and all appropriate county, city, state, and federal agencies, including the Washington Department of Archaeology and Historic Preservation and the City of La Center. The agencies and Tribe(s) will discuss possible measures to remove or avoid cultural material, and will reach an agreement with the applicant regarding actions to be taken and disposition of material. If human remains are uncovered, appropriate law enforcement agencies shall be notified first, and the above steps followed. If the remains are determined to be Native, consultation with the affected Tribes will take place in order to mitigate the final disposition of said remains.

See the Revised Code of Washington, Chapter 27.53, "Archaeological Sites and Resources," for applicable state laws and statutes. See also Washington State Executive Order 05-05, "Archaeological and Cultural Resources." Additional state and federal law(s) may also apply.

Copies of the above inadvertent discovery language shall be retained on-site while project activity is underway.

Contact	**Information**
Cowlitz Indian Tribe, Nathan Reynolds, Interim Cultural Resources Manager	Phone: 360-575-6226; email: nreynolds@cowlitz.org
City of La Center, Bryan Kast, Public Works Director	Phone: 360-263-2889; email: bkast@ci.lacenter.wa.us
Office of the Clark County Medical Examiner (for human remains)	Phone: 564-397-8405; email: medical.examiner@clark.wa.gov
Washington DAHP, Dr. Allison Brooks, Ph.D, Director	Phone: 360-586-3066; email: Allyson.Brooks@dahp.wa.gov

19. Transportation: The applicant shall comply with the recommendations of the Traffic Analysis Report (Charbonneau Engineering, August 2021) and Trip Generation Update and Assessment Memorandum (Charbonneau Engineering, October 26, 2021).
20. Transportation: The applicant is required to pay transportation impact fees prior to issuance of building permits.
21. Utilities: The applicant shall pay the applicable sewer system development charge for each residential unit. Applicable fees will be assessed at the time of building permit application and are due prior to issuance of final occupancy for each unit.
22. Public Services: The applicant shall pay school, and park impact fees prior to the issuance of building permits for the onsite units. Applicable impact fees will be assessed at the time of building permit application and are due prior to issuance of final occupancy for each unit.

IV.D CCFR Fire Conditions

1. Applicant must comply with all applicable requirements and receive approval through Clark Cowlitz Fire & Rescue.

IV.E CPU Conditions

1. Applicant must comply with all applicable requirements and receive approval through Clark Public Utilities.

V. APPEALS

The applicant, applicant's representative, or any person, agency or firm with an interest in the matter may appeal the Critical area decision. The appellant shall file the appeal together with the requisite fee and information within 14 calendar days of the date of the decision being appealed. (18.030.130 LCMC.)

Bryan Kast, P.E.,
Public Works Director
City of La Center

Anthony Cooper, P.E.
City Engineer
City of La Center

Exhibits

Exhibit A – Application Materials

1. Cover & Table of Contents
2. City Master Land Use Application
3. Proof of Ownership & Authorization
4. Pre-Application Conference Notes
5. Project Narrative
6. Variance Narrative
7. Legal Description
8. Preliminary Stormwater Report
9. State Environmental Review (SEPA)
10. Geotechnical Report
11. Water Review Letter
12. Public Health Review Letter
13. Traffic Circulation Plan
14. Road Modification Request
15. Traffic Study Update Memo
16. Traffic Study
17. Archaeological Report - Contact Jessica Nash 360-263-7665
18. Bank Use Plan
19. Critical Areas Report
20. Preliminary Plans

21. Offsite Features

Exhibit B – SEPA

1. Mitigated DNS Notice and Checklist
2. Combined SEPA Comments

Exhibit A.1

LOCKWOOD CREEK SUBDIVISION

Located in the NE ¼ of Section 02, T.4N, R.1E, W.M.
Clark County, Washington

Prepared for:
Susanna Hung
701 Columbia St. #414
Vancouver, WA 98660
(415) 990-8907
sshung_2000@yahoo.com

Prepared by:
PLS Engineering
Engineers, Surveyors and Planners
Contact: Travis Johnson
604 W Evergreen Blvd
Vancouver, WA 98660
(360) 944-6519
pm@plsengineering.com

TABLE OF CONTENTS

Exhibit A.2

DocuSign Envelope ID: 230AD26A-6B3B-4AD4-ADE5-11F61027509D

Master Land Use Application

City of La Center, Planning Services
305 NW Pacific Highway
La Center, WA 98629
www.ci.lacenter.wa.us
Ph. 360.263.7665 Fax: 360.263.7666
www.ci.lacenter.wa.us

Property Information

Site Address 2000 NE Lockwood Creek Road La Center, WA 98629

Legal Description #94 SEC 2 T4N R1EWM 20A

Assessor's Serial Number 209113000

Lot Size (square feet) 871,200 sf/20 Acres

Zoning/Comprehensive Plan Designation R1-7.5

Existing Use of Site Manufactured Home

Contact Information

APPLICANT:

Contact Name Susanna S. Hung

Company Susanna S. Hung Trust

Phone 415-990-8907 **Email** sshung_2000@yahoo.com

Complete Address 701 Columbia Street #414 Vancouver, WA 98660

DocuSigned by:
Signature Susanna Hung
FD20BF3036A845C...
(Original Signature Required)

APPLICANT'S REPRESENTATIVE:

Contact Name Travis Johnson

Company PLS Engineering

Phone 360-944-6519 **Email** pm@plsengineering.com

Complete Address 604 W Evergreen Blvd Vancouver, Wa 98660

DocuSigned by:
Signature TRAVIS JOHNSON
8056EA7E6216458...
(Original Signature Required)

PROPERTY OWNER:

Contact Name Susanna S. Hung

Company Susanna S. Hung Trust

Phone 415-990-8907 **Email** sshung_2000@yahoo.com

Complete Address 701 Columbia Street #414 Vancouver, WA 98660

DocuSigned by:
Signature Susanna Hung
FD20BF3036A845C...
(Original Signature Required)

Development Proposal

Project Name

Type(s) of Application Preliminary Subdivision

Previous Project Name and File Number(s), if known

Pre-Application Conference Date and File Number June 7, 2021 2021-016-PAC

Description of Proposal Proposal to subdivide approximately 20 acres into 71 single family lots

Office Use Only

File # ______________________________ **Planner** ______________________________

Received By ______________________________ **Fees: $**______________________________

Date Received: ______________________________ **Date Paid:** ______________________________

Procedure: ☐ Type I ☐ Type II ☐ Type III ☐ Type IV

Receipt # ______________________________

Notes ______________________________

Exhibit A.3

5629532 D
Total Pages: 3 Rec Fee: $103.50
eRecorded in Clark County, WA 07/24/2019 12:10 PM
CLARK COUNTY TITLE COMPANY
SIMPLIFILE LC E-RECORDING

When recorded return to:

Susanna S. Hung Trust
710 Columbia Street # 414
Vancouver, WA 98660

STATUTORY WARRANTY DEED

CL13553

The Grantor, **Patricia Kay Reed, an unmarried woman**

for and in consideration of **Ten Dollars and other valuable consideration**

in hand paid, conveys, and warrants to **Susanna S. Hung Trustee of the Susanne S. Hung Trust**

the following described real estate, situated in the County of Clark, State of Washington:

SEE ATTACHED EXHIBIT "A"

Abbreviated Legal: **PTN SEC 2, T4N, R1EWM**
Tax Parcel Numbers(s): **209113-000**

SUBJECT TO covenants, conditions, restrictions, reservations, easements and agreements of record, if any.

Dated: 7-8-19

Patricia Kay Reed
Patricia Kay Reed

STATE OF **Washington**

} ss.

COUNTY OF **Clark**

I certify that I know or have satisfactory evidence that **Patricia Kay Reed** is/are the person who appeared before me, and said person acknowledged that signed this instrument and acknowledged it to be free and voluntary act for the uses and purposes mentioned in this instrument.

Dated: 7-8-19

Beth M. Woodward

Beth M. Woodward
Notary Public in and for the State of Washington
Residing at
My appointment expires: 1-26-20

BETH M. WOODWARD
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
JANUARY 26, 2020

EXHIBIT "A"

A PARCEL OF PROPERTY IN THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 2, TOWNSHIP 4 NORTH, RANGE 1 EAST OF THE WILLAMETTE MERIDIAN IN CLARK COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID WEST HALF OF THE NORTHEAST QUARTER OF SECTION 2; THENCE SOUTH 01° 48'40" WEST ALONG THE EAST LINE OF SAID WEST HALF 1229.66 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING SOUTH 01° 48'40" WEST ALONG SAID EAST LINE 699.60 FEET TO THE LINE MONUMENTED BY OLSON ENGINEERING, INC. AS SHOWN IN THAT SURVEY RECORDED IN BOOK 28 AT PAGE 24, RECORDS OF CLARK COUNTY; THENCE FOLLOWING SAID LINE, NORTH 88° 46'09" WEST 384.03 FEET; THENCE ALONG SAID LINE NORTH 88° 19'06" WEST 425.16 FEET; THENCE ALONG SAID LINE NORTH 03° 32'17" EAST 183.51 FEET; THENCE ALONG SAID LINE NORTH 85° 43'03" WEST 260.48 FEET; THENCE ALONG SAID LINE SOUTH 01° 42'18" WEST 290.92 FEET TO THE CENTERLINE OF THE COUNTY ROAD NO. 42; THENCE NORTH 63° 36'17" WEST ALONG SAID CENTERLINE 250.87 FEET TO THE WEST LINE MONUMENTED ON SAID SURVEY; THENCE NORTH 01° 34'46 EAST ALONG SAID LINE 426.12 FEET; THENCE NORTH 00° 58'08" EAST 270.24 FEET TO A POINT WHICH BEARS NORTH 88° 11'22" WEST FROM THE TRUE POINT OF BEGINNING; THENCE SOUTH 88° 11'22" EAST 1297.17 FEET TO THE TRUE POINT OF BEGINNING.

Situated in the County of **Clark**, State of **Washington**.

End of Exhibit "A"

Exhibit A.4

305 NW Pacific Highway,
La Center, Washington 98629
T/360.263.7661 **F**/360.263.7666

PRE-APPLICATION CONFERENCE
Lockwood Creek Subdivision (2021-016-PAC) Meeting conducted on Monday, June 7, 2021– 3:00 PM

PROJECT INFORMATION

Site Address	2000 NE Lockwood Creek Road, La Center, WA
Legal Description	#94 SEC 2 T4N R1EWM 20A PIN 209113000
Applicant	Susanna S. Hung, 701 Columbia Street #414, Vancouver, WA 98660
Applicant's Representative	Contact: Nicolle Sicillia or Travis Johnson, PLS Engineering, 604 W Evergreen Blvd., Vancouver, WA 98660 Nicolle@plsengineering.com travis@plsengineering.com
Property Owner	Susanna S. Hung, 701 Columbia Street #414, Vancouver, WA 98660
Proposal	Subdivide a 20-acre parcel into 74 single-family lots served by public streets.
Date of Issue	June 14, 2021

SUMMARY

The applicant is proposing a 74-lot subdivision on the approximate 20-acre site. Lot sizes would range from 6,000 to 9,140 square feet. The property is located at the city's eastern limits, north of Lockwood Creek Road and bordered on the north and west by the Heritage Country Estates Subdivision. The applicant should note that the City recently approved Ordinance 2021-04 which revised the LDR-7.5 code to establish a minimum lot size of 7,500 square feet or 6,000 square feet with approved density transfers under the critical areas ordinance. The prior version of the LDR-7.5 code allowed 90 percent of lot sizes within a subdivision to average between 6,750 and 8,250 square feet. That averaging provision no longer exists in the code, so lot size minimums are 7,500 square feet and up to 10 percent of lots may be as small as 6,000 square feet under the density transfer provisions of the critical areas ordinance.

Access to the property would be from the Heritage Country Estates Subdivision using East 4th Way, East Upland Avenue, and East White Oak Avenue and from East 24th Avenue via Lockwood Creek Road. All proposed streets within the subdivision would be public.

The eastern portion of the site is mapped as having a wetland by Clark County. The applicant filed a critical areas report with the pre-application conference request that includes a wetland delineation. The delineation found two wetlands onsite (A and B). Both are category IV wetlands. Wetland A is 0.05 acres and Wetland B is 0.08 acres. The applicant proposes to fill Wetland A, which is exempt from avoidance requirements under the provisions of LCMC 18.300.090(5)(d). Clark County and the Washington Department of Natural Resources (DNR) also map a non-fish bearing seasonal stream (Type Ns) flowing south through the center of the site. However, the applicant's critical areas report concludes that that mapped stream does not meet the definition of a stream in the City's critical areas ordinance because it does not feature a channel, bed, bank, or signs of regular water flow. There are also Oregon White Oaks on the property, only one of which is protected habitat under the City's critical areas ordinance: a 40-inch tree located at the far southwestern corner of the property that applicant proposes to preserve and will include a buffer to the edge of the tree's dripline.

Clark County also maps the majority of the property as moderate to moderate-high risk of encountering archaeological resources. Development activities on the property will be subject to the City's archaeological protection ordinance in LCMC 18.360 including the requirement to provide an archaeological predetermination report.

The City Council approved the property to be annexed to the city (see File # 2021-004-ANX/SEPA and Ordinance 2021-07 on April 14, 2021. The City of La Center is finalizing the annexation process with the State of Washington and expects that the annexation will be complete on June 28, 2021. The annexation applied an Urban Residential comprehensive plan designation and Low Density Residential (LDR-7.5) zone to the property.

PRELIMINARY REVIEW

Development Standards

Subsequent application(s) shall address the following development standards. Failure of the City to cite specific requirements of the La Center Municipal Code (LCMC) in this report does not relieve the applicant of the responsibility to meet all applicable criteria. If the proposal changes from what was presented in the pre-application conference, it may trigger other review standards and processes than what is identified in this report.

Applicable Criteria: The application will be reviewed for compliance with the La Center Municipal Code (LCMC): 3.35 Impact Fees; Chapter 8.60 Sign Regulations; Title 12, Streets, Sidewalks & Public Ways; Title 13, Public Utilities; Title 18, Development Code Chapters: 18.30 Procedures; 18.130 Low Density Residential District; 18.147 Parks and Open Spaces; 18.190 Urban Holding District; 18.210 Subdivisions; 18.245 Supplementary Development Standards; 18.280 Off-Street Parking Requirements; 18.282 Outdoor Lighting; 18.300 Critical Areas; 18.310 Environmental Policy; 18.320 Stormwater and Erosion Control; 18.340 Native Plant List; 18.350 Tree Protection; 18.360 Archaeological Resource Protection.

Public Works and Engineering Analysis

Chapter 12.10 -- Public and Private Road Standards

City of La Center Engineering Standards for Construction shall apply to all public road improvements unless modified by the director. LCMC 12.10.040.

Lockwood Creek Road is classified as a Minor Arterial per the updated Capital Facilities Plan. The City has designated Lockwood Creek Road as a Minor Collector "A" per the Engineering Standards. General roadway and right-of-way standards shall apply and provide half street improvements per LCMC

12.10.090. The applicant will need to adjust the sidewalk for widening so that it does not impact the existing White Oak tree adjacent to the property.

East 24th Avenue is classified as a Minor Collector per the updated Capital Facilities Plan. The City has designated E. 24th Avenue as a Rural Minor Collector per the Engineering Standards. General roadway and right-of-way standards shall apply and provide half street improvements per LCMC 12.10.090. The entire road section of E. 24th Avenue is subsiding and is experiencing subgrade failure. Due to added traffic from this subdivision, and construction vehicles that will access the site for this subdivision, the applicant will need to reconstruct the entire width of E. 24th Avenue to support these future vehicle loads.

The applicant shall provide full street improvements on interior streets according to the City of La Center Local Access standard ST-15

In addition to the interior street improvements, street lights, street trees and per LCMC 12.10.190.

All pedestrian path of travel in public right of way including; sidewalks, curb ramps and street pedestrian crossings shall comply with the American Disabilities Act.

Fire hydrants shall be spaced every 500' per IFC or as otherwise approved by the Fire District. The location of all the hydrants must be approved by the Fire District.

The Fire District must approve access to all the lots per the IFC.

Comments

Streets and Circulation

Per LCMC 12.10.090 (2)(a) (b), the applicant will need to provide a circulation plan showing access to future development adjacent to the property. Streets shall be extended to the boundary of the land division.

The updated CFP restricts access to Arterial streets, with a minimum intersection spacing of 600-feet along Lockwood Creek Road. In particular the three parcels to the south need of the Hung property need to be considered for access through the subdivision to comply with the access requirements. The circulation plan will need to be submitted to the City for review of the overall circulation to adjacent City streets.

A Traffic Engineer, licensed in Washington State, will need to assess the impacts to City streets resulting trips from the Hung Development and adjacent development trips. The impacts to the intersection of East Spruce Avenue and Lockwood Creek Road will need to be evaluated for added trips to determine if improvements are warranted.

Grading

The applicant shall submit final grading and erosion control permit as part of the subdivision plans showing the proposed contours on the plans.

The City Erosion Control Standards require that any activity disturbance over 500 SF must comply with the City standards. As part of these standards a construction stormwater permit is required from the Department of Ecology and an SWPPP will be necessary as part of the plan submittal to the City. All erosion control measures shall be designed, approved, installed and maintained consistent with Chapter 18.320 LCMC and the applicant's Construction Stormwater Permit. Per the City Erosion Control Manual, from October 1 through April 30th, no soils shall remain exposed for more than two

(2) days. From May 1st through September 30th, no soils shall remain exposed more than seven (7) days.

As a minimum the structural sections listed in the city standard street sections must be used. In addition, the report must recommend the over-excavation section for unstable soil encountered during construction. The Geotechnical Engineer is responsible for determining the over-excavation stabilization section during construction for unstable soil encountered, but a recommended over-excavation section must be provided as part of the report and site plans.

Geotechnical Study. A complete application will include a geotechnical study and report, prepared by a geotechnical engineer or geologist, licensed in the state of Washington. The report shall include at a minimum, testing to support the structural section of the roadway, site building construction, grading, retaining wall design, as applicable, and subsurface drainage. LCMC 18.212.050.

Chapter 13.10 -- Sewer System Rules and Regulations

Connection to public sewer is required. LCMC 13.10. All work is to be performed by a duly licensed contractor in the City of La Center. LCMC 13.10.230. Work will be performed using an open trench method unless otherwise approved. LCMC 13.10.200. All costs associated with installing the side sewer shall be borne by the applicant. LCMC 13.10.110.

Per the City Engineering Standards, sanitary sewers should be designed to care for future loads that may reasonably be expected from full development upstream, consistent with the La Center Comprehensive Plan, Capital Facilities Plan, LCMC Title 13, and the Sewer Master Plan (General Sewer Plan).

The applicant is proposing to connect the sanitary sewer piping from the Hung development to the existing gravity sewer in East 4th Way, to the west, that was constructed as part of the Heritage Country Estates Development. The applicant will need to verify the capacity of the downstream system with a basin analysis to justify connection of the Hung Development.

Chapter 18.320 (Stormwater and Erosion Control)

Section 18.320.120 (1) LCMC states that ground-disturbing activities of more than 500 square feet are subject to the requirements of *City of La Center Erosion Control Guidelines*. Section 18.320.120 (2)(a) LCMC states that the creation of more than 2,000 square feet of impervious surface is subject to stormwater regulation.

The applicant proposes to create new impervious interior streets in the subdivision. Per LCMC 18.320.210, treatment BMPs shall be sized to the treat the water quality design storm, defined as the six-month, 24-hour storm runoff volume.

A Technical Information Report (TIR) will need to be submitted by the applicant and must comply with LCMC 18.320.

The LCMC section 18.320.220 states that if surface water leaves the site, stormwater must be detained per LCMC. Runoff calculations need to consider undisturbed forest as the pre-developed condition in determining runoff curve numbers or a downstream analysis of the existing conveyance system is required. The design must meet the LCMC 18.320 and the 1992 Puget Sound Manual for the design of the system.

As part of the half street improvements for Lockwood Creek Road, the existing storm pipe culverts will need to be extended east to accommodate the new sidewalk and curb and gutter. The capacity of the existing roadside ditch is under insufficient and the condition may have to be assessed and upgraded to allow for stormwater from the development to be conveyed downstream.

The existing wetland on Tract B currently is being recharged by stormwater water and subsurface flow from the north portion of the parcel. By constructing the lots north of the wetland, the storm flow to this wetland will be reduced or eliminated. In addition, the drainage from the lots north and east of this wetland appear to drain to the adjacent property. The applicant will need to show how the drainage from the new lots will not affect adjacent property, complying with the LCMC.

The applicant will need to show how this wetland will be recharged following development.

The collection system shall be designed by the rational method using HEC-12 1984 edition standards for gutter and storm pipe capacity. As an alternate, WSDOT Hydraulics Manual can be used for inlet capacity design. The 100-year rainfall intensity must be used for pipe capacity design using the rational method.

Downspouts connections from the houses must connect directly into the site stormwater system. Laterals from the storm main in the street must be shown to serve each lot.

Maintenance of Stormwater Facility

The applicant shall be responsible for maintenance of the stormwater facility until an HOA is established to maintain the facility. When the HOA assumes responsibility of the facility, they will establish monetary funding of a reserve fund, for maintenance of the stormwater facility, when at least 50% of development of the housing units has occurred or at minimum 2-years after completion and acceptance of the subdivision by the City, whichever is more. The applicant and future owners will be responsible for maintaining the stormwater facility. An operations manual must be submitted for City review approval for the maintenance of the facility in all cases. Adequate bonding is required to guarantee maintenance of the facility for a period of two years following final plat. The minimum bond amount shall be 10% of the construction cost of the stormwater facility. Stormwater facilities must be located in a separate tract.

Prior to initiation of any construction or final plat approval, the developer shall demonstrate to the City's satisfaction that:

1. The developer shall establish a homeowner's association (HOA) and Articles of Incorporation, By-laws and CC&Rs of the HOA shall reflect that the HOA's operation and maintenance costs for stormwater facilities shall be borne by the HOA. The applicant will provide a "Stormwater Covenant" that shall describe the scope of maintenance of the stormwater facility and it shall be recorded and incorporated in the CC&Rs.
2. The HOA shall be empowered to access its members' fees to be reserved and used to reimburse the City for the operation and maintenance of the facilities, if enforcement becomes necessary.

3. The City shall have the right of a third-party enforcement to ensure that the HOA remains intact and collects the fees and the City shall have the right to recapture any fees and costs associated with enforcement actions. Further, the following language is to be placed on the face of the plat: The City shall be granted the right, but not the duty, to access and maintain the stormwater facility consistent with 18.320.230 LCMC.

Street Lighting

Street light design and installation is reviewed and approved by the City of La Center. Street lighting on local streets shall be Acorn full cutoff single fixture on a black decorative fiberglass pole and the frontage improvements will need to have Cobra Head LED light per the Engineering Standards. The applicant shall submit a Photometric analysis along with the street light design to verify compliance with the Engineering Standards.

Potable Water

Water system connections are regulated by Clark Public Utility (CPU) and a permit and plan approval will be required for City plan approval.

Clark Public Utilities must approve the water pipe system and service to all lots. CPU needs to be contacted about the existing water system pressure and the applicant must meet CPU approval for the new water system.

Building

The plat is reviewed and approved by Public Works Building Services. Proposed setbacks for each lot will be required on the plat. The plat notes should stipulate amount of impervious/saturation development allowed (maximum building lot coverage is 35% and maximum impervious surface area is 50%).

Development of the lots shall not create hazards or conditions for any adjacent lot. A geotechnical report will be required analyzing the development design and for lot infill. The report should propose plat development conditions for the builders, by lot if required. Plat conditions for individual lot build out should include provision of adequate foundation drainage, in particular on the high side of each lot. An adequate absorption/dissipater design that cannot flow by gravity to the storm lateral should be included in the plat conditions for stormwater. Stormwater collected from newly created impervious sources or surfaces (roof, slabs, flatworks, etc.) shall be terminated in an approved manner. A plat note and detail shall be provided for a concrete truck washout area which builders and contractors shall be required to use and maintain until final build out.

If retaining walls are to be constructed, there design details will need to be included in the plat conditions for the builder(s). Any required walls shall be installed and approved before final occupancy approval. Other walls built shall be built to a plat standard detail. Fence detail will need to be provided. Fencing should be uniform.

Coordinate with Chief Mike Jackson, Clark Fire & Rescue regarding hydrant spacing and related fire flow and fire protections issues.

Land Use

Chapter 8.60 Sign Requirements
If proposed, monument signs must comply with this chapter.

Chapter 18.130 (Low Density Residential)

The site is zoned LDR-7.5, low density residential, with a minimum lot size of 7,500 feet. Single-family detached residential dwelling units are a permitted use within the zoning district. The development must meet a minimum of 4 units per net acre. Net acre is defined as gross minus area for public rights-of-way, private streets, utility easements, public parks, and undeveloped critical areas and buffers. Density can be transferred from undeveloped critical areas and buffers under the provisions 18.300.130 and reduce lot sizes for up to 10 percent of the lots on the site to 6,000 square feet. Individual parcels may not be smaller than 6,000 S.F. or larger than 11,000 S.F. LCMC 18.130.180.

The applicant's proposed conceptual plan shows lots ranging in size from 6,000 square feet to 9,472 square feet. They applicant indicates they are using the density transfer provisions in the critical areas ordinance to reduce lots to as small as 6,000 square feet. However, as indicated in the summary discussion, the minimum lot size in the LDR-7.5 zone is 7,500 square feet and lots cannot be smaller than this except by density transfer and no more than 10 percent of the lots can be less than 7,500 square feet. The applicant's conceptual plan shows the majority of the lots within subdivision below 7,500 square feet. Prior to formal preliminary plat applicational submittal, the lots will need to be adjusted to be 7,500 square feet minimum with no more than 10 percent of lots less than this standard.

Each lot shall comply with the dimensional standards within Table 18.130.080.

Minimum Lot Width (feet)	Minimum Lot Depth (feet)	Minimum Front Yard Setback (feet)[1, 2]	Minimum Side Yard Setback (feet)[2]	Minimum Street Side Yard Setback (feet)[2]	Minimum Rear Yard (feet)[2, 3]
60	90	20	7.5	10	20

[1]If there are dwellings on both adjoining lots with front yard setbacks less than the required depth for the district, the minimum front setback for the lot is the average of the front setbacks of the adjoining dwellings. If there is a dwelling on only one adjoining lot with a front yard setback less than the required depth for the district, the minimum front setback for the lot in question is the average of the adjoining front yard setback and 15 feet.

[2]Cornices, eaves, belt courses, sills, canopies, or other similar architectural features (not including bay windows or vertical projections) may extend or project into a required yard not more than 30 inches. Chimneys may not project into a required yard more than 24 inches. A deck not more than 30 inches in height (measured from the lowest grade in the setback to the deck surface) and not covered by a roof or canopy may extend up to 10 feet into a front yard setback, seven and one-half feet into a street side yard setback and is permitted in a side or rear yard regardless of the setback requirements.

[3]A detached accessory structure, other than a garage or carport, may be situated in a rear and/or side yard provided it is at least six feet from the primary structure on a lot or parcel and it is set back from interior side and rear lot lines by at least five feet and from street side lot lines by at least 10 feet. A garage or carport may be situated in a rear and/or side yard provided it is at least 20 feet from the front and street side lot lines

Maximum building lot coverage shall not exceed 35 percent. Maximum impervious surface area shall not exceed 50 percent. Your proposed plat should calculate building lot coverage per lot and total amount of impervious surface area to be created.

Chapter 18.147 Parks and Open Spaces
LCMC 18.147 requires single-family residential development of 40 or more dwelling units to provide publicly accessible park space at a ratio of 0.25 acres per 40 dwelling units in excess of the first 40 units.

Based on the 74 units proposed, the applicant is required to provide 0.21 acres of park space. However, the minimum contiguous park size is 0.25 acres. The applicant's conceptual plan indicates that 0.5 acres of usable park spaces is proposed. Tract B has a trail, but does not have any other required park elements. Parks must contain the required elements in LCMC 18.147.030(1)(b). The preliminary plat application shall include a preliminary park site plan and landscape plan showing the location of elements. The property owner or home owner's association is responsible for park maintenance.

Chapter 18.190 Urban Holding District

The property currently has an Urban Holding 10 (UH-10) overlay. If the Public Works Director or City engineer certifies that the capital facility deficiencies associated with the property have been resolved, the City may remove the UH-10 overlay. The overlay can be <u>removed concurrently</u> with the approval of the Preliminary Plat for development or as a separate Type II application and land use review <u>not</u> associated with subdivision approval. LCMC 18.190.060.

Chapter 18.210 Subdivisions

<u>Review Process for Subdivisions (LCMC 18.210.020)</u>

All correspondence must be submitted to the La Center City Clerk. Subdivision applications are processed as a Type III land use review requiring a public hearing before the La Center Hearing Examiner. Within 14 days after the City finds the application technically complete, the Clerk shall mail a Notice of Application to you and adjacent property owners. The comment period shall remain open for a minimum of 14 days. The City will schedule a hearing within 78 days after the City finds the application to be technically complete. The City shall issue a staff report a minimum of seven calendar days prior to the hearing date. An appeal of the Hearing Examiner's decision must be made to the City Council within 14 days after the date of issuance of the decision.

<u>Submittal Requirements (LCMC 18.210.030)</u>: A completed application form and the following materials will be required, if applicable, prior to a determination of technical completeness (ten copies and an electronic version of all materials), please):

1. The information listed in LCMC 18.210.010(2), provided an environmental checklist is required for a technically complete application unless categorically exempt.
2. Written authorization to file the application signed by the owner of the property that is the subject of the application, if the applicant is not the same as the owner as listed by the Clark County assessor.
3. Proof of ownership document, such as copies of deeds and/or a policy or satisfactory commitment for title insurance.
4. A legal description of the property proposed to be divided.
5. If a subdivision contains large lots or tracts, which at some future time are likely to be re-subdivided, the application shall include a master plan of all land under common ownership in order to provide for extension and opening of streets at intervals which will permit a subsequent division of each divisible parcel into lots of smaller size.
6. A copy of the pre-application conference summary and all information required to address issues, comments and concerns in the summary.
7. A written description of how the proposed preliminary plat does or can comply with each applicable approval criterion for the preliminary plat, and basic facts and other substantial evidence that support the description.

8. The names and addresses of owners of land within a radius of 300 feet of the site. Owner names and addresses shall be printed on mailing labels.
   a. The applicant shall submit a statement by the assessor's office or a title company certifying that the list is complete and accurate, based on the records of the Clark County assessor within 30 days of when the list is submitted.
   b. If the applicant owns property adjoining or across a right-of-way or easement from the property that is the subject of the application, then notice shall be mailed to owners of property within a 300-foot radius, as provided above, of the edge of the property owned by the applicant adjoining or across a right-of-way or easement from the property that is the subject of the application.
9. Applications associated with the preliminary plat, such as exceptions, adjustments or variances to dimensional requirements of the base or overlay zones or for modifications to the road standards in Chapter 12.10 LCMC that are required to approve the preliminary plat application as proposed.
10. A wetland delineation and assessment is required by Chapter 18.300 LCMC and an application for a critical area permit. The wetlands on site must be classified using the 2014 Ecology wetland rating system. A wetland mitigation report is required.
11. A geotechnical study is required if the site will contain substantial fill or there are steep or unstable slopes on the site.
12. Preliminary grading, erosion control and drainage plans, which may be a single plan, consistent with applicable provisions of Chapter 18.320 LCMC.
13. Evidence that potable water will be provided to each lot from a public water system, and that each lot will be connected to public sewer.
14. A phasing plan, if proposed.
15. An archaeological predetermination
16. Additional information:
   a. A traffic study (please consult with the City Engineer regarding intersections to be studied.)
   b. A signed *Agreement to Pay Outside Professional Review Expenses Related to Land Use Application*. (Provided during the meeting.)

Vesting: Applications are vested on the date the City deems the application to be technically complete.

Subdivision Approval criteria (LCMC 18.210.040): The applicant carries the burden of proof to demonstrate that the proposal complies with the following City regulations and standards:

- Chapter 12.05 LCMC, Sidewalks;
- Chapter 12.10 LCMC, Public and Private Road Standards;
- Chapter 15.05 LCMC, Building Code and Specialty Codes;
- Chapter 15.35 LCMC, Impact Fees;
- Chapter 18.245 LCMC, Supplemental Development Standards;
- Chapter 18.300 LCMC, Critical Areas;
- Chapter 18.310 LCMC, Environmental Policy;
- Chapter 18.320 LCMC, Stormwater and Erosion Control;
- The subdivision must make appropriate provision for parks, trails, potable water supplies and disposal of sanitary wastes; and
- The subdivision complies with Chapter 58.17 RCW.

<u>Subdivision General Issues</u>:

1. To approve the preliminary plat, the Hearing Examiner must make an affirmative finding that "appropriate provision for potable water supplies and for the disposal of sanitary wastes".
2. All existing wells and septic systems must be properly decommissioned prior to final plat.
3. The City may refuse bonds in lieu of improvements at the time of final platting if such bonding has not been previously discussed and documented.
4. Flag lots are discouraged.
5. The preliminary plat shall expire five years from the date of the Final Order. RCW 17.58.140(3)(a).
6. Phasing is permitted. All phases must be identified on the preliminary plat and be consistent with the lot number sequencing.

Chapter 18.245 Supplementary Development Standards

The applicant did not include specific information regarding the fencing, hedging, solid waste, lighting, noise, and landscaping requirements regulated by Chapter 18.245. The subsequent application must address these specific issues. No landscape screening is required for this site because all adjacent lands are zoned low density residential or are located within Clark County. Lighting might comply with the provisions of 18.282 Outdoor Lighting.

Chapter 18.260 Variances

No variances have been requested. If requested, please fully address the variance approval criteria in LCMC 18.260.

Chapter 18.280 Off-Street Parking and Loading Requirements

Each dwelling unit shall be provided with two off-street parking spaces per Table 18.280.010 plus one space for guests. This may be accommodated with a note on the plat requiring each lot to provide three off-street parking spaces. Parking spaces within garages, carports and driveways serve to meet this requirement. The front plane of the garage must be setback a minimum of 18 feet from the interior edge of the sidewalk.

Chapter 18.300 Critical Areas

The applicant's critical areas report includes a wetland delineation which found two wetlands (A and B) onsite. Both are category IV wetlands. Wetland A is exempt from avoidance requirements based on size, but must be mitigated under the provisions of LCMC 18.300.090(5)(d). The applicant's critical areas report must address the applicable provisions of 18.300.080(5), 18.300.110, and 18.300.120 for development of Wetland A. If mitigation is proposed onsite (preferred), it needs to meet the mitigation ratios of Table 18.300.090(5)(l). Any mitigation required shall use native plants in accordance with LCMC 18.340. The applicant proposes to avoid impacts to Wetland B and provide a 50-foot buffer in accordance with the City's requirements for category IV wetlands with an adjacent high intensity use.

Wetlands. LCMC 18.300.090(5)

(iv) Buffers. All buffers shall be measured perpendicularly outward from the delineated wetland boundary.

(v) Marking Buffer during Construction. The location of the outer extent of the wetland buffer shall be marked in the field and such markings shall be maintained throughout the duration of the permit.

(vi) Permanent Marking of Buffer Area. A permanent physical demarcation along the upland boundary of the wetland buffer area shall be installed and thereafter maintained. Such demarcation may consist of logs, a tree or hedgerow, fencing, or other prominent physical marking approved by the hearings examiner. In addition, small signs shall be posted at an interval of one per lot or every 100 feet, whichever

is less, and perpetually maintained at locations along the outer perimeter of the wetland buffer worded substantially as follows: "Wetland and Buffer – Please Retain in a Natural State."
(vii) A conservation covenant shall be recorded in a form approved by the City attorney as adequate to incorporate the other restrictions of this section and to give notice of the requirement to obtain a wetland permit prior to engaging in regulated activities within a wetland or its buffer.
(viii) In the cases of plats, short plats, and recorded site plans, include on the face of such instrument the boundary of the wetland and its buffer and a reference to the separately recorded conservation covenant.

Chapter 18.300.090(2)(a) Oregon White Oak
Oregon white oak is classified as a Nonriparian Priority Habitat and Species critical area. LCMC Table 18.300.090.(2)(a). The required buffer around the Oregon white oak is 300 feet or threshold based upon consultation with WDFW or through the city's peer review process.[1] The applicant has provided email documentation in the critical areas report indicating that the dripline of the tree is adequate to protect it. This is sufficient information for the City to reduce the otherwise required 300-foot buffer.

Chapter 18.310 Environmental Policy
The project review application must include a SEPA checklist and appropriate processing fees.

The City will run the SEPA comment and land use comment period concurrently and will not make a decision on the land use application until after the close of the SEPA comment period.

Chapter 18.350 Tree Protection
If any tree greater than 5" DHA is proposed to be removed, a tree cutting permit and mitigation will be required. A tree protection plan will also be required in accordance with LCMC 18.350.060. Mitigation may consist of replanting on or off-site or payment in lieu of planting. LCMC 18.350.050.

Chapter 18.360 Archaeological Resource Protection
The site is identified as having a moderate to moderate-high risk of containing archaeological resources and must file an archaeological predetermination report as per Table 18.360.020-1. Predetermination reports must contain the information in 18.360.080(4). Based on the findings of the predetermination report, further archaeological work or a full archaeological survey may be required.

Application Fees
An estimated fee schedule was provided during the meeting. Based upon the information provided to date, we estimate that the land use application fees will include:

- Preliminary subdivision plat ($3,400 +$125/lot);
- SEPA ($170 x 3);
- Critical Area review ($340);
- Variances (if requested) (ranges from $850)

The City requires an applicant pay actual costs of outside professional services including engineering, legal, and planning. Impact fees shall be assessed against each lot at time of building permit. (La Center

[1] For example, the city may allow a reduced buffer around a single Oregon white oak tree as a result of consultation with the regulatory agency or as a result of the city peer review process if the important functions and values of the resource will not be significantly diminished as a result of the buffer reduction.

Resolution No. 13-372). A copy of the agreement was provided at pre-application conference. Please include a signed agreement with the application.

Please note that the City is due to update its land use fees. Timeline for that is uncertain, but the fees listed above could change.

Attachments

- Clark Public Utility District pre-application meeting notes
- Clark County Fire and Rescue pre-application meeting notes

June 7, 2021 – Attendees

Name	Address	Phone	Email
Susanna Hung, Property Owner	701 Columbia St. #414, Vancouver, WA 98660	415-990-8907	Sshung_2000@yahoo.com
Travis Johnson, PLS	604 W Evergreen Blvd. Vancouver, WA 98660	360-944-6519	travis@plsengineering.com
Nicolle Sicilia, PLS			nicolle@plsengineering.com
Jason Taylor, PLS			
Mike Walling, real estate agent			
Tonya Dow, Clark Public Utilities			
Tony Cooper, P.E., City Engineer	305 NW Pacific Highway La Center, WA 98629	360-263-2889	acooper@ci.lacenter.wa.us
Ethan Spoo Consulting Planner	210 E 13th Street	360-823-6138	ethan.spoo@wsp.com
Jeff Swanson, Community and Economic Development Director	305 NW Pacific Highway La Center, WA 98629	360-263-7665	jswanson@ci.lacenter.wa.us
Sarah Dollar, Permit Technician	305 NW Pacific Highway La Center, WA 98629	360-263-7665	sdollar@ci.lacenter.wa.us

Attachment A

2021-049

Customer-owned, customer-focused

REQUEST FOR UTILITY REVIEW – WATER AVAILABILITY
P. O. Box 8900 (8600 N.E. 117 Ave) Vancouver, WA 98668
(360) 992-8022 Email: wateradmin@clarkpud.com

APPLICANT INFORMATION

DATE: 6/4/2021

NAME	Travis Johnson/ PLS Engineering		
ADDRESS	604 W Evergreen Blvd		
CITY	Vancouver	STATE	WA ZIP 98660
TELEPHONE	(360) 944-6519	EMAIL	pm@plsengineering.com

Notification Method: Email Type of Development: Subdivision
Number of Units: 74

Property Location

Serial Acct. No	209113-000		
Property Address	2000 NW Lockwood Creek Rd, La Center	(or nearest cross street)	
Property Size	19.8 ACRES	Required Fire Flow	TBD GPM

PLEASE SUBMIT PLAT MAP WITH REQUEST

GENERAL CONDITIONS FOR SERVICE (CPU Staff Only)

Clark Public Utilities (CPU) is the water purveyor for this site. CPU Water distribution maps indicate that there are existing 8" PVC water main within E 4th Way, E Upland Ave, E White Oaks Ave, NE Lockwood Creek Rd, and NE 24th Ave and a fire hydrant located along the eastern property frontage. See attached CPU water distribution map for reference. Utility drawings are for reference only and project engineer should verify existing conditions in the field prior to final design.

The fire flow at FH – 7472, located near the intersection of E 5th St and E Spruce Ave was previously calculated at 1,954 gpm at 20 psi. Static water pressure is expected to vary, around 135 psi depending on site elevation, system demand and reservoir levels. Due to high anticipated pressure it is recommended that a private plumber be consulted regarding installing privately owned and operated pressure reducing valves. If updated fire flow data is required, please contact Water Services at (360) 992-8022.

For this development, depending on site access and layout, plan to connect to the existing 8" water mains within E 4th Way, E Upland Ave, E White Oak Ave, and NE 24th Ave. If fire protection is required, extend a minimum 8" water main within the public right-of-way to the site. If fire protection is not required, a minimum 4" water main may be acceptable. Install proper fire protection (i.e. hydrants and building sprinkler systems) as required by the Fire Marshal. Any existing, unused services shall be properly capped and abandoned. All water mains and services (up to the meter) located within private property, shall be included in an easement granted to Clark Public Utilities.

Proper state approved backflow devices will be required for all domestic, fire and landscape water services. All hot taps shall be performed by a Utility approved contractor. The Developer is responsible for costs associated with the service and fire protection installation, right-of-way permitting, and any other needed water improvements.

Submit full engineering plan set for further requirements and comments.

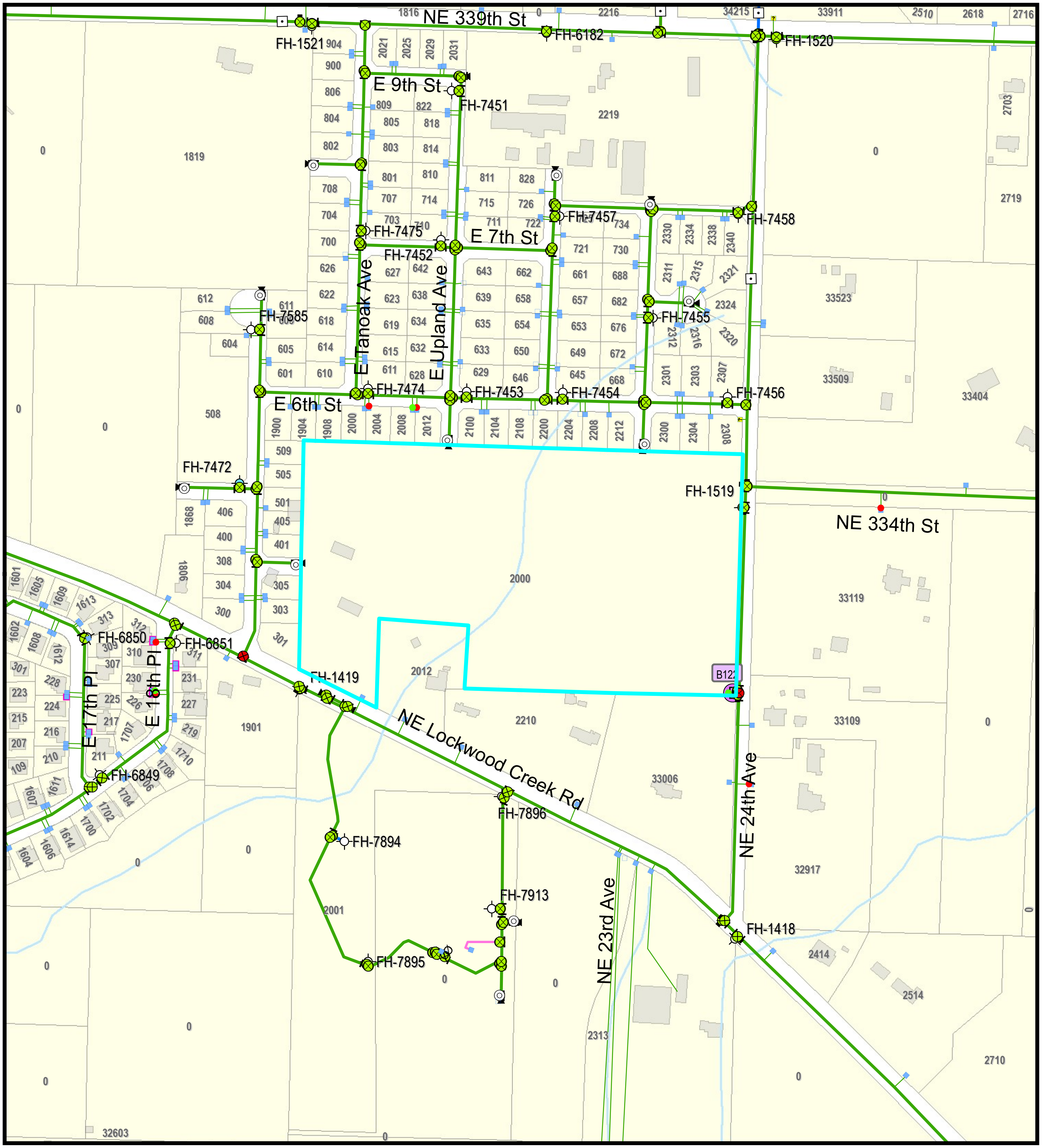
☒ Licensed Civil Eng. Drawing Required for Clark Public Utilities approval prior to construction
☒ Easement Required
☒ Clark Public Utilities has the capacity to serve, if the above conditions are met
☒ Developer/Owner shall pay County Right-of-Way fees based on off-site improvements

Review comments are subject to modification during detailed plan check and review.
This utility review is valid for six months after the date of signature below.

Tonya Dow Tonya Dow 6/4/21

REVIEWED BY______________________________________ DATE______________________

Tonya Dow, PE



Legend

Unknown	8"	Butterfly, Closed	Air Release	Cross	Reservoir	Fire Flow At 20psi
2"	10"	Butterfly, Open	Check	Tee	Booster Pumping Station	Not Tested
3"	12"	Gate, Closed	Double Check	Cap and Thrust Block	Satellite Well	1 - 499
4"	14"	Gate, Open	Blow Off	Reducer	Production Well	500 - 999
6"	16"	Abandoned Valve	Pressure Regulating Valve	Coupling		1000 - 1499
Water Service		Water Meter	Valve Book	Tapping Sleeve		1500 - 7981

1 inch = 400 feet

N

OPERATIONS MAP

Printed on: 6/4/2021
Printed by: TonyaD

MAP NUMBER

4102-N

Attachment B

1-2 Family Residential Pre-Application Notes: *La Center*

Clark-Cowlitz FIRE RESCUE

Fire Department Access:

- **Roadways to Structures:** The perimeter of all structures must be within 150’ an approved access road with a minimum clear width of 20’ (26’ where a hydrant is located). IFC 503.1.1 / D102 / D103
- **Dead end Streets:** Any dead-end road longer than 150’ must be provided with an approved cul-de-sac or hammer-head turn-around in accordance the International Fire Code design criteria. (96’ Diameter Cul-de-sac; 120’ Hammerhead with 20’ clear width and 28’R corners) IFC D103.4
- **Parking Restrictions:** Roadways must have signage for parking restrictions as follows: Signs for no-parking must be provided on both sides of all streets that are less than 26’ wide in accordance with local standards for future enforcement. Signs for no-parking must be provided on one side of all streets that are between 26’ and 32’ wide in accordance with local standards for future enforcement. IFC D103.6
- **Remote Access Points:** One and Two Family Residential Developments with more than 30 dwelling units must be provided with two separate and remote fire apparatus access roads. Multiple Family Residential Developments with more than 100 dwelling units must be provided with two separate and remote fire apparatus access roads. (remote = min. ½ the overall diagonal of the land area being served) IFC D106/107
- **Access During Construction:** Access roadways must be completed and unobstructed prior to combustible construction.
- **Gates:** Where required access is restricted with a gate, a Knox padlock with multi-access locking device (e.g. gatekeeper locking device) or Knox key switch shall be provided to allow Emergency Non-destructive Fire Department Access. (IFC 506)

Fire Department Water Supply and Suppression Systems:

*Hydrant spacing is assessed based on structures that are non-sprinklered, type V-B Construction and no larger than 4,800 combined square feet.   Additional hydrants may be required for streets providing access to structures greater than 4,800 SF.   (IFC Table B105.1(2) / C102.1)

- **Fire Hydrants:** Hydrants must be provided on fire access roadways so that average spacing does not exceed 500' and the maximum distance from any point on the street frontage to a hydrant is no more than 250'.   (400' and 200' for Dead end roads) IFC C102
- **Water Supply During Construction:** Required hydrants must be serviceable and unobstructed prior to combustible construction.
- **FIRE SPRINKLERS May be Considered as an alternate method to increase hydrant spacing or to address access issues.**

For plans submittal, permitting and inspections; all projects shall be submitted and requested through our online portal at: https://clarkfr.idtplans.com

Please feel free to contact me with any questions or concerns:

Michael J. Jackson
Fire Marshal
Mike.jackson@clarkfr.org
360.887.4609

Clark-Cowlitz FIRE RESCUE

911 N 65th Avenue
Ridgefield, WA 98642

phone: 360.887.4609 **fax:** 360.887.0862 **web:** www.clarkfr.org

Project Overview #560042

Project Title: Lockwood Subdivision Pre-Application Conference

Application Type: 5) Request by City/Jurisdiction Staff for Development Review

Workflow: Pre-Application Conference

Jurisdiction: City of La Center

State: WA

County: Clark

Project Data

Permit/Case Number: 2021-016-PAC

Type of Review: Pre-Application Conference

Project Address: 2000 NE LOCKWOOD CREEK RD. - 209113000

Description of Project/Process:

The applicant is proposing to subdivide an approximately 20-acre parcel into 74 single-family lots in the LDR-7.5 zone.

The entire site area is 20 acres in size and is identified as parcel number 209113000.The site is located in the SW of the NE of Section 2, T4N, R1E. The parcel recently went through an annexation process with the City of La Center. On April 6, 2021 the application for annexation was approved, bringing the parcel into the City of La Centers jurisdiction under the LDR-7.5 zone with an Urban Hold overlay until the future subdivision proposal is approved.

The applicant requests a pre-application conference to review the proposed subdivision. The proposed project will provide a total of 74 lots to be developed with single family detached homes. Access to the site will be provided E. 4th Way, E. Upland Avenue and NE 24th Avenue. No direct access is proposed to Lockwood Creek Avenue.

Notes/Comments:

Due Date (Optional): 06/07/2021 2:00 PM

Clark-Cowlitz
FIRE RESCUE

911 N 65th Avenue
Ridgefield, WA 98642

phone: 360.887.4609 **fax:** 360.887.0862 **web:** www.clarkfr.org

TO: Sarah Dollar
FROM: Michael Jackson, Division Chief/Fire Marshal - Clark-Cowlitz Fire Rescue
DATE: June 11, 2021
RE: Lockwood Subdivision Pre-Application Conference
LINK: https://clarkfr.idtplans.com/secure/project/?projectid=560042

Pre-Application Fire and Life Safety Comments

Thank you for your presentation your proposed project with CCFR. Please go to the assigned project for this Pre-App and pay the Pre-Applicaiton fee for the conference (**95.00**); at such time you will be given access to the Notes and/or any Open Issues regarding this proposed project.

If you have any further questions for CCFR, don't hesitate to contact us.

Please feel free to contact me with any questions that you may have.

Michael Jackson
Division Chief/Fire Marshal
Clark-Cowlitz Fire Rescue
911 N 65th Ave, Ridgefield, WA 98642
mike.jackson@clarkfr.org
3608874609

Open Issues: 3

Clark-Cowlitz Fire Rescue

Conceptual Plat Preapp-Layout1.pdf (Page 1) [1] Layout1

1. Fire & Life Safety B

Michael Jackson 3608874609 mike.jackson@clarkfr.org	Cul-de-sacs that are required for Fire Apparatus Turn-around at dead ends must have paved Diameter of 96' and signed for no parking in accordance with the adopted Fire Code.

2. Fire & Life Safety B

Michael Jackson 3608874609 mike.jackson@clarkfr.org	Fire Hydrants must be provided on 8" mains and spaced in accordance with the Fire Code. Average spacing can be used to accommodate practical locations at intersections for fire district operations. Recommended locations have been identified with with red circles on the plans. Residential fire sprinklers may be considered for increased hydrant spacing and fewer hydrants installed.

3. Fire & Life Safety B

Michael Jackson 3608874609 mike.jackson@clarkfr.org	Roadways must meet width and signing requirements of the Fire Code. Grades in excess of 10% may require installation of fire sprinklers for effected dwellings.

Exhibit A.5

PLS ENGINEERING

PROJECT NARRATIVE
For
LOCKWOOD MEADOWS

A PRELIMINARY TYPE III SUBDIVISION APPLICATION

Submitted to
CITY OF LA CENTER

For
Susanna S. Hung Trust
710 Columbia Street #414
Vancouver, WA 98660
sshung_2000@yahoo.com
415-990-8907

January 2022

General Project Information

Applicant/Owner:	**Susanna S. Hung Trust** 710 Columbia Street #414 Vancouver, WA 98660 sshung_2000@yahoo.com **415-990-8907**
Contact:	**PLS Engineering** Travis Johnson 604 W Evergreen Blvd Vancouver, WA 98660 (360) 944-6519, Office (360) 944-6539, Fax pm@plsengineering.com

Location:	**#94 Section 2, T4N, R1E, WM**
Site Address:	**2000 NW Lockwood Creek Road**
Project Size:	**20 acres**
Jurisdiction:	**La Center**
Zoning:	**LDR-7.5 – Single Family Residential**
Comprehensive Plan:	**Urban Low Density Residential**
Comprehensive Plan Overlay:	**Urban Holding**
Current Use:	**Manufactured Home**
Tax Lot Information:	**209113000**
School District:	**La Center**
Water District:	**Clark Public Utilities**
Sewer District:	**City of La Center**
Fire District:	**Clark Cowlitz Fire Rescue**

Table of Contents

Project Description

The site was recently annexed into the City of La Center with a designated zoning of LDR-7.5 (Low Density Residential). An Urban Holding 10 comprehensive plan designation remains on the site until a Type II application is filed that can prove the capital facilities deficiencies affecting the site have been resolved. A concurrent Type II application to remove the Urban Holding designation has been filed with this subdivision request.

The site is approximately 20 acres in size and is identified as tax lot 209113000. The site address is 2000 NW Lockwood Creek Road and is located in the Southwest ¼ of the Northeast ¼ of Section 2, Township 4 North, Range 1 East of the Willamette Meridian.

There is currently a manufactured home and barn on site with scattered trees and grass. The site is bordered by Heritage Country Estates on the north and west, NE Lockwood Creek Road to the south and NE 24th Avenue to the east. The site is sloping and contains critical areas: two wetlands and one Oregon white oak that meets criteria to be protected.

The applicant proposes to develop the site with a 71-lot single-family residential subdivision. See attached plans for land use synopses and additional information.

Construction will commence within five years of preliminary site plan approval, as required by the City of La Center. Construction will not start until necessary approvals & permits are acquired by the applicant.

The Lockwood Meadows Subdivision is a residential project whose construction of single-family residential homes will aid in meeting both zoning and comprehensive plan goals for the area.

Proposal & Code Compliance Discussion

In order to obtain preliminary plat approval, it is necessary to demonstrate how the proposal meets or exceeds each of the applicable approval criteria and various standards set forth in the La Center Municipal Code (LCMC). The following addresses these items, including a general description of how services will be provided to the site and how the proposal is consistent with all applicable provisions.

LCMC 3.35 Impact Fees

All impact fees are collected at time of building permit.

Chapter 8.60 Sign Regulations

No signs are proposed at this time.

Title 12 Streets, Sidewalks and Public Ways

LCMC 120.5 & 12.10 Street, Curbs, and Sidewalks

Street Standards:
Access to the site is provided via NW Lockwood Creek Road and E. 24th Avenue. Lockwood Creek Road is classified as a Minor Arterial. No additional right-of-way or paving is proposed. Sidewalk will be added along the site frontage and will be jogged as necessary to retain the existing Oregon white oak along the road frontage. A 15' wide access easement is proposed off of Lockwood Creek Road for maintenance of the stormwater facility.

East 24th Avenue is classified as a Minor Collector/Rural Minor Collector. Currently the street has a 20' half-width right-of-way with approximately 17' of pavement. The applicant proposes to provide half-width improvements consisting of an 8' right-of-way dedication, additional paving to provide a 25' paved width and 5.5' detached sidewalks with a 4' planter strip. There is a booster pump station located in the southeast corner of the site with an associated easement dedicated to CPU. The booster pump station will be relocated within the CPU easement to make room for the proposed improvements to the frontage along NE 24th Avenue.

All new interior streets are designed as Local Access Streets per standard drawing ST-15. East 3rd Circle will be fully constructed along the property boundary minus the south sidewalk; when parcels to the south develop they will complete the sidewalk on the south side of the street.

In accordance with LCMC 12.10.350 and 12.10.360, all interior streets improvements will have streetlights, street trees and stormwater improvements. Additionally, driveways to each lot will comply with and shall meet City of La Center Approved Standard Detail for driveways. (ST-3).

Circulation:
A circulation plan has been provided with this application showing how future development adjacent to this parcel will be served. Proposed East 3rd Circle and NE 23rd Avenue provide access from this development to parcels to the south for future development. Intersection spacing of 600' or more is required along Lockwood Creek Road. No direct access is proposed to Lockwood Creek Road with this development, except for the maintenance road to service the storm facility. When the three parcels to the south of the Hung property develop, they will be able to add one access point to Lockwood Creek Road and still meet minimum intersection spacing. With that future connection point, and the stubs provided by East 3rd Circle and NE 23rd Avenue with this development, circulation goals will be met. Please see the included circulation plan for further details.

Concurrency:
A Traffic Analysis Report was prepared for this project by Charbonneau Engineering. The report dated August 2021, along with an addendum issued on October 26, 2021, summarizes and recommends the following:

- The 71-lot development will generate 670 daily trips with 53 AM and 70 PM peak hour trips.
- Intersection sight distances are met. When the development is constructed, it will be necessary to maintain the required sight distance.
- All intersections except East 4th/Lockwood Creek Road at Highland Avenue/Ivy Avenue will operate at LOS 'D' or better through the year 2024 total traffic scenario. This intersection maintains LOS 'D" or better in the PM peak hour through the year 2024 total traffic scenario but is currently failing in the AM peak hour. No mitigation is proposed for the failing intersection at East 4th/Lockwood Creek Road at Highland Avenue/Ivy Avenue because:
    - the proposed development distributes no trips to the failing northbound approach,
    - there is only a 4% impact when comparing the number of trips distributed at the intersection to the year 2024 background traffic conditions, and
    - The City's Capital Facilities Plan documents the intersection is currently failing and proposes no mitigation through the year 2036.
- Queue length at the study intersections will not exceed one to two vehicles except at the intersection of East 4th/Lockwood Creek Road at Highland Avenue/Ivy Avenue. The projection at this intersection is for three to four cars in the AM peak hour and two to three cars in the PM peak hour.
- Crash data was reviewed and no mitigation is required.

"Based on evaluation of the study intersections including level of service conditions, vehicle delays, crash history, and warrants no intersection improvements beyond those planned at the site access approaches to East Spruce Avenue and NE 24th Avenue and the frontage improvements along Lockwood Creek Road and NE 24th Avenue are required in conjunctions with the proposed development. The site access approaches to East Spruce Avenue and NE 24th Avenue will require stop sign control and stop bar pavement markings."

Road Modifications:
LCMC 12.10.310 gives criteria for road modifications. The applicant is requesting 2 road modifications:

1. To allow detached sidewalk rather than attached sidewalk on proposed interior streets
2. To allow proposed East 4th Street to exceed 500' in length

A separate road modification request has been submitted with this application addressing the criteria within LCMC 12.10.310.

Title 13 Public Utilities

LCMC 13.10 Sewer & Water System Rules and Regulations

Lockwood Meadows proposes to connect to public sewer. All work will be performed by a duly licensed Contractor in the City of La Center. Work will be performed using an open trench method unless otherwise approved. Applicant shall bear all costs associated and required for the installation of the main and side sewer as required for the development. The applicant proposes to install gravity sewer across the site and connect into the sanitary sewer cleanout located in E 4th Way.

Water and power will be provided by Clark Public Utilities. There are existing 8" water mains located in E 4th Way, E Upland Ave, E White Oak Ave, and NE 24th Ave. An 8" water main will be looped around the site within the proposed public roads and will connect the existing water mains adjacent to the site. There is a booster pump station located in the southeast corner of the site with an associated easement dedicated to CPU. The booster pump station will be relocated within the CPU easement to make room for the proposed improvements to the frontage along NE 24th Avenue.

Title 15 Buildings and Construction

LCMC Chapter 15 documents a variety of requirements related to buildings and structures, including building codes, grading requirements, plumbing codes, mechanical codes, and energy codes. During the building permit review process, the applicant will be required to demonstrate compliance with applicable codes and regulations found in Title 15 of LCMC.

A preliminary Grading and Erosion control plan is submitted with this application.

Maximum building lot coverage is 35% and the maximum impervious surface area is 50%. This plat can comply with these standards.

A Geotechnical Report for the development is included with this application. Development of the lots will not create hazardous conditions for any adjacent lots.

Fire hydrants throughout this development are spaced every 500' feet (IFC 508.5.1). An 8" water main will be looped around the site within the proposed public roads and will connect the existing water mains adjacent to the site. The project will be designed so no obstruction will be allowed that would keep fire apparatus further than 10 feet from any hydrant in the project. A three-foot clear radius shall be maintained around all hydrants. The location all hydrants will be approved by the Fire District.

No sprinklers are proposed at this time. Building code may require sprinklers for individual homes depending on the size of the home; this will be addressed at building permit for each future home.

Title 18 - Development Code

LCMC 18.30 Procedures

The applicant filed a preapplication submittal and a preapplication conference was held on June 7, 2021. The formal subdivision application will be reviewed as a Type III process with a concurrent Type II request to remove the Urban Holding 10 overlay.

LCMC 18.130 Low Density Residential District

The proposal will subdivide the property which is zoned LDR-7.5 into 71 lots. Single-family detached residential dwellings are a permitted use with this zone. Density is required to meet a minimum of 4 units per net acre, with a minimum lot size of 7,500 sf. This development has a net site area of 550,212 sf/12.63 acres:

871,028 sf
– 215,972 sf ROW
– 10,800 sf (Tract A-open space)
– 20,134 sf (Tract B-park/usable area)
- 31,025 sf (Tract C-wetland/buffer)

- 42,885 sf (Tract D-storm water facility)
550,212 sf/12.63 acres

At 4 units per net acre, this development must have a minimum of 50 units. This criteria is met with 71 lots proposed.

Lot standards in this zone are as follows:

	Minimum Width	*Minimum Depth*	*Front yard setback*	*Side yard setback*	*Street side yard setback*	*Rear yard setback*	*Maximum bldg. coverage*
Required	60’	90’	20’	7.5’	10’	20’	35%
Proposed	60’	90’	20’	7.5’	10’	20’	50%

All proposed lots meet the above standards, except for 4 lots: Lot 33-37 are proposed to be 6,000 sf. The applicant would like to apply density transfer from the wetland and buffer area of the site (Tract C) to reduce up to 10% of lots below the 7,500 sf standard. Please see the Density Transfer section further in this narrative for more detail. Please see the Variance section further in this narrative for details on the proposed 50% maximum building coverage.

LCMC 18.147 Parks and Open Spaces

Single family residential developments of 40 or more dwellings are required to provide public park space at a ratio of 0.25 acres per 40 dwelling units in excess of the first 40 units. This development proposes 71 lots, therefore 0.19 acres must be provided as public park area, however the minimum contiguous park size allowed is 0.25 acres. The applicant is proposing a park area of 20,134 sf/0.46 acres (Tract B) consisting of trail, open space and improved park area. The improved area is a total of 16,353 sf/0.37 acres and will provide the following amenities: play structure, benches, picnic tables, bike racks and trash receptacles. The proposed park area exceeds the requirements of the code. All the parks and open space along with the trails will be maintained by the HOA at no cost to the City.

All landscaping will meet or exceed all the requirements of Chapter 18.147 and will be contained in the final approved parks/landscape plan. Please refer to the Preliminary Landscape Plan included with this submittal for further details.

LCMC 18.190 Urban Holding District

The property is currently within the Urban Holding 10 (UH-10) overlay. The applicant requests that the overlay be removed with the approval of this Preliminary Plat. The materials submitted with this application prove that the capital facility deficiencies associated with the property have been resolved. A Type II concurrent application for removal of the Urban Holding designation has been submitted with this subdivision application.

LCMC 18.210 Subdivisions

The required materials for a Type III land use review have been submitted to the City of La Center for review. This application and narrative show that there are adequate facilities to serve the proposed subdivision. There are adequate public roads, open spaces, drainage facilities, access to mass transit, potable water, sanitary waste collection and treatment, schools and educational services, pedestrian facilities, and fire prevention services. Students within this development will attend La Center Public Schools and school impact fees will be paid for each lot.

No phasing is proposed at this time. No flag lots are proposed. All required submittal items are included with this application.

The subdivision complies with the applicable portions of RCW 58.17 as evidenced within this narrative and the project materials. The preliminary plat is in the public interest and will provide additional housing that is needed in La Center area.

LCMC 18.245 Supplementary Development Standards

All requirements of Chapter 18.245 shall be addressed on the final landscaping plan, lighting and electrical plan. No shared outdoor trash or recycling area is proposed. Security fencing and fencing shall be on final construction drawings for and outlined on the landscape plan. Screening is not required for this development. A Preliminary Lighting Plan and a Preliminary Landscape Plan are included with this application.

LCMC 18.260 Variances

One variance is requested to increase maximum building lot coverage from 35% to 50% and maximum impervious surface area from 50% to 65%. This request is over a 10% increase therefore it will be reviewed as a Type II application. A Variance Request narrative has been submitted separately within this application addressing the request in detail.

LCMC 18.280 Off-Street Parking and Loading Requirements

Each future home will provide at least 3 off-street parking spaces within garage and/or driveway areas. It is likely that the future homes will have a minimum of a 2-car garage while some may offer a 3-car garage. Additional parking within driveways will provide off-street parking within the development.

LCMC 18.282 Outdoor Lighting

A Preliminary Lighting Plan has been submitted with this application that provides outdoor lighting details complying with this section. Lighting will not directly illuminate the critical areas onsite.

LCMC 18.300 Critical Areas

A Critical Areas Report for this proposal was prepared by Ecological Land Services (ELS) on March 24, 2021 in accordance with Chapter 18.300 LCMC. Their conclusion was,

> "One depressional wetland and one slope wetland were delineated onsite. The wetland boundaries were confirmed by Ecology on November 10, 2020. One priority habitat Oregon white oak is located in the southwestern corner of the site. The mapped Type Ns stream was not observed onsite, as no channel, bed, bank, or signs of regular water flow were observed onsite."

Wetland A on the maps in the Critical Areas Report will be filled. Wetland B will be protected and is included as Tract C on the preliminary plat. The Oregon white oak in the southwestern corner of the site will be retained by jogging the required sidewalk along Lockwood Creek Road.

Impacts to Wetland A are proposed to be mitigated at the East Fork Lewis Mitigation Bank. A Bank Use Plan prepared by ELS is included with this application to address the impacts to Wetland A.

The pre-application conference report states that the applicant must show how Wetland B will be recharged. Some of the runoff from non-pollution generating surfaces will be discharged into the wetland, please see the stormwater report and plan for further details.

LCMC 18.300.130 Density Transfer

This site is within an LDR zoned district and contains wetlands that will be preserved, therefore the project qualifies for residential density transfer. This site will preserve 31,025 sf/0.71 acres of wetland and buffer area within Tract C. At 4 dwelling units per acre, this area would allow for 2 additional dwelling units on the buildable areas of the site. The applicant is not taking advantage of the density transfer but proposes to utilize the reduced lot area discussed in 18.300.130.c that allows reduced lot sizes of up to 80% of the minimum lot size. This development proposes 5 lots at 6,000 sf: lots 33-37. These lots are interior lots, therefore adjacent developments will not be affected by this reduction in lot size. All other lots meet or exceed the 7,500 sf lot size requirement.

LCMC 18.310 Environmental Policy

A SEPA Checklist has been provided with this subdivision application.

LCMC 18.320 Stormwater and Erosion Control

A preliminary stormwater analysis and report detailing the stormwater design for the subdivision and how it meets the requirements of the LCMC has been included as part of this application. In an attempt to mimic natural processes, stormwater mitigation will be accomplished utilizing Low Impact Development (LID) Best Management Practices (BMP's). In addition, the homes will be constructed that will direct roof runoff into the stormwater convenience system.

Prior to construction a grading and erosion control plan will be designed to meet the LCMC and will be approved by City staff. Measures will be put in place to reduce the potential for erosion and prevent sediment from exiting the site during construction activities, approved erosion control Best Management Practices (BMP's) will be implemented. A site specific, engineered erosion control plan will be prepared for this development with the final construction drawings. The plan will be reviewed and approved by the City of La Center engineering staff prior to any construction on the site. The plan will detail the use of approved BMP's, including but not limited to filter fabric fence, construction entranceway, hydroseeding, and all other BMP's necessary to control sediment and erosion on-site. Standard erosion control practices will be followed during all phases of construction on this project.

LCMC 18.340 Native Plant List

The mitigation plan and the landscape plan have referenced the native plant list and will comply with this section. Please refer to the Preliminary Landscape Plan and Preliminary Tree Protection Plan included with this submittal for further detail.

LCMC 18.350 Tree Protection

A Preliminary Tree Protection Plan has been provided with this submittal that shows there are 47 jurisdictional trees on site. Of those 47 trees, 4 are propose to be removed. The Preliminary Landscape Plan shows that there will be 220 new trees planted along streets and within the proposed park and open space areas, mitigating for the removal of the 4 jurisdictional trees. Please refer to the Preliminary Landscape Plan and Preliminary Tree Protection Plan included with this submittal for further detail.

LCMC 18.360 Archaeological Resource Protection

Archaeological Services of Clark County, LLC (ASCC) performed a field investigation on 8/23/21 and 8/24/21. One flake fragment was found however no other artifacts were found. The report summarizes,

> "Given the isolated nature of the find, and the relative scarcity of other nearby recorded precontact archaeological resources, it is ASCC's professional opinion that no further archaeological work is necessary in association with the proposed project aside from adherence to an inadvertent discovery plan."

Their report, and an e-mail from DAHP confirming receipt of the report, is provided with this submittal.

Summary

The applicant has submitted all necessary information required to receive a technically complete determination and to support that the Urban Holding District (UH10) be lifted. This submittal demonstrates compliance with all applicable approval criteria provided for under the LCMC. No substantial burden will be placed upon service providers as a result of this project. There is adequate water availability, sewer availability, and fire protection to serve the site. The applicant will mitigate the impacts to the surrounding areas and infrastructure through a variety of measures including complying with the LCMC, paying system development charges for connection to municipal services if necessary, and contributing to the parks fund.

Exhibit A.6

VARIANCE NARRATIVE
For
LOCKWOOD MEADOWS

A PRELIMINARY TYPE III SUBDIVISION APPLICATION

Submitted to
CITY OF LA CENTER

For
Susanna S. Hung Trust
710 Columbia Street #414
Vancouver, WA 98660
sshung_2000@yahoo.com
415-990-8907

January 2022

General Project Information

Applicant/Owner:	**Susanna S. Hung Trust** 710 Columbia Street #414 Vancouver, WA 98660 sshung_2000@yahoo.com **415-990-8907**
Contact:	**PLS Engineering** Travis Johnson 604 W Evergreen Blvd Vancouver, WA 98660 (360) 944-6519, Office (360) 944-6539, Fax pm@plsengineering.com

Location:	**#94 Section 2, T4N, R1E, WM**
Site Address:	**2000 NW Lockwood Creek Road**
Project Size:	**20 acres**
Jurisdiction:	**La Center**
Zoning:	**LDR-7.5 – Single Family Residential**
Comprehensive Plan:	**Urban Low Density Residential**
Comprehensive Plan Overlay:	**Urban Holding**
Current Use:	**Manufactured Home**
Tax Lot Information:	**209113000**
School District:	**La Center**
Water District:	**Clark Public Utilities**
Sewer District:	**Rural/Resource**
Fire District:	**Clark Co Fire**

Lockwood Meadows 2021-016-PAC
Variance Narrative

Per City of La Center Code (LCMC) 18.260 (Variances), the applicant is requesting one variance for the proposed Lockwood Meadows Subdivision.

Variance Request

1. The applicant is requesting a variance to section LCMC 18.130.080, as allowed by La Center Municipal Code (LCMC) 18.260, to exceed the maximum building lot coverage of 35% and maximum impervious surface area of 50%. The development proposes a maximum of 50% maximum building lot coverage and a maximum of 65% impervious surface area. LCMC 18.260.040 states that variances may be approved if the applicant can prove the following,

   (1) Unusual circumstances or conditions, such as size, shape or topography of a site, or the location of an existing legal development apply to the property and/or the intended use that do not generally apply to other properties in the vicinity or zone. An unusual circumstance could also include another obligation under a different municipal code section or a state or federal requirement;

   (2) The unusual circumstance cannot be a result of actions taken by the applicant.

   (3) The variance request is necessary for the preservation of a substantial property right of the applicant which is possessed by the owners of other properties in the vicinity or zone.

   (4) The variance request is the least necessary to relieve the unusual circumstances or conditions identified in subsection (1) of this section.

   (5) Any impacts resulting from the variance are mitigated to the extent practical; and

   (6) The granting of the variance will not be materially detrimental to the public welfare, or injurious to the property or improvements in the vicinity and zone in which the property is situated.

The proposed variance request is an increase of approximately 42.9%, therefore this request will be processed as a Type II review per LCMC 18.260.020(2).

Variance Justification

The proposed variance request is justified per the following criteria:

- Criteria 1 states, "Unusual circumstances or conditions, such as size, shape or topography of a site, or the location of an existing legal development apply to the property and/or the intended use that do not generally apply to other properties in the vicinity or zone. An unusual circumstance could also include another obligation under a different municipal code section or a state or federal requirement;".

Response: The site is sloped and contains wetlands which creates an unusual circumstance that does not generally apply to other properties in the vicinity or zone. Allowing a greater building coverage and impervious surface area allows more flexibility in building on slopes.

- Criteria 2 states, "The unusual circumstance cannot be a result of actions taken by the applicant."

Response: The sloped site and the wetlands are not the result of actions taken by the applicant.

- Criteria 3 states, "The variance request is necessary for the preservation of a substantial property right of the applicant which is possessed by the owners of other properties in the vicinity or zone."

Response: The request for maximum lot coverage of 50% and maximum impervious surface area is the same that is allowed in adjacent jurisdictions. For example, Clark County Municipal Code 40.220.010 allows a maximum lot coverage of 50% in the R1-7.5 zone (7,500 sf lots). Ridgefield Municipal Code 18.210.030 states that RLD-8 (minimum lot size 5,000 sf/maximum lot size 7,500 sf) and RLD-6 (minimum lot size 7,200 sf/maximum lot size 10,800 sf) are both limited to a maximum impervious surface area of 65%; no maximum building coverage is listed. City of Battle Ground Municipal Code 17.106.030 allows all low-density residential districts a maximum lot coverage of 50%. This creates an unusual circumstance where properties in La Center have a different standard than all other surrounding jurisdictions, which affects the buildability of lots. This request is necessary for the preservation of a substantial property right of the applicant which is possessed by the owners of other properties in the area.

- Criteria 4 states, "The variance request is the least necessary to relieve the unusual circumstances or conditions identified in subsection (1) of this section."

Response: The request for maximum lot coverage of 50% and maximum impervious surface area of 65% is the least necessary to relieve the unusual circumstance where properties in La Center differ from adjacent jurisdictions in lot coverage as well as addressing the buildability on slopes.

- Criteria 5 states, "Any impacts resulting from the variance are mitigated to the extent practical."

Response: The only impact greater building lot coverage and greater impervious surface area has is on stormwater. Both have been addressed with the proposed stormwater plan and report included with this application, proving that the impacts can be mitigated.

- Criteria 6 states, "The granting of the variance will not be materially detrimental to the public welfare, or injurious to the property or improvements in the vicinity and zone in which the property is situated."

Response: The granting of the variance will not be detrimental to the public welfare or injurious to the property or improvements in the vicinity. As stated above, stormwater for the greater lot coverage and impervious surface area has been addressed. The request does not increase density or request smaller lots, therefore the variance will likely not be noticed by properties in the vicinity.

Conclusion

If you have any questions or concerns, please contact me at (360) 944-6519 or nicolle@plsengineering.com.

Sincerely,

N Sicilia

Nicolle Sicilia
PLS Engineering

Exhibit A.7

LEGAL DESCRIPTION
PN:209113-000

A PARCEL OF PROPERTY IN THE WEST HALF OF THE NORTHEAST QUARTER OF SECTION 2, TOWNSHIP 4 NORTH, RANGE 1 EAST OF THE WILLAMETTE MERIDIAN IN CLARK COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF SAID WEST HALF OF THE NORTHEAST QUARTER OF SECTION 2; THENCE SOUTH 01° 48’40” WEST ALONG THE EAST LINE OF SAID WEST HALF 1229.66 FEET TO THE TRUE POINT OF BEGINNING; THENCE CONTINUING SOUTH 01° 48'40" WEST ALONG SAID EAST LINE 699.60 FEET TO THE LINE MONUMENTED BY OLSON ENGINEERING, INC. AS SHOWN IN THAT SURVEY RECORDED IN BOOK 28 AT PAGE 24, RECORDS OF CLARK COUNTY; THENCE FOLLOWING SAID LINE, NORTH 88° 46'09" WEST 384.03 FEET; THENCE ALONG SAID LINE NORTH 88° 19'06" WEST 425.16 FEET; THENCE ALONG SAID LINE NORTH 03° 32'17" EAST 183.51 FEET; THENCE ALONG SAID LINE NORTH 85° 43’03" WEST 260.48 FEET; THENCE ALONG SAID LINE SOUTH 01° 42'18" WEST 290.92 FEET TO THE CENTERLINE OF THE COUNTY ROAD NO. 42; THENCE NORTH 63° 36’1T” WEST ALONG SAID CENTERLINE 250.87 FEET TO THE WEST LINE MONUMENTED ON SAID SURVEY; THENCE NORTH 01° 34'46 EAST ALONG SAID LINE 426.12 FEET; THENCE NORTH 00° 58’08" EAST 270.24 FEET TO A POINT WHICH BEARS NORTH 88° 11'22" WEST FROM THE TRUE POINT OF BEGINNING; THENCE SOUTH 88° 11’22" EAST 1297.17 FEET TO THE TRUE POINT OF BEGINNING.

Exhibit A.8

PRELIMINARY TECHNICAL INFORMATION REPORT

Lockwood Meadows Subdivision

La Center, Washington

Prepared by:

PLS Engineering
Consulting Engineers and Planners
604 W. Evergreen Blvd
Vancouver, WA 98660
PH: (360) 944-6519
PM@plsengineering.com

Prepared for:

Sussana S Hung Trust
710 Columbia St #414
Vancouver, WA 98660
(360) 450-8154
sshung_2000@yahoo.com

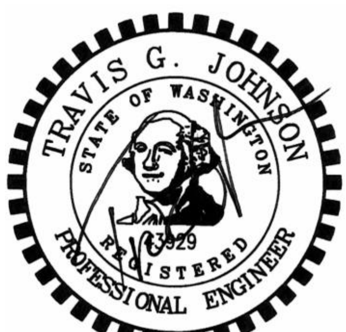
Submitted: January, 2022

TABLE OF CONTENTS

CERTIFICATE OF ENGINEER

Lockwood Meadows Subdivision
Preliminary Drainage Report

The technical information and data contained in this report were prepared by the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



1-18-22

This document was:

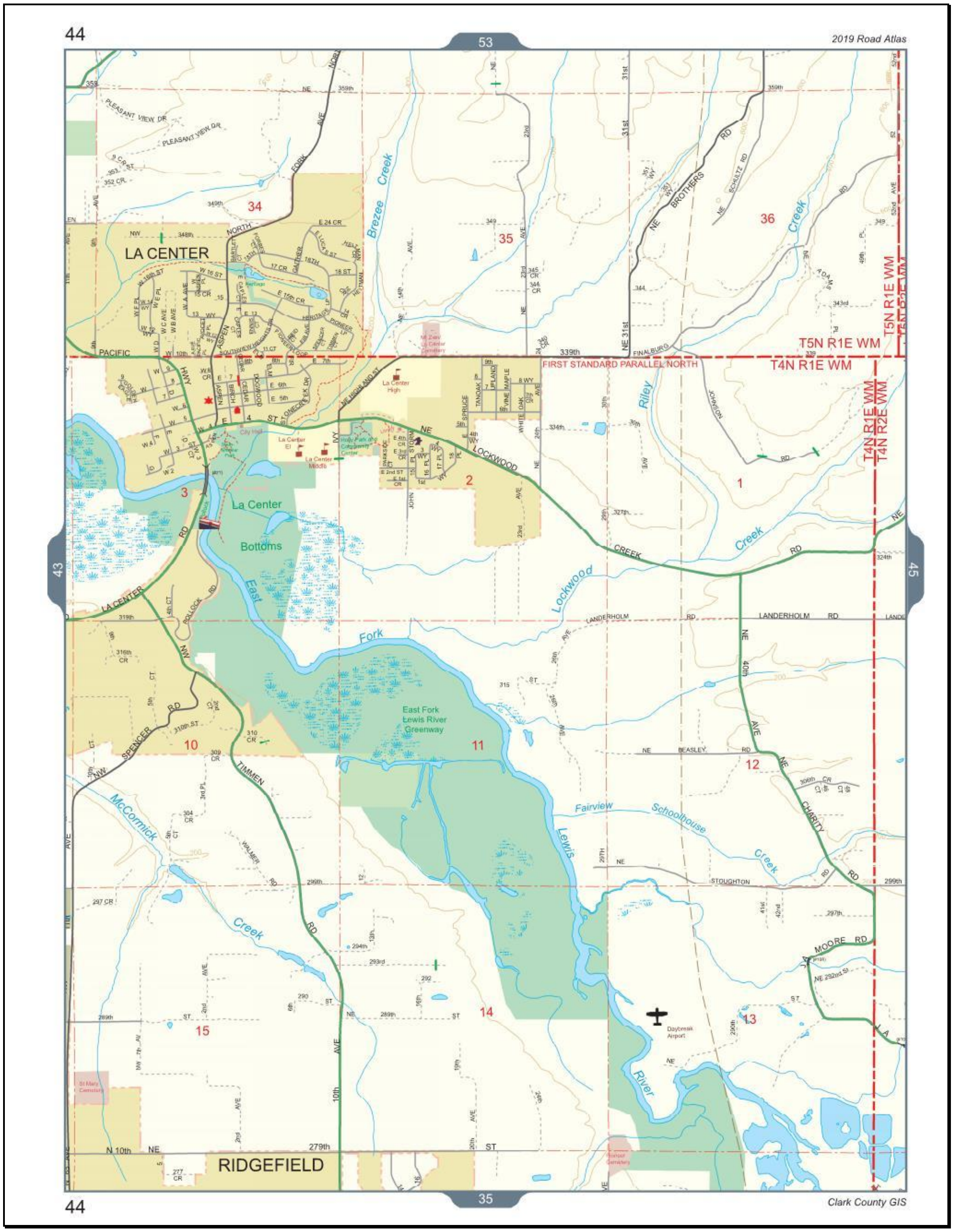
Prepared by:

Jeffrey M. Whaley, EIT

VICINITY MAPS

(a) Site Location Map

Clark County Atlas
NE 1/4, S02, T4N, R1E



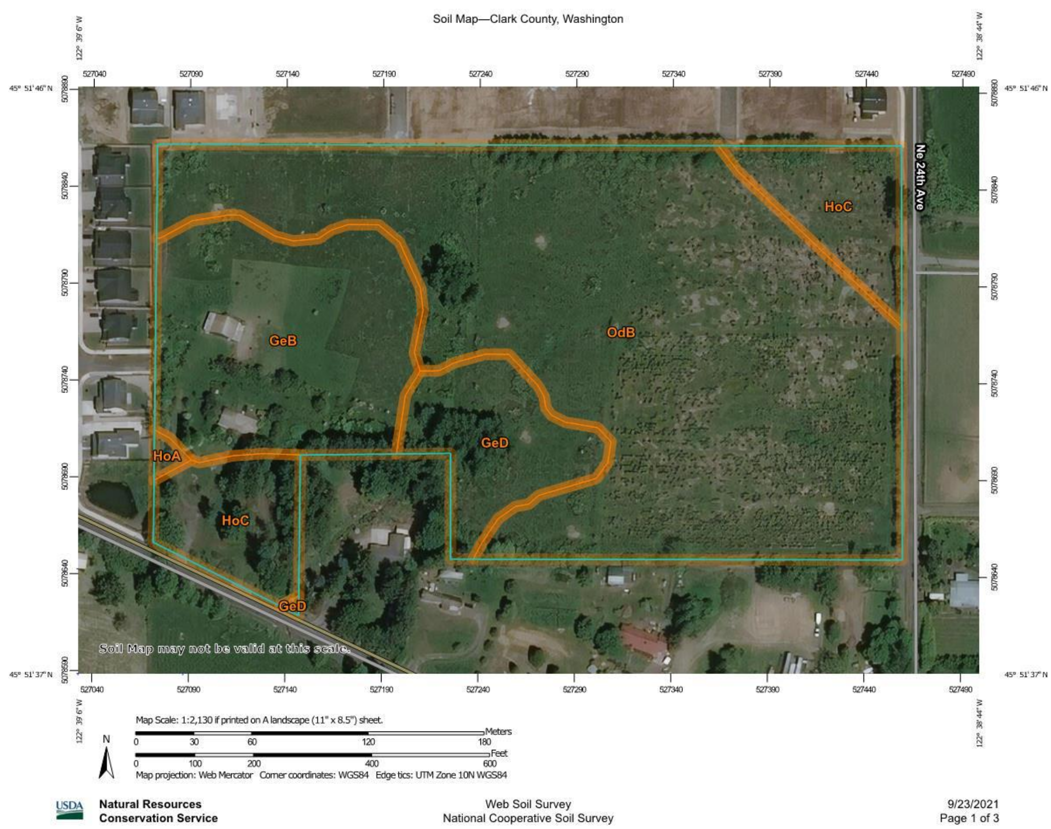
(b). Soils Map

USDA SCS Map 1" = 2130'

**Outlined Area of Interest (AOI) is an estimate of property boundary

Map Unit Legend:

GeB (Gee silt loam, 0-8% slopes):	19.4% of site
GeD (Gee silt loam, 8-20% slopes):	7.8% of site
HoA (Hillsboro silt loam, 0-3% slopes):	0.3% of site
HoC (Hillsboro silt loam, 8-15% slopes):	11.6% of site
OdB (Odne silt loam, 0-5%% slopes):	60.8% of site



SECTION A – PROJECT OVERVIEW

Lockwood Meadows Subdivision is a 19.8-acre site located on one parcel in La Center, WA. The site address is 2000 NE Lockwood Creek Road, La Center, WA 98629. It is identified by the Clark County Assessors office as parcel 209113000 and further identified within the NE ¼ of section 02, T4N, R1E of the Willamette Meridian in Clark County, Washington. NE Lockwood Creek Road borders the south, NE 24th Avenue borders the site to the east and the Heritage Country Estates borders the site to the north and west. There is currently a residence and Barn located onsite.

The site's existing topography is generally rolling with some steep areas near the northeast corner of the site. The site slopes down from this corner to the low point in the southwest border of the site. The proposed development will maintain the drainage patterns from the predeveloped conditions. There are two delineated wetlands both are category IV, wetland A is 0.05 acres and wetland B is 0.08 acres. Wetland A will be filled and a runoff generated from the roof and lawn of lots 6, 39, 40 and 41 will be routed to wetland B to maintain its hydrology.

Lockwood Meadows Subdivision proposes to subdivide one parcel into 71 lots. The site will be accessed by NE 24th avenue from the east and by E 4th street from the west. All roads installed onsite will be public and provide access to the lots. Individual driveway construction will be completed at the time of home construction.

The combined impervious area generated by the project includes approximately 270,413 ft^2 or roof area, 81,124 ft^2 of private driveway, 149,169 ft^2 of public road and 44,139 ft^2 public sidewalk, totaling 544,845 ft^2. The roof areas were calculated to be 50% of each lots area and the driveway areas were calculated to be 15% of each lots area. These areas were modelled to ensure that enough detention is provided for the maximum impervious surface area. The remaining area in each lot will be converted to lawn or landscaping totaling 257,147 ft^2 of pervious area.

Due to negligible infiltration rates onsite, the project will utilize a detention pond with a flow control structure to store and release stormwater runoff to a culvert that runs under Lockwood Creed Road. Stormwater runoff will be piped to a Stormfilter Vault for treatment before being routed to the detention pond.

SECTION B – QUANTITY CONTROL ANALYSIS AND DESIGN

Per Chapter 18.320 of the La Center Municipal Code (LCMC), the subdivision will be required to mitigate for stormwater runoff impacts generated as a result of the proposed improvements. The hydrologic analysis of this site was performed in accordance with the guidelines contained in LCMC and Chapters III-1 and III-2 of the Puget Sound Manual. The storm events were assumed to have a 24-hour duration and follow a Type 1A storm distribution. Rainfall depth for the 2, 10, 25, and 100-year 24-hour storm events are 2.4, 3.3, 3.8, and 4.5 inches respectively, as obtained from the Isopluvial maps for Clark County included in Appendix A. The detention facilities have been designed to produce release rates for the entire site equal or less than the predevelopment peak runoff rates for the 2, 10, 25 and 100-year, 24-hour storm events as stated in LCMC Code Section 18.320.220 (3)(d)(i). In addition, the facilities have been designed utilizing Figure III-1.1 Volume Correction Factor from the Puget Sound Manual. This resulted in a correction factor of 1.31 for the detention facilities.

The live storage area of the stormwater facilities was assumed to be empty at the beginning of the design storm event. The hydrological analysis was completed using HydroCAD v 10.0, which allows the SCS TR-20 method of hydrograph routing to be utilized and the TR-55 method to determine the times of concentration. The soil characteristics were obtained from USDA NRCS website. As can be seen on the soils map located in the appendix of this report, there are multiple soil types covering this site. These soil types consist of hydrologic soil groups (HSG) D. The Runoff Curve Numbers (RCNs) that were used in the design of the project were taken from Table III-1.3 of the Puget Sound Manual. An RCN value of 81 was used for the HSG D soil covered in forested area across the site. RCN value of 90 was used for post-development landscaping and an RCN value of 98 was used for pavement and roofs.

Table 1 below shows a tabulation of the project site areas for pre- and post-developed conditions.

Table 1- Summary of Pre-Developed Areas

	Basin	Impervious (sq-ft)	Pervious (sq-ft)	Total (sq-ft)	Total (acres)
Pre-Developed Area					
	Onsite	8,994	792,998	801,992	18.4

Table 2- Summary of Post-Developed Areas

Existing hard surface to remain	0 ft^2
New hard surface	544,844 ft^2 (12.5 acre)
Replaced hard surface	0 ft^2
Native vegetation converted to lawn or landscaping	257,146 ft^2 (5.9 acre)
Native vegetation converted to pasture	0 ft^2
Total land-disturbing activity	801,992 ft^2 (18.4 acre)
Pollution-generating hard surface	272,761 ft^2 (6.26 acre)
Pollution-generating pervious surface	0 ft^2
Total pollution-generating surfaces	272,761 ft^2 (6.26 acre)
Total non-pollution-generating surfaces	529,230 ft^2 (12.15 acre)

For the post-development prelim analysis one basin was modeled. A majority of the runoff from the site will be routed to a pond in the southwest corner of the site. The remaining runoff, the path and park area from Tract B, and the roof and lawn areas from lots 6, 39-41 will be piped and dispersed to Wetland B. RCN values of 90 for landscaping and 98 for the impervious areas were used.

Please refer to the HydroCAD stormwater model located in Appendix B, for tabulated acreage, imperviousness, curve numbers, length and grade of overland flow, and other hydrological parameters used in completing the analysis. Basin Maps are included in Appendix C.

Water quantity control for the development will be accomplished utilizing a detention facility. The detention pond will be constructed between in the southwest corner of the site and will be accessed by Lockwood Creek Road. It will include a simple control structure that will meter discharge to the culvert located in Lockwood Creek Road. The flow rate at the culvert will be equal to or less than the existing flow rates. See Appendix B for the HydroCAD printout.

SECTION C – CONVEYANCE SYSTEMS ANALYSIS AND DESIGN

The pipes for the conveyance system will be designed for the 100-year storm event per LCMC 18.320.220 and will be sized to carry flows from the contributing drainage areas upon full buildout while operating in an open flow regime. The conveyance calculations for the stormwater pipes will be included with the Final TIR.

SECTION D – RUNOFF WATER QUALITY TREATMENT

Runoff from pollution generating surfaces will be treated using a Peak Diversion Stormfilter vault. Stormfilter Media cartridge systems supplied by Contech Engineered Solutions will be used to treat stormwater runoff from the site's new roadways, driveways and sidewalk. All runoff will be treated through the vault before being piped to the detention facility. The number of required Stormfilter cartridges in the system will be based on the water quality treatment flow rate calculated for pollution generating and non-pollution generating surfaces and the treatment capacity of the filters supplied by Contech Engineered Solutions. Stormfilters have gained Washington Department of Ecology approval and have been allowed to be sized as offline systems because peak storms bypass the Stormfilter treatment chamber via an inlet/bypass assembly. See Appendix B for water quality flow rates from WWHM.

SECTION E – SOILS EVALUATION

There are five soil types located on this site. A soils map, obtained from USDA NRCS website is located before the narrative of this report. The soil types onsite consist of Gee silt loam, 0 to 8% slopes (GeB) and 8 to 20% slopes (GeD), Hillsboro silt loam, 0 to 3% slopes (HoA) and 8 to 15% slopes (HoC) and Odne silt loam, 0 to 5% slopes. These soils are in hydrologic soil group (HSG) D.

SECTION F – SPECIAL REPORTS AND STUDIES

A geotechnical report, a wetland and habitat report, and an archeological report were all completed for this site. All of these reports have been included as part of the subdivision application. The Geotechnical Report is provided in Appendix D.

SECTION G – OTHER PERMITS

A JARPA will be submitted to the Army Corps of Engineer's and Washington State Department of Ecology for wetland areas that are to be impacted as part of development of the site.

SECTION H – MAINTENANCE AND OPERATIONS MANUAL

All of the stormwater facilities associated with this development are to be owned & maintained by the Lockwood Meadows Homeowner's Association. A maintenance and operations manual is provided in Appendix E.

APPENDIX A

Design Criteria

Curve Numbers
Manning's "n" Values
Isopluvial Maps (2-, 10-, and 100-Year)
NRCS Soils Map

Table III-1.3 SCS Western Washington Runoff Curve Numbers (Published by SCS in 1982) Runoff curve numbers for selected agricultural, suburban and urban land use for Type 1A rainfall distribution, 24-hour storm duration.

LAND USE DESCRIPTION		CURVE NUMBERS BY HYDROLOGIC SOIL GROUP A	B	C	D
Cultivated land(1):	winter condition	86	91	94	95
Mountain open areas:	low growing brush & grasslands	74	82	89	92
Meadow or pasture:		65	78	85	89
Wood or forest land:	undisturbed	42	64	76	81
Wood or forest land:	young second growth or brush	55	72	81	86
Orchard:	with cover crop	81	88	92	94
Open spaces, lawns, parks, golf courses, cemeteries, landscaping.					
Good condition:	grass cover on ≥75% of the area	68	80	86	90
Fair condition:	grass cover on 50-75% of the area	77	85	90	92
Gravel roads & parking lots:		76	85	89	91
Dirt roads & parking lots:		72	82	87	89
Impervious surfaces, pavement, roofs etc.		98	98	98	98
Open water bodies:	lakes, wetlands, ponds etc.	100	100	100	100
Single family residential(2):		Separate curve number shall be selected for pervious & impervious portions of the site or basin			
Dwelling Unit/Gross Acre	%Impervious(3)				
1.0 DU/GA	15				
1.5 DU/GA	20				
2.0 DU/GA	25				
2.5 DU/GA	30				
3.0 DU/GA	34				
3.5 DU/GA	38				
4.0 DU/GA	42				
4.5 DU/GA	46				
5.0 DU/GA	48				
5.5 DU/GA	50				
6.0 DU/GA	52				
6.5 DU/GA	54				
7.0 DU/GA	56				
PUD's, condos, apartments, commercial businesses & industrial areas	%impervious must be computed				

(1) For a more detailed description of agricultural land use curve numbers refer to National Engineering Handbook, Sec. 4, Hydrology, Chapter 9, August 1972.
(2) Assumes roof and driveway runoff is directed into street/storm system.
(3) The remaining pervious areas (lawn) are considered to be in good condition for these curve numbers.

Table III-1.4 "n" AND "k" Values Used in Time Calculations for Hydrographs

"n_s" Sheet Flow Equation Manning's Values (for the initial 300 ft. of travel)	n_s
Smooth surfaces (concrete, asphalt, gravel, or bare hand packed soil)	0.011
Fallow fields or loose soil surface (no residue)	0.05
Cultivated soil with residue cover ($s \leq 0.20$ ft/ft)	0.06
Cultivated soil with residue cover ($s > 0.20$ ft/ft)	0.17
Short prairie grass and lawns	0.15
Dense grasses	0.24
Bermuda grass	0.41
Range (natural)	0.13
Woods or forest with light underbrush	0.40
Woods or forest with dense underbrush	0.80

*Manning values for sheet flow only, from Overton and Meadows 1976 (See TR-55, 1986)

"k" Values Used in Travel Time/Time of Concentration Calculations

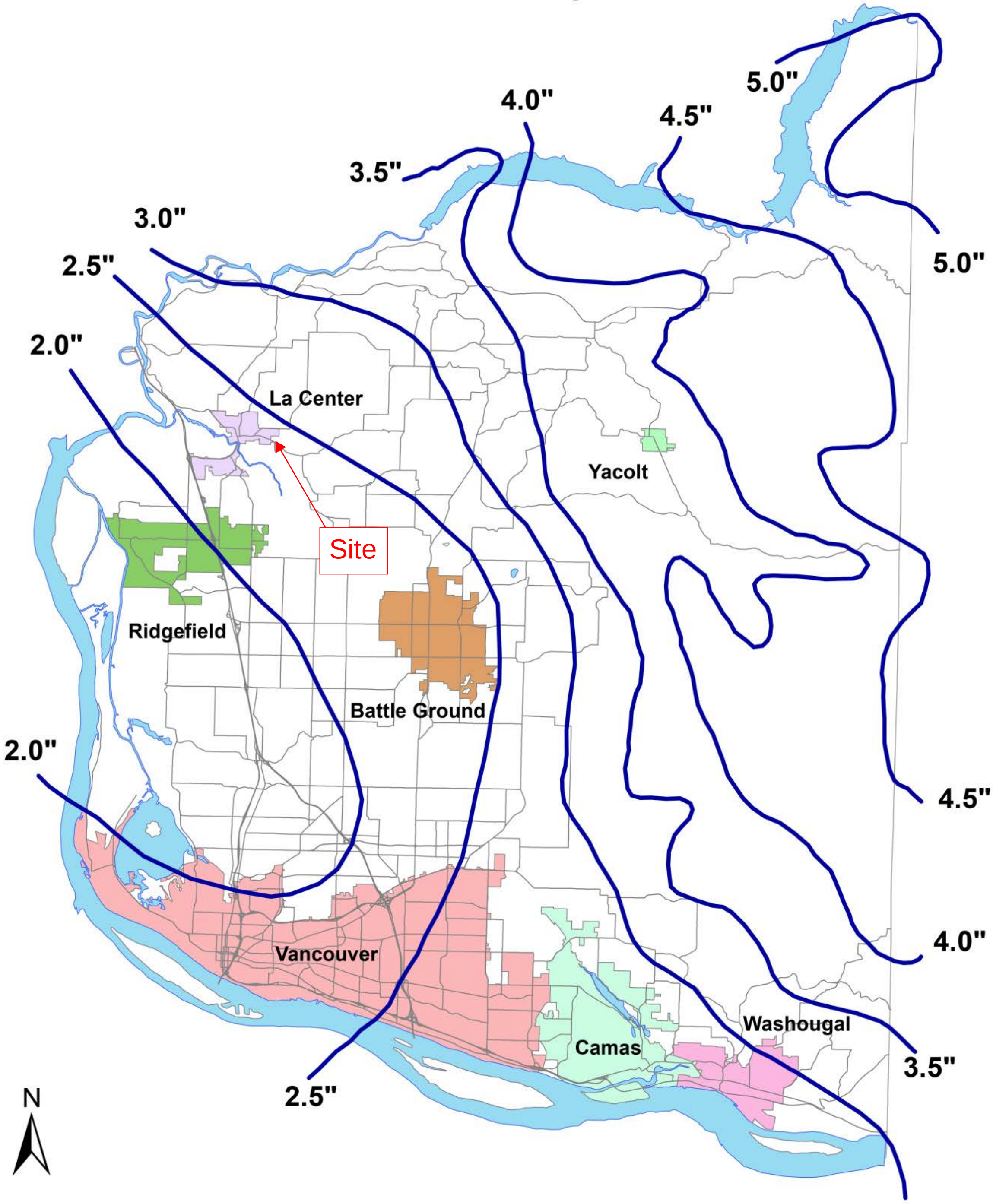
Shallow Concentrated Flow (After the initial 300 ft. of sheet flow, R = 0.1)	k_s
1. Forest with heavy ground litter and meadows (n = 0.10)	3
2. Brushy ground with some trees (n = 0.060)	5
3. Fallow or minimum tillage cultivation (n = 0.040)	8
4. High grass (n = 0.035)	9
5. Short grass, pasture and lawns (n = 0.030)	11
6. Nearly bare ground (n = 0.25)	13
7. Paved and gravel areas (n = 0.012)	27

Channel Flow (intermittent) (At the beginning of visible channels R = 0.2)	k_c
1. Forested swale with heavy ground litter (n = 0.10)	5
2. Forested drainage course/ravine with defined channel bed (n = 0.050)	10
3. Rock-lined waterway (n = 0.035)	15
4. Grassed waterway (n = 0.030)	17
5. Earth-lined waterway (n = 0.025)	20
6. CMP pipe (n = 0.024)	21
7. Concrete pipe (0.012)	42
8. Other waterways and pipe 0.508/n	

Channel Flow (Continuous stream, R = 0.4)	k_c
9. Meandering stream with some pools (n = 0.040)	20
10. Rock-lined stream (n = 0.035)	23
11. Grass-lined stream (n = 0.030)	27
12. Other streams, man-made channels and pipe 0.807/n**	

Isopluvial Map for Clark County

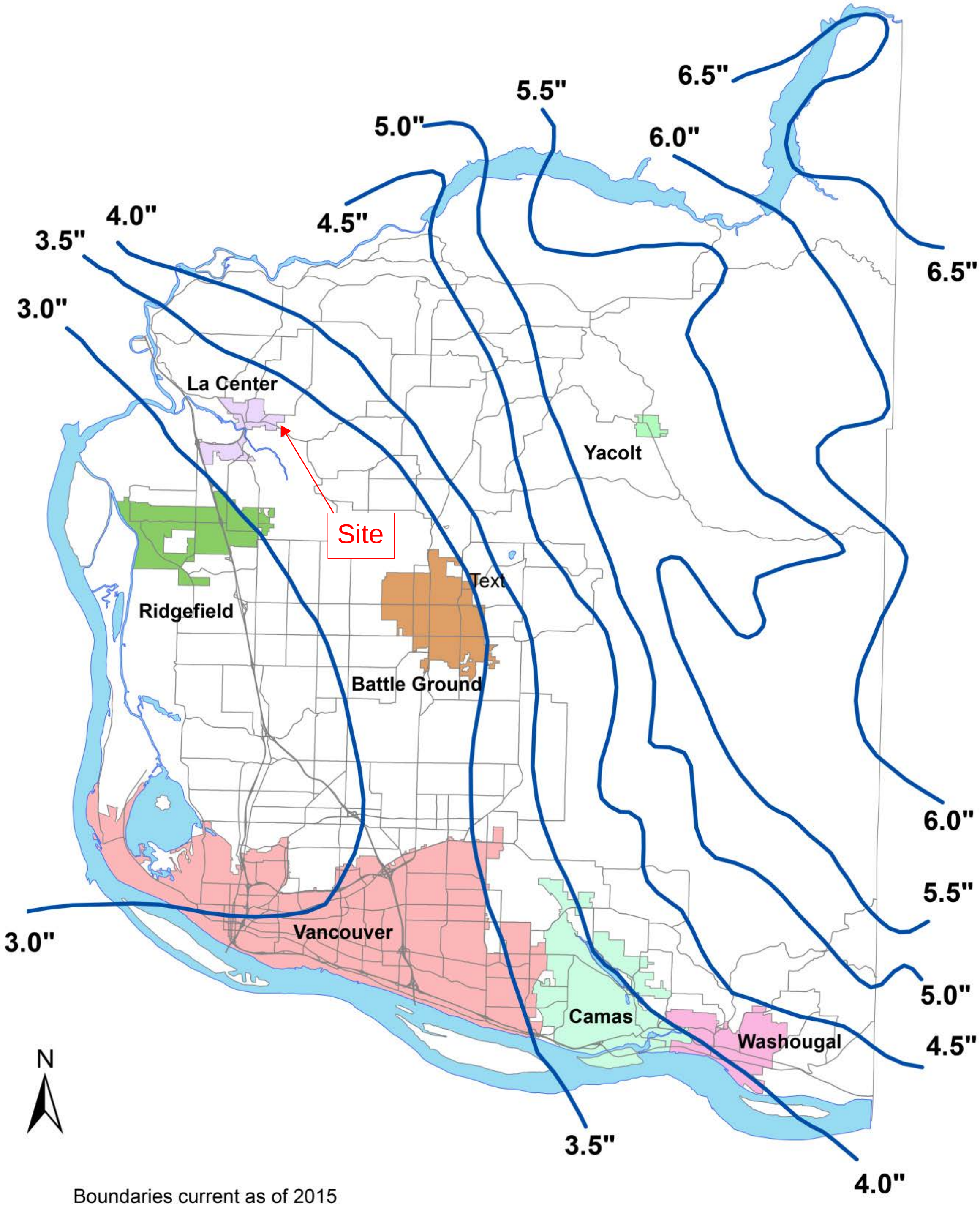
2-Year, 24-Hour Design Storm



Boundaries current as of 2015

ERRATA September 2016

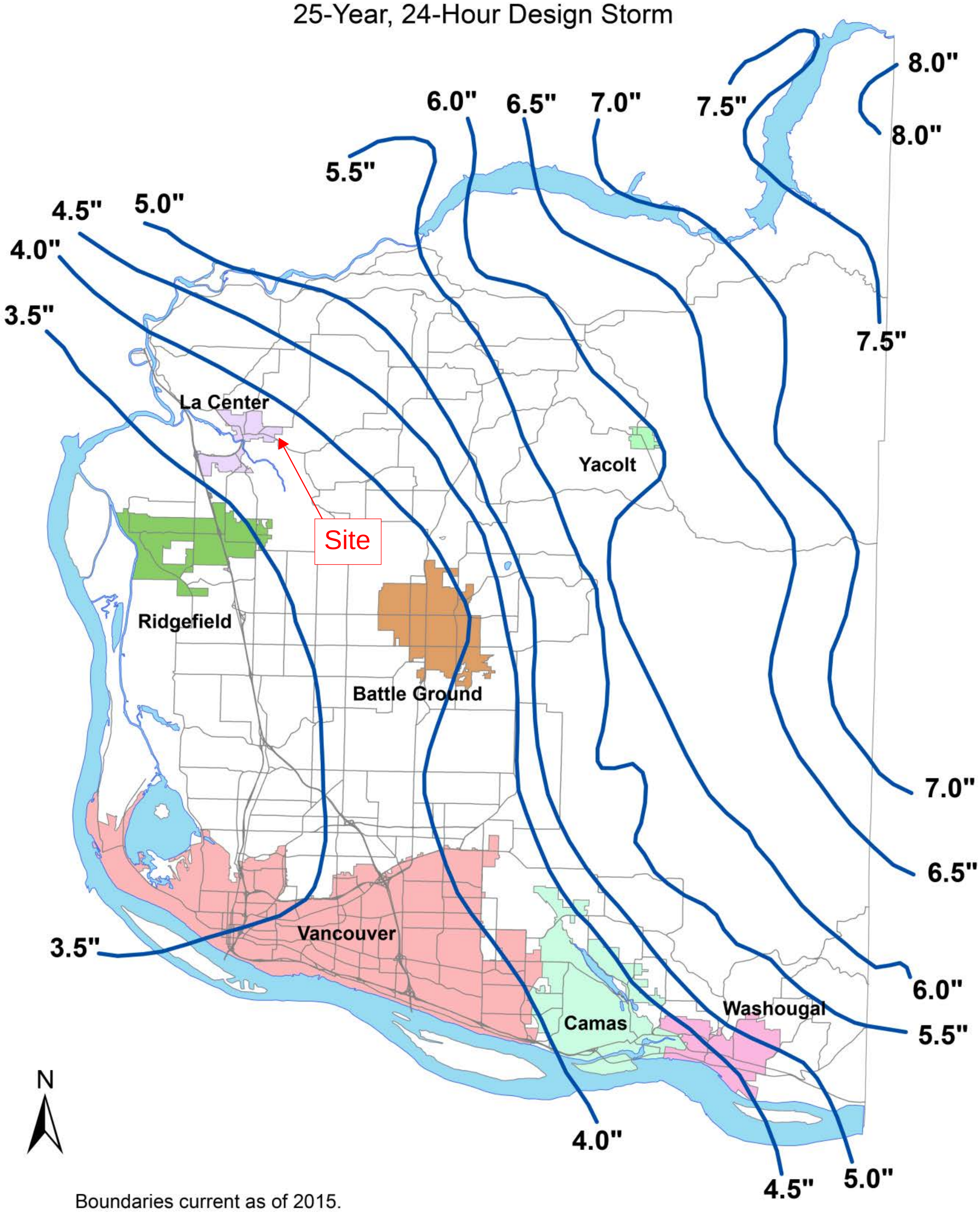
Isopluvial Map for Clark County
10-Year, 24-Hour Design Storm



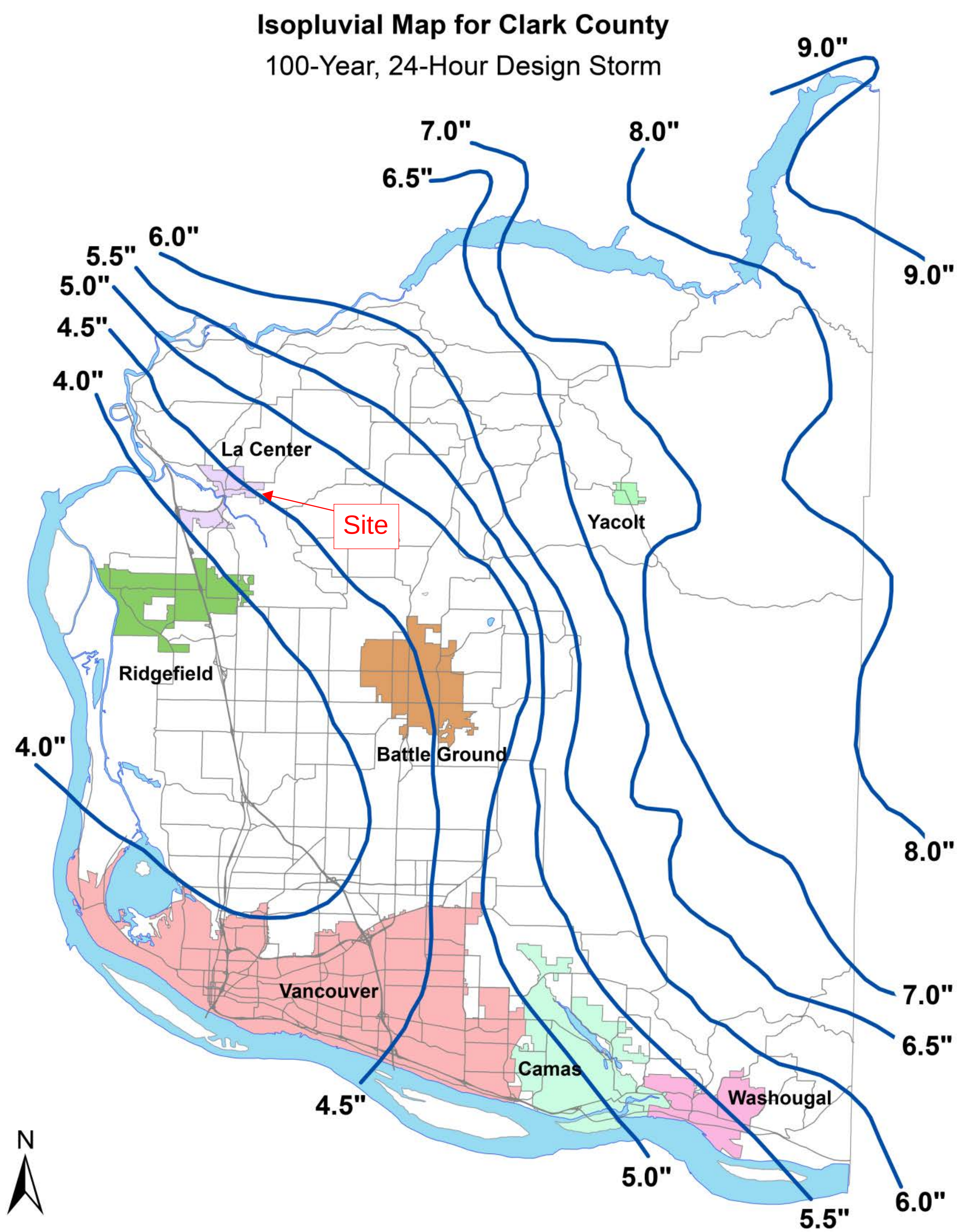
Boundaries current as of 2015

Isopluvial Map for Clark County

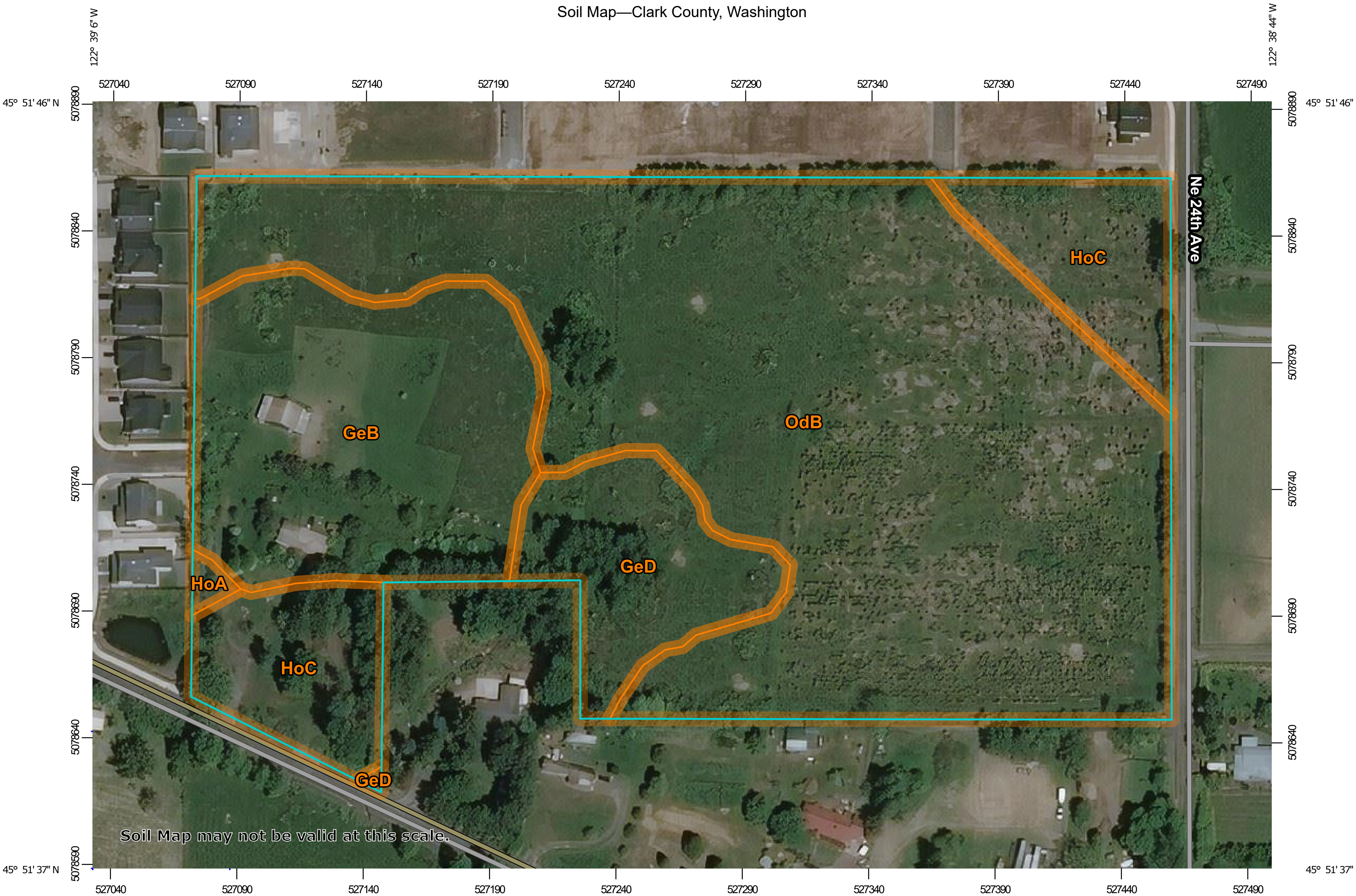
25-Year, 24-Hour Design Storm



Boundaries current as of 2015.



Boundaries current as of 2015.



Map Scale: 1:2,130 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

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 1:20,000.

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: Clark County, Washington
Survey Area Data: Version 18, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 24, 2018—May 10, 2019

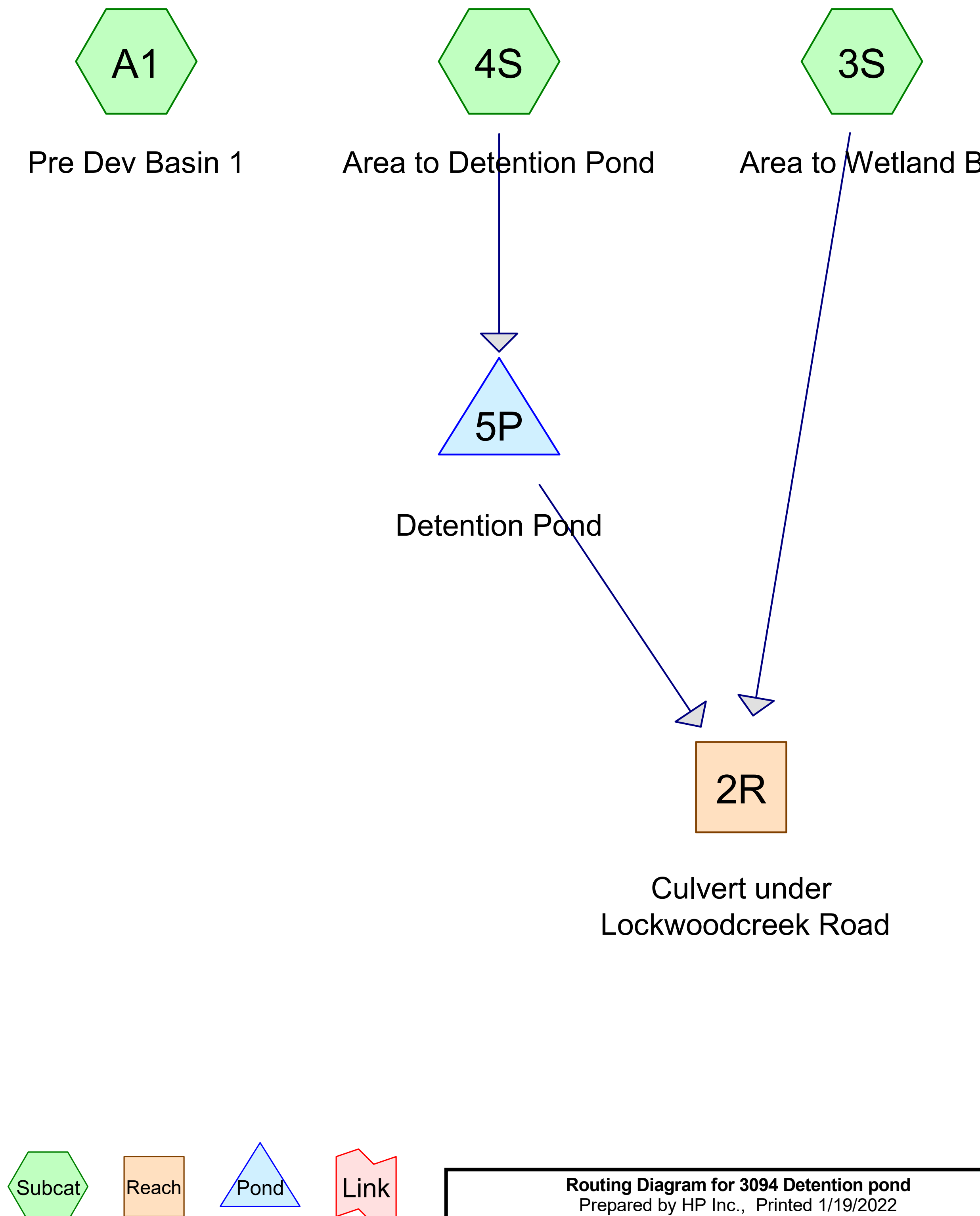
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GeB	Gee silt loam, 0 to 8 percent slopes	3.8	19.4%
GeD	Gee silt loam, 8 to 20 percent slopes	1.5	7.8%
HoA	Hillsboro silt loam, 0 to 3 percent slopes	0.1	0.3%
HoC	Hillsboro silt loam, 8 to 15 percent slopes	2.3	11.6%
OdB	Odne silt loam, 0 to 5 percent slopes	12.0	60.8%
Totals for Area of Interest		**19.7**	**100.0%**

APPENDIX B

Stormwater Models



Routing Diagram for 3094 Detention pond
Prepared by HP Inc., Printed 1/19/2022
HydroCAD® 10.00 s/n 04953 © 2011 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
792,998	81	Undisturbed Forest HSG D (A1)
257,146	90	Landscaping (3S, 4S)
81,124	98	Driveway (4S)
8,993	98	Impervious (A1)
149,169	98	Road (4S)
270,413	98	Roof (3S, 4S)
44,139	98	Sidewalk (3S, 4S)
1,603,982	**88**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
0	HSG C	
792,998	HSG D	A1
810,984	Other	3S, 4S, A1
1,603,982		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatch Numbers
0	0	0	0	81,124	81,124	Driveway	
0	0	0	0	8,993	8,993	Impervious	
0	0	0	0	257,146	257,146	Landscaping	
0	0	0	0	149,169	149,169	Road	
0	0	0	0	270,413	270,413	Roof	
0	0	0	0	44,139	44,139	Sidewalk	
0	0	0	792,998	0	792,998	Undisturbed Forest	
0	**0**	**0**	**792,998**	**810,984**	**1,603,982**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2R	145.08	142.91	36.0	0.0603	0.012	24.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Area to Wetland B Runoff Area=35,802 sf 47.45% Impervious Runoff Depth=1.77"
Tc=6.0 min CN=94 Runoff=0.38 cfs 5,293 cf

Subcatchment 4S: Area to Detention Pond Runoff Area=766,189 sf 68.89% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=96 Runoff=9.06 cfs 125,369 cf

Subcatchment A1: Pre Dev Basin 1 Runoff Area=801,991 sf 1.12% Impervious Runoff Depth=0.87"
Flow Length=300' Slope=0.1500 '/' Tc=27.2 min CN=81 Runoff=2.74 cfs 58,264 cf

Reach 2R: Culvert under Avg. Flow Depth=0.27' Max Vel=9.32 fps Inflow=2.39 cfs 112,190 cf
24.0" Round Pipe n=0.012 L=36.0' S=0.0603 '/' Capacity=60.17 cfs Outflow=2.39 cfs 112,184 cf

Pond 5P: Detention Pond Peak Elev=156.40' Storage=41,040 cf Inflow=9.06 cfs 125,369 cf
Outflow=2.29 cfs 106,897 cf

Total Runoff Area = 1,603,982 sf Runoff Volume = 188,925 cf Average Runoff Depth = 1.41"
65.47% Pervious = 1,050,144 sf 34.53% Impervious = 553,838 sf

Summary for Subcatchment 3S: Area to Wetland B

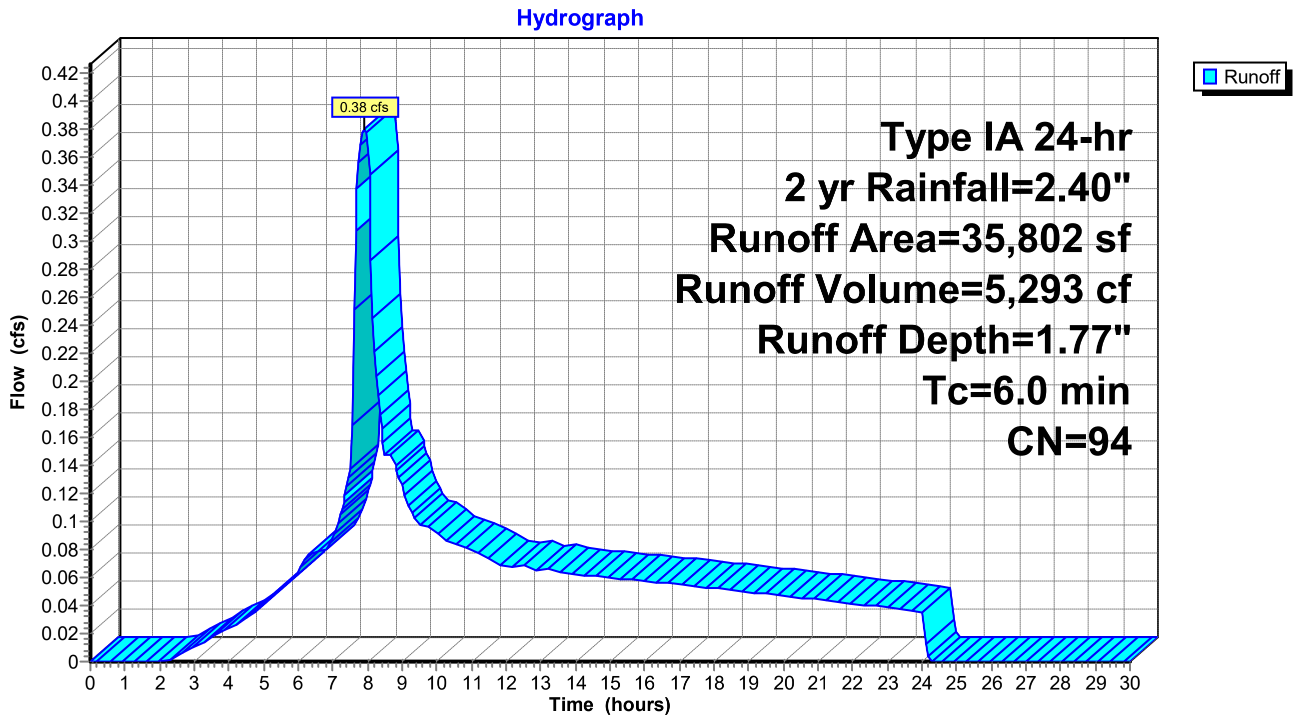
Runoff = 0.38 cfs @ 7.91 hrs, Volume= 5,293 cf, Depth= 1.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 yr Rainfall=2.40"

	Area (sf)	CN	Description
*	18,814	90	Landscaping
*	0	98	Road
*	0	98	Driveway
*	15,318	98	Roof
*	1,670	98	Sidewalk
	35,802	94	Weighted Average
	18,814		52.55% Pervious Area
	16,988		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 3S: Area to Wetland B



Summary for Subcatchment 4S: Area to Detention Pond

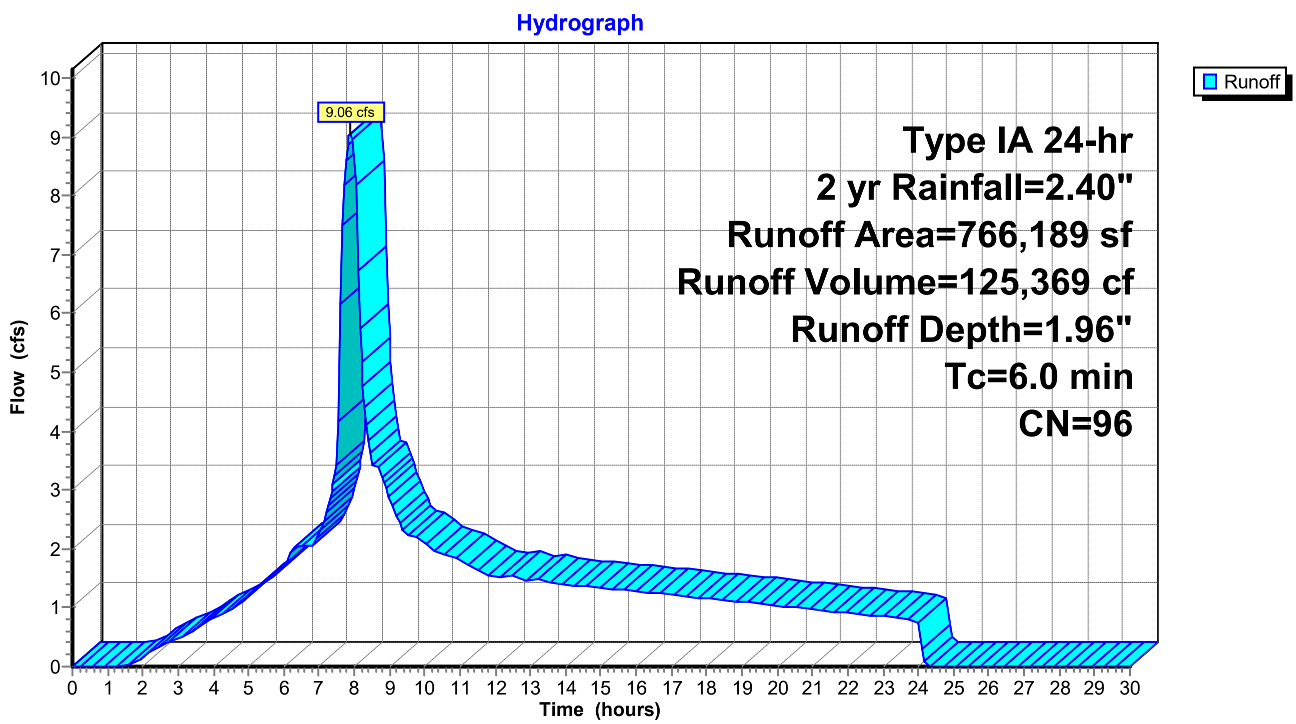
Runoff = 9.06 cfs @ 7.89 hrs, Volume= 125,369 cf, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 yr Rainfall=2.40"

	Area (sf)	CN	Description
*	238,332	90	Landscaping
*	149,169	98	Road
*	81,124	98	Driveway
*	255,095	98	Roof
*	42,469	98	Sidewalk
	766,189	96	Weighted Average
	238,332		31.11% Pervious Area
	527,857		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 4S: Area to Detention Pond



Summary for Subcatchment A1: Pre Dev Basin 1

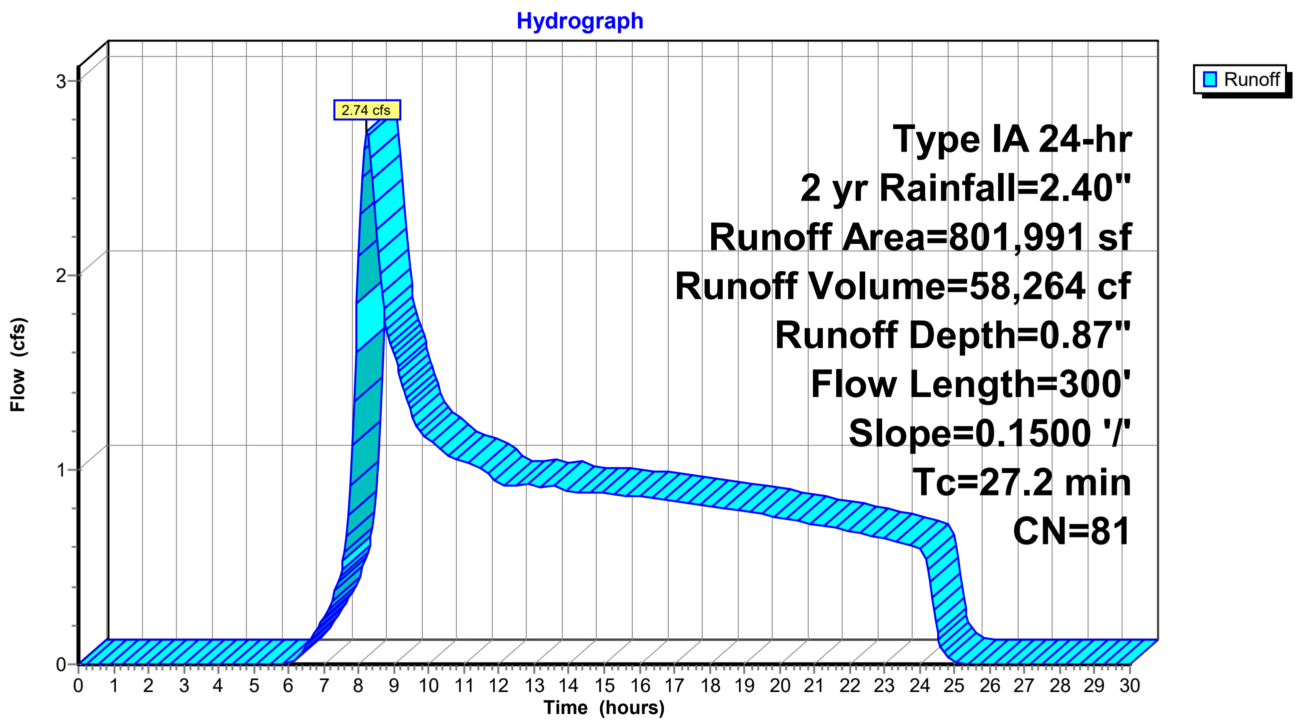
Runoff = 2.74 cfs @ 8.24 hrs, Volume= 58,264 cf, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 2 yr Rainfall=2.40"

	Area (sf)	CN	Description
*	792,998	81	Undisturbed Forest HSG D
*	8,993	98	Impervious
	801,991	81	Weighted Average
	792,998		98.88% Pervious Area
	8,993		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	300	0.1500	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.30"

Subcatchment A1: Pre Dev Basin 1



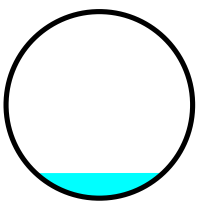
Summary for Reach 2R: Culvert under Lockwoodcreek Road

Inflow Area = 801,991 sf, 67.94% Impervious, Inflow Depth > 1.68" for 2 yr event
Inflow = 2.39 cfs @ 9.38 hrs, Volume= 112,190 cf
Outflow = 2.39 cfs @ 9.37 hrs, Volume= 112,184 cf, Atten= 0%, Lag= 0.0 min

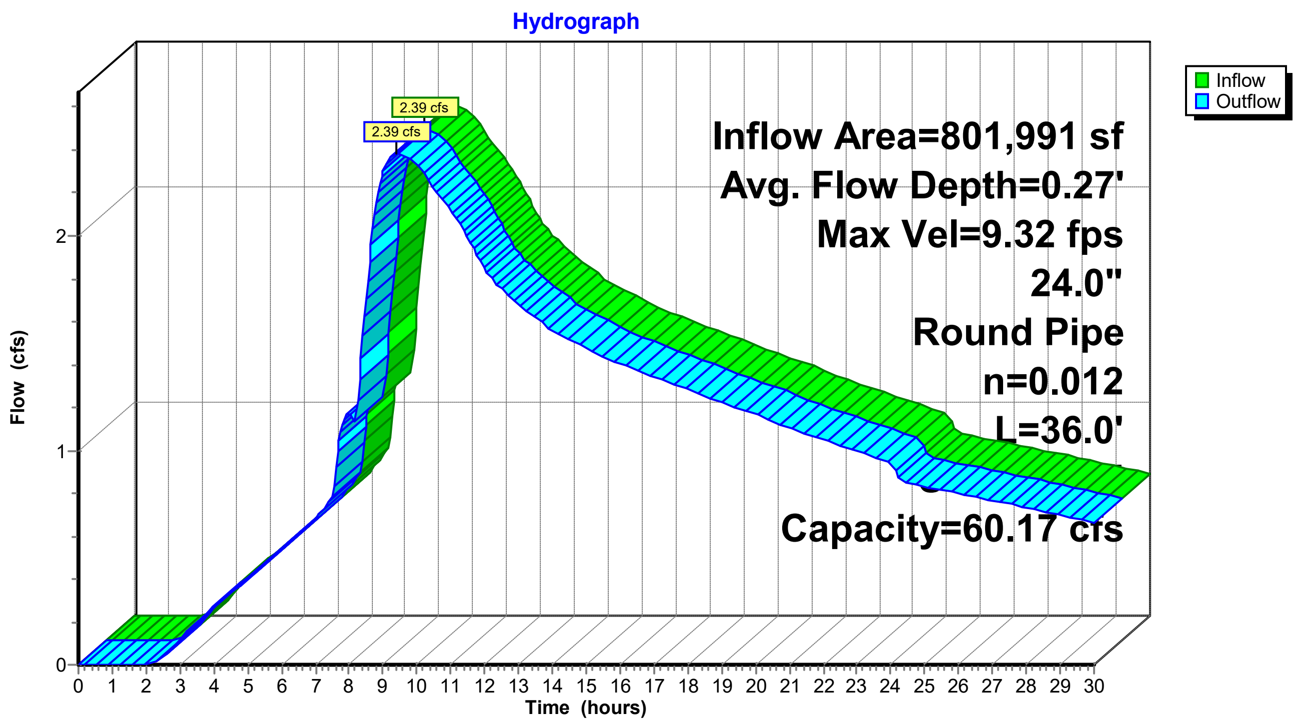
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.32 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.05 fps, Avg. Travel Time= 0.1 min

Peak Storage= 9 cf @ 9.37 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 60.17 cfs

24.0" Round Pipe
n= 0.012 Steel, smooth
Length= 36.0' Slope= 0.0603 '/'
Inlet Invert= 145.08', Outlet Invert= 142.91'



Reach 2R: Culvert under Lockwoodcreek Road



Summary for Pond 5P: Detention Pond

Inflow Area = 766,189 sf, 68.89% Impervious, Inflow Depth = 1.96" for 2 yr event
Inflow = 9.06 cfs @ 7.89 hrs, Volume= 125,369 cf
Outflow = 2.29 cfs @ 9.43 hrs, Volume= 106,897 cf, Atten= 75%, Lag= 92.2 min
Primary = 2.29 cfs @ 9.43 hrs, Volume= 106,897 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 156.40' @ 9.43 hrs Surf.Area= 10,359 sf Storage= 41,040 cf

Plug-Flow detention time= 360.6 min calculated for 106,897 cf (85% of inflow)
Center-of-Mass det. time= 262.2 min (966.4 - 704.2)

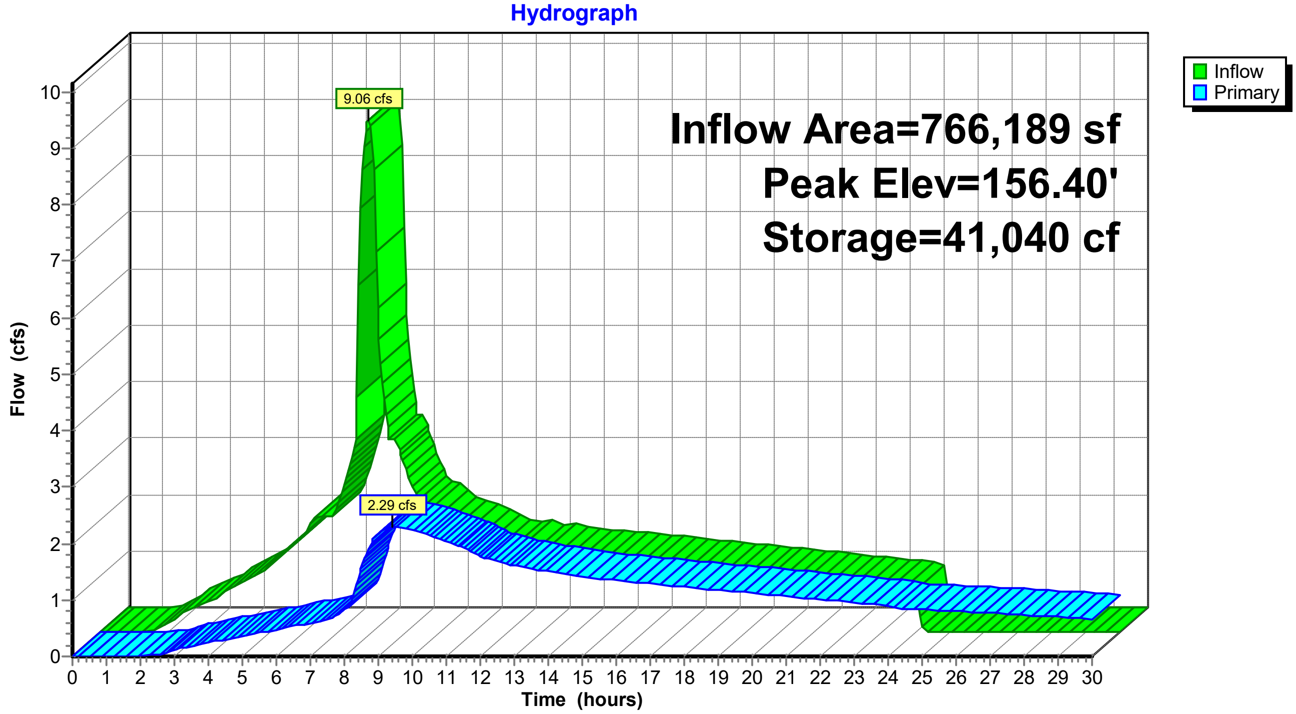
Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	71,745 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 0.76

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	6,608	0	0
152.00	7,793	7,201	7,201
153.00	9,029	8,411	15,612
154.00	10,317	9,673	25,285
155.00	11,657	10,987	36,272
156.00	13,049	12,353	48,625
157.00	14,493	13,771	62,396
158.00	15,989	15,241	77,637
159.00	17,540	16,765	94,401

Device	Routing	Invert	Outlet Devices
#1	Primary	151.00'	**3.9" Vert. Orifice/Grate** C= 0.600
#2	Primary	155.67'	**9.4" Vert. Orifice/Grate** C= 0.600
#3	Primary	156.35'	**5.7" Vert. Orifice/Grate** C= 0.600
#4	Primary	158.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.29 cfs @ 9.43 hrs HW=156.40' (Free Discharge)
1=Orifice/Grate (Orifice Controls 0.91 cfs @ 11.02 fps)
2=Orifice/Grate (Orifice Controls 1.37 cfs @ 2.91 fps)
3=Orifice/Grate (Orifice Controls 0.01 cfs @ 0.78 fps)
4=Orifice/Grate (Controls 0.00 cfs)

Pond 5P: Detention Pond



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Area to Wetland B Runoff Area=35,802 sf 47.45% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=94 Runoff=0.57 cfs 7,879 cf

Subcatchment 4S: Area to Detention Pond Runoff Area=766,189 sf 68.89% Impervious Runoff Depth=2.85"
Tc=6.0 min CN=96 Runoff=13.07 cfs 181,828 cf

Subcatchment A1: Pre Dev Basin 1 Runoff Area=801,991 sf 1.12% Impervious Runoff Depth=1.55"
Flow Length=300' Slope=0.1500 '/' Tc=27.2 min CN=81 Runoff=5.64 cfs 103,463 cf

Reach 2R: Culvert under Avg. Flow Depth=0.38' Max Vel=11.49 fps Inflow=4.84 cfs 170,018 cf
24.0" Round Pipe n=0.012 L=36.0' S=0.0603 '/' Capacity=60.17 cfs Outflow=4.84 cfs 170,012 cf

Pond 5P: Detention Pond Peak Elev=157.52' Storage=53,248 cf Inflow=13.07 cfs 181,828 cf
Outflow=4.63 cfs 162,138 cf

Total Runoff Area = 1,603,982 sf Runoff Volume = 293,171 cf Average Runoff Depth = 2.19"
65.47% Pervious = 1,050,144 sf 34.53% Impervious = 553,838 sf

Summary for Subcatchment 3S: Area to Wetland B

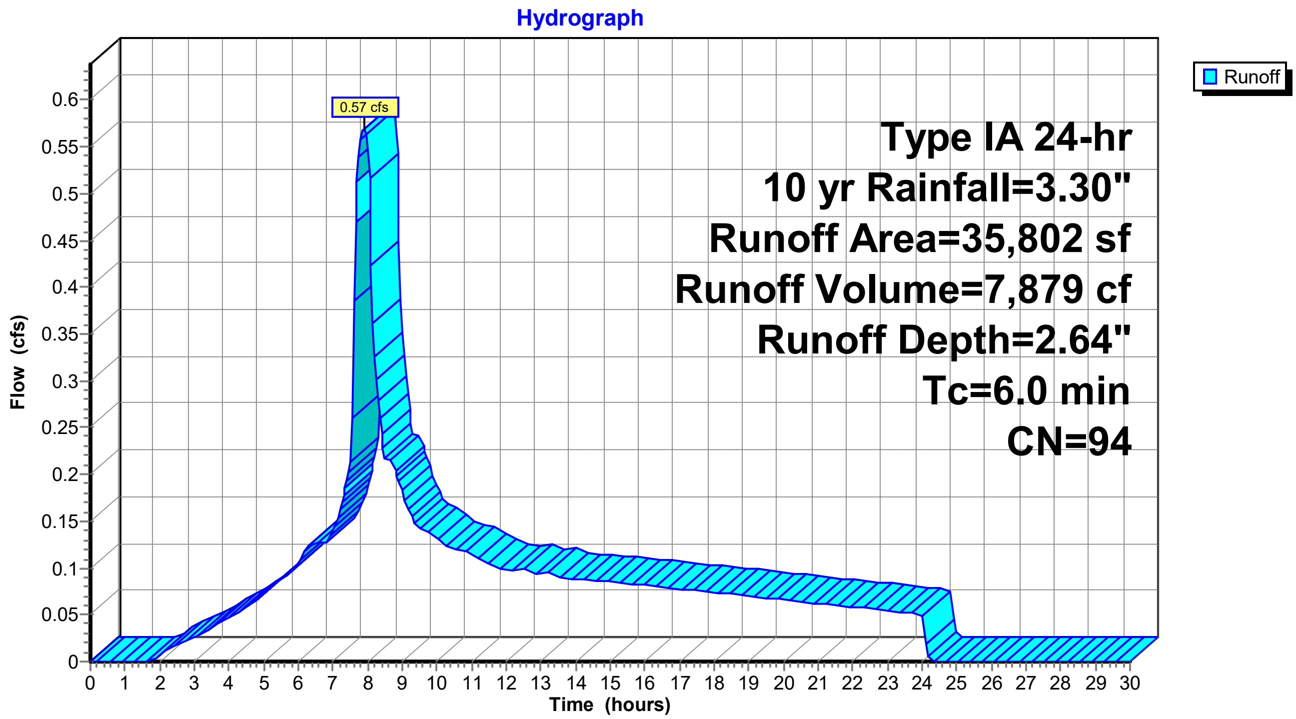
Runoff = 0.57 cfs @ 7.90 hrs, Volume= 7,879 cf, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 yr Rainfall=3.30"

	Area (sf)	CN	Description
*	18,814	90	Landscaping
*	0	98	Road
*	0	98	Driveway
*	15,318	98	Roof
*	1,670	98	Sidewalk
	35,802	94	Weighted Average
	18,814		52.55% Pervious Area
	16,988		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 3S: Area to Wetland B



Summary for Subcatchment 4S: Area to Detention Pond

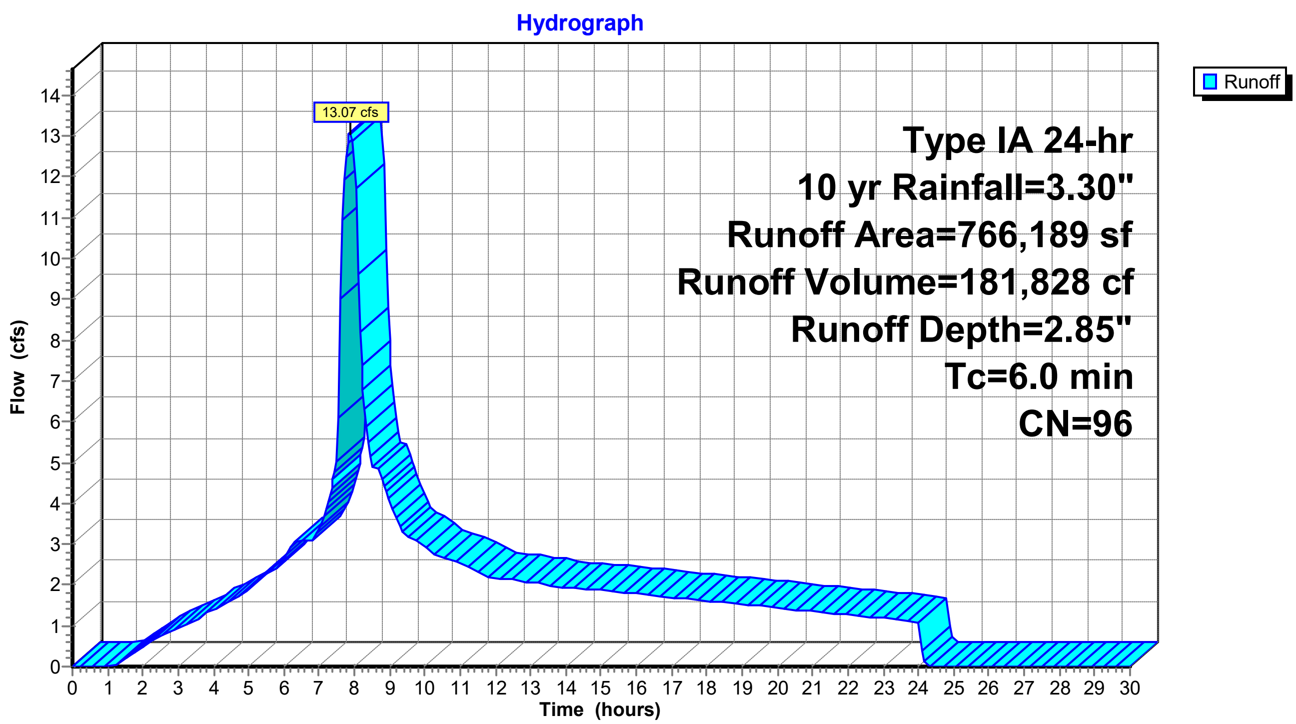
Runoff = 13.07 cfs @ 7.88 hrs, Volume= 181,828 cf, Depth= 2.85"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 yr Rainfall=3.30"

	Area (sf)	CN	Description
*	238,332	90	Landscaping
*	149,169	98	Road
*	81,124	98	Driveway
*	255,095	98	Roof
*	42,469	98	Sidewalk
	766,189	96	Weighted Average
	238,332		31.11% Pervious Area
	527,857		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 4S: Area to Detention Pond



Summary for Subcatchment A1: Pre Dev Basin 1

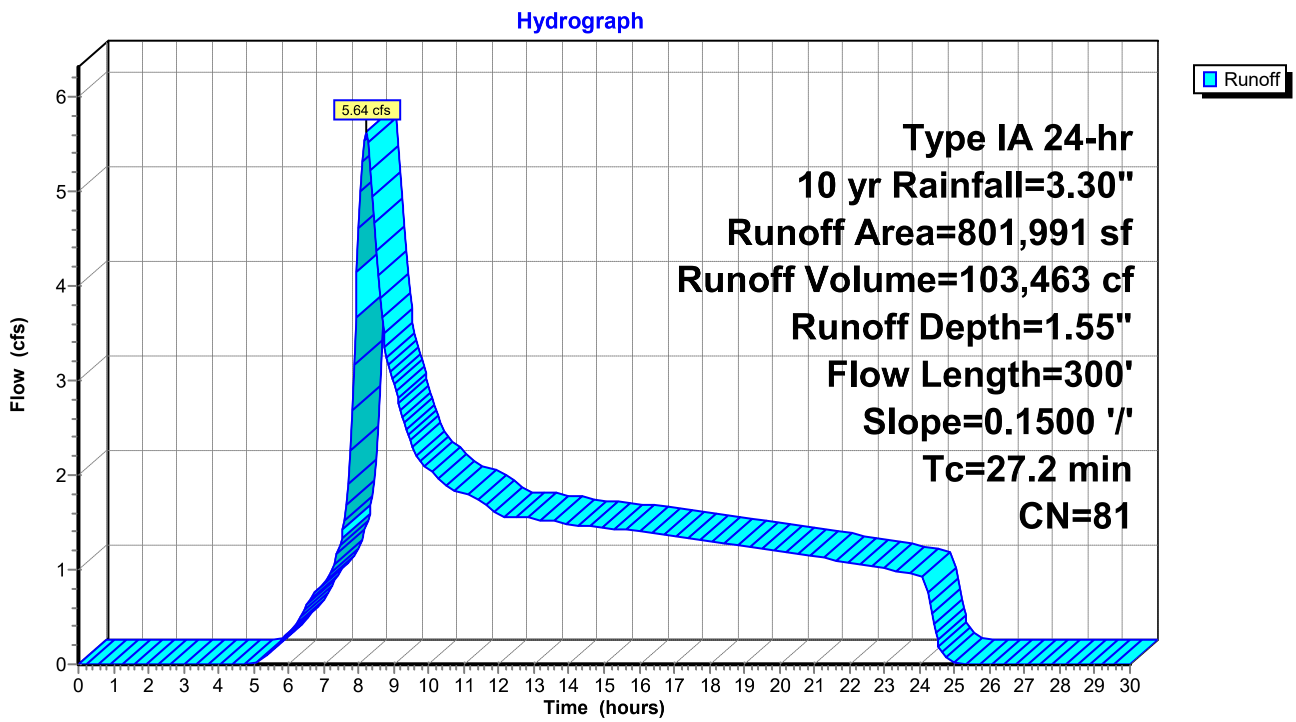
Runoff = 5.64 cfs @ 8.21 hrs, Volume= 103,463 cf, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 yr Rainfall=3.30"

	Area (sf)	CN	Description
*	792,998	81	Undisturbed Forest HSG D
*	8,993	98	Impervious
	801,991	81	Weighted Average
	792,998		98.88% Pervious Area
	8,993		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	300	0.1500	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.30"

Subcatchment A1: Pre Dev Basin 1



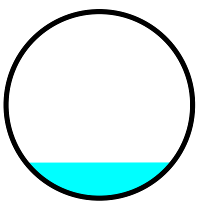
Summary for Reach 2R: Culvert under Lockwoodcreek Road

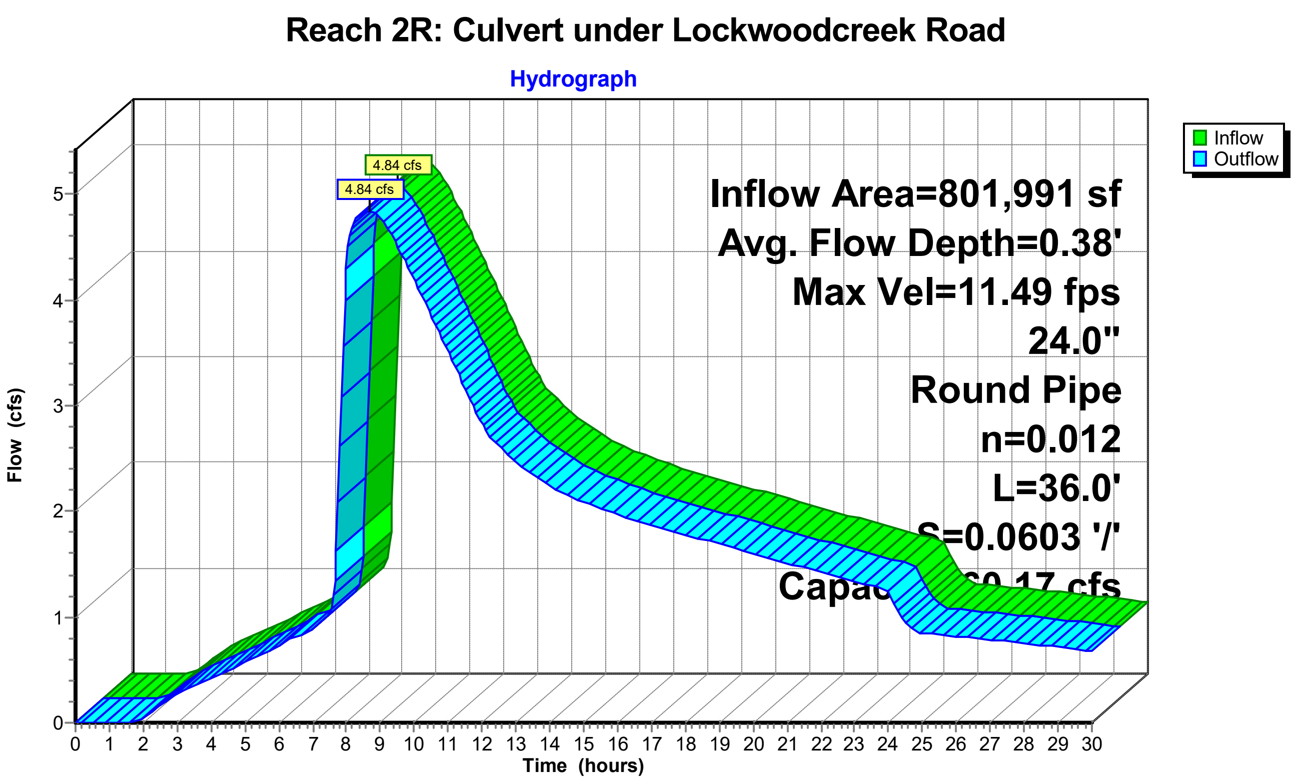
Inflow Area = 801,991 sf, 67.94% Impervious, Inflow Depth > 2.54" for 10 yr event
Inflow = 4.84 cfs @ 8.70 hrs, Volume= 170,018 cf
Outflow = 4.84 cfs @ 8.70 hrs, Volume= 170,012 cf, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.49 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.82 fps, Avg. Travel Time= 0.1 min

Peak Storage= 15 cf @ 8.69 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 60.17 cfs

24.0" Round Pipe
n= 0.012 Steel, smooth
Length= 36.0' Slope= 0.0603 '/'
Inlet Invert= 145.08', Outlet Invert= 142.91'





Summary for Pond 5P: Detention Pond

Inflow Area = 766,189 sf, 68.89% Impervious, Inflow Depth = 2.85" for 10 yr event
Inflow = 13.07 cfs @ 7.88 hrs, Volume= 181,828 cf
Outflow = 4.63 cfs @ 8.78 hrs, Volume= 162,138 cf, Atten= 65%, Lag= 53.9 min
Primary = 4.63 cfs @ 8.78 hrs, Volume= 162,138 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 157.52' @ 8.78 hrs Surf.Area= 11,601 sf Storage= 53,248 cf

Plug-Flow detention time= 277.2 min calculated for 162,138 cf (89% of inflow)
Center-of-Mass det. time= 201.8 min (891.1 - 689.2)

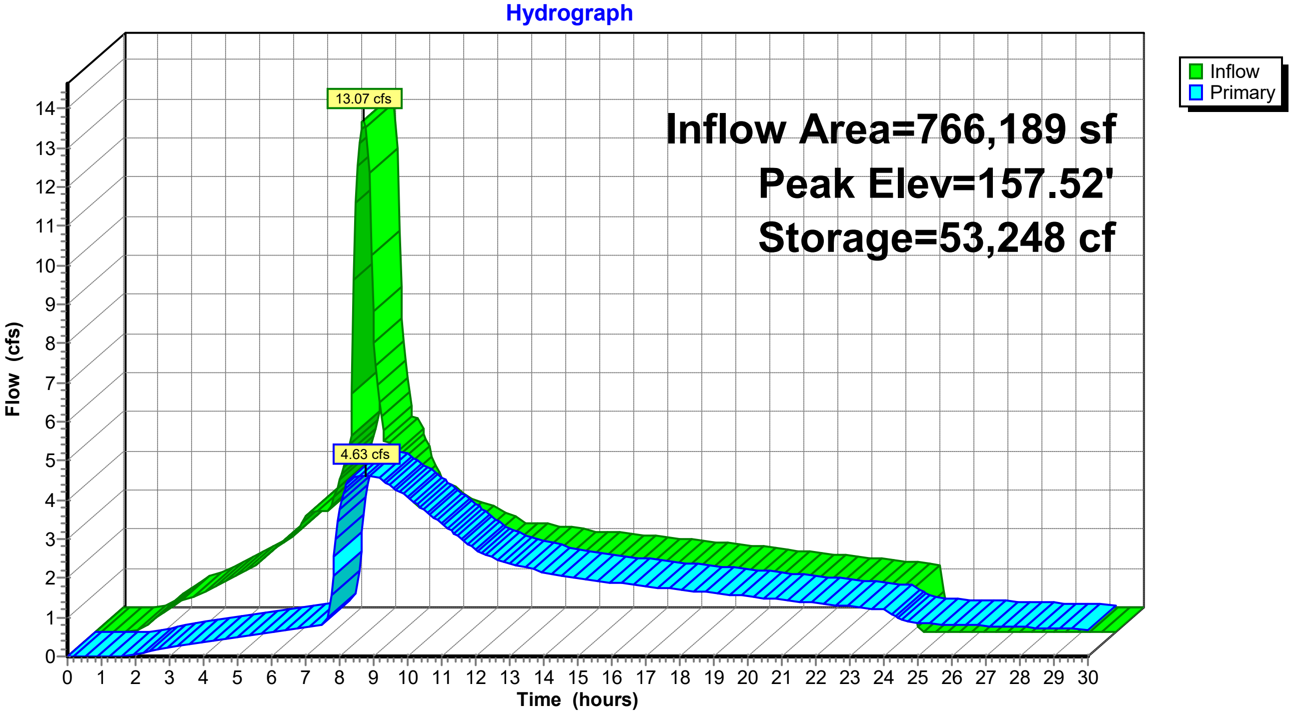
Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	71,745 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 0.76

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	6,608	0	0
152.00	7,793	7,201	7,201
153.00	9,029	8,411	15,612
154.00	10,317	9,673	25,285
155.00	11,657	10,987	36,272
156.00	13,049	12,353	48,625
157.00	14,493	13,771	62,396
158.00	15,989	15,241	77,637
159.00	17,540	16,765	94,401

Device	Routing	Invert	Outlet Devices
#1	Primary	151.00'	**3.9" Vert. Orifice/Grate** C= 0.600
#2	Primary	155.67'	**9.4" Vert. Orifice/Grate** C= 0.600
#3	Primary	156.35'	**5.7" Vert. Orifice/Grate** C= 0.600
#4	Primary	158.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.63 cfs @ 8.78 hrs HW=157.52' (Free Discharge)
—**1=Orifice/Grate** (Orifice Controls 1.01 cfs @ 12.14 fps)
—**2=Orifice/Grate** (Orifice Controls 2.80 cfs @ 5.80 fps)
—**3=Orifice/Grate** (Orifice Controls 0.82 cfs @ 4.64 fps)
—**4=Orifice/Grate** (Controls 0.00 cfs)

Pond 5P: Detention Pond



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Area to Wetland B Runoff Area=35,802 sf 47.45% Impervious Runoff Depth=3.13"
Tc=6.0 min CN=94 Runoff=0.67 cfs 9,334 cf

Subcatchment 4S: Area to Detention Pond Runoff Area=766,189 sf 68.89% Impervious Runoff Depth=3.34"
Tc=6.0 min CN=96 Runoff=15.28 cfs 213,384 cf

Subcatchment A1: Pre Dev Basin 1 Runoff Area=801,991 sf 1.12% Impervious Runoff Depth=1.95"
Flow Length=300' Slope=0.1500 '/' Tc=27.2 min CN=81 Runoff=7.42 cfs 130,623 cf

Reach 2R: Culvert under Avg. Flow Depth=0.44' Max Vel=12.50 fps Inflow=6.46 cfs 202,614 cf
24.0" Round Pipe n=0.012 L=36.0' S=0.0603 '/' Capacity=60.17 cfs Outflow=6.46 cfs 202,608 cf

Pond 5P: Detention Pond Peak Elev=158.16' Storage=60,991 cf Inflow=15.28 cfs 213,384 cf
Outflow=6.18 cfs 193,280 cf

Total Runoff Area = 1,603,982 sf Runoff Volume = 353,340 cf Average Runoff Depth = 2.64"
65.47% Pervious = 1,050,144 sf 34.53% Impervious = 553,838 sf

Summary for Subcatchment 3S: Area to Wetland B

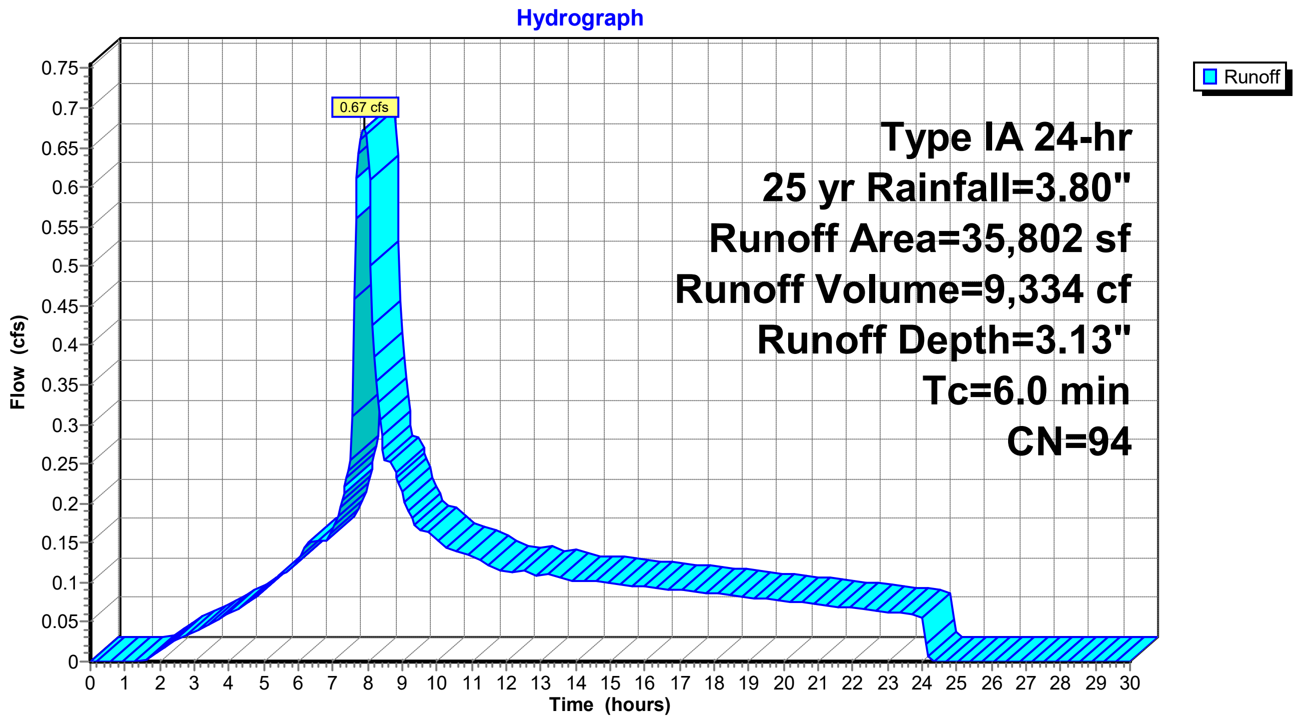
Runoff = 0.67 cfs @ 7.89 hrs, Volume= 9,334 cf, Depth= 3.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 yr Rainfall=3.80"

	Area (sf)	CN	Description
*	18,814	90	Landscaping
*	0	98	Road
*	0	98	Driveway
*	15,318	98	Roof
*	1,670	98	Sidewalk
	35,802	94	Weighted Average
	18,814		52.55% Pervious Area
	16,988		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 3S: Area to Wetland B



Summary for Subcatchment 4S: Area to Detention Pond

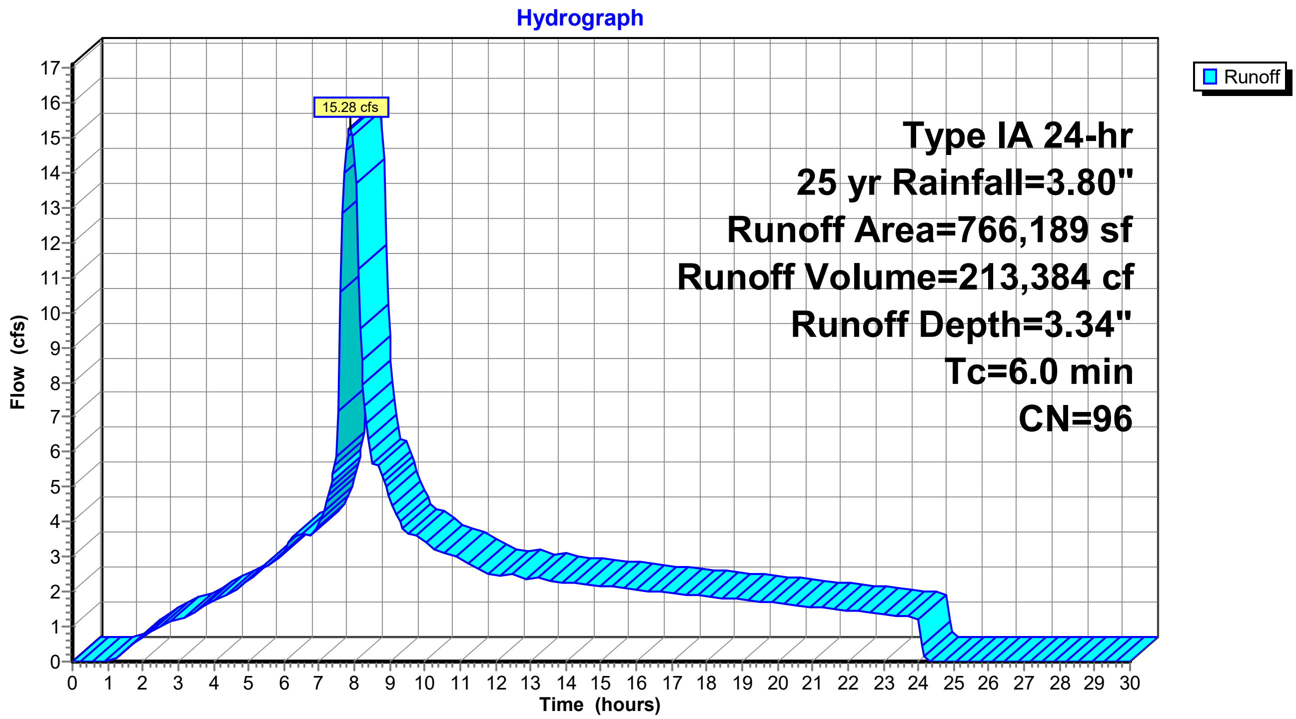
Runoff = 15.28 cfs @ 7.88 hrs, Volume= 213,384 cf, Depth= 3.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 yr Rainfall=3.80"

	Area (sf)	CN	Description
*	238,332	90	Landscaping
*	149,169	98	Road
*	81,124	98	Driveway
*	255,095	98	Roof
*	42,469	98	Sidewalk
	766,189	96	Weighted Average
	238,332		31.11% Pervious Area
	527,857		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 4S: Area to Detention Pond



Summary for Subcatchment A1: Pre Dev Basin 1

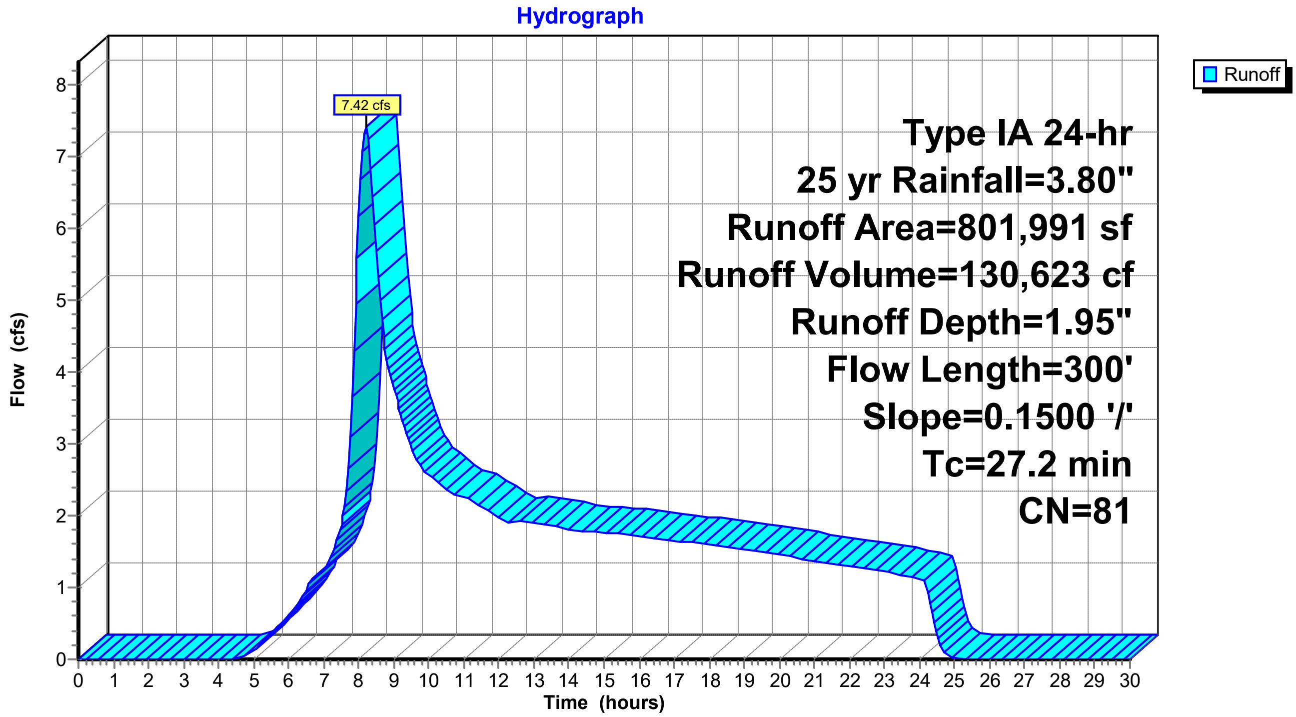
Runoff = 7.42 cfs @ 8.20 hrs, Volume= 130,623 cf, Depth= 1.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 25 yr Rainfall=3.80"

	Area (sf)	CN	Description
*	792,998	81	Undisturbed Forest HSG D
*	8,993	98	Impervious
	801,991	81	Weighted Average
	792,998		98.88% Pervious Area
	8,993		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	300	0.1500	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.30"

Subcatchment A1: Pre Dev Basin 1



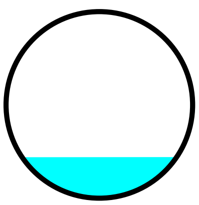
Summary for Reach 2R: Culvert under Lockwoodcreek Road

Inflow Area = 801,991 sf, 67.94% Impervious, Inflow Depth > 3.03" for 25 yr event
Inflow = 6.46 cfs @ 8.41 hrs, Volume= 202,614 cf
Outflow = 6.46 cfs @ 8.41 hrs, Volume= 202,608 cf, Atten= 0%, Lag= 0.2 min

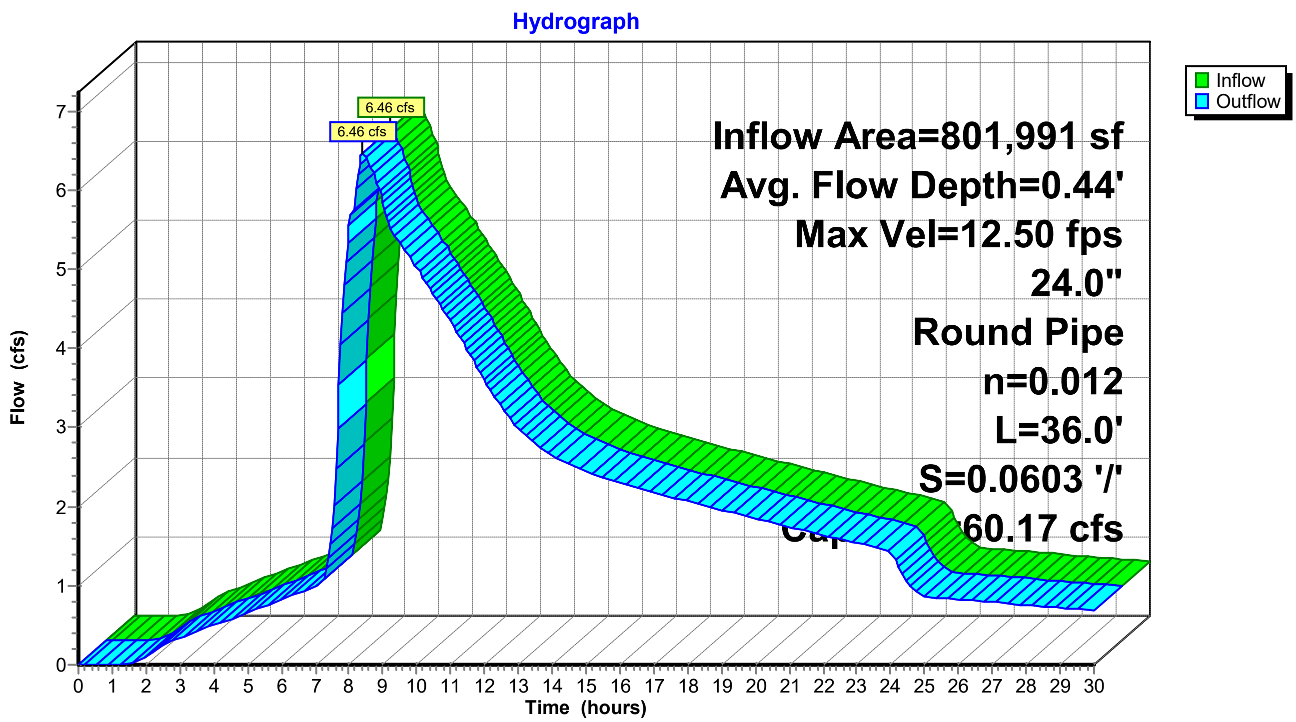
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.50 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 8.16 fps, Avg. Travel Time= 0.1 min

Peak Storage= 19 cf @ 8.41 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 60.17 cfs

24.0" Round Pipe
n= 0.012 Steel, smooth
Length= 36.0' Slope= 0.0603 '/'
Inlet Invert= 145.08', Outlet Invert= 142.91'



Reach 2R: Culvert under Lockwoodcreek Road



Summary for Pond 5P: Detention Pond

Inflow Area = 766,189 sf, 68.89% Impervious, Inflow Depth = 3.34" for 25 yr event
Inflow = 15.28 cfs @ 7.88 hrs, Volume= 213,384 cf
Outflow = 6.18 cfs @ 8.43 hrs, Volume= 193,280 cf, Atten= 60%, Lag= 32.8 min
Primary = 6.18 cfs @ 8.43 hrs, Volume= 193,280 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 158.16' @ 8.43 hrs Surf.Area= 12,343 sf Storage= 60,991 cf

Plug-Flow detention time= 251.7 min calculated for 192,958 cf (90% of inflow)
Center-of-Mass det. time= 185.6 min (869.0 - 683.4)

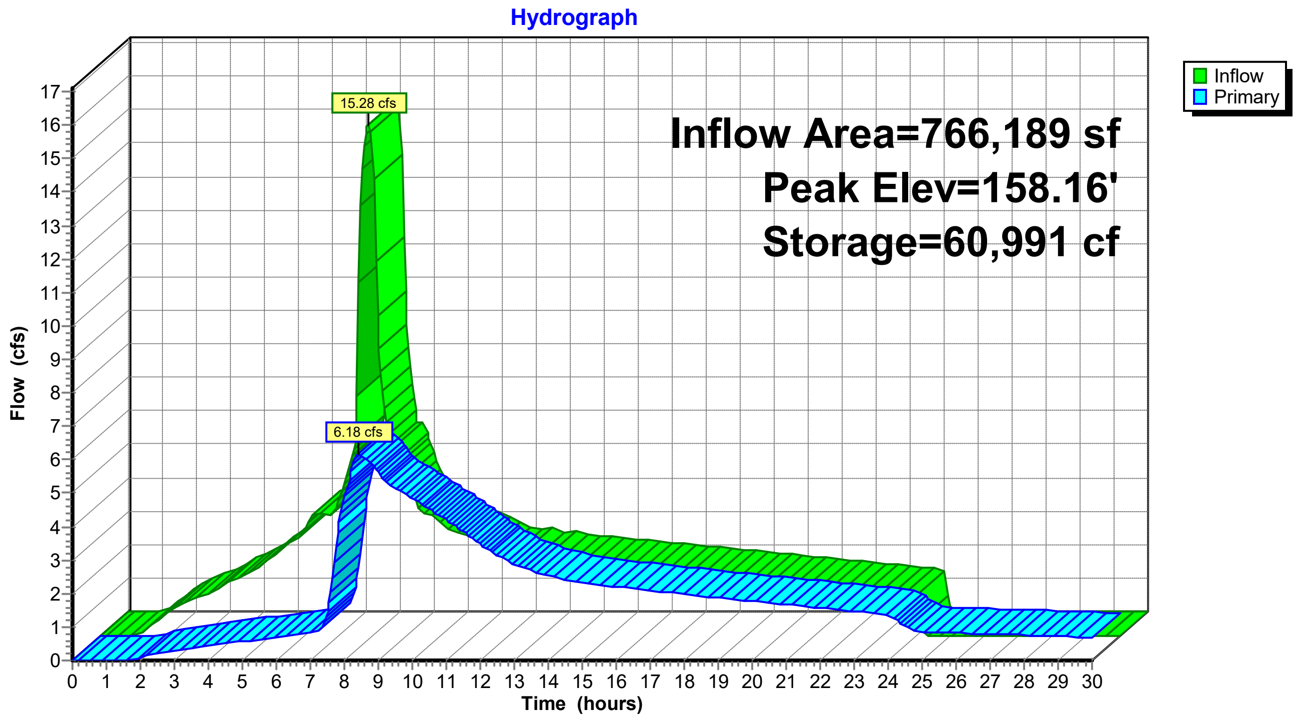
Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	71,745 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 0.76

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	6,608	0	0
152.00	7,793	7,201	7,201
153.00	9,029	8,411	15,612
154.00	10,317	9,673	25,285
155.00	11,657	10,987	36,272
156.00	13,049	12,353	48,625
157.00	14,493	13,771	62,396
158.00	15,989	15,241	77,637
159.00	17,540	16,765	94,401

Device	Routing	Invert	Outlet Devices
#1	Primary	151.00'	**3.9" Vert. Orifice/Grate** C= 0.600
#2	Primary	155.67'	**9.4" Vert. Orifice/Grate** C= 0.600
#3	Primary	156.35'	**5.7" Vert. Orifice/Grate** C= 0.600
#4	Primary	158.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.16 cfs @ 8.43 hrs HW=158.16' (Free Discharge)
├─**1=Orifice/Grate** (Orifice Controls 1.06 cfs @ 12.74 fps)
├─**2=Orifice/Grate** (Orifice Controls 3.36 cfs @ 6.98 fps)
├─**3=Orifice/Grate** (Orifice Controls 1.07 cfs @ 6.04 fps)
└─**4=Orifice/Grate** (Weir Controls 0.67 cfs @ 1.31 fps)

Pond 5P: Detention Pond



Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 3S: Area to Wetland B Runoff Area=35,802 sf 47.45% Impervious Runoff Depth=3.82"
Tc=6.0 min CN=94 Runoff=0.82 cfs 11,383 cf

Subcatchment 4S: Area to Detention Pond Runoff Area=766,189 sf 68.89% Impervious Runoff Depth=4.04"
Tc=6.0 min CN=96 Runoff=18.35 cfs 257,690 cf

Subcatchment A1: Pre Dev Basin 1 Runoff Area=801,991 sf 1.12% Impervious Runoff Depth=2.55"
Flow Length=300' Slope=0.1500 '/' Tc=27.2 min CN=81 Runoff=10.05 cfs 170,294 cf

Reach 2R: Culvert under Avg. Flow Depth=0.55' Max Vel=14.10 fps Inflow=9.79 cfs 248,509 cf
24.0" Round Pipe n=0.012 L=36.0' S=0.0603 '/' Capacity=60.17 cfs Outflow=9.79 cfs 248,503 cf

Pond 5P: Detention Pond Peak Elev=158.72' Storage=68,114 cf Inflow=18.35 cfs 257,690 cf
Outflow=9.35 cfs 237,126 cf

Total Runoff Area = 1,603,982 sf Runoff Volume = 439,367 cf Average Runoff Depth = 3.29"
65.47% Pervious = 1,050,144 sf 34.53% Impervious = 553,838 sf

Summary for Subcatchment 3S: Area to Wetland B

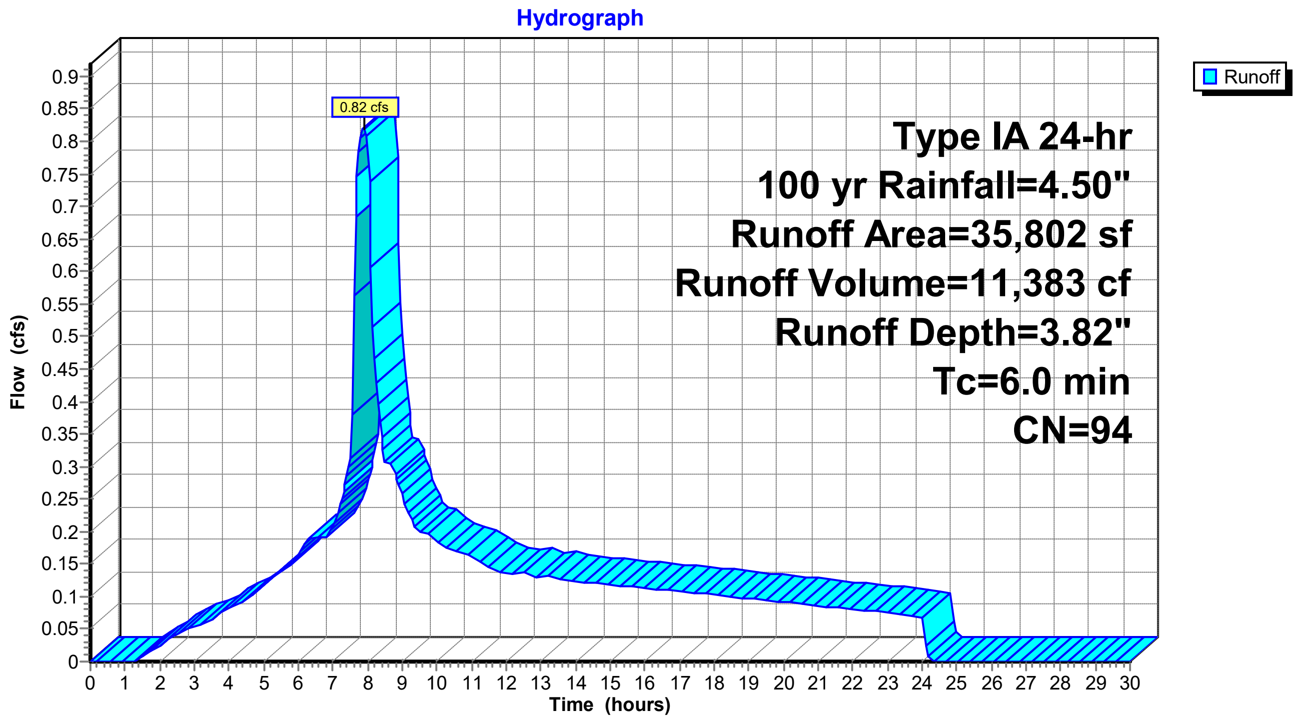
Runoff = 0.82 cfs @ 7.89 hrs, Volume= 11,383 cf, Depth= 3.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	18,814	90	Landscaping
*	0	98	Road
*	0	98	Driveway
*	15,318	98	Roof
*	1,670	98	Sidewalk
	35,802	94	Weighted Average
	18,814		52.55% Pervious Area
	16,988		47.45% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 3S: Area to Wetland B



Summary for Subcatchment 4S: Area to Detention Pond

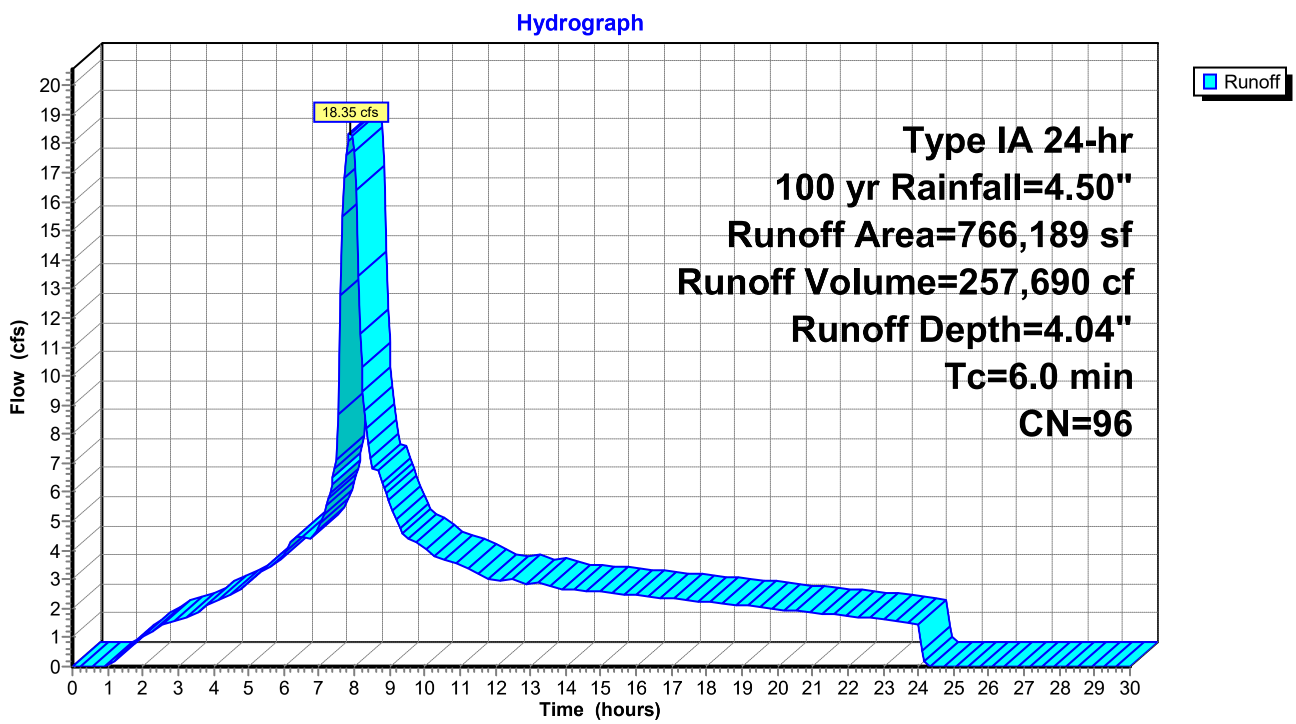
Runoff = 18.35 cfs @ 7.88 hrs, Volume= 257,690 cf, Depth= 4.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	238,332	90	Landscaping
*	149,169	98	Road
*	81,124	98	Driveway
*	255,095	98	Roof
*	42,469	98	Sidewalk
	766,189	96	Weighted Average
	238,332		31.11% Pervious Area
	527,857		68.89% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 4S: Area to Detention Pond



Summary for Subcatchment A1: Pre Dev Basin 1

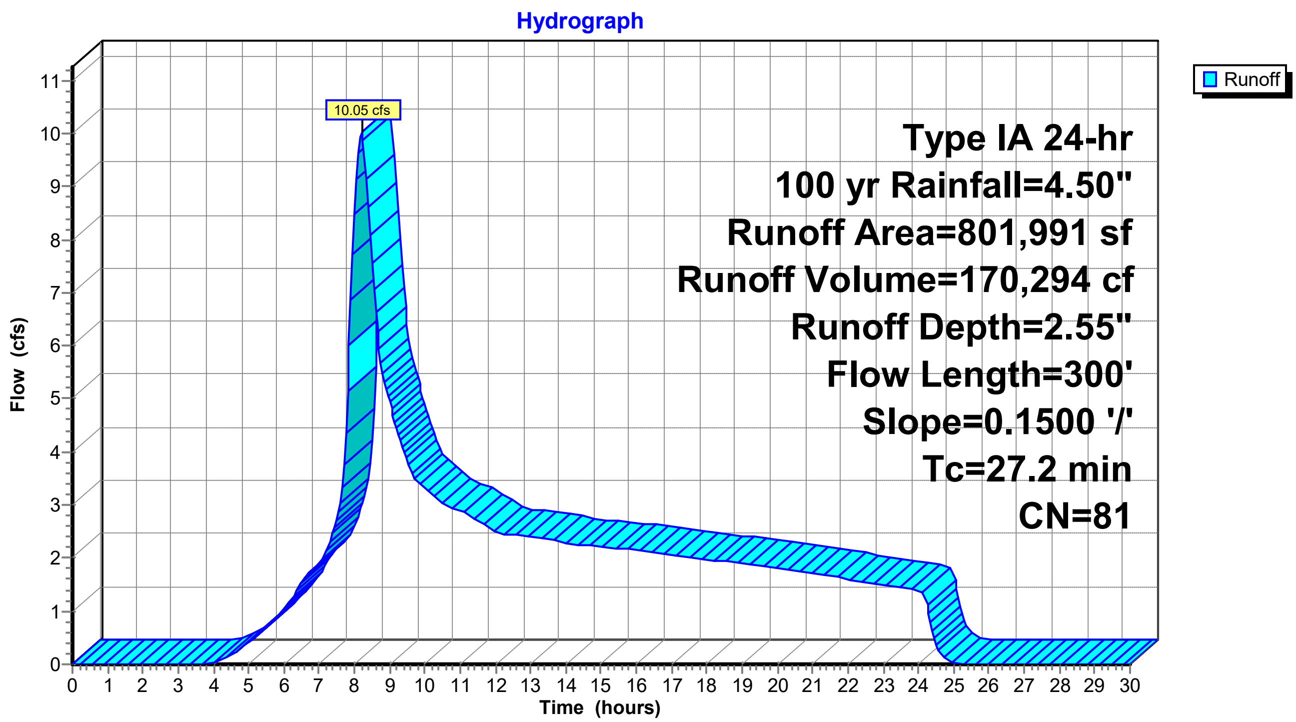
Runoff = 10.05 cfs @ 8.20 hrs, Volume= 170,294 cf, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 yr Rainfall=4.50"

	Area (sf)	CN	Description
*	792,998	81	Undisturbed Forest HSG D
*	8,993	98	Impervious
	801,991	81	Weighted Average
	792,998		98.88% Pervious Area
	8,993		1.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.2	300	0.1500	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.30"

Subcatchment A1: Pre Dev Basin 1



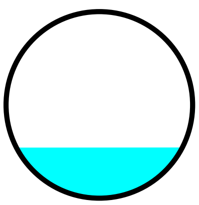
Summary for Reach 2R: Culvert under Lockwoodcreek Road

Inflow Area = 801,991 sf, 67.94% Impervious, Inflow Depth > 3.72" for 100 yr event
Inflow = 9.79 cfs @ 8.21 hrs, Volume= 248,509 cf
Outflow = 9.79 cfs @ 8.21 hrs, Volume= 248,503 cf, Atten= 0%, Lag= 0.0 min

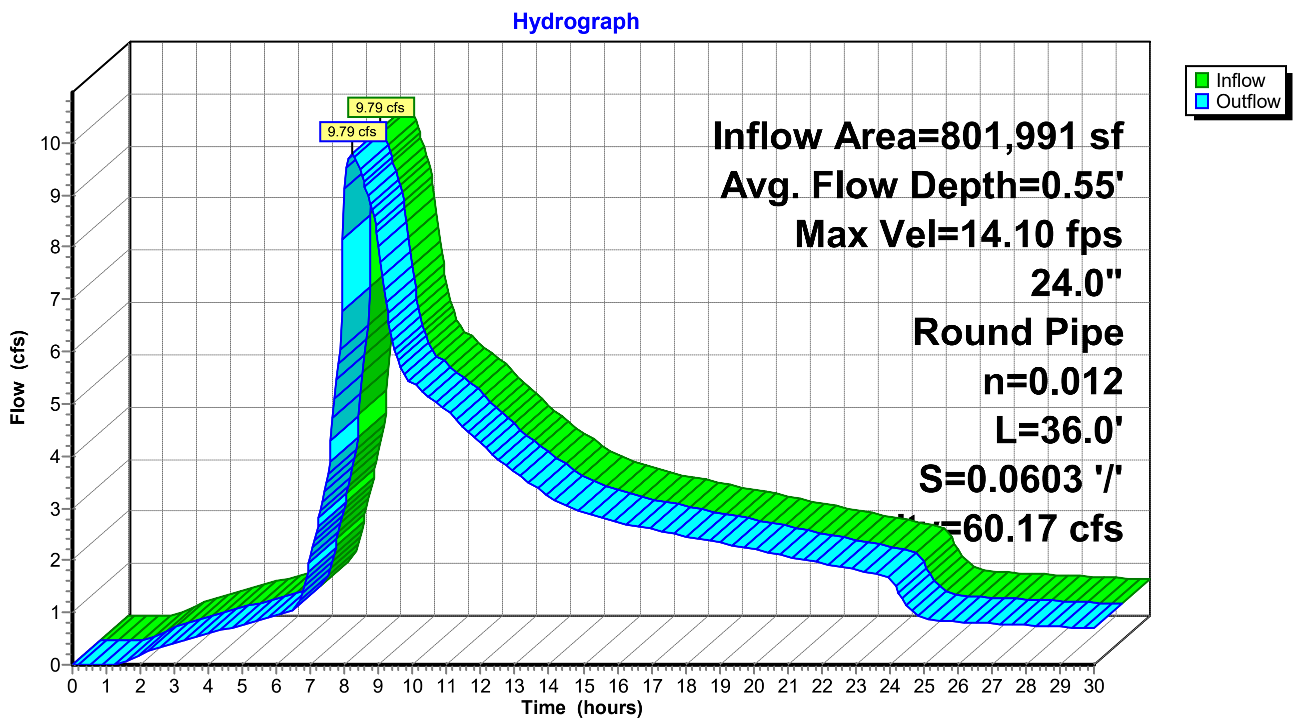
Routing by Stor-Ind+Trans method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.10 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 8.60 fps, Avg. Travel Time= 0.1 min

Peak Storage= 25 cf @ 8.21 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 60.17 cfs

24.0" Round Pipe
n= 0.012 Steel, smooth
Length= 36.0' Slope= 0.0603 '/'
Inlet Invert= 145.08', Outlet Invert= 142.91'



Reach 2R: Culvert under Lockwoodcreek Road



Summary for Pond 5P: Detention Pond

Inflow Area = 766,189 sf, 68.89% Impervious, Inflow Depth = 4.04" for 100 yr event
Inflow = 18.35 cfs @ 7.88 hrs, Volume= 257,690 cf
Outflow = 9.35 cfs @ 8.26 hrs, Volume= 237,126 cf, Atten= 49%, Lag= 23.0 min
Primary = 9.35 cfs @ 8.26 hrs, Volume= 237,126 cf

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 158.72' @ 8.26 hrs Surf.Area= 13,005 sf Storage= 68,114 cf

Plug-Flow detention time= 222.8 min calculated for 236,731 cf (92% of inflow)
Center-of-Mass det. time= 165.9 min (843.0 - 677.1)

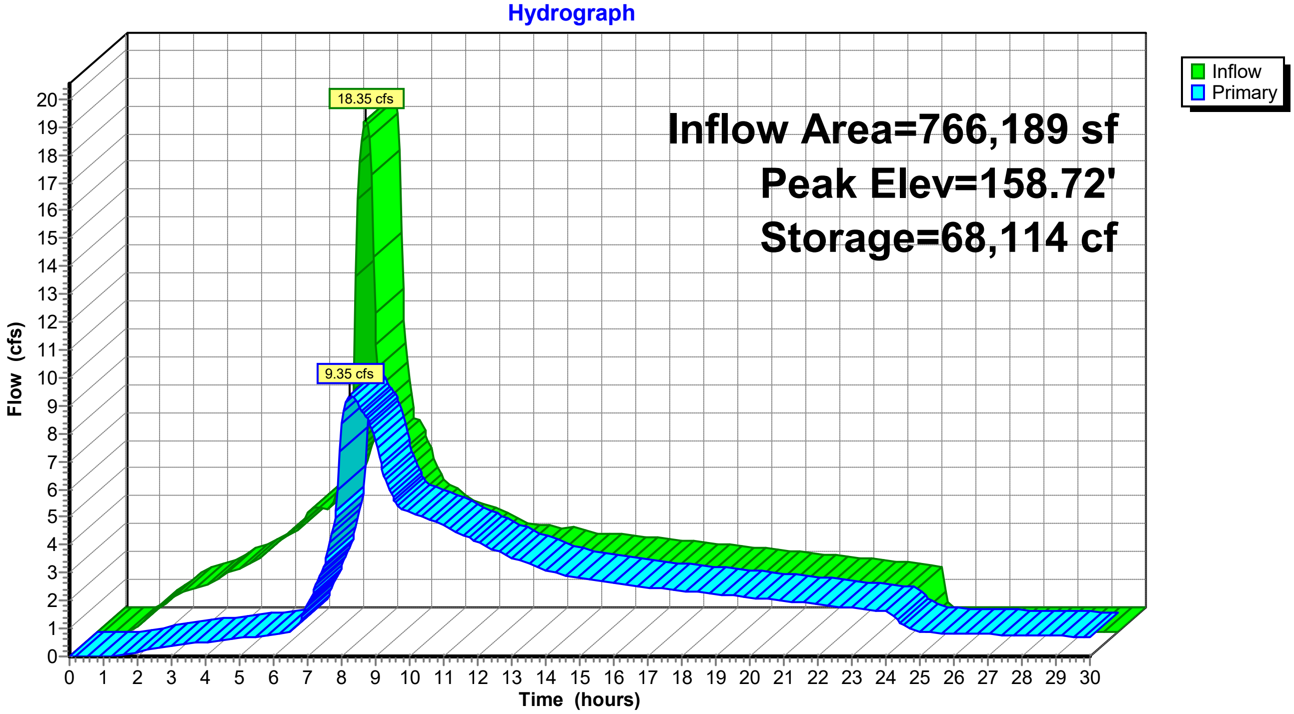
Volume	Invert	Avail.Storage	Storage Description
#1	151.00'	71,745 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc) x 0.76

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
151.00	6,608	0	0
152.00	7,793	7,201	7,201
153.00	9,029	8,411	15,612
154.00	10,317	9,673	25,285
155.00	11,657	10,987	36,272
156.00	13,049	12,353	48,625
157.00	14,493	13,771	62,396
158.00	15,989	15,241	77,637
159.00	17,540	16,765	94,401

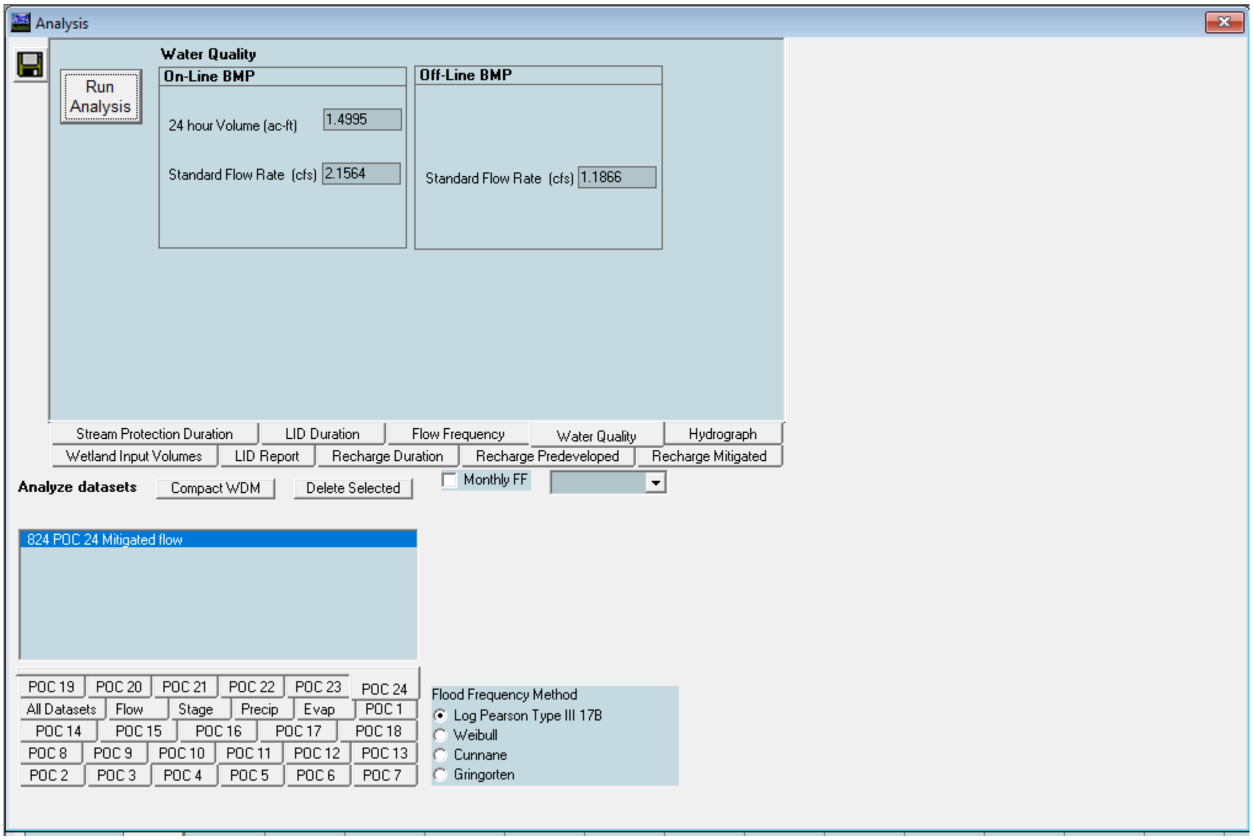
Device	Routing	Invert	Outlet Devices
#1	Primary	151.00'	**3.9" Vert. Orifice/Grate** C= 0.600
#2	Primary	155.67'	**9.4" Vert. Orifice/Grate** C= 0.600
#3	Primary	156.35'	**5.7" Vert. Orifice/Grate** C= 0.600
#4	Primary	158.00'	**12.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.35 cfs @ 8.26 hrs HW=158.72' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.10 cfs @ 13.24 fps)
2=Orifice/Grate (Orifice Controls 3.79 cfs @ 7.86 fps)
3=Orifice/Grate (Orifice Controls 1.25 cfs @ 7.04 fps)
4=Orifice/Grate (Orifice Controls 3.22 cfs @ 4.10 fps)

Pond 5P: Detention Pond



StormFilter Vault WWHM WQ:



APPENDIX C

Basin Maps

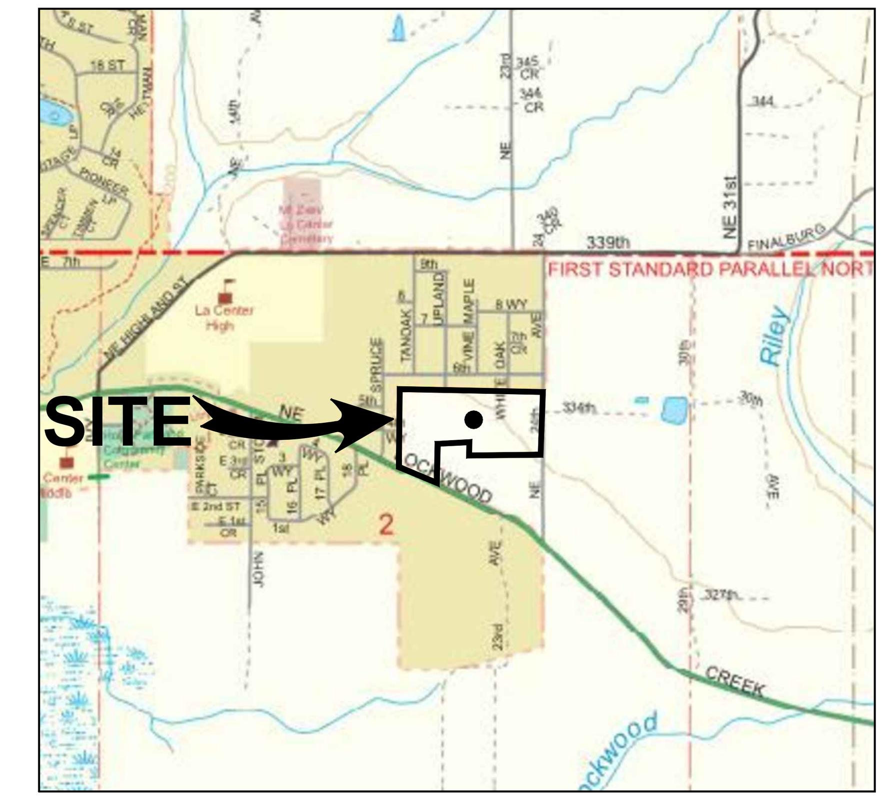
Pre-Developed
Post-Developed

Lockwood Meadows Subdivision

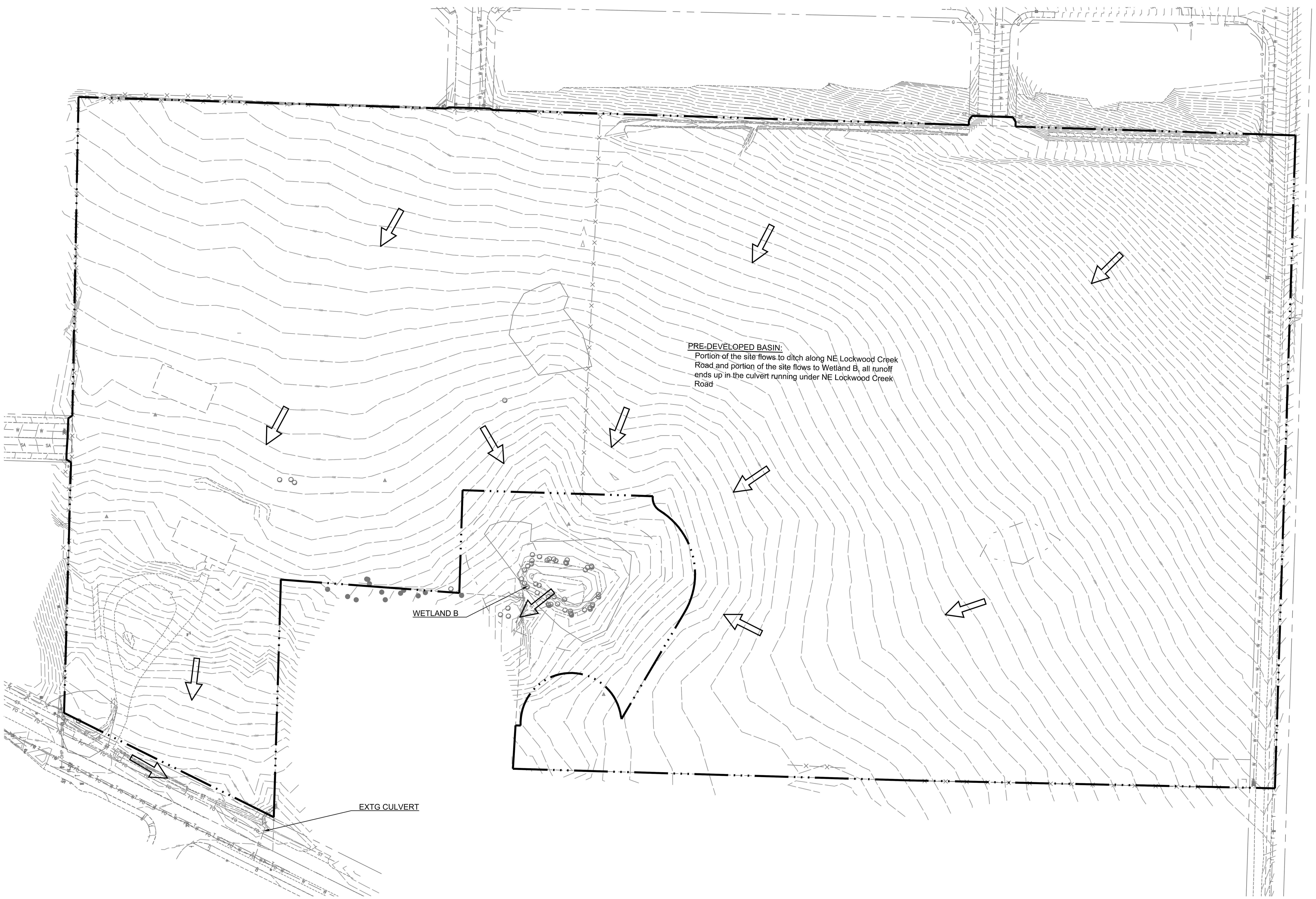
Located in the SW 1/4 Of Section 02, Township 4N, Range 1E, W.M.,
La Center, Washington

	Basin 1	Basin 2	Predeveloped
Roads, Moderate:	3.4245 AC	0.000 AC	0.2065 AC
Driveway, Moderate:	1.8623 AC	0.000 AC	0.0000 AC
Sidewalk, Moderate:	0.9750 AC	0.0383 AC	0.0000 AC
Rooftops, Flat:	5.8562 AC	0.3517 AC	0.0000 AC
HSGD, Lawn:	5.4714 AC	0.4319 AC	0.0000 AC
HSGD, Forest:	0.0000 AC	0.0000 AC	18.2047 AC
Total:	17.5893 AC	0.8219 AC	18.4112 AC

Basin Summary Table



VICINITY MAP
NOT TO SCALE



GENERAL NOTES

OWNER/APLICANT:
Wapati Ventures LLC
10013 NE HAZEL DELL AVE PMB 504
VANCOUVER WA, 98685
Susanna S Hung Trust
710 Columbis St #414
Vancouver, WA 98660
(360) 450-8154
sshung_2000@yahoo.com

PROJECT CONTACT:
PLS Engineering
Contact: Travis Johnson, PE
604 W Evergreen Blvd
Vancouver, WA 98660
PH: (360) 944-6519
pm@plsengineering.com

SITE ADDRESS:
2000 NW Lockwood Creek Road
La Center, WA 98629

Parcel #: 209113000

Scale 1" = 60'
60 30 0 60

PLS ENGINEERING

Pre Development Basin Map For:
Lockwood Meadows Subdivision
A Site Located in the City of La Center, Washington

Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions

1	
2	
3	
4	
5	
6	

Project No. 3094

SCALE:	H: 1" = 60' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JMW
REVIEWED BY:	TGJ

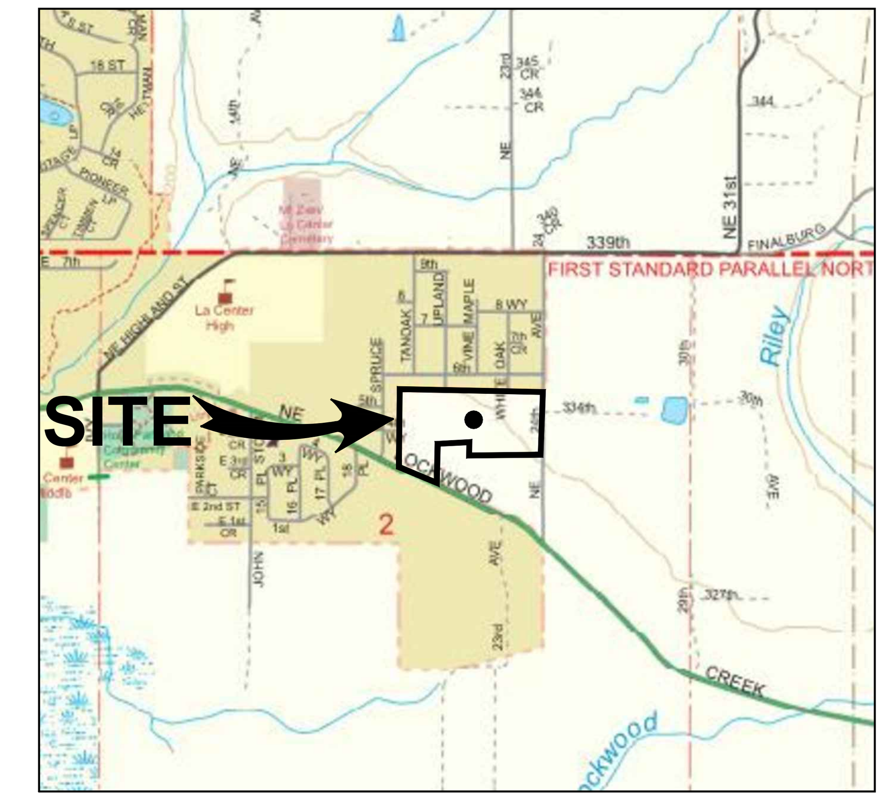
1 / 1

Lockwood Meadows Subdivision

Located in the SW 1/4 Of Section 02, Township 4N, Range 1E, W.M.,
La Center, Washington

	Basin 1	Basin 2	Predeveloped
Roads, Moderate:	3.4245 AC	0.000 AC	0.2065 AC
Driveway, Moderate:	1.8623 AC	0.000 AC	0.0000 AC
Sidewalk, Moderate:	0.9750 AC	0.0383 AC	0.0000 AC
Rooftops, Flat:	5.8562 AC	0.3517 AC	0.0000 AC
HSGD, Lawn:	5.4714 AC	0.4319 AC	0.0000 AC
HSGD, Forest:	0.0000 AC	0.0000 AC	18.2047 AC
Total:	17.5893 AC	0.8219 AC	18.4112 AC

Basin Summary Table



VICINITY MAP
NOT TO SCALE

GENERAL NOTES

OWNER/APLICANT:
Wapati Ventures LLC
10013 NE HAZEL DELL AVE PMB 504
VANCOUVER WA, 98685
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Contact: Travis Johnson, PE
604 W Evergreen Blvd
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SITE ADDRESS:
2000 NW Lockwood Creek Road
La Center, WA 98629

Parcel #: 209113000

Scale 1" = 60'
60 30 0 60

PLS ENGINEERING

Post Development Basin Map For:
Lockwood Meadows Subdivision
A Site Located in the City of La Center, Washington

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Revisions

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Project No. 3094

SCALE:	H: 1" = 60' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JMW
REVIEWED BY:	TGJ

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APPENDIX D

Geotechnical Report

Geotechnical Site Investigation

Lockwood Meadows Subdivision

La Center, Washington

September 23, 2021

Geotechnical ▪ Environmental ▪ Special Inspections

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Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

GEOTECHNICAL SITE INVESTIGATION
LOCKWOOD MEADOWS SUBDIVISION
LA CENTER, WASHINGTON

Prepared For:	**PLS Engineering** **Attn: Nicolle Sicilia** **604 W Evergreen Blvd** **Vancouver, Washington 98660**
Site Location:	**2000 NE Lockwood Creek Road** **Parcel No. 209113000** **La Center, Washington**
Prepared By:	**Columbia West Engineering, Inc.** **11917 NE 95th Street** **Vancouver, Washington 98682** **Phone: 360-823-2900** **W.O. No. 21172**
Date Prepared:	**September 23, 2021**

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GEOTECHNICAL SITE INVESTIGATION
LOCKWOOD MEADOWS SUBDIVISION
LA CENTER, WASHINGTON

1.0 INTRODUCTION

Columbia West Engineering, Inc. (Columbia West) was retained by PLS Engineering to conduct a geotechnical site investigation for the proposed Lockwood Meadows Subdivision project located in La Center, Washington. The purpose of the investigation was to observe and assess subsurface soil conditions at specific locations and provide geotechnical engineering analyses, planning, and design recommendations for proposed development. The specific scope of services was outlined in a proposal contract dated July 12, 2021. This report summarizes the investigation and provides field assessment documentation and laboratory analytical test reports. This report is subject to the limitations expressed in Section 7.0, *Conclusion and Limitations*, and Appendix E.

1.1 General Site Information

As indicated on Figures 1, 2 and 2A, the subject site is located at 2000 NE Lockwood Creek Road in La Center, Washington. The site is comprised of tax parcel number 209113000 totaling approximately 20 acres. The approximate latitude and longitude are N 45° 51’ 42” and W 122° 38’ 55”, and the legal description is a portion of the NE ¼ of Section 02, T4N, R1E, Willamette Meridian. The current regulatory jurisdictional agency is the City of La Center.

1.2 Proposed Development

Correspondence with the design team and review of the preliminary site plan shown on Figure 2A indicates that proposed development at the Lockwood Meadows Subdivision includes the division of the referenced parcel into 71 new single-family residential lots, private asphalt access drives, public asphalt roadways, underground utilities, and stormwater facilities. Columbia West has not reviewed preliminary grading plans but understands that cut and fill may be proposed at the subject site. This report is based upon proposed development as described above and may not be applicable if modified.

2.0 REGIONAL GEOLOGY AND SOIL CONDITIONS

The subject site lies within the Willamette Valley/Puget Sound Lowland, a wide physiographic depression flanked by the mountainous Coast Range on the west and the Cascade Range on the east. Inclined or uplifted structural zones within the Willamette Valley/Puget Sound Lowland constitute highland areas and depressed structural zones form sediment-filled basins. The site is located in the northern portion of the Portland/Vancouver Basin, an open, somewhat elliptical, northwest-trending syncline approximately 60 miles wide.

According to the *Geologic Map of the Ridgefield Quadrangle, Clark and Cowlitz Counties, Washington* (Russell C. Evarts, USGS Geological Survey Scientific Investigation Map 2844, 2004), near-surface soils are expected to consist of Pleistocene-aged, unconsolidated, rhythmically bedded, periglacial clay, silt, and fine- to medium-textured sand deposits derived from catastrophic outburst floods of Glacial Lake Missoula (Qfs). Fine-textured flood deposits are underlain by Pleistocene to Pliocene, unconsolidated to cemented, deeply weathered, pebble to boulder sedimentary conglomerate (QTc).

The Web Soil Survey (United States Department of Agriculture, Natural Resource Conservation Service [USDA NRCS], 2021 Website) identifies surface soils as Gee silt loam, Odne silt loam, and Hillsboro silt loam. Although soil conditions may vary from the broad USDA descriptions, Gee, Odne, and Hillsboro series soils are generally fine-textured clays and silts with very low permeability, moderate to high water capacity, and low shear strength. Gee, Odne, and Hillsboro soils are generally moisture sensitive, somewhat compressible, and described as having low to moderate shrink-swell potential. The erosion hazard is slight primarily based upon slope grade.

3.0 REGIONAL SEISMOLOGY

Recent research and subsurface mapping investigations within the Pacific Northwest appear to suggest the historic potential risk for a large earthquake event with strong localized ground movement may be underestimated. Past earthquakes in the Pacific Northwest appear to have caused landslides and ground subsidence, in addition to severe flooding near coastal areas. Earthquakes may also induce soil liquefaction, which occurs when elevated horizontal ground acceleration and velocity cause soil particles to interact as a fluid as opposed to a solid. Liquefaction of soil can result in lateral spreading and temporary loss of bearing capacity and shear strength.

There are at least four major known fault zones in the vicinity of the site that may be capable of generating potentially destructive horizontal accelerations. These fault zones are described briefly in the following text.

<u>Portland Hills Fault Zone</u>

The Portland Hills Fault Zone consists of several northwest-trending faults located along the northeastern margin of the Tualatin Mountains, also known as the Portland Hills, and the southwest margin of the Portland Basin. The fault zone is approximately 25 to 30 miles in length and is located approximately 17 miles southwest of the site. According to *Seismic Design Mapping, State of Oregon* (Geomatrix Consultants, 1995), there is no definitive consensus among geologists as to the zone fault type. Several alternate interpretations have been suggested.

According to the *USGS Earthquake Hazards Program*, the fault was originally mapped as a down-to-the-northeast normal fault but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets Miocene Columbia River Basalts, and Miocene to Pliocene sedimentary rocks of the Troutdale Formation. No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene-aged Missoula flood deposits.

However, evidence suggests that fault movement has impacted shallow Holocene deposits and deeper Pleistocene sediments. Seismologists recorded a M3.2 earthquake thought to be associated with the fault zone near Kelly Point Park in November 2012, a M3.9 earthquake thought to be associated with the fault zone near Kelly Point Park in April 2003, and a M3.5 earthquake possibly associated with the fault zone approximately 1.3 miles east of the fault in 1991. Therefore, the Portland Hills Fault Zone is generally thought to be potentially active and capable of producing possible damaging earthquakes.

Gales Creek-Newberg-Mt. Angel Fault Zone

Located approximately 33 miles southwest of the site, the northwest-striking, approximately 50-mile long Gales Creek-Newberg-Mt. Angel Structural Zone forms the northwestern boundary between the Oregon Coast Range and the Willamette Valley, and consists of a series of discontinuous northwest-trending faults. The southern end of the fault zone forms the southwest margin of the Tualatin basin. Possible late-Quaternary geomorphic surface deformation may exist along the structural zone (Geomatrix Consultants, 1995).

According to the *USGS Earthquake Hazards Program*, the Mount Angel fault is mapped as a high-angle, reverse-oblique fault, which offsets Miocene rocks of the Columbia River Basalts, and Miocene and Pliocene sedimentary rocks. The fault appears to have controlled emplacement of the Frenchman Spring Member of the Wanapum Basalts, and thus must have a history that predates the Miocene age of these rocks. No unequivocal evidence of deformation of Quaternary deposits has been described as a thick sequence of sediments deposited by the Missoula floods covers much of the southern part of the fault trace.

Although no definitive evidence of impacts to Holocene sediments have clearly been identified, the Mount Angel fault appears to have been the location of minor earthquake swarms in 1990 near Woodburn, Oregon, and a M5.6 earthquake in March 1993 near Scotts Mills, approximately four miles south of the mapped extent of the Mt. Angel fault. It is unclear if the earthquake occurred along the fault zone or a parallel structure. Therefore, the Gales Creek-Newberg-Mt. Angel Structural Zone is considered potentially active.

Lacamas Lake-Sandy River Fault Zone

The northwest-trending Lacamas Lake Fault and northeast-trending Sandy River Fault intersect north of Camas, Washington approximately 21 miles southeast of the site, and form part of the northeastern margin of the Portland basin. According to *Geology and Groundwater Conditions of Clark County Washington* (USGS Water Supply Paper 1600, Mundorff, 1964) and the *Geologic Map of the Lake Oswego Quadrangle* (Oregon DOGAMI Series GMS-59, 1989), the Lacamas Lake fault zone consists of shear contact between the Troutdale Formation and underlying Oligocene andesite-basalt bedrock. Secondary shear contact associated with the fault zone may have produced a series of prominent northwest-southeast geomorphic lineaments in proximity to the site.

According to the *USGS Earthquake Hazards Program* the fault has been mapped as a normal fault with down-to-the-southwest displacement and has also been described as a steeply northeast or southwest-dipping, oblique, right-lateral, slip-fault. The trace of the Lacamas Lake fault is marked by the very linear lower reach of Lacamas Creek. No fault scarps on Quaternary surficial deposits have been described. The Lacamas Lake fault offsets Pliocene-aged sedimentary conglomerates generally identified as the Troutdale formation, and Pliocene- to Pleistocene-aged basalts generally identified as the Boring Lava formation.

Recent seismic reflection data across the probable trace of the fault under the Columbia River yielded no unequivocal evidence of displacement underlying the Missoula flood deposits, however, recorded mild seismic activity during the recent past indicates this area may be potentially seismogenic.

<u>Cascadia Subduction Zone</u>

The Cascadia Subduction Zone has recently been recognized as a potential source of strong earthquake activity in the Portland/Vancouver Basin. This phenomenon is the result of the earth's large tectonic plate movement. Geologic evidence indicates that volcanic ocean floor activity along the Juan de Fuca ridge in the Pacific Ocean causes the Juan de Fuca Plate to perpetually move east and subduct under the North American Continental Plate. The subduction zone results in historic volcanic and potential earthquake activity in proximity to the plate interface, believed to lie approximately 20 to 50 miles west of the general location of the Oregon and Washington coast (Geomatrix Consultants, 1995).

4.0 GEOTECHNICAL AND GEOLOGIC FIELD INVESTIGATION

A geotechnical field investigation consisting of visual reconnaissance, nine test pits (TP-1 through TP-8 and STP-1) and two infiltration tests (IT-1 and IT-2) was conducted at the site on July 27, 2021. The test pits were explored with a track-mounted excavator. Subsurface soil profiles were logged in accordance with Unified Soil Classification System (USCS) specifications. Disturbed soil samples were collected from relevant soil horizons and submitted for laboratory analysis. Analytical laboratory test results are presented in Appendix A. Exploration locations are indicated on Figure 2. Subsurface exploration logs are presented in Appendix B. Soil descriptions and classification information are provided in Appendix C. A photo log is presented in Appendix D.

4.1 Surface Investigation and Site Description

The subject site is located at 2000 NE Lockwood Creek Road in La Center, Washington and is comprised of tax parcel 209113000, totaling approximately 20 acres. Site observations during exploration indicate the west half of the site is generally open and vegetated with grass and brush. An existing residence and appurtenant farm structures are located in the southwest area of the site. Surface water and hydrophytic vegetation were observed in lowland areas proposed for stormwater management at the approximate south-center of the site. Rows of young conifers occupying approximately 6 to 7 acres were observed on the eastern half of the property. An approximate one to- three-foot earth berm was observed at the northern property boundary on the eastern half of the site. Berm material may be associated with development of Sunrise Terrace residential subdivision directly north of the subject site. The site is bounded by NE Lockwood Creek Road to the south, NE 24th Avenue to the east, and the Sunrise Terrace residential subdivision to the north and west. Field reconnaissance and review of site topographic mapping indicate the presence of south- and southwest-facing slopes with grades between 5 and 25 percent. Site elevations in the proposed development area range from 150 feet amsl at the southwest property corner to 250 feet amsl at the northeast property corner. Slope geometry and geomorphic features are discussed in greater detail in Section 5.2.2, *Slope Reconnaissance and Slope Stability Assessment*.

4.2 Subsurface Exploration and Investigation

Test pits were explored to a maximum depth of approximately 14 feet below ground surface (bgs). Exploration locations were selected to observe subsurface soil characteristics in proximity to proposed development areas and are indicated on Figure 2.

4.2.1 Soil Type Description

The field investigation indicated the presence of approximately 8 to 14 inches of sod and topsoil in the observed locations. Underlying the topsoil layer, subsurface soils resembling geologically mapped unconsolidated to compact glacial till (Qat) and native USDA Gee, Odne and Hillsboro soil series description were encountered. Subsurface lithology may generally be described by soil types identified in the following text. Field logs and observed stratigraphy for the encountered materials are presented in Appendix B, *Subsurface Exploration Logs*.

Soil Type 1 - Existing FILL

Soil Type 1 was observed to primarily consist of light brown to brown/gray, moist, apparent native soils and trace organic debris. Soil Type 1 was observed at the ground surface in STP-1 and along the northern property boundary on the eastern half of the site, extending to apparent depths of approximately one to- three feet bgs.

Soil Type 2 - SILT with Sand / Sandy SILT

Soil Type 2 was observed to consist of light brown to brown/gray, damp to moist, SILT with sand and sandy SILT. Soil Type 2 was observed below the topsoil layer in test pits TP-1 through TP-7 and extended to observed depths of approximately 7 to 14 feet bgs.

Soil Type 3 - Lean CLAY with Sand

Soil Type 3 was observed to primarily consist of brown and gray, moist, lean CLAY with sand. Soil Type 3 was observed below the topsoil layer in test pit TP-8, below Soil Type 2 in test pits TP-3 through TP-6, and interbedded in Soil Type 2 in test pit TP-7. Soil Type 3 extended to depths of approximately 13 to 14 feet bgs in the areas observed.

Soil Type 4 - Fat CLAY

Soil Type 4 was observed to primarily consist of brown and gray, moist, fat CLAY. Soil Type 4 was observed below Soil Type 3 in test pits TP-5 and TP-6 and extended to the maximum depths of exploration.

4.2.2 Groundwater

Groundwater was not encountered within test pit explorations to a maximum explored depth of approximately 14 feet bgs on July 27, 2021. Groundwater levels are often subject to seasonal variance and may rise during extended periods of increased precipitation or flooding.

Seeps and springs may become evident during site grading, primarily along slopes or in areas cut below existing grade. Structures, roads, and drainage design should be planned accordingly. Piezometer installation and long-term monitoring, beyond the scope of this investigation, would be necessary to provide more detailed groundwater information.

5.0 GEOLOGIC HAZARDS

City of La Center Municipal Code (*LCMC Development Code Section 18.300*) defines geologic hazard requirements for proposed development in areas subject to the City of La Center jurisdiction. Three potential geologic hazards are identified: (1) erosion hazard areas, (2) landslide hazard and steep slope areas, and (3) seismic hazard areas. Hazard mapping obtained from *Clark County Maps Online* indicates the presence of site slope grades of up to 25 percent at the northeast site corner.

Columbia West conducted a geologic hazard review to assess whether a geologic hazard is present at the site proposed for development, and if so, to provide mitigation recommendations. The geologic hazard review was based upon physical and visual reconnaissance, subsurface exploration, and review of maps and other published technical literature. The results of the geologic hazard review for potential geologic hazards are discussed in the following sections.

5.1 Erosion Hazard Areas

According to *Clark County Maps Online*, the *Soil Survey of Clark County, Washington* and field observations, an erosion hazard is not present on the subject site. Therefore, according to the *City of La Center Development Code,* a soil erosion hazard area is not present at the site. However, if there are erosion concerns, erosion can be successfully mitigated by preparation and adherence to a site-specific erosion control plan that identifies BMPs to be utilized to reduce potential impacts on site soils during construction. Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Erosion control measures are discussed further in Section 6.15, *Erosion Control Measures*.

5.2 Landslide Hazard and Steep Slope Areas

To evaluate steep slope areas and assess whether landslide hazards are present at the site, Columbia West conducted a review of literature, subsurface exploration, and physical slope reconnaissance. As mentioned previously, slope grades of up to 25 percent were observed at the northeast site corner.

5.2.1 Geologic Literature Review

Columbia West reviewed *Slope Stability of Clark County* (Washington Department of Natural Resources, Division of Geology and Earth Resources, Fiksdal, 1975) to assess site slope characteristics. The Fiksdal report identifies four levels of potential slope instability within Clark County: (1) stable areas – no slides or unstable slopes, (2) areas of potential instability because of underlying geologic conditions and physical characteristics associated with steepness, (3) areas of historical or still active landslides, and (4) older landslide debris. The site is mapped as (1) stable areas – no slides or unstable slopes.

Columbia West also reviewed the *Geologic Map of the Ridgefield Quadrangle, Clark County, Washington* (R.C. Evarts, Washington Division of Geology and Earth Resources, Scientific Investigations Map 2844, 2004), which indicates that no landslide deposits are mapped at the subject site or in the surrounding vicinity.

5.2.2 Slope Reconnaissance and Slope Stability Assessment

Review of topographic mapping published by *Clark County Maps Online* indicates that the subject site is located in an area that slopes regionally downgradient from north to south with no apparent toe or crest observed on the property or adjacent parcels.

The maximum grade change between the north and south property boundaries is approximately 100 feet with slope grades generally ranging from 5 to 25 percent. Slopes appear planar with no observed evidence of instability. There was no observed direct evidence of large-scale, mass slope movements or historic landslides. No landslide debris was observed within subsurface soils explored onsite and groundwater seeps or springs were not observed.

City of La Center Municipal Code defines a landslide hazard as areas meeting all three of the following characteristics: 1) slopes steeper than 15 percent; 2) hillsides intersecting geologic contacts with permeable sediment overlying low permeability sediment or bedrock, and; 3) any springs or groundwater seepage. The above-mentioned criteria were not observed during our field investigation or site research. Based upon the results of slope reconnaissance, subsurface exploration, and site research, slopes on the subject site do not appear to meet the definition of a landslide hazard according to *City of La Center Municipal Code*.

5.3 Seismic Hazard Areas

Seismic hazards include areas subject to severe risk of earthquake-induced damage. Damage may occur due to soil liquefaction, dynamic settlement, ground shaking amplification, or surface faulting rupture. These seismic hazards are discussed below.

5.3.1 Soil Liquefaction and Dynamic Settlement

According to the *Liquefaction Susceptibility Map of Clark County Washington* (Washington State Department of Natural Resources, 2004), the site is mapped as very low susceptibility for liquefaction. Liquefaction, defined as the transformation of the behavior of a granular material from a solid to a liquid due to increased pore-water pressure and reduced effective stress, may occur when granular materials quickly compact under cyclic stresses caused by a seismic event. The effects of liquefaction may include immediate ground settlement and lateral spreading.

Soils most susceptible to liquefaction are generally saturated, cohesionless, loose to medium-dense sands within 50 feet of the ground surface. Recent research has also indicated that low plasticity silts and clays may also be subject to sand-like liquefaction behavior if the plasticity index determined by the Atterberg Limits analysis is less than 8. Potentially liquefiable soils located above the existing, historic, or expected ground water levels do not generally pose a liquefaction hazard. It is important to note that changes in perched ground water elevation may occur due to project development or other factors not observed at the time of investigation.

Based upon results of literature review, site-specific testing, and laboratory analysis, the potential for soil liquefaction is considered to be low.

5.3.2 Ground Shaking Amplification

Review of the *Site Class Map of Clark County, Washington* (Washington State Department of Natural Resources, 2004), indicates that site soils may be represented by Site Classes C and D as defined by the *ASCE 7, Chapter 20, Table 20.3-1*. However, subsurface exploration, in situ soil testing, and review of local well logs and geologic maps indicated that site soils exhibit characteristics of Site Class D. A designation of Site Class D indicates that minor amplification of seismic energy may occur during a seismic event due to subsurface conditions. However, this is typical for many areas within Clark County, does not constitute a geologic hazard in Columbia West's opinion, and will not prohibit development if properly accounted for during the design process.

5.3.3 Fault Rupture

Because there are no known geologic seismic faults within the site boundaries, fault rupture is unlikely.

6.0 DESIGN RECOMMENDATIONS

The geotechnical site investigation suggests the proposed development is generally compatible with surface and subsurface soils, provided the recommendations presented in this report are utilized and incorporated into the design and construction processes. The primary geotechnical concerns associated with the site are shallow groundwater, and fine-textured soils and drainage. Design recommendations are presented in the following text sections.

6.1 Site Preparation and Grading

Vegetation, organic material, unsuitable fill, and deleterious material that may be encountered should be cleared from areas identified for structures and site grading. Vegetation, other organic material, and debris should be removed from the site. Stripped topsoil should also be removed or used only as landscape fill in nonstructural areas with slopes less than 25 percent. The stripping depth for sod and highly organic topsoil is anticipated to vary between approximately 8 and 14 inches. The required stripping depth may increase in areas of existing fill, heavy organics, or previously existing structures. Actual stripping depths should be determined based upon visual observations made during construction when soil conditions are exposed. The post-construction maximum depth of landscape fill placed or spread at any location onsite should not exceed one foot.

Previously disturbed soil, debris, or unconsolidated fill encountered during grading or construction activities should be removed completely and thoroughly from structural areas. This includes old remnant foundations, basement walls, utilities, associated soft soils, and debris. These materials and associated disturbed soils should also be completely removed from structural areas. Excavation areas should be backfilled with engineered structural fill.

The test pits excavated during site exploration were backfilled loosely with onsite soils. The test pits should be located and properly backfilled with structural fill during site improvements construction. Trees, stumps, and associated roots should also be removed from structural areas, individually and carefully. Resulting cavities and excavation areas should be backfilled with engineered structural fill.

Site grading activities should be performed in accordance with requirements specified in the *2018 International Building Code* (IBC), Chapter 18 and Appendix J, with exceptions noted in the text herein. Site preparation, soil stripping, and grading activities should be observed and documented by Columbia West.

6.1.1 Existing Fill

As previously discussed, and indicated on Figure 2, existing fill was observed in test pit exploration STP-1. Test pit exploration and field reconnaissance indicate that existing fill primarily consists of light brown to brown/gray, moist, apparent native soils and trace organic debris. Soil Type 1 was observed at the ground surface in STP-1 and along the northern property boundary on the eastern half of the site, extending to apparent depths of approximately one to- three feet bgs.

Existing fill and other previously disturbed soils or debris should be removed completely and thoroughly from structural areas. In some areas, existing fill may directly overlie vegetation and the original topsoil layer. This material should also be removed completely from structural areas. Upon removal of existing fill, Columbia West should observe the exposed subgrade. It should be noted that the limited scope of exploration conducted for this investigation cannot wholly eliminate uncertainty regarding the presence of unsuitable soils in areas not explored.

Based upon Columbia West's investigation, existing fill soils are not acceptable for reuse as structural fill.

6.2 Engineered Structural Fill

Areas proposed for fill placement should be appropriately prepared as described in the preceding text. Surface soils should be scarified and compacted prior to additional fill placement. Engineered structural fill should be placed in loose lifts not exceeding 12 inches in depth and compacted using standard conventional compaction equipment. The soil moisture content should be within two percentage points of optimum conditions. A field density at least equal to 95 percent of the maximum dry density, obtained from the standard Proctor moisture-density relationship test (ASTM D698), is recommended for structural fill placement and scarified and recompacted subgrade.

Compaction of engineered structural fill should be verified by nuclear gauge field compaction testing performed in accordance with *ASTM D6938*. Field compaction testing should be performed for each vertical foot of engineered fill placed. Engineered fill placement should be observed by Columbia West.

Engineered structural fill placement activities should be performed during dry summer months if possible. Most clean native soils may be suitable for use as structural fill if adequately dried or moisture-conditioned to achieve recommended compaction specifications. Native clay soils with a plasticity index greater than 25 (Soil Type 4) should be evaluated and approved by Columbia West prior to use as structural fill. Native soils may require addition of moisture during periods of dry weather. Compacted fill soils should be covered shortly after placement.

Because they are moisture-sensitive, fine-textured soils are often difficult to excavate and compact during wet weather conditions. If adequate compaction is not achievable with clean native soils, import structural fill consisting of granular fill meeting WSDOT specifications for *Gravel Borrow 9-03.14*(*1*) is recommended.

Representative samples of proposed engineered structural fill should be submitted for laboratory analysis and approval by Columbia West prior to placement. Laboratory analyses should include particle-size gradation and standard Proctor moisture-density analysis.

6.3 Cut and Fill Slopes

Fill placed on existing grades steeper than 5H:1V should be horizontally benched at least 10 feet into the slope. Fill slopes greater than six feet in height should be vertically keyed into existing subsurface soil. A typical fill slope cross-section is shown in Figure 3. Drainage implementations, including subdrains or perforated drainpipe trenches, may also be necessary in proximity to cut and fill slopes if seeps or springs are encountered. Drainage design may be performed on a case-by-case basis. Extent, depth, and location of drainage may be determined in the field by Columbia West during construction when soil conditions are exposed. Failure to provide adequate drainage may result in soil sloughing, settlement, or erosion.

Final cut or fill slopes at the site should not exceed 2H:1V or 10 feet in height without individual slope stability analysis. The values above assume a minimum horizontal setback for loads of 10 feet from top of cut or fill slope face or overall slope height divided by three (H/3), whichever is greater. A minimum slope setback detail for structures is presented in Figure 4.

Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Fill slopes should be constructed by placing fill material in maximum 12-inch level lifts, compacting as described in Section 6.2, *Engineered Structural Fill* and horizontally benching where appropriate. Fill slopes should be overbuilt, compacted, and trimmed at least two feet horizontally to provide adequate compaction of the outer slope face. Proper cut and fill slope construction is critical to overall project stability and should be observed and documented by Columbia West.

6.4 Foundations

Foundations for proposed structures are anticipated to consist of shallow continuous perimeter or column spread footings. Footings should be designed by a licensed structural engineer and conform to the recommendations below. Typical building loads are not expected to exceed approximately 3 kips per foot for perimeter footings or 10 kips per column. If actual loading exceeds anticipated loading, additional analysis should be conducted for the specific load conditions and proposed footing dimensions.

The existing ground surface should be prepared as described in Section 6.1, *Site Preparation and Grading*, and Section 6.2, *Engineered Structural Fill*. Foundations should bear upon firm native soil or engineered structural fill.

To evaluate bearing capacity for proposed structures, serviceability and reliability of shear resistance for subsurface soils was considered. Allowable bearing capacity is typically a function of footing dimension and subsurface soil properties, including settlement and shear resistance. Based upon in situ field testing and laboratory analysis, the estimated allowable bearing capacity for well-drained foundations prepared as described above is 1,500 psf. Bearing capacity may be increased by one-third for transient lateral forces such as seismic or wind. The estimated coefficient of friction between in situ compacted native soil or engineered structural fill and in-place poured concrete is 0.35. Lateral forces may also be resisted by an assumed passive soil equivalent fluid pressure of 250 psf/f against embedded footings. The upper six inches of soil should be neglected in passive pressure calculations.

Footings should extend to a depth at least 18 inches below lowest adjacent grade to provide adequate bearing capacity and protection against frost heave. Foundations constructed during wet weather conditions will require over-excavation of saturated subgrade soils and granular structural backfill prior to concrete placement. Over-excavation recommendations should be provided by Columbia West during foundation excavation and construction. Excavations adjacent to foundations should not extend within a 2H:1V angle projected down from the outside bottom footing edge without additional geotechnical analysis.

Foundations should not be permitted to bear upon undocumented fill or disturbed soil. Columbia West should observe foundation excavations prior to placing forms or reinforcing bar to verify subgrade support conditions are as anticipated in this report.

6.5 Slabs on Grade

Proposed structures may have slab-on-grade floors. Slabs should be supported on firm, competent, in situ soil or engineered structural fill. Disturbed soils and unsuitable fills in proposed slab locations should be removed and replaced with structural fill.

Preparation beneath slabs should be performed in accordance with the recommendations presented in Section 6.1, *Site Preparation and Grading* and Section 6.2, *Engineered Structural Fill*. Slabs should be underlain by at least 6 inches of 1 ¼"-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*). Geotextile filter fabric conforming to *WSDOT 2010 Standard Specification M 41-10, 9-33.2*(*1*), *Geotextile Properties, Table 3: Geotextile for Separation or Soil Stabilization* may be used below the crushed aggregate to increase subgrade support. Base aggregate should be compacted to at least 95 percent of maximum dry density determined by the modified Proctor moisture-density relationship test (ASTM D1557).

For lightly loaded slabs not exceeding 200 psf, the modulus of subgrade reaction is estimated to be 150 psi/inch. Columbia West should be contacted for additional analysis if slab loading exceeds 200 psf. If desired, a moisture barrier may be constructed beneath the slabs. Slabs should be appropriately waterproofed in accordance with the desired type of finished flooring. Slab thickness and reinforcement should be designed by an experienced structural engineer in accordance with anticipated loads.

6.6 Static Settlement

Total long-term static footing displacement for shallow foundations constructed as described in this report is not anticipated to exceed approximately 1 inch. Differential settlement between comparably loaded footing elements is not expected to exceed approximately ½ inch over a span of 50 feet. The resulting vertical displacement after loading may be due to elastic distortion, dissipation of excess pore pressure, or soil creep.

6.7 Excavation

Soils at the site were explored to a maximum depth of 14 feet using a track-mounted excavator. Bedrock was not encountered and blasting or specialized rock-excavation techniques are not anticipated. Perched groundwater layers may exist at shallower depths depending on seasonal fluctuations in the water table. Recommendations as presented in Section 6.8, *Dewatering* should be considered where below-grade construction intersects the shallow groundwater table.

Based upon laboratory analysis and field testing, near-surface soils may be Washington State Industrial Safety and Health Administration (WISHA) Type C. For temporary open-cut excavations deeper than four feet, but less than 20 feet in soils of these types, the maximum allowable slope is 1.5H:1V. WISHA soil type should be confirmed during field construction activities by the contractor. Soil is often anisotropic and heterogeneous, and it is possible that WISHA soil types determined in the field may differ from those described above.

Site-specific shoring design may be required if open-cut excavations are infeasible or if excavations are proposed adjacent to existing infrastructure. Typical methods for stabilizing excavations consist of soldier piles and timber lagging, sheet pile walls, tiebacks and shotcrete, or pre-fabricated hydraulic shoring. Because lateral earth pressure distributions acting on below-grade structures are dependent upon the type of shoring system used, Columbia West should be contacted to conduct additional analysis when shoring type, excavation depths, and locations are known.

The contractor should be held responsible for site safety, sloping, and shoring. Columbia West is not responsible for contractor activities and excavation should be conducted in accordance with all applicable local, state, and federal laws.

6.8 Dewatering

Groundwater elevation and hydrostatic pressure should be carefully considered during design of utilities, retaining walls, or other structures that require below-grade excavation. Utility trenches in shallow groundwater areas or excavations and cuts that remain open for even short periods of time may undermine or collapse due to groundwater effects. Placement of layers of riprap or quarry spalls in localized areas on shallow excavation side slopes may be required to limit instability. Over-excavation and stabilization of pipe trenches or other excavations with imported crushed aggregate or gabion rock may also be necessary to provide adequate subgrade support.

Significant pumping and dewatering may be required to temporarily reduce the groundwater elevation to allow construction of proposed below-grade structures, installation of utilities, or placement of structural fills. Dewatering via a sump within excavation zones may be insufficient to control groundwater and provide excavation side slope stability. Dewatering may be more feasibly conducted by installing a system of temporary well points and pumps around proposed excavation areas or utility trenches. Depending on proposed utility depths, a site-specific dewatering plan may be necessary. Well pumps should remain functioning at all times during the excavation and construction period. Suitable back-up pumps and power supplies should be available to prevent unanticipated shut-down of dewatering equipment. Failure to operate pumps full-time may result in flooding of the excavation zones, resulting in damage to forms, slopes, or equipment.

6.9 Lateral Earth Pressure

Lateral earth pressures should be considered during design of retaining walls and below grade structures. Hydrostatic pressure and additional surcharge loading should also be considered. Wall foundation construction and bearing capacity should adhere to specifications provided previously in Section 6.4, *Foundations*. Retained material may include engineered structural backfill or undisturbed native soil. Structural wall backfill should consist of imported granular material meeting *Section 9-03.12*(*2*) of *WSDOT Standard Specifications*. Backfill should be prepared and compacted to at least 95 percent of maximum dry density as determined by the modified Proctor test (ASTM D1557). Recommended parameters for lateral earth pressures for retained soils and engineered structural backfill consisting of imported granular fill meeting WSDOT specifications for *Gravel Backfill for Walls 9-03.12*(*2*) are presented in Table 1.

The design parameters presented in Table 1 are valid for static loading cases only and are based upon in situ undisturbed native soils or compacted granular fill. The recommended earth pressures do not include surcharge loads, dynamic loading, hydrostatic pressure, or seismic design. If sloped backfill conditions are proposed, Columbia West should be contacted for additional analysis and associated recommendations.

If seismic design is required for unrestrained walls, seismic forces may be calculated by superimposing a uniform lateral force of $10H^2$ pounds per lineal foot of wall, where H is the total wall height in feet. The resultant force should be applied at 0.6H from the base of the wall.

Table 1. Recommended Lateral Earth Pressure Parameters for Level Backfill

Retained Soil	Equivalent Fluid Pressure for Level Backfill			Wet Density	Drained Internal Angle of Friction
	At-rest	Active	Passive		
Undisturbed native SILT with Sand and Sandy SILT (Soil Type 2)	61 pcf	42 pcf	319 pcf	115 pcf	28°
Undisturbed native Lean CLAY with Sand (Soil Type 3)	60 pcf	41 pcf	293 pcf	110 pcf	27°
Undisturbed Native Fat CLAY (Soil Type 4)	65 pcf	46 pcf	261 pcf	110 pcf	24°
Approved Structural Backfill Material WSDOT 9-03.12(2) compacted aggregate backfill	56 pcf	35 pcf	520 pcf	135 pcf	36°

**The upper 6 inches of soil should be neglected in passive pressure calculations. If exterior grade from top or toe of retaining wall is sloped, Columbia West should be contacted to provide location-specific lateral earth pressures.*

A continuous one-foot-thick zone of free-draining, washed, open-graded 1-inch by 2-inch drain rock and a 4-inch perforated gravity drainpipe is assumed behind retaining walls. Geotextile filter fabric should be placed between the drain rock and backfill soil. Specifications for drainpipe design are presented in Section 6.12, *Drainage*. If walls cannot be gravity drained, saturated base conditions and/or applicable hydrostatic pressures should be assumed.

Final retaining wall design should be reviewed and approved by Columbia West. Retaining wall subgrade and backfill activities should also be observed and tested for compliance with recommended specifications by Columbia West during construction.

6.10 Seismic Design Considerations

According to the *ASCE 7 Hazard Tool,* the anticipated peak ground and maximum considered earthquake spectral response accelerations resulting from seismic activity for the subject site are summarized in Table 2.

Table 2. Approximate Probabilistic Ground Motion Values for 'firm rock' sites based on subject property longitude and latitude

	2% Probability of Exceedance in 50 yrs
Peak Ground Acceleration	0.360 g
0.2 sec Spectral Acceleration	0.797 g
1.0 sec Spectral Acceleration	0.374 g

The listed probabilistic ground motion values are based upon "firm rock" sites with an assumed shear wave velocity of 2,500 ft/s in the upper 100 feet of soil profile. These values should be adjusted for site class effects by applying site coefficients F_a and F_v and F_{PGA} as defined by *ASCE 7-16 and associated ASCE 7-16 Supplement 1, dated December 12, 2018, Tables 11.4-1, 11.4-2, and 11.8-1*. The site coefficients are intended to more accurately characterize estimated peak ground and respective earthquake spectral response accelerations by considering site-specific soil characteristics and index properties.

Localized peak ground accelerations exceeding the adjusted values may occur in some areas in direct proximity to an earthquake's origin. This may be a result of amplification of seismic energy due to depth to competent bedrock, compression and shear wave velocity of bedrock, presence and thickness of loose, unconsolidated alluvial deposits, soil plasticity, grain size, and other factors.

Identification of specific seismic response spectra is beyond the scope of this investigation. If site structures are designed in accordance with recommendations specified in the *2018 IBC*, the potential for peak ground accelerations in excess of the adjusted and amplified values should be understood.

6.11 Infiltration Testing Results and Soil Group Classification

To investigate the feasibility of subsurface disposal of stormwater, Columbia West conducted in situ infiltration testing at two locations within the project area on July 27, 2021. Results of in situ infiltration testing are presented in Table 3. The soil classification presented in Table 3 is based upon laboratory analysis. The infiltration rate is presented as a recommended coefficient of permeability (k) and has been reported without application of a factor of safety.

As indicated in Table 3, the tests were conducted in test pits TP-1 and TP-8 at a depth of approximately one-foot bgs. Soils in the tested location were observed and sampled to adequately characterize the subsurface profile. Tested native soils are classified as SILT with sand (ML) and lean CLAY with sand (CL) according to USCS specifications. Soil laboratory analytical test reports are provided in Appendix A.

Single-ring, falling head infiltration testing was performed by inserting a three-inch diameter pipe into the soil at the noted depth. The test was conducted by filling the apparatus with water and measuring time relative to changes in hydraulic head at regular intervals. Using Darcy's Law for saturated flow in homogenous media, the coefficient of permeability (k) was then calculated.

Table 3. Infiltration Test Results

Test Number	Location	Test Depth (feet bgs)	Groundwater Depth on 07/27/21 (feet bgs)	USCS Soil Type (*Indicates Visual Soil Classification)	Passing No. 200 Sieve (%)	WWHM Soil Group Classification**	Infiltration Rate (Coefficient of Permeability, k) (inches/hour)
IT-1.1	TP-1	1	Not Observed	ML, SILT with Sand*	-	4	< 0.06
IT-8.1	TP-8	1	Not Observed	CL, Lean CLAY with Sand*	-	4	< 0.06

** WWHM Classifications are Based Upon Subsurface Investigation and Infiltration Testing Conducted at the Locations Shown.

Columbia West also classified tested near-surface soils into a representative soil group based upon site-specific infiltration test results and review of published literature. As indicated in Table 3, observed near-surface infiltration rates were less than 0.06 inches per hour in the tested locations. Based upon review of USDA hydrologic soil group criteria (USDA, 2007), Appendix 2-A of the *2021 Clark County Stormwater Manual,* and the *Clark County WWHM Soil Groupings Memorandum* (Otak, 2010), measured infiltration rates generally meet the criteria for WWHM Soil Group 4. Therefore, based upon site-specific infiltration testing and review of published literature, tested near-surface soils may be appropriately classified as presented in Table 3.

Due to the presence of fine-textured, low permeability soils at the site, subsurface disposal of concentrated stormwater via infiltration is likely infeasible and is not recommended without further study.

6.12 Drainage

At a minimum, site drainage should include surface water collection and conveyance to properly designed stormwater management structures and facilities. Drainage design in general should conform to City of La Center regulations. Finished site grading should be conducted with positive drainage away from structures. Depressions or shallow areas that may retain ponding water should be avoided. Roof drains, low-point drains, and perimeter foundation drains are recommended for structures. Drains should consist of separate systems and gravity flow with a minimum two-percent slope away from foundations into an approved discharge location.

Perimeter foundation drains should consist of 3-inch perforated PVC pipe surrounded by a minimum of 1 ft^3 of clean, washed drain rock per linear foot of pipe and wrapped with geotextile filter fabric. Open-graded drain rock with a maximum particle size of 3 inches and less than 2 percent passing the No. 200 sieve is recommended. Geotextile filter fabric should consist of Mirafi 140N or approved equivalent, with AOS between No. 70 and No. 100 sieve. The water permittivity should be greater than 1.5/sec. Figure 5 presents a typical foundation drain. Perimeter drains may limit increased hydrostatic pressure beneath footings and assist in reducing potential perched moisture areas.

Subdrains should also be considered if portions of the site are cut below surrounding grades. Shallow groundwater, springs, or seeps should be conveyed via drainage channel or perforated pipe into an approved discharge. Recommendations for design and installation of perforated drainage pipe may be performed on a case-by-case basis by Columbia West during construction. Failure to provide adequate surface and sub-surface drainage may result in soil slumping or unanticipated settlement of structures exceeding tolerable limits. A typical perforated drainpipe trench detail is presented in Figure 6.

Site improvements construction in some areas may occur at or near the shallow groundwater table, particularly if work is conducted during wet-weather conditions. Dewatering may be necessary, and a drainage mat may be required to achieve sufficient elevation for fill placement. A typical drainage mat is shown on Figure 7. Columbia West should determine drainage mat location, extent, and thickness when subsurface conditions are exposed. Drainage mats may need to be constructed in conjunction with subdrains to convey captured water to an approved discharge location.

Drains should be closely monitored after construction to assess their effectiveness. If additional surface or shallow subsurface seeps become evident, the drainage provisions may require modification or additional drains. Columbia West should be consulted to provide appropriate recommendations.

6.13 Bituminous Asphalt and Portland Cement Concrete

Based upon correspondence with the client, proposed development will include new public asphalt-paved roadways. Columbia West recommends adherence to City of La Center paving guidelines for roadway improvements in the public right-of-way.

For dry weather construction, pavement surface sections should bear upon competent subgrade consisting of scarified and compacted native soil or engineered structural fill. Wet weather pavement construction is discussed in Section 6.14, *Wet Weather Construction Methods and Techniques*. Subgrade conditions should be evaluated and tested by Columbia West prior to placement of crushed aggregate base. Subgrade evaluation should include nuclear gauge density testing and wheel proof-roll observations conducted with a loaded 12-cubic yard, double-axle dump truck or equivalent. Nuclear gauge density testing should be conducted at 150-foot intervals or as determined by the onsite geotechnical engineer. Subgrade soil should be compacted to at least 95 percent of the modified Proctor dry density, as determined by *ASTM D1557*. Areas of observed deflection or rutting during proof-roll evaluation should be excavated to a firm surface and replaced with compacted crushed aggregate.

Aggregate base should consist of 1 ¼"-0 crushed aggregate meeting *WSDOT 9-03.9(3)* and be compacted to at least 95 percent of maximum dry density as determined by *ASTM D1557*. Aggregate base should also be subject to proof-roll observations as described above. Asphalt concrete pavement should be compacted to at least 91 percent of maximum Rice density. Nuclear gauge density testing should be conducted to verify adherence to recommended specifications. Testing frequency should be in accordance with WSDOT and City of La Center specifications.

Portland cement concrete curbs and sidewalks should be installed in accordance with City of La Center specifications. Curb and sidewalk aggregate base should consist of 1 ¼”-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*) and be compacted to at least 95 percent of maximum dry density as determined by *ASTM D1557*. Curb and sidewalk base should also be subject to proof-roll observations as described above. Soft areas that deflect or rut should be stabilized prior to pouring concrete. Concrete should be tested during installation in accordance with *ASTM C171, C138, C231, C143, C1064, and C31*. This includes casting of cylinder specimen at a frequency of four cylinders per 100 cubic yards of poured concrete. Recommended field concrete testing includes slump, air entrainment, temperature, and unit weight.

6.14 Wet Weather Construction Methods and Techniques

Wet weather construction often results in significant shear strength reduction and soft areas that may rut or deflect. Installation of granular working layers may be necessary to provide a firm support base and sustain construction equipment. Granular layers should consist of all-weather gravel, 2x4-inch gabion, or other similar material (six-inch maximum size with less than five percent passing the No. 200 sieve).

Construction equipment traffic across exposed soil should be minimized. Equipment traffic induces dynamic loading, which may result in weak areas and significant reduction in shear strength for wet soils. Wet weather construction may also result in generation of significant excess quantities of soft wet soil. This material should be removed from the site or stockpiled in a designated area.

Construction during wet weather conditions may require increased base thickness. Over-excavation of subgrade soils or subgrade amendment with lime and/or cement may be necessary to provide a firm base upon which to place crushed aggregate. Geotextile filter fabric is also recommended. If soil amendment with lime or cement is considered, Columbia West should be contacted to provide appropriate recommendations based upon observed field conditions and desired performance criteria.

Crushed aggregate base should be installed in a single lift with trucks end-dumping from an advancing pad of granular fill. During extended wet periods, stripping activities may also need to be conducted from an advancing pad of granular fill. Once installed, the crushed aggregate base should be compacted with several passes from a static drum roller. A vibratory compactor is not recommended because it may further disturb the subgrade. Subdrains may also be necessary to provide subgrade drainage and maintain structural integrity.

Aggregate base should consist of 1 ¼”-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*) and be compacted to at least 95 percent of maximum dry density according to the modified Proctor density test (ASTM D1557). Compaction should be verified by nuclear gauge density testing, conducted at 150-foot intervals or as determined by the onsite geotechnical engineer. Observation of a proof-roll with a loaded dump truck is also recommended as an indication of the compacted aggregate’s performance.

It should be understood that wet weather construction is risky and costly. Columbia West should observe and document wet weather construction activities. Proper construction methods and techniques are critical to overall project integrity.

6.15 Erosion Control Measures

Based upon field observations and laboratory testing, the erosion hazard for site soils in flat to shallow-gradient portions of the property is likely to be low. The potential for erosion generally increases in sloped areas. Therefore, disturbance to vegetation in sloped areas should be minimized during construction activities. Soil is also prone to erosion if unprotected and unvegetated during periods of increases precipitation. Erosion can be minimized by performing construction activities during dry summer months.

Site-specific erosion control measures should be implemented to address the maintenance of exposed areas. This may include silt fence, biofilter bags, straw wattles, or other suitable methods. During construction activities, exposed areas should be well-compacted and protected from erosion with visqueen, surface tackifier, or other means, as appropriate. Temporary slopes or exposed areas may be covered with straw, crushed aggregate, or riprap in localized areas to minimize erosion. Erosion and water runoff during wet weather conditions may be controlled by application of strategically placed channels and small detention depressions with overflow pipes.

After grading, exposed surfaces should be vegetated as soon as possible with erosion-resistant native vegetation. Jute mesh or straw may be applied to enhance vegetation. Once established, vegetation should be properly maintained. Disturbance to existing native vegetation and surrounding organic soil should also be minimized during construction activities.

6.16 Soil Shrink/Swell Potential

Based upon laboratory analysis, near-surface soils contain as much as approximately 90 percent by weight passing the No. 200 sieve and exhibit a plasticity index ranging from 5 to 31 percent. This indicates the potential for soil shrinking or swelling and underscores the importance of proper moisture conditioning during fill placement. Medium to high plasticity soils should be placed and compacted at a moisture content approximately two percent above optimum as determined by laboratory analysis. As discussed previously in Section 6.2, *Engineered Structural Fill,* Columbia West should evaluate and assess all soils proposed for use as structural fill, particularly those with a plasticity index greater than 25, to determine suitability for the proposed end use.

6.17 Utility Installation

Utility installation may require subsurface excavation and trenching. Excavation, trenching and shoring should conform to federal (Occupational Safety and Health Administration) (OSHA) (29 CFR, Part 1926) and WISHA (WAC, Chapter 296-155) regulations. Site soils may slough when cut vertically and sudden precipitation events or perched groundwater may result in accumulation of water within excavation zones and trenches.

Utilities should be installed in general accordance with manufacturer's recommendations. Utility trench backfill should consist of *WSDOT 9-03.19 Bank Run Gravel for Trench Backfill* or *WSDOT 9-03.14(2) Select Borrow* with a maximum particle size of 2 ½-inches. Trench backfill material within 18 inches of the top of utility pipes should be hand compacted (i.e., no heavy compaction equipment). The remaining backfill should be compacted to at least 95 percent of maximum dry density as determined by the standard Proctor moisture-density test (ASTM D698). Clean, free-draining, fine bedding sand is recommended for use in the pipe zone. With exception of the pipe zone, backfill should be placed in loose lifts not exceeding 12 inches in thickness.

Compaction of utility trench backfill material should be verified by nuclear gauge field compaction testing performed in accordance with *ASTM D6938*. Field compaction testing should be performed at 200-foot intervals along the utility trench centerline at the surface and midpoint depth of the trench. Compaction frequency and specifications may be modified for non-structural areas in accordance with recommendations of the site geotechnical engineer.

7.0 CONCLUSION AND LIMITATIONS

This geotechnical site investigation report was prepared in accordance with accepted standard conventional principles and practices of geotechnical engineering. This investigation pertains only to material tested and observed as of the date of this report and is based upon proposed site development as described in the text herein. This report is a professional opinion containing recommendations established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. Soil conditions may differ between tested locations or over time. Slight variations may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions are as anticipated in this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Columbia West cannot accept responsibility for deviations from recommendations described in this report. Future performance of structural facilities is often related to the degree of construction observation by qualified personnel. These services should be performed to the full extent recommended.

This report is not an environmental assessment and should not be construed as a representative warranty of site subsurface conditions. The discovery of adverse environmental conditions, or subsurface soils that deviate from those described in this report, should immediately prompt further investigation. The above statements are in lieu of all other statements expressed or implied.

This report was prepared solely for the client and is not to be reproduced without prior authorization from Columbia West. Final engineering plans and specifications for the project should be reviewed and approved by Columbia West as they relate to geotechnical and grading issues prior to final design approval. Columbia West is not responsible for independent conclusions or recommendations made by other parties based upon information presented in this report. Unless a particular service was expressly included in the scope, it was not performed and there should be no assumptions based upon services not provided. Additional report limitations and important information about this document are presented in Appendix E. This information should be carefully read and understood by the client and other parties reviewing this document.

Sincerely,

COLUMBIA WEST ENGINEERING, Inc.

Daniel E. Lehto, PE, GE
Principal

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STATE OF WASHINGTON
44702
REGISTERED
PROFESSIONAL ENGINEER

9-23-21

expires: 6-5-23

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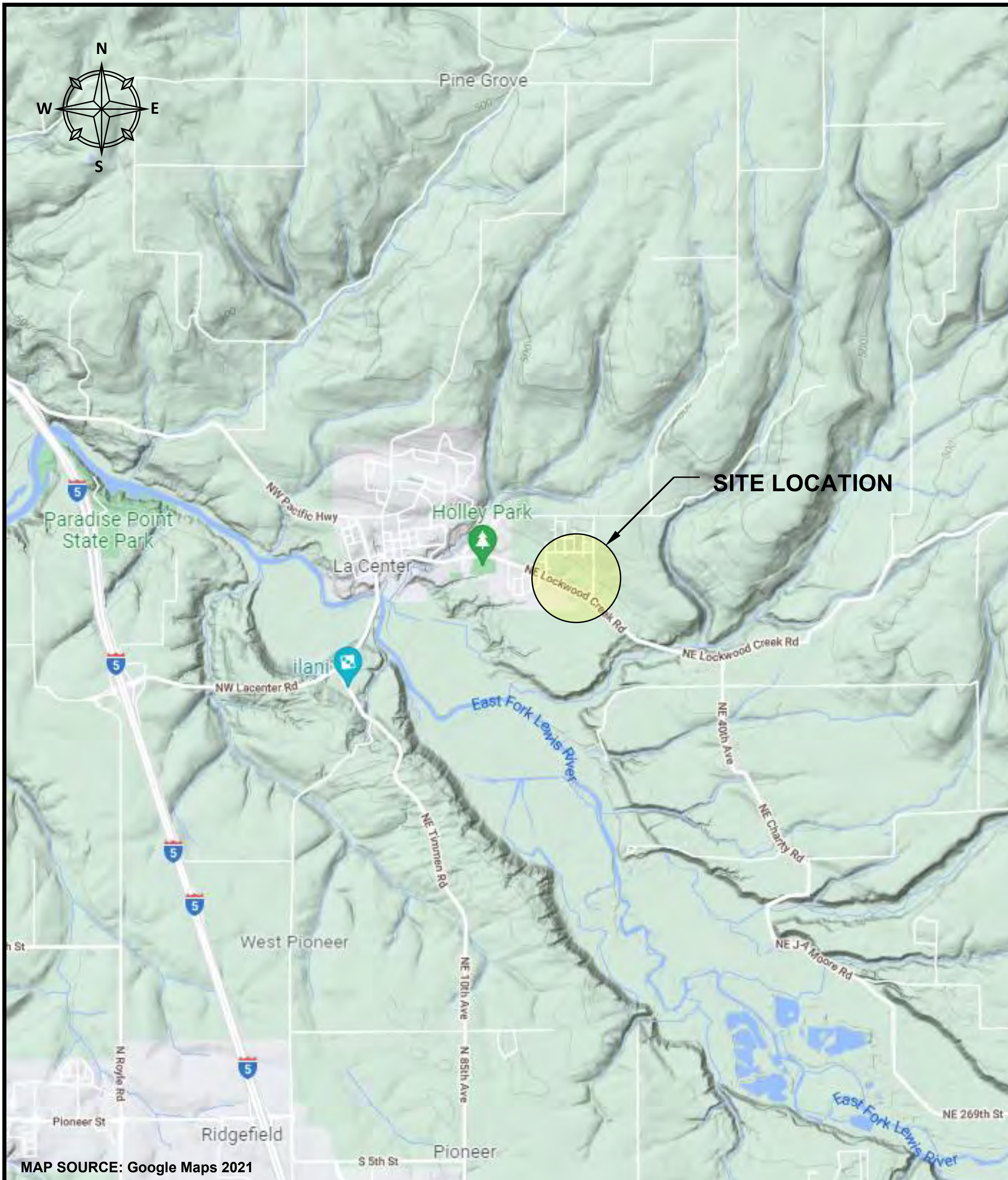
FIGURES



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	Job No: 21172 Date: 8/6/21 Drawn: CWS Checked: DEL	SITE LOCATION MAP LOCKWOOD MEADOWS SUBDIVISION LA CENTER, WASHINGTON	FIGURE 1

Test Number	Location	Test Depth (feet bgs)	Groundwater Depth on 07/27/21 (feet bgs)	USCS Soil Type (*Indicated Visual Soil Classification)	Passing No. 200 Sieve (%)	WWHM Soil Group Classification **	Infiltration Rate (Coefficient of Permeability, k) (inches/hour)
IT-1.1	TP-1	1	Not Observed	ML, SILT with Sand*	-	4	< 0.06
IT-8.1	TP-8	1	Not Observed	CL, Lean CLAY with Sand*	-	4	< 0.06

SITE BOUNDARY — LOCATION OF TEST PIT — LOCATION OF INFILTRATION TEST

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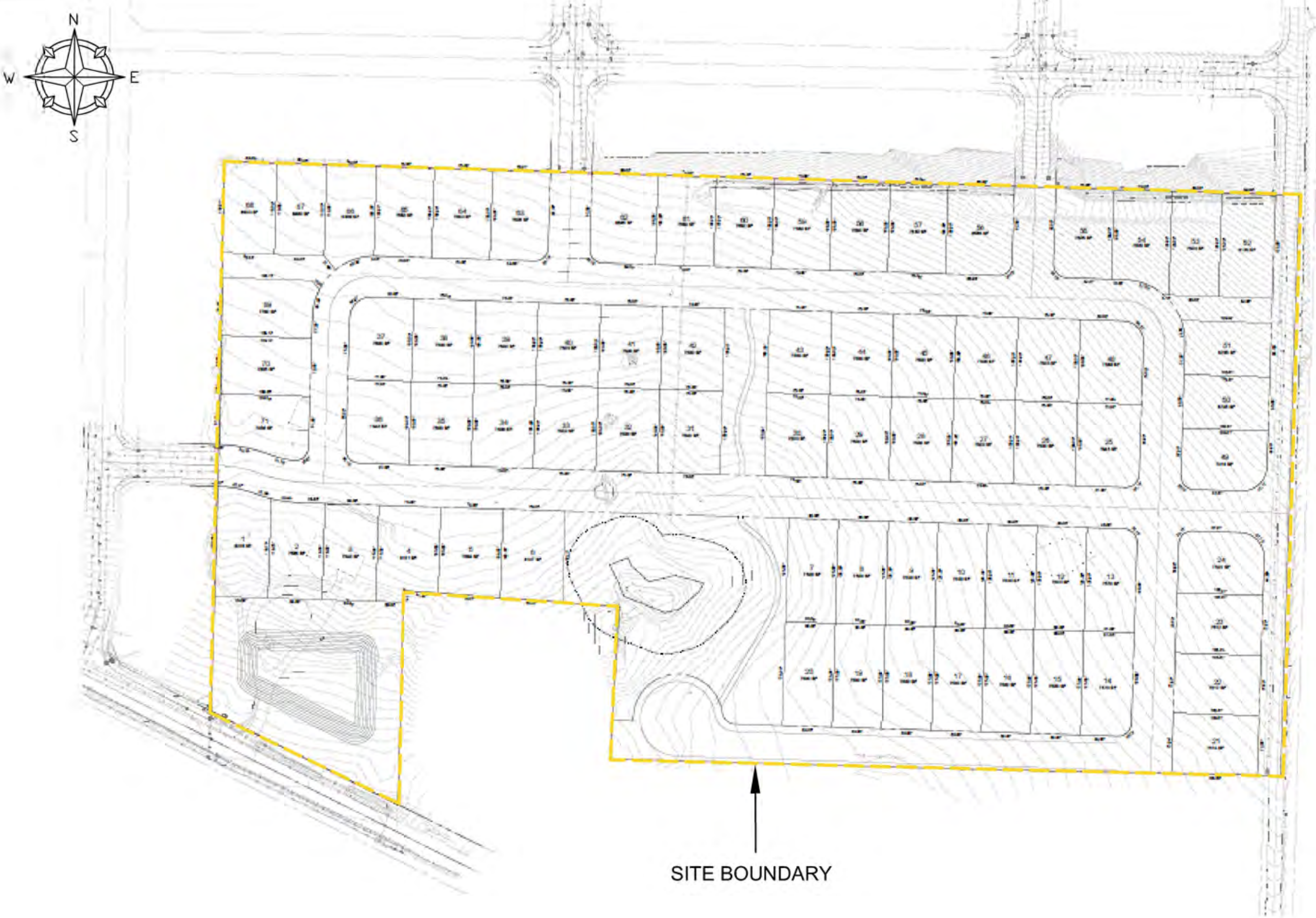
Job No: 21172
Date: 07/28/21
Drawn: EMU
Checked: CWS

EXPLORATION LOCATION MAP
LOCKWOOD MEADOWS SUBDIVISION

NOTES:
1. SITE LOCATION: 2000 NE LOCKWOOD CREEK ROAD IN LA CENTER, WASHINGTON.
2. SITE CONSISTS OF TAX PARCEL 209113000, TOTALING APPROXIMATELY 20 ACRES.
3. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.
4. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
5. TEST PITS BACKFILLED LOOSELY WITH ONSITE SOILS ON JULY 27, 2021.

FIGURE 2



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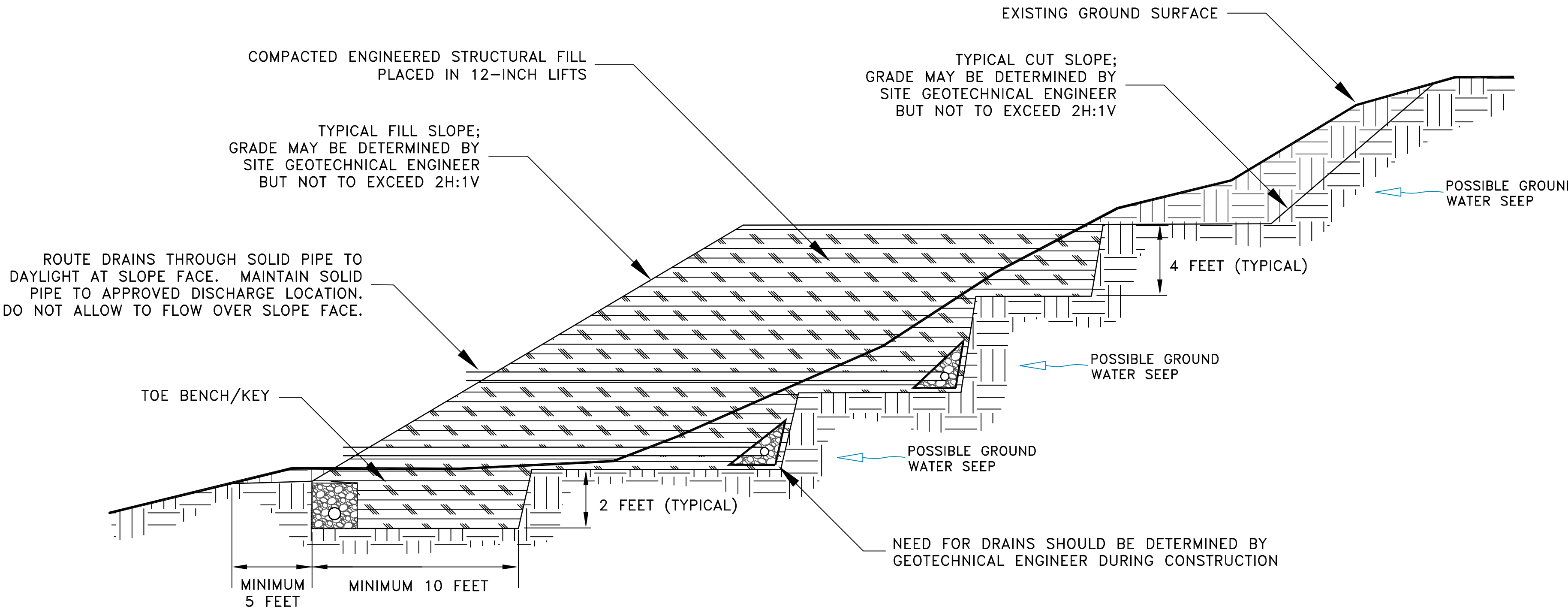
Columbia West Engineering, Inc

Job No: 21172
Date: 08/25/21
Drawn: EMU
Checked: CWS

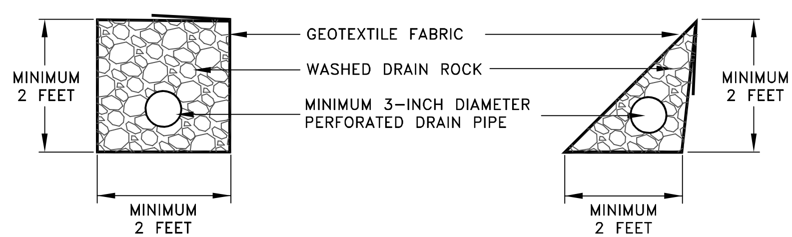
PRELIMINARY SITE PLAN
LOCKWOOD MEADOWS
SUBDIVISION

NOTES:
1. PRELIMINARY SITE PLAN PROVIDED BY PLS ENGINEERING
2. SITE PLAN APPLIES TO PARCEL NO. 209113000

FIGURE
2A



TYPICAL DRAIN SECTION DETAIL



DRAIN SPECIFICATIONS

GEOTEXTILE FABRIC SHALL CONSIST OF MIRAFI 140N OR APPROVED EQUIVALENT WITH AOS BETWEEN No. 70 AND No. 100 SIEVE.

WASHED DRAIN ROCK SHALL BE OPEN-GRADED ANGULAR DRAIN ROCK WITH LESS THAN 2 PERCENT PASSING THE No. 200 SIEVE AND A MAXIMUM PARTICLE SIZE OF 3 INCHES.

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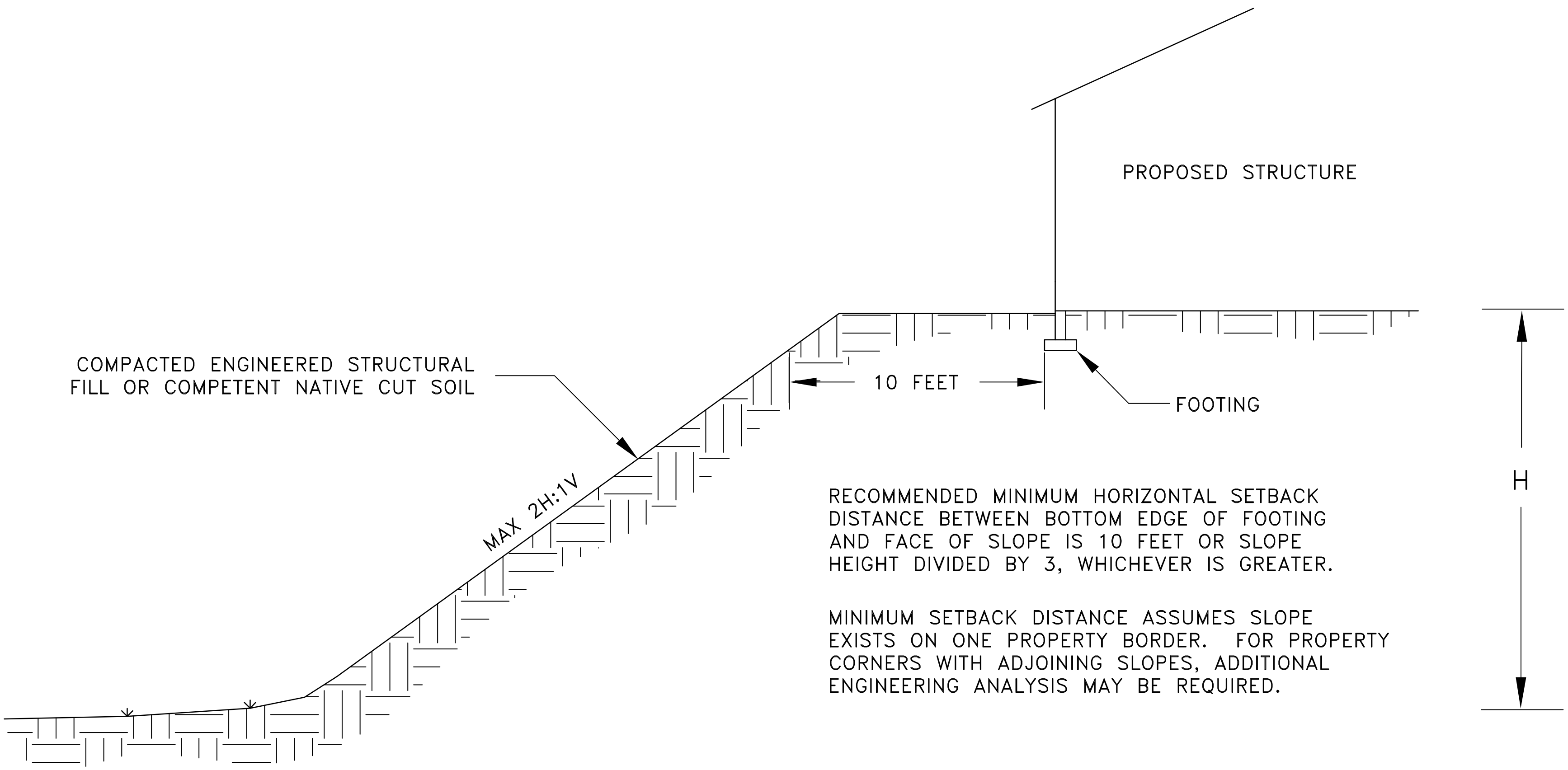
TYPICAL CUT AND FILL SLOPE CROSS SECTION

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL CUT AND FILL SLOPE CROSS SECTION AND MAY NOT BE SITE-SPECIFIC.

FIGURE 3



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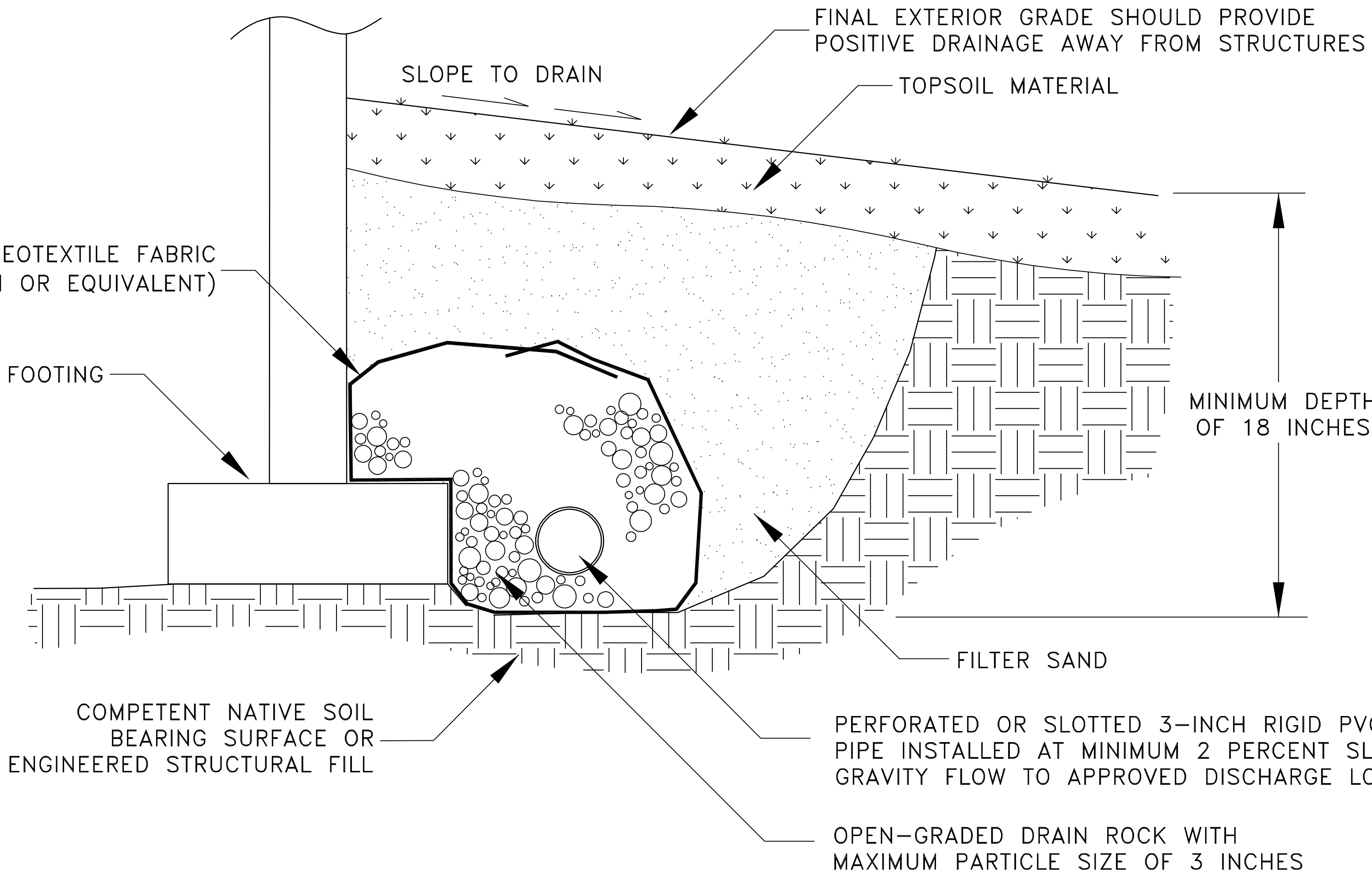
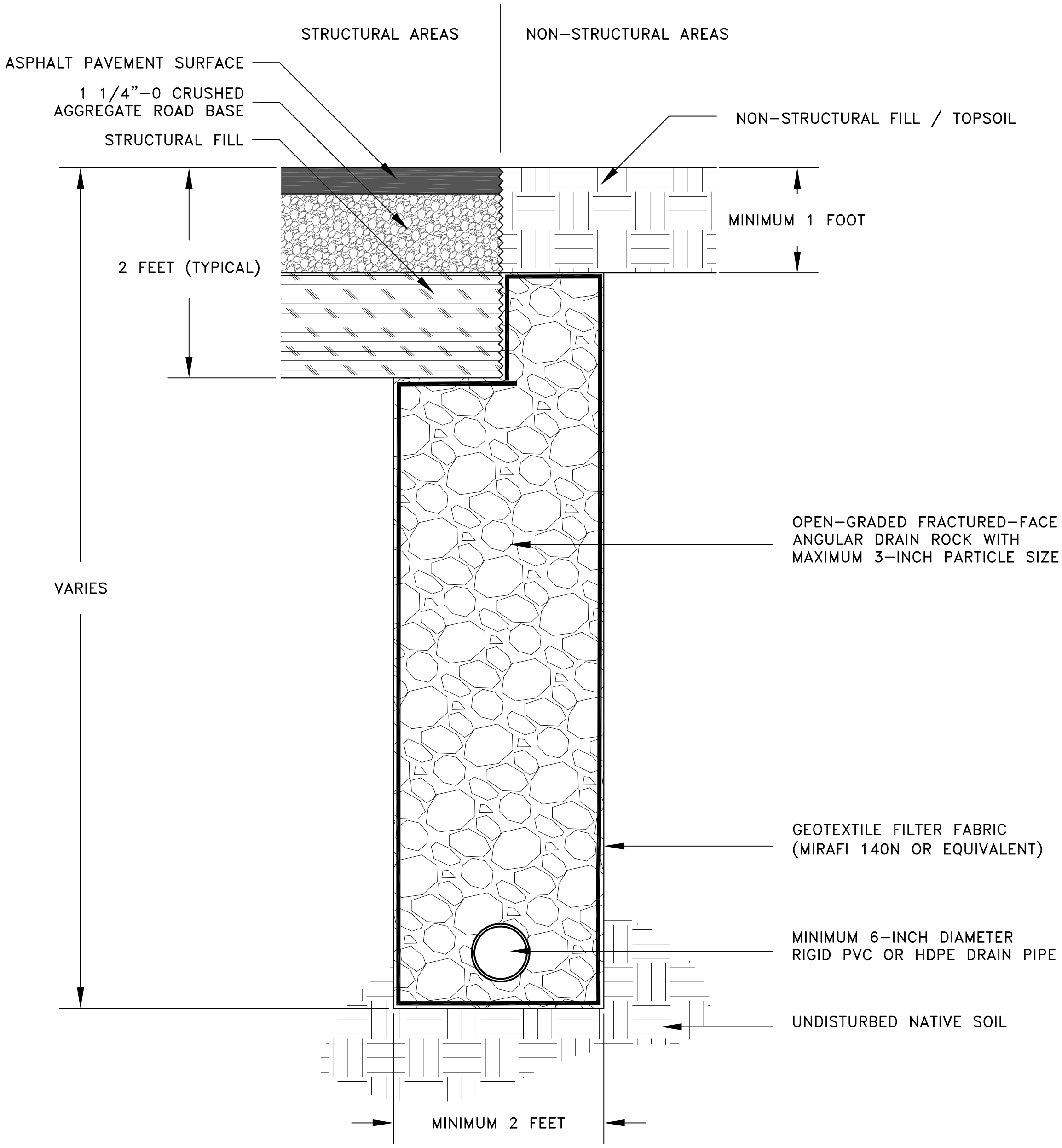
TYPICAL MINIMUM FOUNDATION
SLOPE SETBACK DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.
2. SLOPES AND PROFILES SHOWN ARE APPROXIMATE.
3. DRAWING REPRESENTS TYPICAL FOUNDATION SETBACK DETAIL AND MAY NOT BE SITE-SPECIFIC.

FIGURE
4



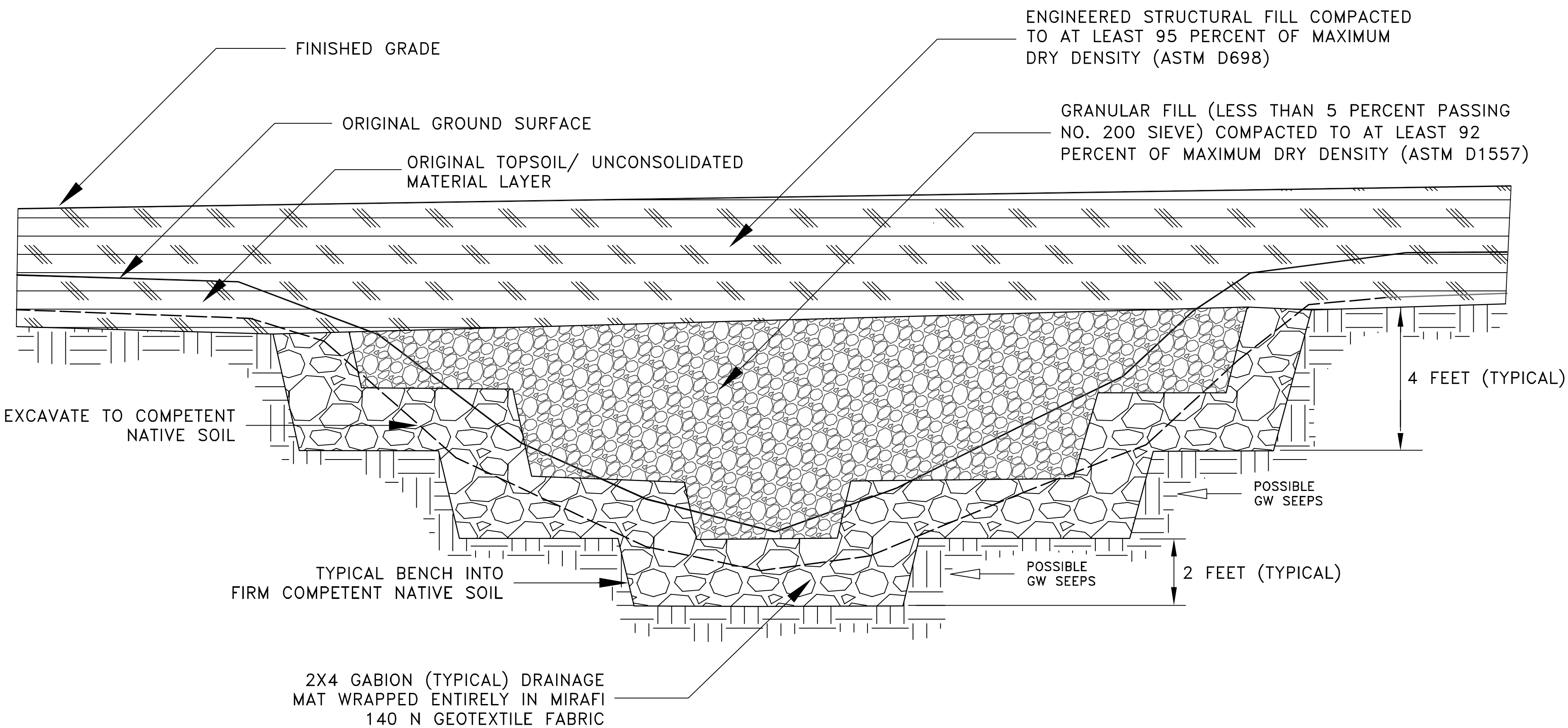
Geotechnical ▪ Environmental ▪ Special Inspections **Columbia West** Engineering, Inc	TYPICAL PERIMETER FOOTING DRAIN DETAIL	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL PERIMETER FOOTING DRAIN DETAIL AND MAY NOT BE SITE-SPECIFIC.	FIGURE 5



NOTE: LOCATION, INVERT ELEVATION, DEPTH OF TRENCH, AND EXTENT OF PERFORATED PIPE REQUIRED MAY BE MODIFIED BY THE GEOTECHNICAL ENGINEER DURING CONSTRUCTION BASED UPON FIELD OBSERVATION AND SITE-SPECIFIC SOIL CONDITIONS.

Geotechnical ■ Environmental ■ Special Inspections Columbia West Engineering, Inc	TYPICAL PERFORATED DRAINPIPE TRENCH DETAIL	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL PERFORATED DRAIN PIPE TRENCH DETAIL AND MAY NOT BE SITE-SPECIFIC.	FIGURE 6

TYPICAL DRAINAGE MAT CROSS-SECTION



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	TYPICAL DRAINAGE MAT CROSS SECTION	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL DRAINAGE MAT SECTION AND MAY NOT BE SITE-SPECIFIC.	FIGURE 7

APPENDIX A
LABORATORY TEST RESULTS

11917 NE 95th Street, Vancouver, Washington 98682
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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0665
		REPORT DATE: 08/20/21	FIELD ID: TP1.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
SILT with Sand	Test Pit, TP-01 depth = 10 feet	ML, Silt with Sand

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-4(4)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

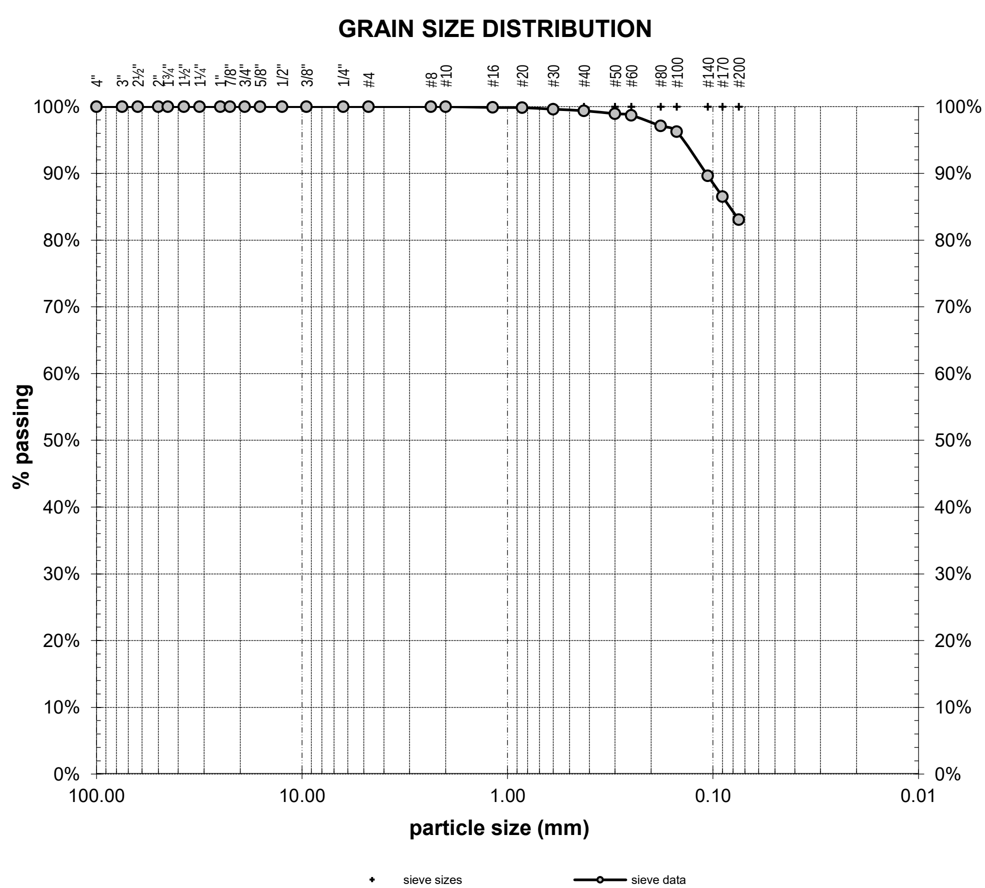
ADDITIONAL DATA

initial dry mass (g) =	164.39		
as-received moisture content =	35.0%	coefficient of curvature, C_C =	n/a
liquid limit =	32	coefficient of uniformity, C_U =	n/a
plastic limit =	27	effective size, $D_{(10)}$ =	n/a
plasticity index =	5	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 16.9%
% silt and clay = 83.1%

	SIEVE SIZE US	SIEVE SIZE mm	PERCENT PASSING SIEVE act.	PERCENT PASSING SIEVE interp.	SPECS max	SPECS min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		100%		
	#20	0.850	100%			
	#30	0.600		100%		
	#40	0.425	99%			
	#50	0.300		99%		
	#60	0.250	99%			
	#80	0.180		97%		
	#100	0.150	96%			
	#140	0.106		90%		
	#170	0.090		87%		
	#200	0.075	83%			



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0665
		REPORT DATE: 08/20/21	FIELD ID: TP1.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
SILT with Sand	Test Pit, TP-01 depth = 10 feet	ML, Silt with Sand

LABORATORY TEST DATA

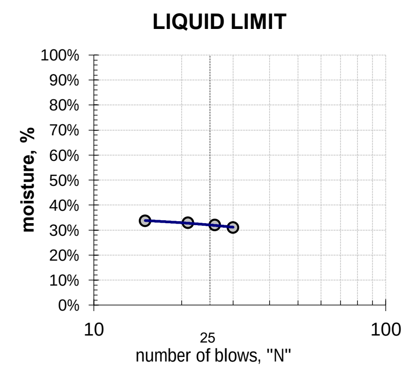
LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

ATTERBERG LIMITS

liquid limit =	32
plastic limit =	27
plasticity index =	5

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	32.88	32.08	32.21	32.61
dry soil + pan weight, g =	30.04	29.37	29.41	29.70
pan weight, g =	20.87	20.91	20.89	21.06
N (blows) =	30	26	21	15
moisture, % =	31.0 %	32.0 %	32.9 %	33.7 %

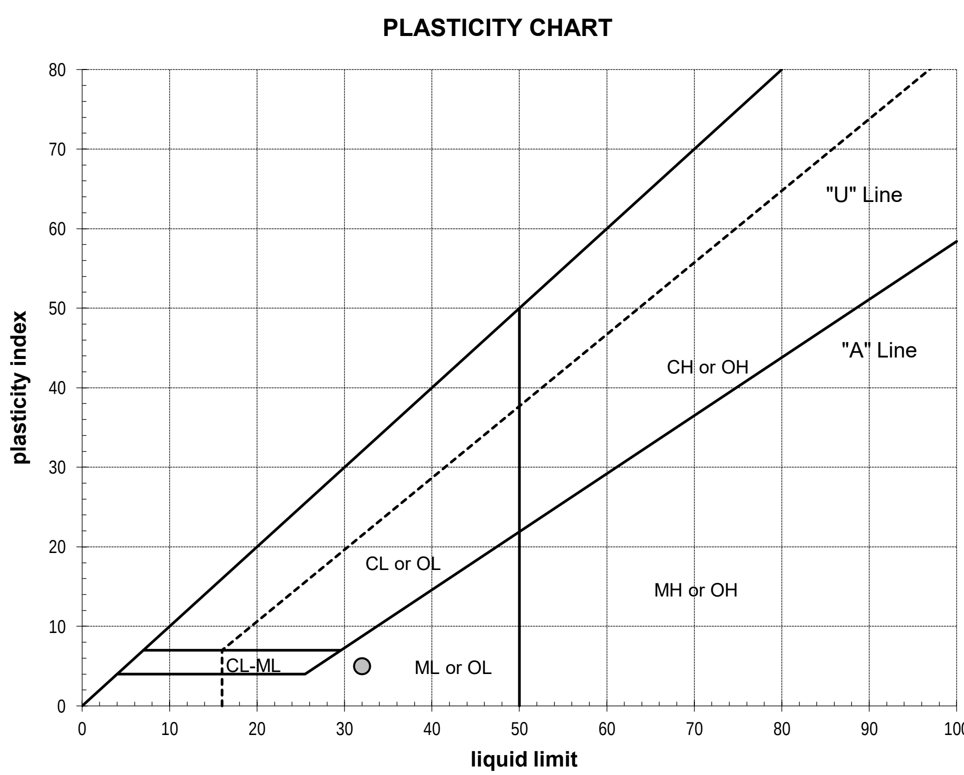


SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.63	27.72		
dry soil + pan weight, g =	26.19	26.25		
pan weight, g =	20.95	20.79		
moisture, % =	27.5 %	26.9 %		



ADDITIONAL DATA

% gravel =	0.0%
% sand =	16.9%
% silt and clay =	83.1%
% silt =	n/a
% clay =	n/a
moisture content =	35.0%

DATE TESTED	TESTED BY
08/19/21	KMS

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0666
		REPORT DATE: 08/20/21	FIELD ID: TP3.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Sandy SILT	Test Pit, TP-03 depth = 4 feet	ML, Sandy Silt

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-6(8)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

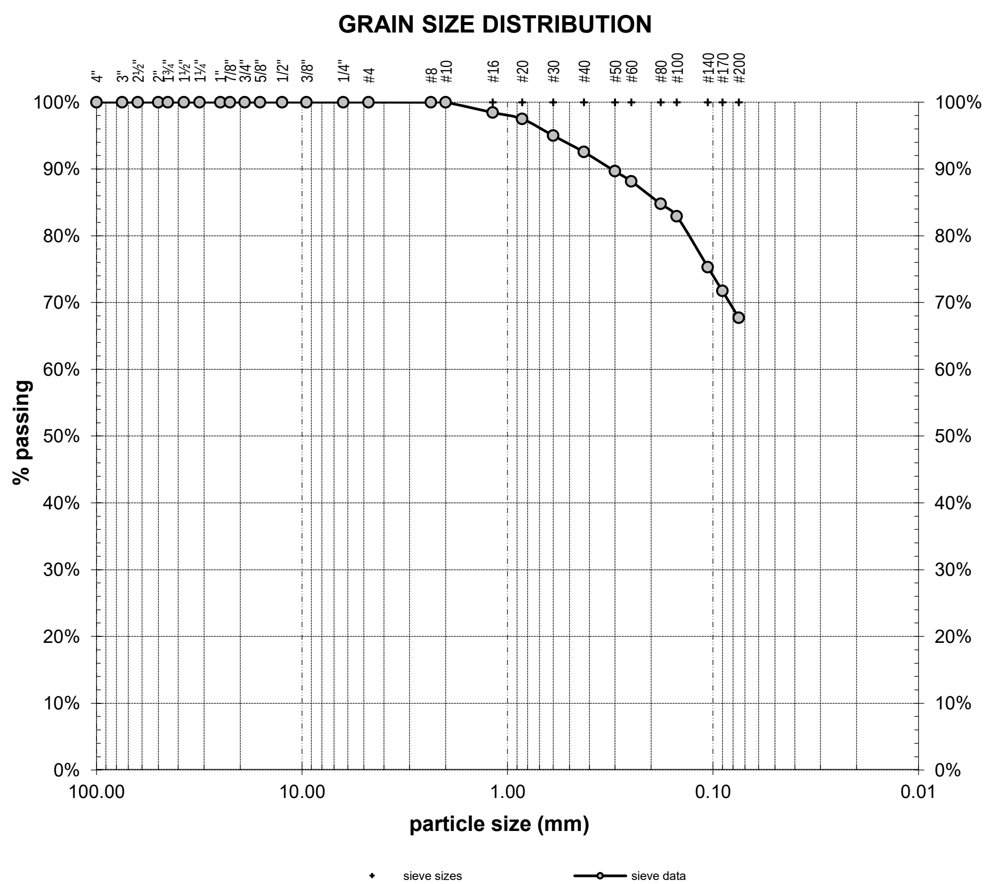
ADDITIONAL DATA

initial dry mass (g) =	162.94		
as-received moisture content =	35.6%	coefficient of curvature, C_C =	n/a
liquid limit =	40	coefficient of uniformity, C_U =	n/a
plastic limit =	27	effective size, $D_{(10)}$ =	n/a
plasticity index =	13	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 32.3%
% silt and clay = 67.7%

	SIEVE SIZE		PERCENT PASSING			
			SIEVE		SPECS	
	US	mm	act.	interp.	max	min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		98%		
	#20	0.850	97%			
	#30	0.600		95%		
	#40	0.425	93%			
	#50	0.300		90%		
	#60	0.250	88%			
	#80	0.180		85%		
	#100	0.150	83%			
	#140	0.106		75%		
	#170	0.090		72%		
	#200	0.075	68%			



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0666
		REPORT DATE: 08/20/21	FIELD ID: TP3.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Sandy SILT	Test Pit, TP-03 depth = 4 feet	ML, Sandy Silt

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

ATTERBERG LIMITS

liquid limit =	40
plastic limit =	27
plasticity index =	13

LIQUID LIMIT DETERMINATION

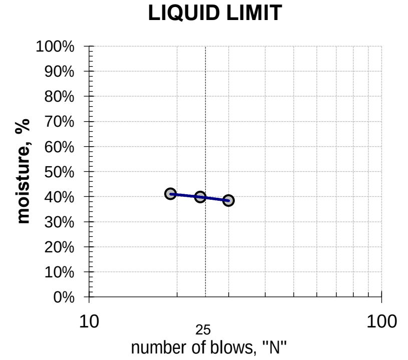
	❶	❷	❸	❹
wet soil + pan weight, g =	31.74	32.02	32.52	
dry soil + pan weight, g =	28.71	28.77	29.15	
pan weight, g =	20.81	20.61	20.93	
N (blows) =	30	24	19	
moisture, % =	38.4 %	39.8 %	41.0 %	

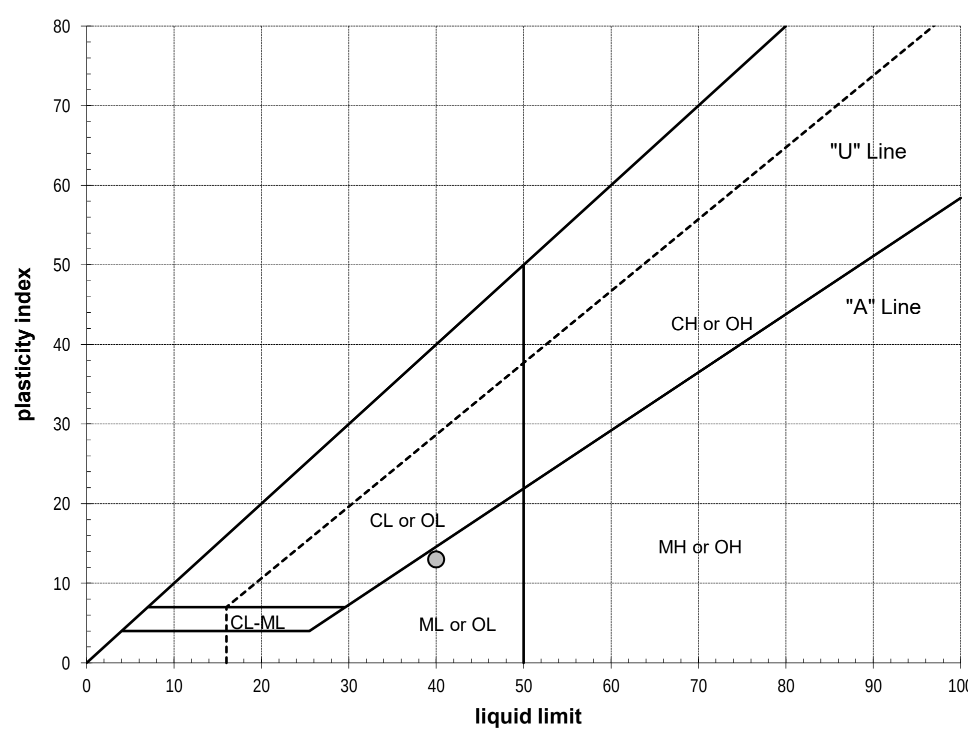
SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.19	27.47		
dry soil + pan weight, g =	25.87	26.05		
pan weight, g =	20.91	20.76		
moisture, % =	26.6 %	26.8 %		





ADDITIONAL DATA

% gravel =	0.0%
% sand =	32.3%
% silt and clay =	67.7%
% silt =	n/a
% clay =	n/a
moisture content =	35.6%

DATE TESTED	TESTED BY
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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0667
		REPORT DATE: 08/20/21	FIELD ID: TP6.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Fat CLAY	Test Pit, TP-06 depth = 12 feet	CH, Fat Clay

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-7-6(30)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

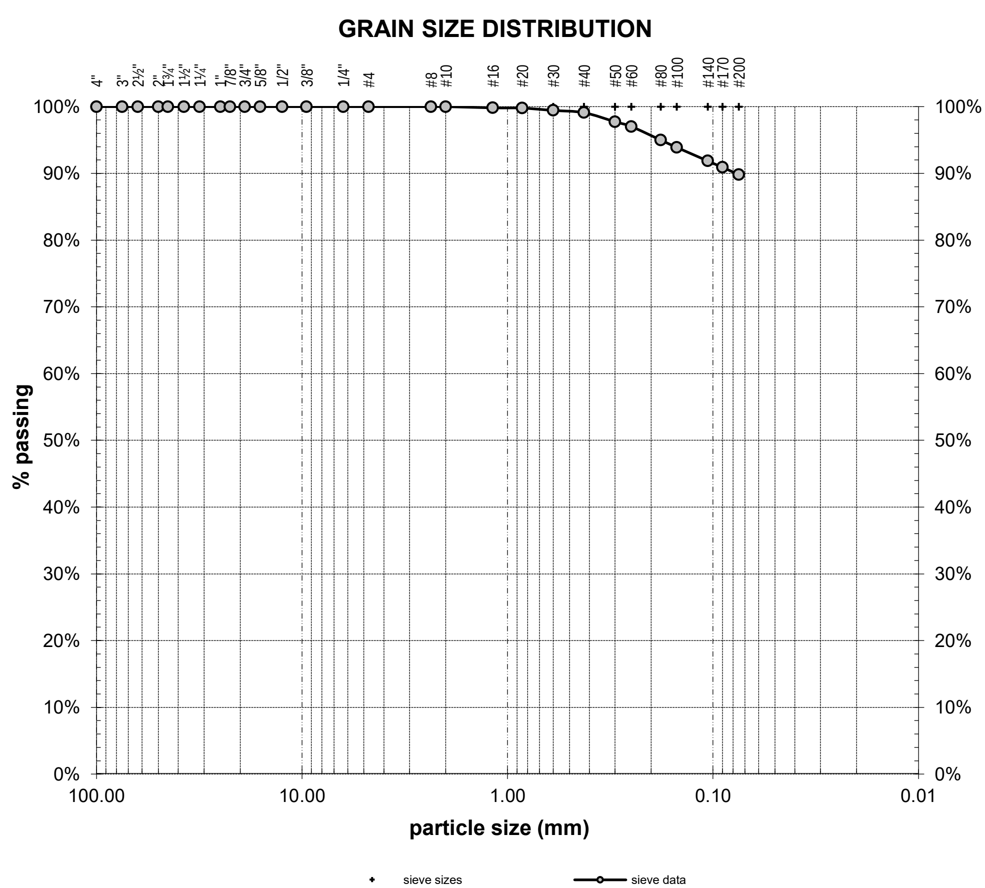
ADDITIONAL DATA

initial dry mass (g) =	168.09		
as-received moisture content =	35.3%	coefficient of curvature, C_C =	n/a
liquid limit =	52	coefficient of uniformity, C_U =	n/a
plastic limit =	21	effective size, $D_{(10)}$ =	n/a
plasticity index =	31	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 10.2%
% silt and clay = 89.8%

	SIEVE SIZE		PERCENT PASSING			
			SIEVE		SPECS	
	US	mm	act.	interp.	max	min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		100%		
	#20	0.850	100%			
	#30	0.600		99%		
	#40	0.425	99%			
	#50	0.300		98%		
	#60	0.250	97%			
	#80	0.180		95%		
	#100	0.150	94%			
	#140	0.106		92%		
	#170	0.090		91%		
	#200	0.075	90%			



DATE TESTED	TESTED BY
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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0667
		REPORT DATE: 08/20/21	FIELD ID: TP6.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Fat CLAY	Test Pit, TP-06 depth = 12 feet	CH, Fat Clay

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

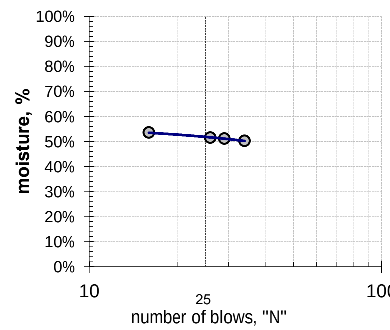
ATTERBERG LIMITS

liquid limit = 52
plastic limit = 21
plasticity index = 31

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	34.55	32.22	33.27	31.98
dry soil + pan weight, g =	29.95	28.41	29.07	28.08
pan weight, g =	20.81	20.96	20.92	20.80
N (blows) =	34	29	26	16
moisture, % =	50.3 %	51.1 %	51.5 %	53.6 %

LIQUID LIMIT



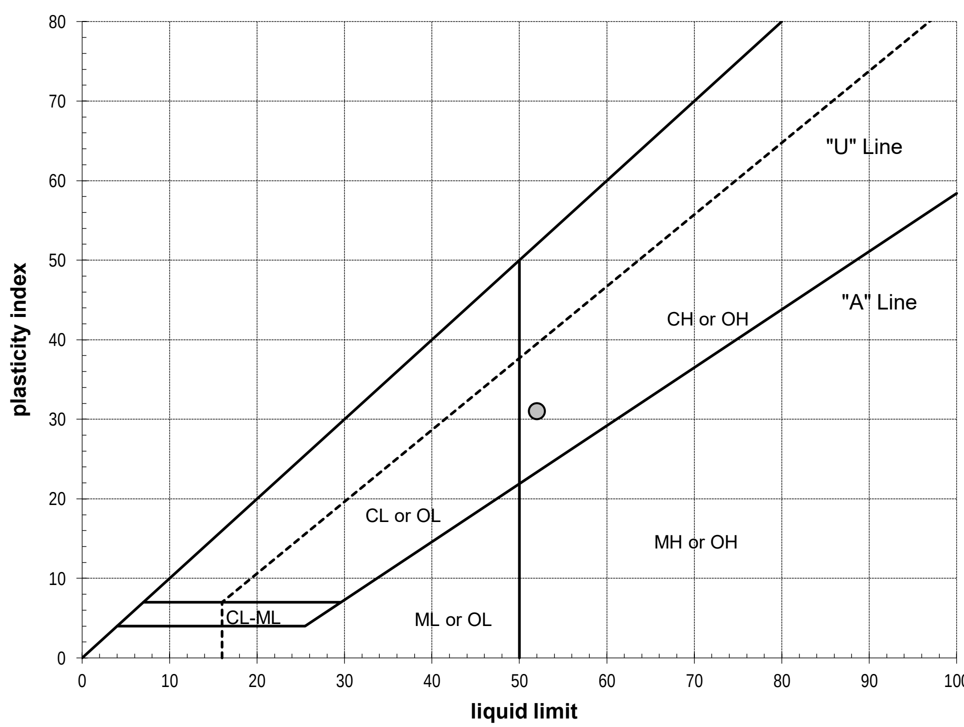
SHRINKAGE

shrinkage limit = n/a
shrinkage ratio = n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.61	28.19		
dry soil + pan weight, g =	26.39	26.91		
pan weight, g =	20.61	20.79		
moisture, % =	21.1 %	20.9 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel =	0.0%
% sand =	10.2%
% silt and clay =	89.8%
% silt =	n/a
% clay =	n/a
moisture content =	35.3%

DATE TESTED	TESTED BY
08/19/21	KMS

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0668
		REPORT DATE: 08/20/21	FIELD ID: TP8.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Lean CLAY with Sand	Test Pit, TP-08 depth = 5 feet	CL, Lean Clay with Sand

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-6(11)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

ADDITIONAL DATA

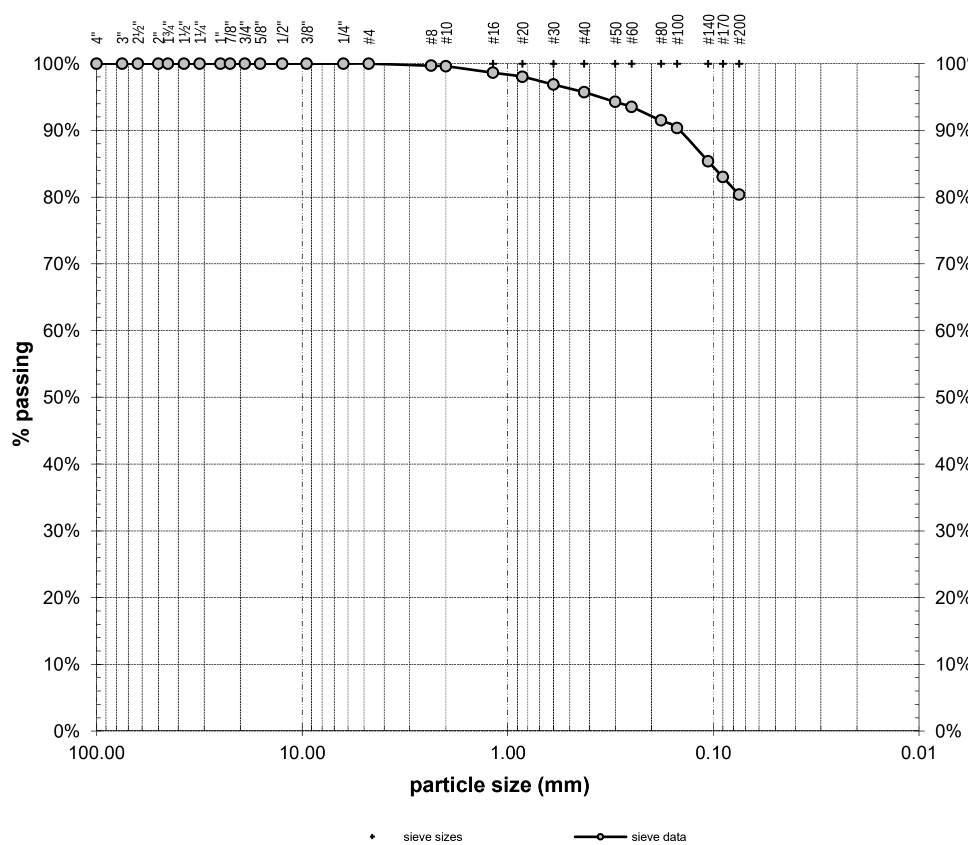
initial dry mass (g) =	177.81		
as-received moisture content =	29.0%	coefficient of curvature, C_C =	n/a
liquid limit =	37	coefficient of uniformity, C_U =	n/a
plastic limit =	23	effective size, $D_{(10)}$ =	n/a
plasticity index =	14	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 19.6%
% silt and clay = 80.4%

	SIEVE SIZE		PERCENT PASSING			
			SIEVE		SPECS	
	US	mm	act.	interp.	max	min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		99%		
	#20	0.850	98%			
	#30	0.600		97%		
	#40	0.425	96%			
	#50	0.300		94%		
	#60	0.250	93%			
	#80	0.180		91%		
	#100	0.150	90%			
	#140	0.106		85%		
	#170	0.090		83%		
	#200	0.075	80%			

GRAIN SIZE DISTRIBUTION



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0668
		REPORT DATE: 08/20/21	FIELD ID: TP8.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Lean CLAY with Sand	Test Pit, TP-08 depth = 5 feet	CL, Lean Clay with Sand

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

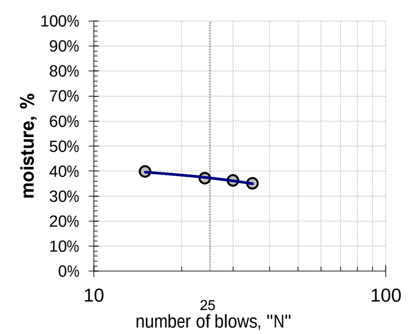
ATTERBERG LIMITS

liquid limit = 37
plastic limit = 23
plasticity index = 14

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	33.40	33.03	32.47	33.44
dry soil + pan weight, g =	30.11	29.69	29.31	29.86
pan weight, g =	20.71	20.48	20.78	20.85
N (blows) =	35	30	24	15
moisture, % =	35.0 %	36.3 %	37.1 %	39.7 %

LIQUID LIMIT



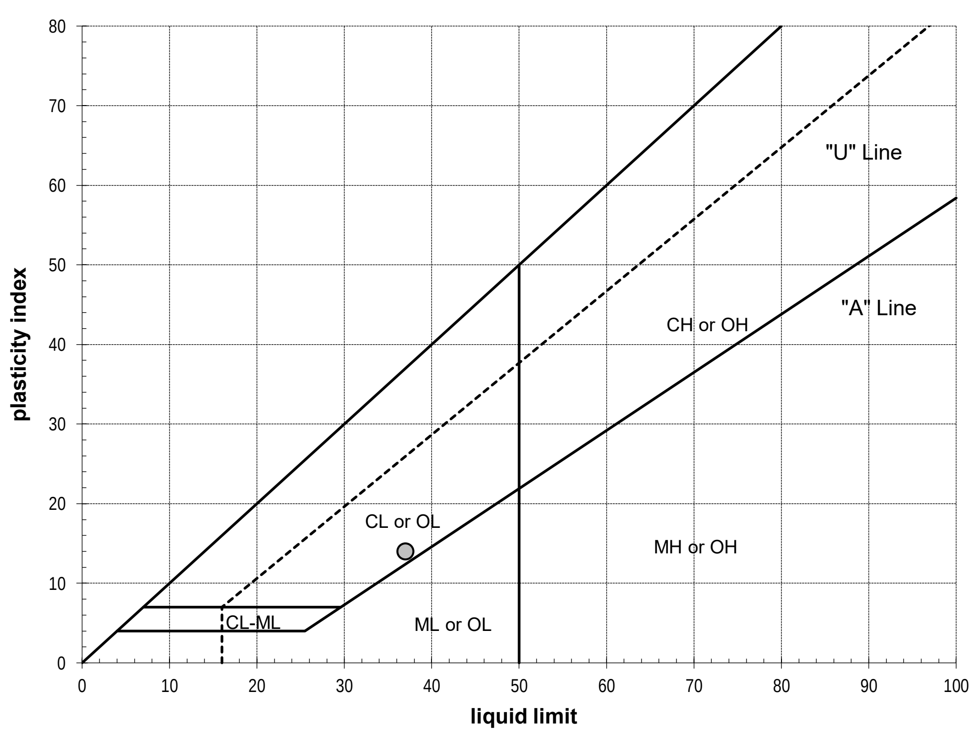
SHRINKAGE

shrinkage limit = n/a
shrinkage ratio = n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.93	27.28		
dry soil + pan weight, g =	26.59	26.07		
pan weight, g =	20.80	20.60		
moisture, % =	23.1 %	22.1 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel = 0.0%
% sand = 19.6%
% silt and clay = 80.4%
% silt = n/a
% clay = n/a
moisture content = 29.0%

DATE TESTED	TESTED BY
08/19/21	KMS

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APPENDIX B
SUBSURFACE EXPLORATION LOGS

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-1
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	156 ft amsl	Not Observed	0819	0842

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Hillsboro Silt Loam	A-4(4)	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					TP1.1 D = 1.0-ft k < 0.06 in/hr
5											
10	TP1.1					Becomes gray and moist at 10 feet.	35.0	83.1	32	5	
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-2
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	188 ft amsl	Not Observed	0850	0920

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to gray, mottled, damp to moist, SILT with sand [Soil Type 2]. Becomes brown and moist at 2.5 feet.					
5											
10											
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-3
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	190 ft amsl	Not Observed	0923	0947

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Odne Silt Loam	A-6(8)	ML		Light brown, damp to moist, sandy SILT [Soil Type 2].					
						Becomes brown, mottled, and moist at 3 feet.					
	TP3.1						35.6	67.7	40	13	
5											
10			A-6	CL		Brown, moist, lean CLAY with sand [Soil Type 3].					
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-4
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	182 ft amsl	Not Observed	0949	1015

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 12 to 14 inches of grass and topsoil.					
		Odne Silt Loam	A-6	ML		Light brown to brown, mottled, damp to moist, sandy SILT [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-5
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	184 ft amsl	Not Observed	1022	1042

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 12 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
			A-7	CH		Brown, moist, fat CLAY [Soil Type 4].					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-6
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	184 ft amsl	Not Observed	1045	1102

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to gray, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown, moist, lean CLAY with sand [Soil Type 3].					
10											
	TP6.1		A-7-6(30)	CH		Gray, moist, fat CLAY [Soil Type 4].	35.3	89.8	52	31	
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-7
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	200 ft amsl	Not Observed	1117	1140

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Odne Silt Loam	A-4	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
			A-4	ML		Brown to gray, moist, SILT with sand [Soil Type 2].					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-8
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	228 ft amsl	Not Observed	1145	1205

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Hillsboro Silt Loam	A-6(11)	CL		Brown, mottled, damp to moist, lean CLAY with sand [Soil Type 3].					TP8.1 D = 1.0-ft k < 0.06 in/hr
5	TP8.1						29.0	80.4	37	14	
10						Becomes moist at 10 feet.					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

APPENDIX C
SOIL CLASSIFICATION INFORMATION

SOIL DESCRIPTION AND CLASSIFICATION GUIDELINES

Particle-Size Classification

COMPONENT	ASTM/USCS size range	ASTM/USCS sieve size range	AASHTO size range	AASHTO sieve size range
Cobbles	> 75 mm	greater than 3 inches	> 75 mm	greater than 3 inches
Gravel	75 mm – 4.75 mm	3 inches to No. 4 sieve	75 mm – 2.00 mm	3 inches to No. 10 sieve
Coarse	75 mm – 19.0 mm	3 inches to 3/4-inch sieve	-	-
Fine	19.0 mm – 4.75 mm	3/4-inch to No. 4 sieve	-	-
Sand	4.75 mm – 0.075 mm	No. 4 to No. 200 sieve	2.00 mm – 0.075 mm	No. 10 to No. 200 sieve
Coarse	4.75 mm – 2.00 mm	No. 4 to No. 10 sieve	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve
Medium	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve	-	-
Fine	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve
Fines (Silt and Clay)	< 0.075 mm	Passing No. 200 sieve	< 0.075 mm	Passing No. 200 sieve

Consistency for Cohesive Soil

CONSISTENCY	SPT N-VALUE (BLOWS PER FOOT)	POCKET PENETROMETER (UNCONFINED COMPRESSIVE STRENGTH, tsf)
Very Soft	2	less than 0.25
Soft	2 to 4	0.25 to 0.50
Medium Stiff	4 to 8	0.50 to 1.0
Stiff	8 to 15	1.0 to 2.0
Very Stiff	15 to 30	2.0 to 4.0
Hard	30 to 60	greater than 4.0
Very Hard	greater than 60	-

Relative Density for Granular Soil

RELATIVE DENSITY	SPT N-VALUE (BLOWS PER FOOT)
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	more than 50

Moisture Designations

TERM	FIELD IDENTIFICATION
Dry	No moisture. Dusty or dry.
Damp	Some moisture. Cohesive soils are usually below plastic limit and are moldable.
Moist	Grains appear darkened, but no visible water is present. Cohesive soils will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grains. Sand and silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is much wetter than optimum moisture content and is above plastic limit.

AASHTO SOIL CLASSIFICATION SYSTEM

TABLE 1. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing .075 mm)			Silt-Clay Materials (More than 35 Percent Passing 0.075)			
Group Classification	A-1	A-3	A-2	A-4	A-5	A-6	A-7
Sieve analysis, percent passing:							
2.00 mm (No. 10)	-	-	-				
0.425 mm (No. 40)	50 max	51 min	-	-	-	-	-
0.075 mm (No. 200)	25 max	10 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)							
Liquid limit				40 max	41 min	40 max	41 min
Plasticity index	6 max	N.P.		10 max	10 max	11 min	11 min
General rating as subgrade	Excellent to good			Fair to poor			

Note: The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

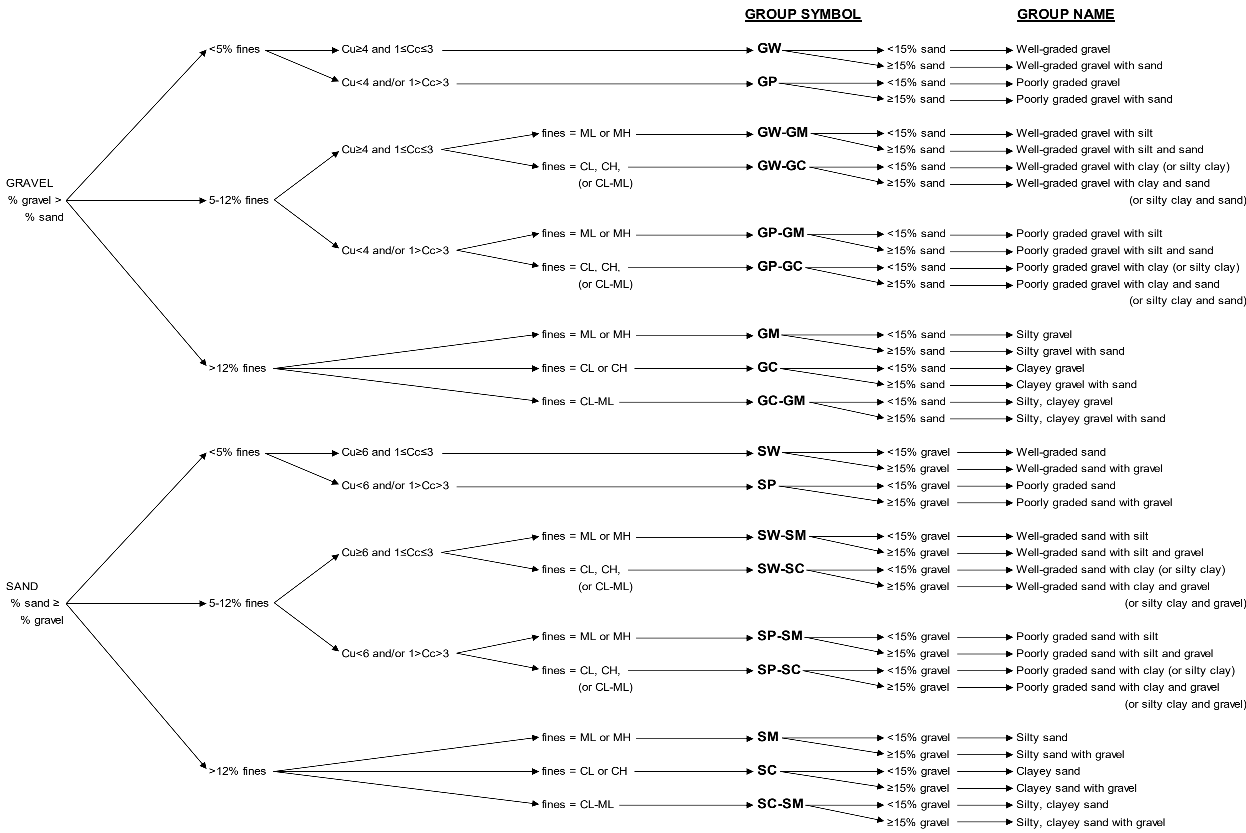
TABLE 2. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing 0.075 mm)							Silt-Clay Materials (More than 35 Percent Passing 0.075 mm)			
	A-1			A-2							A-7
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5, A-7-6
Sieve analysis, percent passing:											
2.00 mm (No. 10)	50 max	-	-	-	-	-	-	-	-	-	-
0.425 mm (No. 40)	30 max	50 max	51 min	-	-	-	-	-	-	-	-
0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)											
Liquid limit				40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11min
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General ratings as subgrade	Excellent to Good							Fair to poor			

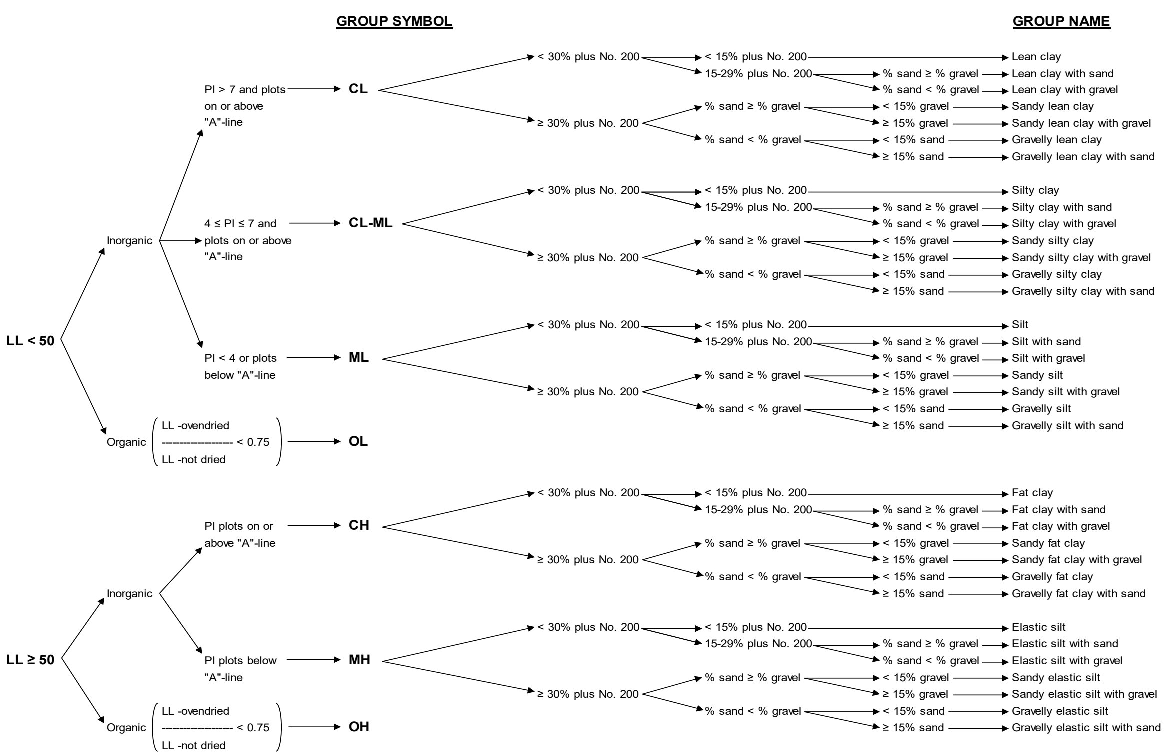
Note: Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30 (see Figure 2).

AASHTO = American Association of State Highway and Transportation Officials

USCS SOIL CLASSIFICATION SYSTEM



Flow Chart for Classifying Coarse-Grained Soils (More Than 50% Retained on No. 200 Sieve)



Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)

APPENDIX D
PHOTO LOG

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

North Site View, Facing East

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

East Site View, Facing West

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

Central Site Area, Facing West

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

Typical Soil Profile, TP-5

APPENDIX E
REPORT LIMITATIONS AND IMPORTANT INFORMATION

Geotechnical ■ Environmental ■ Special Inspections
Columbia West
Engineering, Inc

Date: September 23, 2021
Project: Lockwood Meadows Subdivision
La Center, Washington

Geotechnical and Environmental Report Limitations and Important Information

Report Purpose, Use, and Standard of Care

This report has been prepared in accordance with standard fundamental principles and practices of geotechnical engineering and/or environmental consulting, and in a manner consistent with the level of care and skill typical of currently practicing local engineers and consultants. This report has been prepared to meet the specific needs of specific individuals for the indicated site. It may not be adequate for use by other consultants, contractors, or engineers, or if change in project ownership has occurred. It should not be used for any other reason than its stated purpose without prior consultation with Columbia West Engineering, Inc. (Columbia West). It is a unique report and not applicable for any other site or project. If site conditions are altered, or if modifications to the project description or proposed plans are made after the date of this report, it may not be valid. Columbia West cannot accept responsibility for use of this report by other individuals for unauthorized purposes, or if problems occur resulting from changes in site conditions for which Columbia West was not aware or informed.

Report Conclusions and Preliminary Nature

This geotechnical or environmental report should be considered preliminary and summary in nature. The recommendations contained herein have been established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. The exploration and associated laboratory analysis of collected representative samples identifies soil conditions at specific discreet locations. It is assumed that these conditions are indicative of actual conditions throughout the subject property. However, soil conditions may differ between tested locations at different seasonal times of the year, either by natural causes or human activity. Distinction between soil types may be more abrupt or gradual than indicated on the soil logs. This report is not intended to stand alone without understanding of concomitant instructions, correspondence, communication, or potential supplemental reports that may have been provided to the client.

Because this report is based upon observations obtained at the time of exploration, its adequacy may be compromised with time. This is particularly relevant in the case of natural disasters, earthquakes, floods, or other significant events. Report conclusions or interpretations may also be subject to revision if significant development or other manmade impacts occur within or in proximity to the subject property. Groundwater conditions, if presented in this report, reflect observed conditions at the time of investigation. These conditions may change annually, seasonally or as a result of adjacent development.

Additional Investigation and Construction QA/QC

Columbia West should be consulted prior to construction to assess whether additional investigation above and beyond that presented in this report is necessary. Even slight variations in soil or site conditions may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions do not differ materially or significantly from the interpreted conditions utilized for preparation of this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Actual subsurface conditions are more readily observed and discerned during the earthwork phase of construction when soils are exposed. Columbia West cannot accept responsibility for deviations from recommendations described in this report or future performance of structural facilities if another consultant is retained during the construction phase or Columbia West is not engaged to provide construction observation to the full extent recommended.

Collected Samples

Uncontaminated samples of soil or rock collected in connection with this report will be retained for thirty days. Retention of such samples beyond thirty days will occur only at client's request and in return for payment of storage charges incurred. All contaminated or environmentally impacted materials or samples are the sole property of the client. Client maintains responsibility for proper disposal.

Report Contents

This geotechnical or environmental report should not be copied or duplicated unless in full, and even then only under prior written consent by Columbia West, as indicated in further detail in the following text section entitled *Report Ownership*. The recommendations, interpretations, and suggestions presented in this report are only understandable in context of reference to the whole report. Under no circumstances should the soil boring or test pit excavation logs, monitor well logs, or laboratory analytical reports be separated from the remainder of the report. The logs or reports should not be redrawn or summarized by other entities for inclusion in architectural or civil drawings, or other relevant applications.

Report Limitations for Contractors

Geotechnical or environmental reports, unless otherwise specifically noted, are not prepared for the purpose of developing cost estimates or bids by contractors. The extent of exploration or investigation conducted as part of this report is usually less than that necessary for contractor's needs. Contractors should be advised of these report limitations, particularly as they relate to development of cost estimates. Contractors may gain valuable information from this report, but should rely upon their own interpretations as to how subsurface conditions may affect cost, feasibility, accessibility and other components of the project work. If believed necessary or relevant, contractors should conduct additional exploratory investigation to obtain satisfactory data for the purposes of developing adequate cost estimates. Clients or developers cannot insulate themselves from attendant liability by disclaiming accuracy for subsurface ground conditions without advising contractors appropriately and providing the best information possible to limit potential for cost overruns, construction problems, or misunderstandings.

Report Ownership

Columbia West retains the ownership and copyright property rights to this entire report and its contents, which may include, but may not be limited to, figures, text, logs, electronic media, drawings, laboratory reports, and appendices. This report was prepared solely for the client, and other relevant approved users or parties, and its distribution must be contingent upon prior express written consent by Columbia West. Furthermore, client or approved users may not use, lend, sell, copy, or distribute this document without express written consent by Columbia West. Client does not own nor have rights to electronic media files that constitute this report, and under no circumstances should said electronic files be distributed or copied. Electronic media is susceptible to unauthorized manipulation or modification, and may not be reliable.

Consultant Responsibility

Geotechnical and environmental engineering and consulting is much less exact than other scientific or engineering disciplines, and relies heavily upon experience, judgment, interpretation, and opinion often based upon media (soils) that are variable, anisotropic, and non-homogenous. This often results in unrealistic expectations, unwarranted claims, and uninformed disputes against a geotechnical or environmental consultant. To reduce potential for these problems and assist relevant parties in better understanding of risk, liability, and responsibility, geotechnical and environmental reports often provide definitive statements or clauses defining and outlining consultant responsibility. The client is encouraged to read these statements carefully and request additional information from Columbia West if necessary.

APPENDIX E

Operations and Maintenance Manual

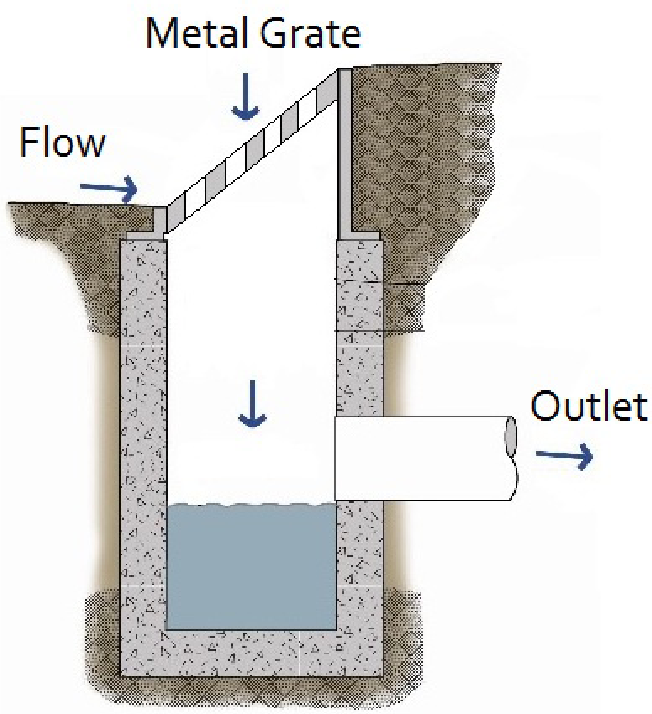
Field Inlet

A field inlet is a concrete structure fitted with a slotted grate to collect stormwater runoff and route it through underground pipes.

Field inlets typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some field inlets are fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or oils.

Facility objects that are typically associated with a field inlet include:

- access road or easement
- control structure/flow restrictor
- biofiltration wale
- detention pond
- infiltration trench



Key Operations and Maintenance Considerations

- The most common tool for cleaning field inlets is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.

- A field inlet may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a field inlet, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Field Inlet

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the field inlet by more than 10%.	No trash or debris located immediately in front of field inlet or on grate opening.
		Trash or debris (in the field inlet) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the field inlet.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the field inlet.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the field inlet.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin).	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering field inlet through cracks.	Pipe is regrouted and secure at basin wall.

Field Inlet			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. Sheen, obvious oil or other contaminants present. • Identify and remove source, AND • Report to Clark County Clean Water Program.	No contaminants or pollutants present.
Metal Grates	Grate Not in Place	Cover is missing or only partially in place. Any open field inlet requires maintenance.	Field inlet cover is closed.
	Grate Opening Unsafe	Grate with opening wider than 3 inches.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

Catch Basin

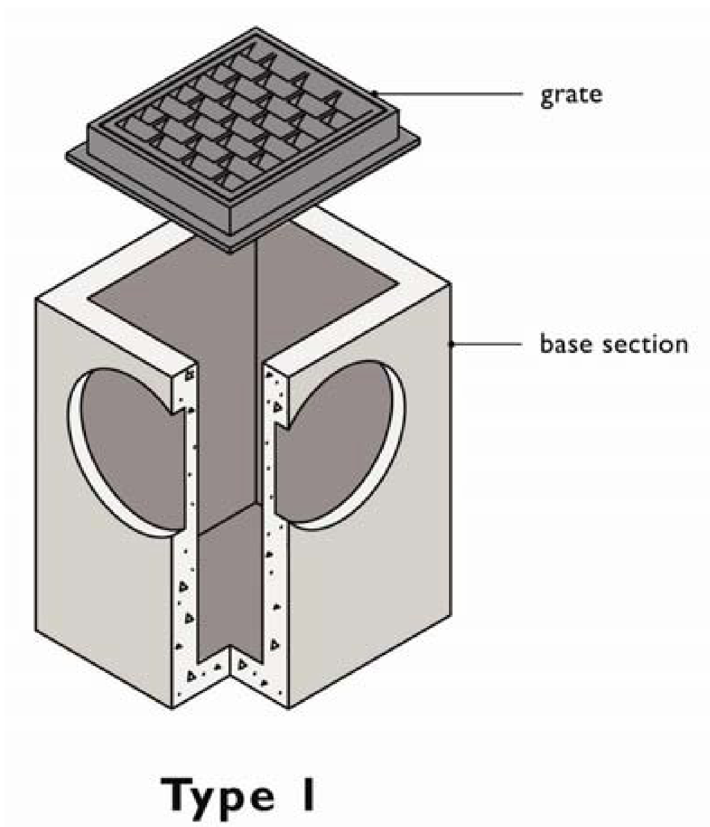
A catch basin is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Catch basins can also be used as a junction in a pipe system and may have a solid lid. There are two types.

A Type 1 catch basin is a rectangular box with approximate dimensions of 3'x2'x5'. Type 1 catch basins are utilized when the connected conveyance pipes are less than 18 inches in diameter and the depth from the gate to the bottom of the pipe is less than 5 feet.

A Type 2 catch basin, also commonly referred to as a storm manhole, is listed separately under "Manhole" in this book.

Catch basins typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some catch basins are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or debris.

Catch basins are frequently associated with all stormwater facilities.



Key Operations and Maintenance Considerations

- The most common tool for cleaning catch basins is an industrial vacuum truck with a tank and vacuum hose (e.g. Vactor® truck) to remove sediment and debris from the sump.
- A catch basin may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a catch basin, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Catch Basin

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
General	Trash and Debris	Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of catch basin or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the catch basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the catch basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into basin.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.

	Basin Walls/ Bottom	Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	Pipe is regrouted and secure at basin wall.
	Settlement/ Misalignment	If failure of basin has created a safety, function, or design problem.	Basin replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the basin opening.	No vegetation blocking opening to basin.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. Sheen, obvious oil or other contaminants present. • Identify and remove source, AND • Report to Clark County Clean Water Program.	No contaminants or pollutants present.
Catch Basin Cover	Cover Not in Place	Cover is missing or only partially in place. Any open catch basin requires maintenance.	Catch basin cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
Metal Grates (If Applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.
Oil/Debris Trap (If Applicable)	Dislodged	Oil or debris trap is misaligned with or dislodged from the outlet pipe.	Trap is connected to and aligned with outlet pipe.

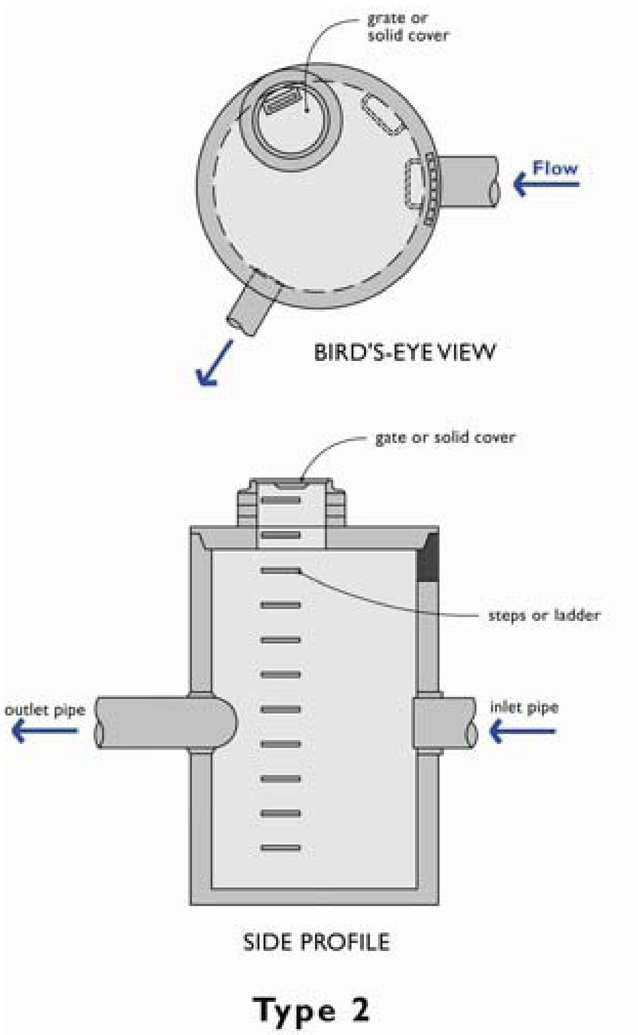
Manhole

A manhole is an underground concrete structure typically fitted with a slotted grate to collect stormwater runoff and route it through underground pipes. Manholes can also be used as a junction in a pipe system and may have a solid lid. A manhole is also known as a Type 2 catch basin.

Manholes are round concrete structures ranging in diameter from 4 feet to 8 feet. They are used when the connecting conveyance pipe is 18 inches or greater or the depth from grate to pipe bottom exceeds 5 feet. Manholes typically have steps mounted on the side of the structure to allow access.

Manholes typically provide a storage volume (sump) below the outlet pipe to allow sediments and debris to settle out of the stormwater runoff. Some manholes are also fitted with a spill control device (inverted elbow on outlet pipe) intended to contain large quantities of grease or oils.

Manholes are often associated with other stormwater facilities.



Key Operations and Maintenance Considerations

- The most common tool for cleaning manholes is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A manhole may be an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a manhole, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Manhole

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
General	Trash and Debris	Trash or debris which is located immediately in front of the opening or is blocking inletting capacity of the basin by more than 10%.	No trash or debris located immediately in front of manhole or on grate opening.
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	No trash or debris in the basin.
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	Inlet and outlet pipes free of trash or debris.
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	No dead animals or vegetation present within the catch basin.
	Sediment	Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	No sediment in the basin.
	Structure Damage to Frame and/or Top Slab	Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch. (Intent is to make sure no material is running into manhole.)	Top slab is free of holes and cracks.
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached.	Frame is sitting flush on the riser rings or top slab and firmly attached.
	Fractures or Cracks in Basin Walls/ Bottom	Maintenance person judges that structure is unsound.	Basin replaced or repaired to design standards.
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering manhole through cracks.	Pipe is regrouted and secure at basin wall.

	Settlement/ Misalignment	If failure of manhole has created a safety, function, or design problem.	Manhole replaced or repaired to design standards.
	Vegetation Inhibiting System	Vegetation growing across and blocking more than 10% of the opening.	No vegetation blocking opening to manhole.
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	No vegetation or root growth present.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. Sheen, obvious oil or other contaminants present. • Identify and remove source, AND • Report to Clark County Clean Water Program.	No contaminants or pollutants present.
Manhole Cover	Cover Not in Place	Cover is missing or only partially in place. Any open manhole is a safety hazard and requires immediate maintenance.	Manhole cover is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	Cover can be removed by one maintenance person.
Ladder	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, not securely attached to manhole wall, misalignment, rust, cracks, or sharp edges.	Ladder meets design standards and allows maintenance person safe access.
Metal Grates (If Applicable)	Grate Opening Unsafe	Grate with opening wider than 7/8 inch.	Grate opening meets design standards.
	Trash and Debris	Trash and debris that is blocking more than 20% of grate surface inletting capacity.	Grate free of trash and debris.
	Damaged or Missing	Grate missing or broken member(s) of the grate.	Grate is in place and meets design standards.

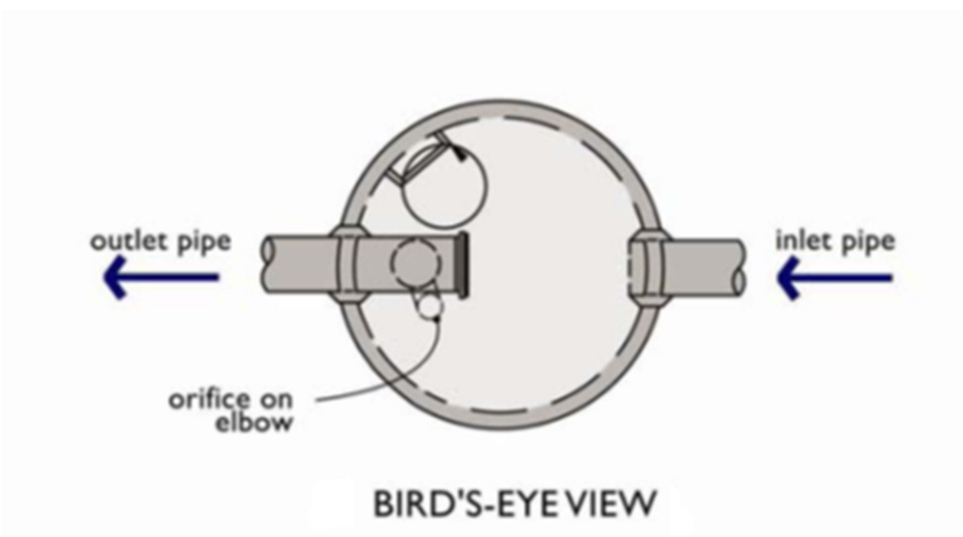
Control Structure/Flow Restrictor

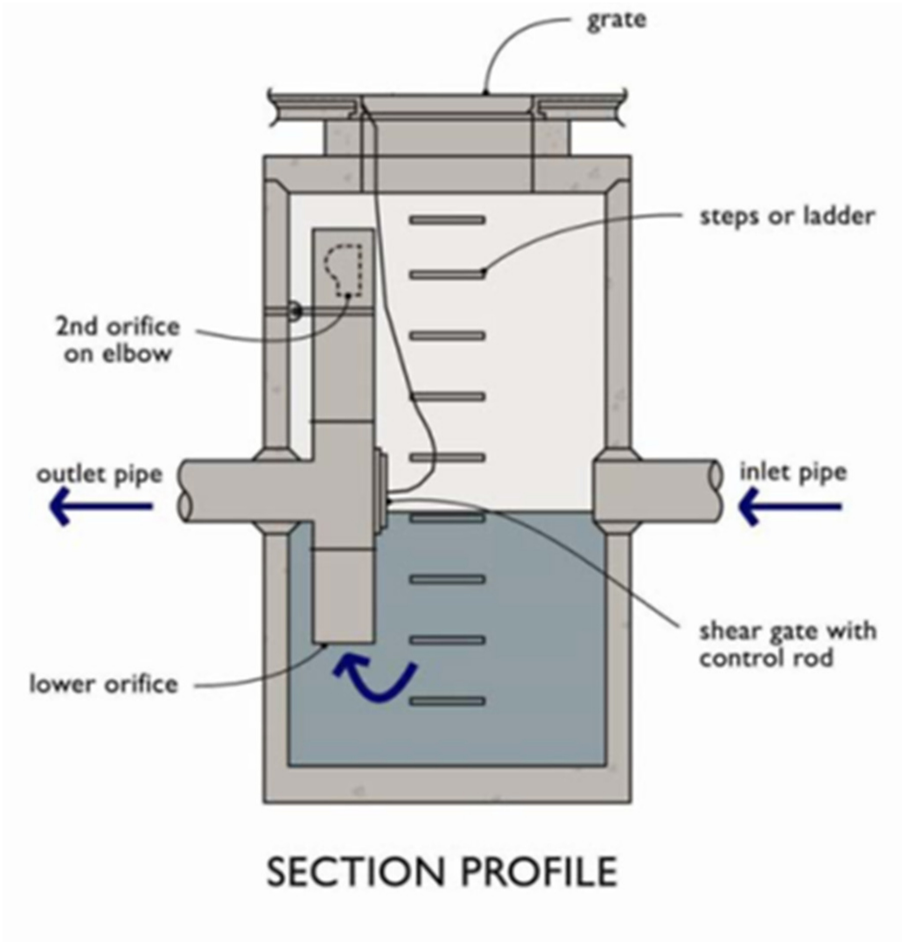
Flow control structures and flow restrictors direct or restrict flow in or out of facility components. Outflow controls on detention facilities are a common example where flow control structures slowly release stormwater at a specific rate. The flow is regulated by a combination of orifices (holes with specifically sized diameters) and weirs (plates with rectangular or "V" shaped notch). Lack of maintenance of the control structure can result in the plugging of an orifice. If these flow controls are damaged, plugged, bypassed, or not working properly, the facility could overtop or release water too quickly.

Control structures have a history of maintenance-related problems and it is imperative to establish a good maintenance program for them to function properly. Sediment typically builds up inside the structure, which blocks or restricts flow to the outlet. To prevent this problem, routinely clean out these structures and conduct regular inspections to detect the need for non-routine cleanout.

Facility objects that are typically associated with a control structure/flow restrictor include:

- detention ponds
- media cartridge filters
- closed detention system
- conveyance stormwater pipe





Key Operations and Maintenance Considerations

- Conduct regular inspections of control structures to detect the need for non-routine cleanout, especially if construction or land-disturbing activities occur in the contributing drainage area.
- The most common tool for cleaning control structures/flow restrictors is a truck with a tank and vacuum hose (Vactor® truck) to remove sediment and debris from the sump.
- A control structure is an enclosed space where harmful chemicals and vapors can accumulate. Therefore, if the inspection and maintenance requires entering a control structure, it should be conducted by an individual trained and certified to work in hazardous confined spaces.

Control Structure/Flow Restrictor

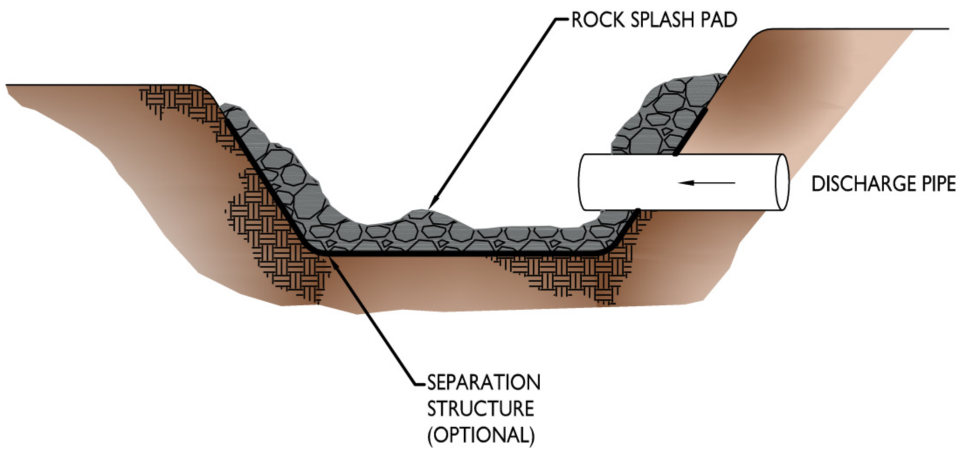
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
General	Trash and Debris (Includes Sediment)	Material exceeds 25% of sump depth or 1 foot below orifice plate.	Control structure orifice is not blocked. All trash and debris has been removed.
	Structural Damage	Structure is not securely attached to manhole wall.	Structure securely attached to wall and outlet pipe.
		Structure is not in upright position (allow up to 10% from plumb).	Structure in correct position.
		Connections to outlet pipe are not watertight and show signs of rust.	Connections to outlet pipe are water tight; structure repaired or replaced and works as designed.
		Any holes--other than designed holes--in the structure.	Structure has no holes other than designed holes.
Cleanout Gate	Damaged or Missing	Cleanout gate is not watertight or is missing.	Gate is watertight and works as designed.
		Gate cannot be moved up and down by one maintenance person.	Gate moves up and down easily and is watertight.
		Chain/rod leading to gate is missing or damaged.	Chain is in place and works as designed.
		Gate is rusted over 50% of its surface area.	Gate is repaired or replaced to meet design standards.
Orifice Plate	Damaged or Missing	Control device is not working properly due to missing, out of place, or bent orifice plate.	Plate is in place and works as designed.
	Obstructions	Any trash, debris, sediment, or vegetation blocking the plate.	Plate is free of all obstructions and works as designed.
Overflow Pipe	Obstructions	Any trash or debris blocking (or having the potential of blocking) the overflow pipe.	Pipe is free of all obstructions and works as designed.
Manhole	Cover Not in Place	Cover is missing or only partially in place. Any open manhole requires maintenance.	Manhole is closed.
	Locking Mechanism Not Working	Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread (may not apply to self-locking lids).	Mechanism opens with proper tools.
	Cover Difficult to Remove	One maintenance person cannot remove lid after applying normal lifting pressure. Intent is to keep cover from sealing off access to maintenance.	Cover can be removed and reinstalled by one maintenance person.
	Ladder Rungs Unsafe	Ladder is unsafe due to missing rungs, misalignment, not securely attached to structure wall, rust, or cracks.	Ladder meets design specifications. Allows maintenance person safe access.
Catch Basins	**See "Catch Basins"**		

Energy Dissipater / Outfall Protection

An energy dissipater is installed on or near the inlet or outlet to a closed pipe system to prevent erosion at these locations. There are a variety of designs, including wire gabion baskets, rock splash pads, trenches, and specially designed pools or manholes. The rock splash pad is typically constructed of 4- to 12-inch diameter rocks a minimum of 12 inches thick and is often lined with filter fabric. The rock pad should extend above the top of the pipe a minimum of 1 foot.

Facility features that are typically associated with energy dissipaters include:

- detention ponds
- infiltration basin
- wetponds
- treatment wetlands



Key Operations and Maintenance Considerations

- The most common tools for maintenance are hand tools such as rakes to redistribute rocks as necessary.
- Periodic removal of sediment or debris may be necessary.

Energy Dissipaters			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
External:			
Rock Pad	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad has been replaced to design function.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad has been replaced to design function.
	Sediment	Sediment on top of rock pad exceeds 10% of the surface.	Rock pad has been cleared of sediment.
	Poisonous Plants and Noxious Weeds	Any poisonous plants or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Coordinate with Clark County Environmental Services Department, Vegetation Management Program.)	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Eradication of Class A weeds as required by State law. Control of Class B weeds designated by Clark County Weed Board. Control of other listed weeds as directed by local policies. Apply requirements of adopted IPM policy for the use of herbicides.
	Other Weeds	Other weeds (not listed on County/State noxious weed lists) are present on the rock pad.	Weeds have been removed per the routine maintenance schedule, following IPM protocols.
Dispersion Trench	Pipe Plugged with Sediment	Accumulated sediment that exceeds 20% of the design depth.	Pipe is free of sediment and meets design specifications.
	Not Discharging Water Properly	Visual evidence of water discharging at concentrated points along trench (normal condition is a “sheet flow” of water along trench). Intent is to prevent erosion damage.	Trench has been repaired or modified such that it does not discharge at concentrated points and meets design function.
	Perforations Plugged	Over 1/2 of perforations in pipe are plugged with debris and sediment.	Perforated pipe has been cleaned or replaced and <25% of perforations are plugged.
	Water Flows Out Top of “Distributor” Catch Basin	Maintenance person observes or receives credible report of water flowing out during any storm less than the design storm or its causing or appears likely to cause damage.	Facility rebuilt per design specifications or redesigned to meet approved County standards.
	Receiving Area Over-Saturated	Water in receiving area is causing or has potential of causing landslide problems.	No danger of landslides.
Internal:			
Manhole/ Chamber	Worn or Damaged Post, Baffles, Side of Chamber	Structure dissipating flow deteriorates to 1/2 of original size or any concentrated worn spot exceeding one square foot which would make structure unsound.	Structure replaced to design standards.
Catch Basins	**See "Catch Basins"**		

Stormwater Conveyance Pipe

Storm sewer pipes convey stormwater. Inlet and outlet stormwater pipes convey stormwater in, through, and out of stormwater facilities.

Pipes are built from many materials and are sometimes perforated to allow stormwater to infiltrate into the ground. Pipes are cleaned to remove sediment or blockages when problems are identified. Stormwater pipes must be clear of obstructions and breaks to prevent localized flooding. All stormwater pipes should be in proper working order and free of the possible defects listed below.

Key Operations and Maintenance Considerations

- The most common tool for cleaning stormwater conveyance pipes is a truck with a tank, vacuum hose, and a jet hose (Vactor® truck) to flush sediment and debris from the pipes.

Stormwater Conveyance Pipe			
Drainage System Feature	**Potential Defect**	**Conditions When Maintenance Is Needed**	**Minimum Performance Standard**
General	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. Sheen, obvious oil or other contaminants present. • Identify and remove source, AND • Report to Clark County Clean Water Program.	No contaminants or pollutants present.
	Drainage Slow	Decreased capacity that indicates slow drainage. Does not meet facility design infiltration rate. The Water Quality Design Storm Volume does not infiltrate within 48 hours (if perforated pipe). Water remains in the pipe for greater than 24 hours after the end of most moderate rainfall events.	Perforated drain pipe has been cleaned and drainage rates are per design specifications. (Do not allow removed sediment and water to discharge back into the storm sewer.)
	Obstructions, Including Roots	Root enters or deforms pipe, reducing flow.	Roots have been removed from pipe (using mechanical methods; do not put root-dissolving chemicals in storm sewer pipes). If necessary, vegetation over the line removed.
	Pipe Dented or Broken	Inlet/outlet piping damaged or broken and in need of repair.	Pipe repaired and/or replaced per design standards.
	Pipe Rusted or Deteriorated	Any part of the piping that is crushed or deformed more than 20% or any other failure to the piping.	Pipe repaired and/or replaced per design standards.
	Sediment & Debris	Sediment depth is greater than 20% of pipe diameter.	Pipe has been cleaned and is free of sediment/ debris. (Upstream debris traps installed where applicable.)
	Debris Barrier or Trash Rack Missing	Stormwater pipes > than 18 inches need debris barrier.	Debris barrier present on all stormwater pipes 18 inches and greater.

Stormwater Facility Discharge Points / Pipe Outlets

Stormwater facility discharge points may convey stormwater from the stormwater facility into open channels, ditches, ponds, streams, and wetlands. Stormwater facility discharge points need to be assessed to make sure stormwater is not causing any negative impacts to these drainage areas.

Key Operations and Maintenance Considerations

- The most common tools are hand tools to remove debris or to redistribute outfall protection rock.

(Source: USDA - Natural Resources Conservation Service - Illinois)

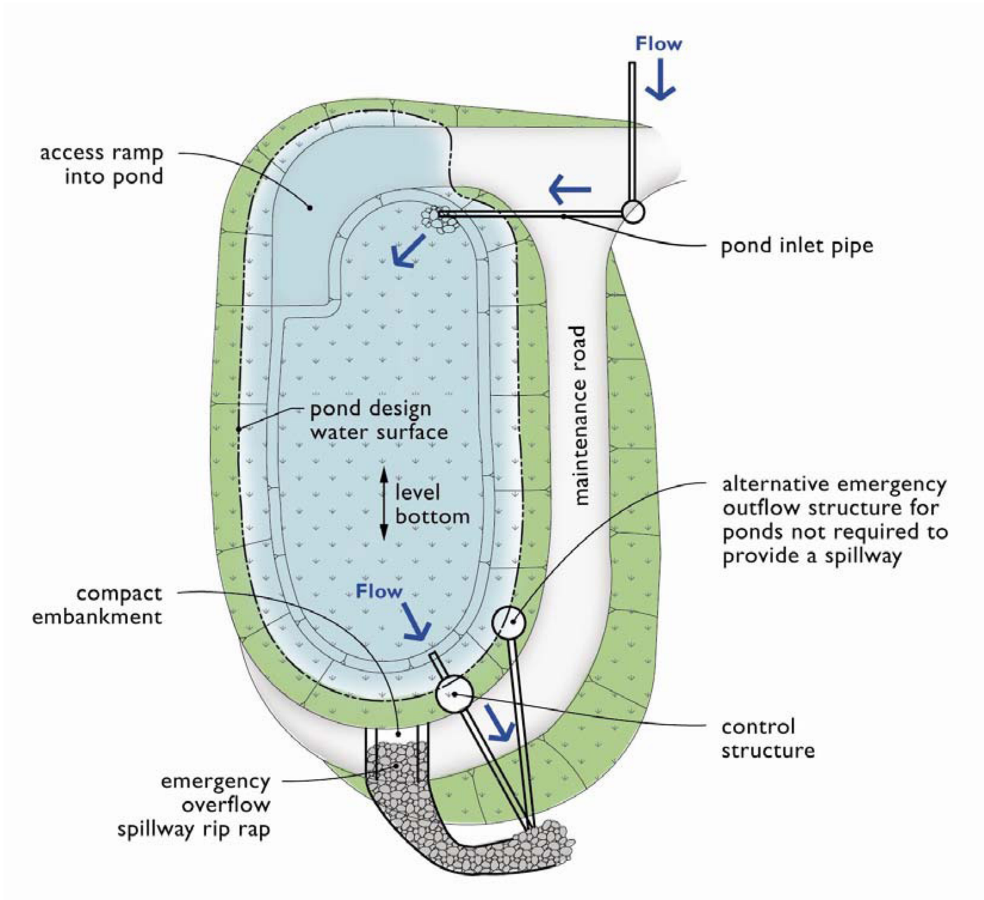
Facility Discharge Point			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Monitoring	Contaminants in Discharge Water	Any evidence of oil, gasoline, contaminants or other pollutants. Sheen, obvious oil or other contaminants present. • Identify and remove source, AND • Report to Clark County Clean Water Program.	Effluent discharge from facility is clear.
	Receiving Area Saturated	Water in receiving area is causing substrate to become saturated and unstable. • Report to Clark County Clean Water Program for Engineer Evaluation.	Receiving area is sound and not saturated.
	Ditch or Stream Banks Eroding (via Off Site Assessment)	Erosion, scouring, or headcuts in ditch or stream banks downstream of facility discharge point due to flow channelization or higher flows. • Report to Clark County Clean Water Program for Engineer Evaluation.	Ditch or stream banks are stable.
General	Missing or Moved Rock	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil.	Rock pad replaced to design function.
	Erosion	Soil erosion in or adjacent to rock pad.	Rock pad replaced to design function.
	Obstructions, Including Roots	Roots or debris enters pipe or deforms pipe, reducing flow.	Roots have been removed from pipe (using mechanical methods; do not put root-dissolving chemicals in storm sewer pipes). If necessary, vegetation over the line removed.
	Pipe Rusted or Deteriorated	Any part of the pipe that is broken, crushed or deformed more than 20% or any other failure to the piping.	Pipe repaired or replaced to design standards.
Internal (If Applicable)			
Energy Dissipater	**See "Energy Dissipater"**		

Detention Pond

A stormwater detention pond is an open basin built by excavating below existing ground or by constructing above-ground berms (embankments). The detention pond temporarily stores stormwater runoff during rain events and slowly releases it through an outlet (control structure). Detention ponds are typically designed to completely drain within 24 hours after the completion of a storm event. Styles vary greatly from well-manicured to natural appearing. Generally, more natural-appearing vegetation is preferred for reduced maintenance and enhanced wildlife habitat.

Facility objects that are typically associated with a detention pond include:

- access road or easement
- fence, gate, and water quality sign
- typical bioswale
- wet bioswale
- media filter cartridge
- control structure/flow restrictor
- energy dissipaters
- conveyance stormwater pipe



Example of a Manicured Detention Pond

Key Operations and Maintenance Considerations

- Maintenance is of primary importance if detention ponds are to continue to function well.
- Sediment should be removed when the standards in the defect table are exceeded. Sediments must be disposed in accordance with current local health department requirements and the Minimum Functional Standards for Solid Waste Handling. For additional guidance see Book 3, Appendix 3-E, Recommendations for Management of Street Waste.
- Handle sediments removed during the maintenance operation in a manner consistent with Book 3, Appendix 3-E, Recommendations for Management of Street Waste.
- If a shallow marsh has established, then contact Clark County Department of Environmental Services for advice.
- Maintenance of sediment forebays and attention to sediment accumulation within the pond is extremely important. Continually monitor sediment deposition in the basin. Owners, operators, and maintenance authorities should be aware that significant concentrations of metals (e.g., lead, zinc, and cadmium) as well as some organics such as pesticides, may be expected to accumulate at the bottom of these types of facilities. Regularly conduct testing sediment, especially near points of inflow, to determine the leaching potential and level of accumulation of potentially hazardous material before disposal.
- Slope areas that have become bare should be revegetated and eroded areas should be regraded prior to being revegetated.
- A common tool for cleaning detention ponds is a small bulldozer or excavator to remove built-up sediment and debris from the bottom of the pond during the dry season.

Plant Material

Table 1: Stormwater Tract "Low Grow" Seed Mix* for Detention Pond

Stormwater Tract "Low Grow" Seed Mix*		
Botanical Name	Common Name	% By Weight
Festuca arundinacea var.	Dwarf tall fescue	40%
Lolium perenne var. barclay	Dwarf perennial rye** 'Barclay'	30%
Festuca rubra	Red fescue	25%
Agrostis tenius	Colonial bentgrass	5%
Selected plants shall not include any plants from the State of Washington Noxious Weed List. Refer to clark.wa.gov/weed/ for a current list of noxious weeds.		
*Adapted from Ecology 2012, v.III, Ch 3.2.		
** If wildflowers are used and sowing is done before Labor Day, the amount of dwarf perennial rye can be reduced proportionately to the amount of wildflower seed used.		

Detention Pond			
Drainage System Feature	**Potential Defect**	**Conditions When Maintenance Is Needed**	**Minimum Performance Standard**
			Note: table spans multiple pages.
General	Trash and Debris	Any trash and debris which exceed 1 cubic foot per 1,000 square feet. In general, there should be no visual evidence of dumping. If less than threshold all trash and debris will be removed as part of next scheduled maintenance.	Site is free of trash and debris.
	Poisonous Plants and Noxious Weeds	Any poisonous plants or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Coordinate with Clark County Environmental Services Department, Vegetation Management Program.)	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Eradication of Class A weeds as required by State law. Control of Class B weeds designated by Clark County Weed Board. Control of other listed weeds as directed by local policies. Apply requirements of adopted IPM policy for the use of herbicides.
	Tree Growth and Hazard Trees	Tree growth does not allow maintenance access or interferes with maintenance activity (i.e., slope mowing, silt removal, vaccuming, or equipment movements). If trees are not interfering with access or maintenance, do not remove. Dead, diseased, or dying trees are identified. (Use a certified Arborist to determine health of tree or removal requirements.)	Trees do not hinder maintenance activities. Harvested trees should be recycled into mulch or other beneficial uses (e.g., alders for firewood). Remove hazard trees.
	Contaminants and Pollution	Any evidence of oil, gasoline, contaminants or other pollutants. (Coordinate removal/cleanup with local water quality response agency.)	No contaminants or pollutants present.
	Rodent Holes	Any evidence of rodent holes if facility is acting as a dam or berm, or any evidence of water piping through dam or berm via rodent holes.	Rodents destroyed and dam or berm repaired. (Coordinate with Clark County Maintenance and Operations department; coordinate with Ecology Dam Safety Office if pond exceeds 10 acre-feet.)
	Beaver Dams	Dam results in change or function of the facility.	Facility is returned to design function. (Coordinate trapping of beavers and removal of dams with appropriate permitting agencies.)

Detention Pond

Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
	Insects	When insects such as wasps and hornets interfere with maintenance activities.	Insects destroyed or removed from site. Apply insecticides in compliance with adopted Clark County Operations and Maintenance policies.
Side Slopes of Pond	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes have been stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.
Storage Area	Sediment	Accumulated sediment that exceeds 10% of the designed pond depth unless otherwise specified or affects inletting or outletting condition of the facility.	Sediment cleaned out to designed pond shape and depth; pond reseeded if necessary to control erosion.
	Liner (If Applicable)	Liner is visible and has more than three 1/4-inch holes in it.	Liner repaired or replaced. Liner is fully covered.
Pond Berms (Dikes)	Settlements	Any part of berm which has settled 4 inches lower than the design elevation.	Dike is built back to the design elevation.
		If settlement is apparent, measure berm to determine amount of settlement.	
		Settling can be an indication of more severe problems with the berm or outlet works. A licensed civil engineer should be consulted to determine the source of the settlement.	
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue.	Piping eliminated. Erosion potential resolved.
		(Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.	
Emergency Overflow/ Spillway and Berms Over 4 Feet in Height	Tree Growth	Tree growth on emergency spillways creates blockage problems and may cause failure of the berm due to uncontrolled overtopping. Tree growth on berms over 4 feet in height may lead to piping through the berm which could lead to failure of the berm.	Trees removed. If root system is small (base less than 4 inches) the root system may be left in place. Otherwise the roots should be removed and the berm restored. A licensed civil engineer should be consulted for proper berm/spillway restoration.

Detention Pond			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
	Piping	Discernible water flow through pond berm. Ongoing erosion with potential for erosion to continue. (Recommend a Geotechnical engineer be called in to inspect and evaluate condition and recommend repair of condition.)	Piping eliminated. Erosion potential resolved.
Emergency Overflow/ Spillway	Rock Missing	Only one layer of rock exists above native soil in area five square feet or larger, or any exposure of native soil at the top of flow path of spillway. (Rip-rap on inside slopes need not be replaced.)	Rocks and pad depth are restored to design standards.
	Erosion	Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion. Any erosion observed on a compacted berm embankment.	Slopes have been stabilized using appropriate erosion control measure(s); e.g., rock reinforcement, planting of grass, compaction. If erosion is occurring on compacted berms a licensed civil engineer should be consulted to resolve source of erosion.

Media Cartridge Filters

Media cartridge filters are passive, flow-through, stormwater treatment systems. They are comprised of one or more vaults that house rechargeable, media-filled filter cartridges. Stormwater passes through a filtering medium, which traps particulates and/or adsorb pollutants such as dissolved metals and hydrocarbons. Once filtered through the media, the treated stormwater is directed to a collection pipe or discharged into an open channel drainage way.

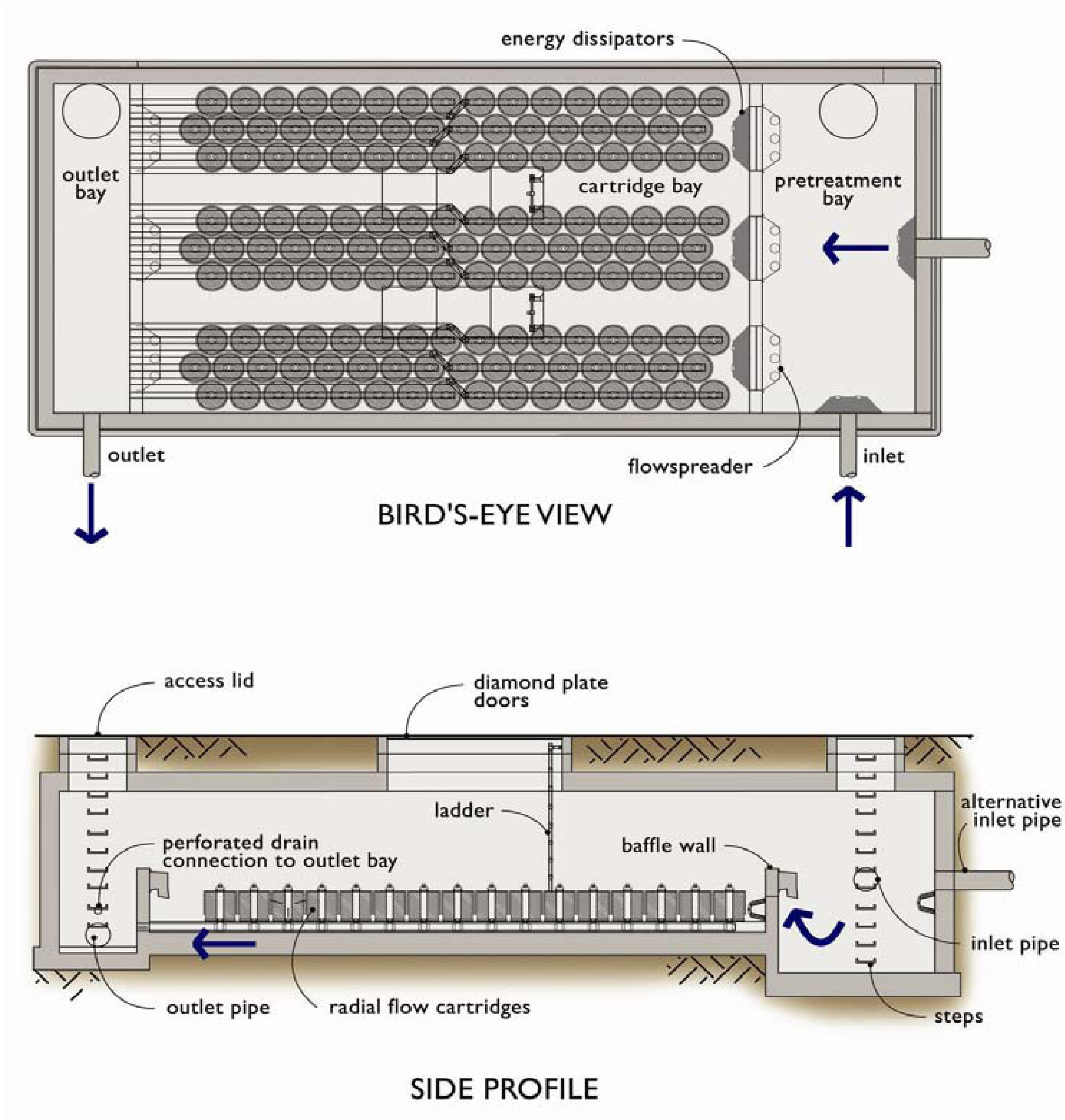
The filter media can be housed in cartridge filters enclosed in concrete vaults or catch basins. Structures will have vault doors or manhole lids (older designs) for maintenance access. Various types of filter media are available from system manufacturers.

StormFilter® units are an example of a proprietary manufactured media cartridge filter system that is common in Clark County. See manufacturer's publications for additional maintenance information.

Facility objects that are typically associated with a manufactured media filter system include:

- access road or easement
- control structure/flow restrictor
- conveyance stormwater pipe

Media Cartridge Filter Vault with Accumulated Sediment



Key Operations and Maintenance Considerations

- The most common tool for cleaning media cartridge filters is a truck with a tank and vacuum hose (e.g.Vactor® truck) to remove sediment and debris from the vault.
- Media cartridge filters are enclosed spaces where harmful chemicals and vapors can accumulate. Therefore, the inspection and maintenance of these facilities should be conducted by an individual trained and certified to work in hazardous confined spaces.
- Cartridges require replacement when the individual cartridges no longer meet the specifications for pollutant removal.

Media Cartridge Filters			
Drainage System Feature	**Potential Defect**	**Conditions When Maintenance Is Needed**	**Minimum Performance Standard**
			Note: table spans multiple pages.
Forebay	Sediment Accumulation	Sediment accumulation exceeds 6 inches or 1/3 of available sump.	Sediment accumulation less than 6 inches.
Media Filter Vault	Sediment Accumulation on Top Media Filters (Cartridges)	Sediment depth exceeds 0.25-inches (on top of filter cartridges).	No sediment deposits which would impede permeability of the compost media. No sediment deposits on top of cartridges. (Sediment on cartridges likely indicates that cartridges are plugged and require maintenance.)
	Sediment Accumulation in Vault	Sediment depth exceeds 4 inches in chamber. Look for other indicators of clogged cartridges or overflow.	No sediment deposits in vault bottom of first chamber. Cartridges have been checked and replaced or serviced as needed.
	Trash and Debris Accumulation	Trash and debris accumulated in vault.	No trash or debris in vault.
	Sediment in Drain Pipes/Clean-Outs	When drain pipes, clean-outs, become full with sediment and/or debris.	Sediment and debris has been removed.
	Damaged Pipes	Any part of the pipes that are crushed or damaged due to corrosion and/or settlement.	Pipe repaired and/or replaced to design specifications.
	Access Cover Damaged/Not Working	Cover cannot be opened; one person cannot open the cover using normal lifting pressure; corrosion/deformation of cover.	Cover repaired or replaced to design specifications.
	Vault Structure Includes Cracks in Wall, Bottom, Damage to Frame and/or Top Slab	Cracks wider than 1/2 inch or evidence of soil particles entering the structure through the cracks, or maintenance/inspection personnel determine that the vault is not structurally sound.	Vault replaced or repairs made so that vault meets design specifications and is structurally sound.
		Cracks wider than 1/2 inch at the joint of any inlet/outlet pipe or evidence of soil particles entering through the cracks.	Vault repaired so that no cracks exist wider than 1/4 inch at the joint of the inlet/outlet pipe.
	Baffles Damaged	Baffles corroding, cracking, warping, and/or showing signs of failure as determined by maintenance/inspection person.	Baffles repaired or replaced to design specifications.
	Access Ladder Damaged	Ladder is corroded or deteriorated, not functioning properly, not securely attached to structure wall, missing rungs, cracks, and misaligned.	Ladder replaced or repaired and meets design specifications, and is safe to use as determined by inspection personnel.
Below Ground Cartridge Type	Compost Media Clogging	Drawdown of water through the media takes longer than 1 hour, and/or overflow occurs frequently.	Media cartridges have been replaced and drawdown time and overflow frequency are per design standards.

Media Cartridge Filters			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
			Note: table spans multiple pages.
	Short Circuiting	Flows do not properly enter filter cartridges.	Flows are properly entering filter cartridges. Cartridges have been replaced if necessary.
	Filter Cartridges Submerged	Filter vault does not drain within 24 hours following storm. Look for evidence of submergence due to backwater or excessive hydrocarbon loading.	Filter media have been checked and replaced if needed and vault drains down within 24 of a storm event. (If cartridges are plugged with oil, additional treatment or source control BMP may be needed.)

Compost-Amended Soil

Naturally occurring (undisturbed) soil and vegetation provide important stormwater functions including: water infiltration; nutrient, sediment, and pollutant adsorption; sediment and pollutant biofiltration; water interflow storage and transmission; and pollutant decomposition.

Compaction from construction can reduce the soil's natural ability to provide these functions. Compost-amended soils are intended to replace these lost functions by establishing a minimum soil quality and depth in the post-development landscape.

Sufficient organic content is a key to soil quality. Soil organic matter can be attained through numerous amendments such as compost, composted woody material, biosolids, and forest product residuals. The full benefits of compost-amended soils are realized when desired soil media depths are maintained and soil compaction is minimized.

Key Operations and Maintenance Considerations

- Replenish soil media as needed (as a result of erosion) and address compacted, poorly draining soils.
- Site uses should protect vegetation and avoid soil compaction. Care should be taken to prevent compaction of soils via vehicular loads and/or excessive foot traffic, especially during wet conditions.
- The table below provides the recommended maintenance frequencies, standards, and procedures for compost-amended soils. The level of routine maintenance required and the frequency of corrective maintenance actions may increase for facilities prone to erosion due to site conditions such as steep slopes or topography tending to concentrate flows.

Compost-Amended Soil			
Drainage System Feature	Potential Defect	Conditions When Maintenance Is Needed	Minimum Performance Standard
Soil Media	Soils Waterlogged or Not Infiltrating	Soils become waterlogged, or otherwise do not appear to be infiltrating.	Soils have been aerated or amended such that infiltration occurs and soils to not remain completely saturated, per design specifications.
	Erosion/Scouring	Areas of potential erosion are visible, such as gullies or scouring.	Any eroded areas have been repaired, and sources of erosion addressed to prevent further soil erosion.
Vegetation	Vegetation in Poor Health	Less than 75% of planted vegetation is healthy with a generally good appearance.	At least 75% of planted vegetation is healthy with generally good appearance. Any conditions found that were deleterious to plant health have been corrected where possible. Routine maintenance schedule has been updated as necessary to ensure continued plant health and satisfactory appearance.
	Poisonous Plants and Noxious Weeds	Any poisonous plants or nuisance vegetation which may constitute a hazard to maintenance personnel or the public. Any evidence of noxious weeds as defined by State or local regulations. (Coordinate with Clark County Environmental Services Department, Vegetation Management Program.)	No danger of poisonous vegetation where maintenance personnel or the public might normally be. Eradication of Class A weeds as required by State law. Control of Class B weeds designated by Clark County Weed Board. Control of other listed weeds as directed by local policies. Apply requirements of adopted IPM policy for the use of herbicides.
	Other Weeds Present	Other weeds (not listed on County/State noxious weed lists) are present on site.	Weeds have been removed per the routine maintenance schedule, following IPM protocols.

APPENDIX F

SWPPP

Stormwater Pollution Prevention Plan

For
Riverside Neighborhood Park

Prepared For
Southwest Regional Office
300 Desmond Drive
Lacey, WA 98503
(360) 407-6300

Owner	Developer	Operator/Contractor
ECM Riverside, LLC	9317 LLC	To Be Determined
340 Oswego Pointe Drive, Suite 208	9321 NE 72nd Ave. Bldg C #7	
Lake Oswego, OR 97034	Vancouver, WA 98665	

Project Site Location
34512 NW Pacific Highway
La Center, WA 98629

Certified Erosion and Sediment Control Lead
To be Determined

SWPPP Prepared By
PLS Engineering
Consulting Engineers and Planners
604 W. Evergreen Blvd
Vancouver, WA 98660
PH: (360) 944-6519
PM@plsengineering.com

SWPPP Preparation Date
October 23, 2020

Approximate Project Construction Dates
November 2020
November 2023

Contents

Appendix A Site plans

- Vicinity map (with all discharge points)
- Site plan with TESC measures

Appendix B Construction BMPs

- Possibly reference in BMPs, but likely it will be a consolidated list so that the applicant can photocopy from the list from the SWMMWW.

Appendix C Alternative Construction BMP list

- List of BMPs not selected, but can be referenced if needed in each of the 12 elements

Appendix D General Permit

Appendix E Site Log and Inspection Forms

Appendix F Engineering Calculations

1.0 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared for the Riverside Neighborhood Park Site Plan project in La Center, Washington. The Riverside Neighborhood Park is a 5.19-acre site located on the southwest side of Old Pacific Highway directly west of Larson Road in La Center, WA. The site address is 34512 NW Pacific Highway and is located in the SE ¼ of Section 33, T5N, R1E, Willamette Meridian. It is identified as Parcel Number 986028825 per the Clark County Assessor's records. The site currently consists of vacant fields, wetlands, and a stock watering pond. In addition, the site was previously used for residential purposes with an existing home having been removed sometime around 2014. A drainage ditch traverses along the south line of the parcel.

The site's existing topography is generally rolling with some steep areas near NW Pacific Hwy. It slopes down from the highway towards the drainage ditch, with the SW corner of the site as a low point. There is a high point near the south property line that separates the site into two drainage basins. The proposed development will maintain these drainage patterns by routing water to two separate facilities. Riverside Neighborhood Park will include picnic tables, play equipment, a basketball court, pedestrian paths, open space, and a drinking fountain. Infrastructure improvements to support the park will include lighting, a water lateral for the drinking fountain, paved driveway and parking area.

The purpose of this SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The objectives of the SWPPP are to:

1. Implement Best Management Practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. Prevent violations of surface water quality, ground water quality, or sediment management standards.

3. Prevent, during the construction phase, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak flow rates and volumes of stormwater runoff at the Permittee's outfalls and downstream of the outfalls.

This SWPPP was prepared using the Ecology SWPPP Template downloaded from the Ecology website. This SWPPP was prepared based on the requirements set forth in the Construction Stormwater General Permit and the *Stormwater Management Manual for Western Washington* (SWMMWW). The report is divided into seven main sections with several appendices that include stormwater related reference materials. The topics presented in the each of the main sections are:

- Section 1 – INTRODUCTION. This section provides a summary description of the project, and the organization of the SWPPP document.

- Section 2 – SITE DESCRIPTION. This section provides a detailed description of the existing site conditions, proposed construction activities, and calculated stormwater flow rates for existing conditions and post–construction conditions.

- Section 3 – CONSTRUCTION BMPs. This section provides a detailed description of the BMPs to be implemented based on the 12 required elements of the SWPPP (SWMMEW 2004).

- Section 4 – CONSTRUCTION PHASING AND BMP IMPLEMENTATION. This section provides a description of the timing of the BMP implementation in relation to the project schedule.

- Section 5 – POLLUTION PREVENTION TEAM. This section identifies the appropriate contact names (emergency and non-emergency), monitoring personnel, and the onsite temporary erosion and sedimentation control inspector

- Section 6 – INSPECTION AND MONITORING. This section provides a description of the inspection and monitoring requirements such as the parameters of concern to be monitored, sample locations, sample frequencies, and sampling methods for all stormwater discharge locations from the site.

- Section 7 – RECORDKEEPING. This section describes the requirements for documentation of the BMP implementation, site inspections, monitoring results, and changes to the implementation of certain BMPs due to site factors experienced during construction.

Supporting documentation and standard forms are provided in the following Appendices:

Appendix A – Site plans
Appendix B – Construction BMPs
Appendix C – Alternative Construction BMP list
Appendix D – General Permit
Appendix E – Site Log and Inspection Forms
Appendix F – Engineering Calculations

2.0 Site Description

2.1 Existing Conditions

The Riverside Neighborhood Park is a 5.19-acre site located on the southwest side of Old Pacific Highway directly west of Larson Road in La Center, WA. The site address is 34512 NW Pacific Highway and is located in the SE ¼ of Section 33, T5N, R1E, Willamette Meridian. It is identified as Parcel Number 986028825 per the Clark County Assessor's records. The site currently consists of vacant fields, wetlands, and a stock watering pond. In addition, the site was previously used for residential purposes with an existing home having been removed sometime around 2014. A drainage ditch traverses along the south line of the parcel.

2.2 Proposed Construction Activities

Current proposed development associated with this SWPPP includes the construction of a park along with the associated infrastructure. The site's existing topography is generally rolling with some steep areas near NW Pacific Hwy. It slopes down from the highway towards the drainage ditch, with the SW corner of the site as a low point. There is a high point near the south property line that separates the site into two drainage basins. The proposed development will maintain these drainage patterns by routing water to two separate facilities.

Riverside Neighborhood Park will include picnic tables, play equipment, a basketball court, pedestrian paths, open space, and a drinking fountain. Infrastructure improvements to support the park will include lighting, a water lateral for the drinking fountain, paved driveway and parking area.

3.0 Construction Stormwater BMPs

3.1 The 12 BMP Elements

3.1.1 Element #1 – Mark Clearing Limits

To protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction will be clearly marked before land-disturbing activities begin. Trees that are to be preserved, as well as all sensitive areas and their buffers, shall be clearly delineated, both in the field and on the plans. In general, natural vegetation and native topsoil shall be retained in an undisturbed state to the maximum extent possible. The BMPs relevant to marking the clearing limits that will be applied for this project include:

- Preserving Native Vegetation (BMP C101)
- Silt Fence (BMP C233)

Alternate BMPs for marking clearing limits are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.2 Element #2 – Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (BMP C105)

Alternate construction access BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.3 Element #3 – Control Flow Rates

In order to protect the properties and waterways downstream of the project site, stormwater discharges from the site will be controlled. The specific BMPs for flow control that shall be used on this project include:

- The stormwater detention facility which will initially function as a Temporary Sediment Pond (BMP C241).

Alternate flow control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, the project must comply with Minimum Requirement 7 (Ecology 2005).

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to downstream erosion, or where necessary to meet local agency stormwater discharge requirements (e.g. discharge to combined sewer systems).

3.1.4 Element #4 – Install Sediment Controls

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Silt Fence (BMP C233)
- Storm Drain Inlet Protection (BMP C220)
- Detention facility to initially function as sediment control facility

Alternate sediment control BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

In addition, sediment will be removed from paved areas in and adjacent to construction work areas manually or using mechanical sweepers, as needed, to minimize tracking of sediments on vehicle tires away from the site and to minimize washoff of sediments from adjacent streets in runoff.

Whenever possible, sediment laden water shall be discharged into onsite, relatively level, vegetated areas (BMP C240 paragraph 5, page 4-102).

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMPs (e.g., infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMPs, such as those used for infiltration or biofiltration; however, those BMPs designed to remove solids by settling (wet ponds or detention ponds) can be used during the construction phase. When permanent stormwater BMPs will be used to control sediment discharge during construction, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMPs. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized.

The following BMPs will be implemented as end-of-pipe sediment controls as required to meet permitted turbidity limits in the site discharge(s). Prior to the implementation of these technologies, sediment sources and erosion control and soil stabilization BMP efforts will be maximized to reduce the need for end-of-pipe sedimentation controls.

- Temporary Sediment Pond (BMP C241)
- Construction Stormwater Filtration (BMP C251)
- Construction Stormwater Chemical Treatment (BMP C 250) (implemented only with prior written approval from Ecology).

3.1.5 Element #5 – Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (BMP C120)
- Mulching (BMP C121)
- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)
- Topsoiling (BMP C125)
- Surface Roughening (BMP C130)
- Dust Control (BMP C140)
- Early application of gravel base on areas to be paved

Alternate soil stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, no soils shall remain exposed and unworked for more than 7 days during the dry season (May 1 to September 30) and 2 days during the wet season (October 1 to April 30). Regardless of the time of year, all soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.

In general, cut and fill slopes will be stabilized as soon as possible and soil stockpiles will be temporarily covered with plastic sheeting. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

3.1.6 Element #6 – Protect Slopes

All cut and fill slopes will be designed, constructed, and protected in a manner than minimizes erosion. The following specific BMPs will be used to protect slopes for this project:

- Temporary and Permanent Seeding (BMP C120)

Alternate slope protection BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1.7 Element #7 – Protect Drain Inlets

All storm drain inlets and culverts made operable during construction or inlets near the site that could potentially receive surface runoff from the construction site shall be protected to prevent unfiltered or untreated water from entering the drainage conveyance system. However, the first priority is to keep all access roads clean of sediment and keep street wash water separate from entering storm drains until treatment can be provided. Storm Drain Inlet Protection (BMP C220) will be implemented for all drainage inlets and culverts that could potentially be impacted by sediment-laden runoff on and near the project site. The following inlet protection measures will be applied on this project:

Drop Inlet Protection

- Block and Gravel Drop Inlet Protection
- Gravel and Wire Drop Inlet Protection
- Catch Basin Filter If the BMP options listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D), or if no BMPs are listed above but deemed necessary during construction, the Certified Erosion and Sediment Control Lead shall implement one or more of the alternative BMP inlet protection options listed in Appendix C.

3.1.8 Element #8 – Stabilize Channels and Outlets

Where site runoff is to be conveyed in channels or discharged to a stream or some other natural drainage point, efforts will be taken to prevent downstream erosion. The specific BMPs for channel and outlet stabilization that shall be used on this project include:

- Outlet Protection (BMP C209)

Alternate channel and outlet stabilization BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

The project site is located west of the Cascade Mountain Crest. As such, all temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected peak 10-minute velocity of flow from a Type 1A, 10-year, 24-hour recurrence interval storm for the developed condition. Alternatively, the 10-year, 1-hour peak flow rate indicated by an approved continuous runoff simulation model, increased by a factor of 1.6, shall be used. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

3.1.9 Element #9 – Control Pollutants

All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.
- On-site fueling tanks and petroleum product storage containers shall include secondary containment.
- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.
- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.
- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

Chemical storage:

- Any chemicals stored in the construction areas will conform to the appropriate source control BMPs listed in Volume IV of the Ecology stormwater manual. In Western WA, all chemicals shall have cover, containment, and protection provided on site, per BMPC153 for Material Delivery, Storage and Containment in SWMMWW 2005
- Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application procedures and rates shall be followed.

Excavation and tunneling spoils dewatering waste:

- Dewatering BMPs and BMPs specific to the excavation and tunneling (including handling of contaminated soils) are discussed under Element 10.

Demolition:

- Dust released from demolished sidewalks, buildings, or structures will be controlled using Dust Control measures (BMP C140).
- Storm drain inlets vulnerable to stormwater discharge carrying dust, soil, or debris will be protected using Storm Drain Inlet Protection (BMP C220 as described above for Element 7).
- Process water and slurry resulting from sawcutting and surfacing operations will be prevented from entering the waters of the State by implementing Sawcutting and Surfacing Pollution Prevention measures (BMP C152).

Concrete and grout:

- Process water and slurry resulting from concrete work will be prevented from entering the waters of the State by implementing Concrete Handling measures (BMP C151).

Sanitary wastewater:

- Portable sanitation facilities will be firmly secured, regularly maintained, and emptied when necessary.
- Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system or to the sanitary sewer as part of Wheel Wash implementation (BMP C106).

Solid Waste:

- Solid waste will be stored in secure, clearly marked containers.

Other:

- Other BMPs will be administered as necessary to address any additional pollutant sources on site.

The facility does not require a Spill Prevention, Control, and Countermeasure (SPCC) Plan under the Federal regulations of the Clean Water Act (CWA).

3.1.10 Element #10 – Control Dewatering

No dewatering is anticipated as part of this construction project. If it is necessary, appropriate BMP's will be implemented to ensure that dewatering water meets state water quality requirements before being discharged from the site.

3.1.11 Element #11 – Maintain BMPs

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMPs specifications (attached). Visual monitoring of the BMPs will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive, and is temporarily stabilized, the inspection frequency will be reduced to once every month.

All temporary erosion and sediment control BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

3.1.12 Element #12 – Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.
- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.
- Schedule major earthwork during the dry season.

In addition, project management will incorporate the key components listed below:

As this project site is located west of the Cascade Mountain Crest, the project will be managed according to the following key project components:

Phasing of Construction

- The construction project is being phased to the extent practicable in order to prevent soil erosion, and, to the maximum extent possible, the transport of sediment from the site during construction.
- Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities during each phase of construction, per the Scheduling BMP (C 162).

Seasonal Work Limitations

- From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:
  - Site conditions including existing vegetative coverage, slope, soil type, and proximity to receiving waters; and
  - Limitations on activities and the extent of disturbed areas; and
  - Proposed erosion and sediment control measures.
- Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance.
- The following activities are exempt from the seasonal clearing and grading limitations:
  - Routine maintenance and necessary repair of erosion and sediment control BMPs;
  - Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and
  - Activities where there is 100 percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.

Coordination with Utilities and Other Jurisdictions

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

Inspection and Monitoring

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. This person has the necessary skills to:
  - Assess the site conditions and construction activities that could impact the quality of stormwater, and
  - Assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.
- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.
- Whenever inspection and/or monitoring reveals that the BMPs identified in this SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

Maintaining an Updated Construction SWPPP

- This SWPPP shall be retained on-site or within reasonable access to the site.
- The SWPPP shall be modified whenever there is a change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.
- The SWPPP shall be modified if, during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) days following the inspection.

3.1.13 Element #13 – Protect Low Impact Development BMPs

- Protect all bioretention and rain garden BMP's from sedimentation through installation and maintenance of erosion control BMP's on portions of the site that drain into them. Restore the BMP's to their fully functioning condition if they accumulate sediment during construction. Restoring the BMP must include removal of sediment and any sediment-laden bioretention/ rain garden soils, and replacing the removed soils with soils meeting the design specification.
- Prevent compacting bioretention and rain garden BMP's by excluding construction equipment and foot traffic. Protect completed lawn and landscaped areas from compaction by construction equipment.
- Control erosion and avoid introducing sediment from surrounding land uses onto permeable pavements. Do not allow muddy construction equipment on the base material or pavement. Do not allow sediment-laden runoff into permeable pavements or base materials.
- Pavements fouled with sediments or no longer passing an initial infiltration test must be cleaned using procedures from Book 4 of the manufacturer's procedures.
- Keep all heavy equipment off existing soils under LID facilities that have been excavated to final grade to retain the infiltration rate of the soils

3.2 Site Specific BMPs

Site specific BMPs are shown on the TESC Plan Sheets and Details in Appendix A. These site-specific plan sheets will be updated annually.

3.3 Additional Advanced BMPs

- The following BMPs are advanced and are only recommended if construction activities are complex enough to warrant them; or if the site has the potential for significant impacts to water quality. The following BMPs are directed at "end-of-pipe" treatment for sedimentation issues related to turbid runoff from construction sites. Effective BMPs are most often the simple BMPs and focus on the minimization of erosion before sedimentation is an issue. The following BMPs will most likely be implemented only after other BMP options are exhausted, or if the construction activity is large and off-site sedimentation or turbid runoff occurs or is inevitable.

- For BMP 250, written pre-approval, through Ecology is required (see SWMMWW 2005):
- BMP C250: Construction Stormwater Chemical Treatment
- BMP C251: Construction Stormwater Filtration.

4.0 Construction Phasing and BMP Implementation

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of the construction project and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located west of the Cascade Mountain Crest. As such, the dry season is considered to be from May 1 to September 30 and the wet season is considered to be from October 1 to April 30.

- Estimate of Construction start date: Unknown
- Estimate of Construction finish date (Phase 1): Unknown
- Mobilize equipment on site: Unknown
- Mobilize and store all ESC and soil stabilization products: Unknown
- Install ESC measures: Unknown
- Install stabilized construction entrance: Unknown
- Begin clearing and grubbing: Unknown
- Demolish existing structures: Unknown
- Begin site grading Unknown
- Site grading ends Unknown
- Excavate and install new utilities and services: Unknown
- Excavation for building foundations Unknown
- Begin building construction: Unknown
- Complete utility construction Unknown
- Begin implementing soil stabilization and sediment control BMPs throughout the site in preparation for wet season: Unknown
- Wet Season starts: Unknown
- Site inspections and monitoring conducted weekly and for applicable rain events as detailed in Section 6 of this SWPPP: Unknown
- Implement Element #12 BMPs and manage site to minimize soil disturbance during the wet season: Unknown
- Complete road paving Unknown
- Building construction complete: Unknown
- Dry Season starts: Unknown

5.0 Pollution Prevention Team

5.1 Roles and Responsibilities

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead (CESCL) – primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Resident Engineer – For projects with engineered structures only (sediment ponds/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative
- Emergency Ecology Contact – individual to be contacted at Ecology in case of emergency.
- Emergency Owner Contact – individual that is the site owner or representative of the site owner to be contacted in the case of an emergency.
- Non-Emergency Ecology Contact – individual that is the site owner or representative of the site owner than can be contacted if required.
- Monitoring Personnel – personnel responsible for conducting water quality monitoring; for most sites this person is also the Certified Erosion and Sediment Control Lead.

5.2 Team Members

Names and contact information for those identified as members of the pollution prevention team are provided in the following table.

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	Unknown	
Resident Engineer	Travis Johnson	(360) 944-6519
Emergency Ecology Contact	Unknown	
Emergency Owner Contact	N/A Contact the engineer	(360) 944-6519
Non-Emergency Ecology Contact	Unknown	
Monitoring Personnel	Unknown	

6.0 Site Inspections and Monitoring

Monitoring includes visual inspection, monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book but must be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a Certified Erosion and Sediment Control Lead (CESCL) per BMP C160. The name and contact information for the CESCL is provided in Section 5 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

6.1.1 Site Inspection Frequency

Site inspections will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduced to once every month.

6.1.2 Site Inspection Documentation

The site inspector will record each site inspection using the site log inspection forms provided in Appendix E. The site inspection log forms may be separated from this SWPPP document, but will be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.2 Stormwater Quality Monitoring

The construction site is more than one acre in size and is therefore not subject to the general water quality monitoring requirements set forth in the 2005 Construction Stormwater General Permit (Appendix D).

The following text describes the monitoring for the proposed development.

6.2.1 Turbidity Sampling

Monitoring requirements for the proposed project will include turbidity sampling to monitor site discharges for water quality compliance with the 2005 Construction Stormwater General Permit(Appendix D), provided that site discharges occur. It should be noted that the site is designed such that all site runoff will be infiltrated so it is likely that discharges will be rare or may not occur at all. Sampling will be conducted at all discharge points at least once per calendar week.

Turbidity monitoring will follow the analytical methodologies described in Section S4 of the 2005 Construction Stormwater General Permit (Appendix D). The key benchmark values that require action are 25 NTU for turbidity (equivalent to 32 cm transparency) and 250 NTU for turbidity (equivalent to 6 cm transparency). If the 25 NTU benchmark for turbidity (equivalent to 32 cm transparency) is exceeded, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.
2. Assess whether additional BMPs should be implemented, and document revisions to the SWPPP as necessary.
3. Sample discharge location daily until the analysis results are less than 25 NTU (turbidity) or greater than 32 cm (transparency).

If the turbidity is greater than 25 NTU (or transparency is less than 32 cm) but less than 250 NTU (transparency greater than 6 cm) for more than 3 days, additional treatment BMPs will be implemented within 24 hours of the third consecutive sample that exceeded the benchmark value. Additional treatment BMPs to be considered will include, but are not limited to, off-site treatment, infiltration, filtration and chemical treatment.

If the 250 NTU benchmark for turbidity (or less than 6 cm transparency) is exceeded at any time, the following steps will be conducted:

1. Notify Ecology by phone within 24 hours of analysis (see Section 5.0 of this SWPPP for contact information).
2. Continue daily sampling until the turbidity is less than 25 NTU (or transparency is greater than 32 cm).
3. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration and chemical treatment within 24 hours of the first 250 NTU exceedance.
4. Implement additional treatment BMPs as soon as possible, but within 7 days of the first 250 NTU exceedance.

5. Describe inspection results and remedial actions taken in the site log book and in monthly discharge monitoring reports as described in Section 7.0 of this SWPPP.

7.0 Reporting and Recordkeeping

7.1 Recordkeeping

7.1.1 Site Log Book

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book.

7.1.2 Records Retention

Records of all monitoring information (site log book, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

7.1.3 Access to Plans and Records

The SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be provided to Ecology within 14 days of receipt of a written request for the SWPPP from Ecology. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with permit condition S5.G.

7.1.4 Updating the SWPPP

In accordance with Conditions S3, S4.B, and S9.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

7.2 Reporting

7.2.1 Discharge Monitoring Reports

Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period, the Permittee shall submit the form as required, with the words “No discharge” entered in the place of monitoring results. The DMR due date is 15 days following the end of each month.

Water quality sampling results will be submitted to Ecology monthly on Discharge Monitoring Report (DMR) forms in accordance with permit condition S5.B. If there was no discharge during a given monitoring period, the form will be submitted with the words “no discharge” entered in place of the monitoring results. If a benchmark was exceeded, a brief summary of inspection results and remedial actions taken will be included. If sampling could not be performed during a monitoring period, a DMR will be submitted with an explanation of why sampling could not be performed.

7.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit are not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

1. Ecology will be immediately notified of the failure to comply.
2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.
3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Any time turbidity sampling indicates turbidity is 250 nephelometric turbidity units (NTU) or greater or water transparency is 6 centimeters or less, the Ecology regional office will be notified by phone within 24 hours of analysis as required by permit condition S5.A (see Section 5.0 of this SWPPP for contact information).

In accordance with permit condition S2.A, a complete application form will be submitted to Ecology and the appropriate local jurisdiction (if applicable) to be covered by the General Permit.

Appendix A – Site Plans

Appendix B – Construction BMPs

Stabilized Construction Entrance (BMP C105)

Temporary Sediment Pond (BMP C241)

Silt Fence (BMP C233)

Storm Drain Inlet Protection (BMP C220)

Bioretention Facility

Temporary and Permanent Seeding (BMP C120)

Mulching (BMP C121)

Nets and Blankets (BMP C122)

Plastic Covering (BMP C123)

Topsoiling (BMP C125)

Dust Control (BMP C140)

Early application of gravel base on areas to be paved

Temporary and Permanent Seeding (BMP C120)

Outlet Protection (BMP C209)

Appendix C – Alternative BMPs

The following includes a list of possible alternative BMPs for each of the 12 elements not described in the main SWPPP text. This list can be referenced in the event a BMP for a specific element is not functioning as designed and an alternative BMP needs to be implemented.

Element #1 - Mark Clearing Limits
High Visibility Plastic or Metal Fence (BMP C103)
Stake and Wire Fence (BMP C104)
Element #2 - Establish Construction Access
Wheel Wash (BMP C106)
Water Bars (BMP C203)
Element #3 - Control Flow Rates
Wattles (BMP C235)

Element #4 - Install Sediment Controls
Straw Bale Barrier (BMP C230)
Gravel Filter Berm (BMP C232)
Straw Wattles (BMP C235)
Portable Water Storage Tanks (Baker Tanks)
Construction Stormwater Chemical Treatment (BMP C250)
Construction Stormwater Filtration (BMP C251)

Element #5 - Stabilize Soils
Polyacrylamide (BMP C126)

Element #6 - Protect Slopes
Straw Wattles (BMP C235)
Surface Roughening (BMP C240)

Element #8 - Stabilize Channels and Outlets
Level Spreader (BMP C206)
Check Dams (BMP C207)

Element #9 – Control Pollutants
Concrete Handling (BMP C151)
Construction Stormwater Chemical Treatment (BMP C250)
Construction Stormwater Filtration (BMP C251)

Element #10 - Control Dewatering
Vegetated Filtration (BMP C236)
Additional Advanced BMPs to Control Dewatering:

Appendix D – General Permit

Appendix E – Site Inspection Forms (and Site Log)

The results of each inspection shall be summarized in an inspection report or checklist that is entered into or attached to the site log book. It is suggested that the inspection report or checklist be included in this appendix to keep monitoring and inspection information in one document, but this is optional. However, it is mandatory that this SWPPP and the site inspection forms be kept onsite at all times during construction, and that inspections be performed and documented as outlined below.

At a minimum, each inspection report or checklist shall include:

a. Inspection date/times

b. Weather information: general conditions during inspection, approximate amount of precipitation since the last inspection, and approximate amount of precipitation within the last 24 hours.

c. A summary or list of all BMPs that have been implemented, including observations of all erosion/sediment control structures or practices.

d. The following shall be noted:

   i. locations of BMPs inspected,

   ii. locations of BMPs that need maintenance,

   iii. the reason maintenance is needed,

   iv. locations of BMPs that failed to operate as designed or intended, and

   v. locations where additional or different BMPs are needed, and the reason(s) why

e. A description of stormwater discharged from the site. The presence of suspended sediment, turbid water, discoloration, and/or oil sheen shall be noted, as applicable.

f. A description of any water quality monitoring performed during inspection, and the results of that monitoring.

g. General comments and notes, including a brief description of any BMP repairs, maintenance or installations made as a result of the inspection.

h. A statement that, in the judgment of the person conducting the site inspection, the site is either in compliance or out of compliance with the terms and conditions of the SWPPP and the NPDES permit. If the site inspection indicates that the site is out of compliance, the inspection report shall include a summary of the remedial actions required to bring the site back into compliance, as well as a schedule of implementation.

i. Name, title, and signature of person conducting the site inspection; and the following statement: "I certify under penalty of law that this report is true, accurate, and complete, to the best of my knowledge and belief".

When the site inspection indicates that the site is not in compliance with any terms and conditions of the NPDES permit, the Permittee shall take immediate action(s) to: stop, contain, and clean up the unauthorized discharges, or otherwise stop the noncompliance; correct the problem(s); implement appropriate Best Management Practices (BMPs), and/or conduct maintenance of existing BMPs; and achieve compliance with all applicable standards and permit conditions. In addition, if the noncompliance causes a threat to human health or the environment, the Permittee shall comply with the Noncompliance Notification requirements in Special Condition S5.F of the permit.

Site Inspection Form

General Information

Project Name:

Inspector Name: **Title:**

CESCL # :

Date: **Time:**

Inspection Type:
- □ After a rain event
- □ Weekly
- □ Turbidity/transparency benchmark exceedance
- □ Other

Weather

Precipitation Since last inspection In last 24 hours

Description of General Site Conditions:

Inspection of BMPs

Element 1: Mark Clearing Limits

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 2: Establish Construction Access

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

BMP:

Location	Inspected Y	Inspected N	Functioning Y	Functioning N	Functioning NIP	Problem/Corrective Action

Element 3: Control Flow Rates

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 4: Install Sediment Controls

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 5: Stabilize Soils						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 6: Protect Slopes						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 7: Protect Drain Inlets

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 8: Stabilize Channels and Outlets

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:

Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 9: Control Pollutants						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Element 10: Control Dewatering						
BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

BMP:						
Location	Inspected		Functioning			Problem/Corrective Action
	Y	N	Y	N	NIP	

Water Quality Monitoring		
Was any water quality monitoring conducted?	□ Yes	□ No
If water quality monitoring was conducted, record results here:		
If water quality monitoring indicated turbidity 250 NTU or greater; or transparency 6 cm or less, was Ecology notified by phone within 24 hrs?	□ Yes	□ No
If Ecology was notified, indicate the date, time, contact name and phone number below:		
Date:		
Time:		
Contact Name:		
Phone #:		
General Comments and Notes		
Include BMP repairs, maintenance, or installations made as a result of the inspection.		
Were Photos Taken?	□ Yes	□ No
If photos taken, describe photos below:		

Appendix F – Engineering Calculations

Exhibit A.9

Environmental Checklist

Purpose of checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An environmental impact statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal if it can be done) and to help the agency decide whether an EIS is required.

Instructions for applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer or if a question does not apply to your proposal, write “do not know” or “does not apply.” Complete answers to the questions now may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for non-project proposals:

Complete the checklist for non-project proposals, even though questions may be answered “does not apply.” In addition, complete the supplemental sheet for Non-project Actions (part D).

For non-project actions, the references in the checklist to the words “project,” “applicant,” and “property or site” should be read as “proposal,” “proposer,” and “affected geographic area,” respectively.

A. Background

1. Name of proposed project, if applicable:

   Lockwood Meadows Subdivision

2. Name of applicant:

   Susanna S. Hung Trust

3. Address and phone number of applicant and contact person:

   Applicant:
   Susanna S. Hung Trust
   710 Columbia Street #414
   Vancouver, WA 98660

   Contact:
   PLS Engineering, Travis Johnson
   604 W Evergreen Blvd.
   Vancouver, WA 98660
   360-944-6519

4. Date checklist prepared:

   October 28, 2021

5. Agency requesting checklist:

   La Center, Washington

6. Proposed timing or schedule (including phasing, if applicable):

   Development is expected to start at the time of final construction drawing approval. No phasing is proposed.

7. Do you have any plans for future additions, expansion, or further activity related to this proposal? If yes, explain.

   No, not at this time.

8. List any environmental information that has been or will be prepared related to this proposal.

   A Critical Areas Report, Mitigation Plan, Geotechnical Report and Archaeological Predetermination have been prepared for this site.

9. Are other applications pending for governmental approvals affecting the property covered by your proposal? If yes, please explain.

- *Preliminary Type III Subdivision Review*
- *Public notification and staff report publications*
- *Public Hearing and Land Use Hearing Decision*
- *Final engineering plan review and approval*
- *Final Plat approval*
- *Removal of Urban Hold Designation*

10. List any government approvals or permits needed for your proposal:

    No other permits or approvals are needed for the project.

11. Give a brief, complete description of your proposal, including the proposed uses and size of the project and site. There are several questions addressed later in this checklist asking you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.)

    The applicant is proposing a 71-lot subdivision on 20 acres in the LDR-7.5 zone.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including street address, section, township, and range. If this proposal occurs over a wide area, please provide the range or boundaries of the site. Also, give a legal description, site plan, vicinity map, and topographic map. You are required to submit any plans required by the agency, but not required to submit duplicate maps or plans submitted with permit applications related to this checklist.

    The site is located in La Center, WA at 2000 NW Lockwood Creek Road. The parcel is identified as Clark County Parcel number 209113000. The site is located within the NE ¼ of Section 2, Township 4 North, Range 1 East, Willamette Meridian.

B. Environmental Elements

1. Earth

a. General description of the site (circle one): Flat, ***rolling***, hilly, ***steep slopes***, mountainous, other ____________.

   The property would be considered rolling with some areas of steep slopes.

b. What is the steepest slope on the site and the approximate percentage of the slope?

   Approximately 25% per the Geotechnical Report for the site.

c. What general types of soils are found on the site (e.g., clay, sand, gravel, peat, muck)? Please specify the classification of agricultural soils and note any prime farmland.

Clark County GIS identifies the site as having the following soils:
GeB – Gee Silt Loam, 0-8% slopes
GeD – Gee Silt Loam, 8-20% slopes
HoA – Hillsboro Silt Loam, 0-3% slopes
HoC - Hillsboro Silt Loam, 8-15% slopes
OdB – Odne Silt Loam, 0-5% slopes

The site has historically been used for agricultural purposes.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, please describe.

The applicant has no knowledge of any unstable soils in the immediate area. A Geotechnical Report is provided for the site that addresses soil stability.

e. Describe the purpose, type, and approximate quantities of any filling or proposed grading. Also, indicate the source of fill.

There will be grading for the construction of roads, driveways, the installation of utilities, and the preparation of the site for single family residential housing. Surplus material may be required to be hauled from the site to an approved dump site or offsite fill may be required. Quantities and source are unknown at this time.

f. Could erosion occur as a result of clearing, construction, or use? If so, please describe.

Standard erosion control measures will be followed during grading construction on the site. A final erosion control plan will be reviewed and approved by City of La Center Public Works prior to construction on the site. A copy of that final erosion control plan will be filed with the final construction plans with City of La Center Public Works.

g. What percentage of the site will be covered with impervious surfaces after the project construction (e.g., asphalt or buildings)?

Approximately 50%

h. Proposed measures to reduce or control erosion, or other impacts to the earth include:

Proposed measures to reduce and control erosion include providing an erosion control plan for review and approval prior to starting construction on the site *and following the conditions of the approved grading and erosion control plan during all phases of construction.*

2. Air

a. What types of emissions to the air would result from this proposal (e.g., dust, automobile, odors, industrial wood smoke) during construction and after completion? Please describe and give approximate quantities.

Construction equipment emissions and dust on the short term. Long-term emissions will be produced by automobile traffic and normal household activities, possibly including wood burning stoves and fireplaces.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, please describe.

There are existing car emissions from traffic, and there may be emissions from nearby farming and agricultural uses, however no off-site sources of emission or odor will affect the proposal.

c. Proposed measures to reduce or control emissions or other impacts to air:

Dust from construction can be mitigated by sprinkling the site with water during construction as needed.

3. Water

a. Surface:

1) Is there any surface water body on or in the vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, and wetlands)? If yes, describe the type and provide names and into which stream or river it flows into.

There are two Type IV wetlands located onsite per the Critical Areas Report for the site.

2) Will the project require any work within 200 feet of the described waters? If yes, please describe and attach available plans.

Yes, one wetland will be filled entirely. There will be work within 200 feet of the other wetland to remain.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Wetland A on the existing conditions plan will be filled. This wetland is 0.05 acres in size. Approximately 149 cy of fill will be placed into wetland A, and approximately 220 cy of fill will be going into the buffer of wetland B. Onsite material will be used for fill material.

4) Will the proposal require surface water withdrawals or diversions? Please provide description, purpose, and approximate quantities:

   No, this proposal will not require surface water withdrawls or diversions.

5) Does the proposal lie within a 100-year floodplain? If so, please note the location on the site plan.

   No, the site does not lie within a 100-year floodplain.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

   No, the proposal does not involve any discharges of waste materials to surface waters.

b. Ground:

1) Will ground water be withdrawn, or will water be discharged to ground water? Please give description, purpose, and approximate quantities.

   No ground water will be withdrawn with this proposal.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources; (e.g., domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the size and number of the systems, houses to be served; or, the number of animals or humans the systems are expected to serve.

   No waste material is proposed to be discharged into the ground.

c. Water runoff (including stormwater):

1) Describe the source of runoff (including storm water) and method of collection and disposal. Include quantities, if known. Describe where water will flow, and if it will flow into other water.

   The main source of runoff is from stormwater. There will be runoff from impervious roof area, driveways, roadways, and landscaped areas. Street catch basins, yard drains, and roof drains will connect to a pipe network that leads to the stormwater facility within Tract D.

2) Could waste materials enter ground or surface waters? If so, please describe.

   Yes, if waste materials were somehow released or dumped into surface runoff flows, substances associated with the source material could enter the ground or other surface waters. There is no proposal to release waste material to the ground or to surface waters.

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

   Use of approved erosion control measures during all phases of development.

---

4. Plants

a. Check or circle types of vegetation found on the site
   - Deciduous tree: ***alder***, ***maple***, aspen, ***other***: ***Oregon White Oak, black cottonwood,***
   - Evergreen tree: ***fir***, cedar, pine, other
   - ***Shrubs***
   - ***Grass***
   - ***Pasture***
   - Crop or grain
   - Wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
   - Water plants: water lily, eelgrass, milfoil, other
   - Other types of vegetation: ***blackberry***

b. What kind and amount of vegetation will be removed or altered?

   Approximately 90% of the site vegetation will be stripped for site preparation.

c. List threatened or endangered species on or near the site.

   There is one priority habitat Oregon white oak in the southwest corner of the site.

d. List proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site:

   The project will retain the priority habitat Oregon white oak. Street trees and landscaping will be provided throughout the park and open space areas.

5. Animals

a. Circle any birds and animals which have been observed on or near the site:

- Birds: ***hawk***, heron, eagle, ***songbirds***, other;
- Mammals: ***deer***, bear, elk, beaver, other; and,
- Fish: bass, salmon, trout, herring, shellfish, and other:

Small mammals such as mice, rabbits, squirrels, raccoons and other rodents likely live on or near the site. It is also quite possible that some larger mammals such as coyote may periodically pass through the site.

b. List any threatened or endangered species known to be on or near the site.

None known.

c. Is the site part of a migration route? If so, please explain.

The site is located within the Pacific Flyway for migratory waterfowl.

d. List proposed measures to preserve or enhance wildlife:

Landscaping will be planted within the open space tract, park area and the future yards. The retained wetland and buffer area will also help to preserve and enhance wildlife in the area.

6. Energy and natural resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

The new homes on the site will be served primarily by electricity and natural gas. Wood stoves might be used for heating. Other forms of energy will depend on homeowners.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, please describe.

No, by meeting setbacks and adhering to the City of La Center development standards this project will not affect the potential use of solar energy by adjacent properties.

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts:

The new homes will have energy efficient windows and comply with the state building codes which includes conservation measures.

7. Environmental health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste that could occur as a result of this proposal? If so, please describe.

There are no known environmental health hazards that could occur as a result of this proposal.

1) Describe special emergency services that might be required.

No special emergency services outside those normally expected in a residential area are anticipated to be required in association with this proposal.

2) Proposed measures to reduce or control environmental health hazards, if any:

None proposed.

b. Noise

1) What types of noise exist in the area which may affect your project (e.g., traffic, equipment, operation, other)?

Light traffic noise from surrounding areas/roads along with typical home use noises. None of these will affect the proposal.

2) What types and levels of noise are associated with the project on a short-term or a long-term basis (e.g., traffic, construction, operation, other)? Indicate what hours the noise would come from the site.

Short term noises would include construction noises which would occur during approved hours as mandated by City of La Center and Washington State. Long term noises could include slight increase in traffic noise and normal household noises.

3) Proposed measures to reduce or control noise impacts:

Construction on the site will take place during normal working hours as allowed by the City of La Center Noise Ordinance.

8. Land and shoreline use

a. What is the current use of the site and adjacent properties?

The site contains an existing residence, barn and well and is used as a single-family residence. Heritage Country Estates Subdivision is located to the north and west and is partially constructed. Immediately to the south are single-family residential uses on large lots. To the south across Lockwood Creek Road is the new middle school. The properties to the east across NE 24th Avenue are single-family residences on large lots.

b. Has the site been used for agriculture? If so, please describe.

Yes, the site has historically been used as a tree farm.

c. Describe any structures on the site.

There is an existing residence, barn and well on site

d. Will any structures be demolished? If so, please describe.

Yes, all structures will be demolished.

e. What is the current zoning classification of the site?

R1-7.5 Single Family Residential, UH – Urban Hold

f. What is the current comprehensive plan designation of the site?

UL, Urban Low Density Residential designation.

g. What is the current shoreline master program designation of the site?

None.

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, please specify.

Yes, there are two delineated wetlands on site and the parcel is within an archaeological site buffer with a moderate - high archaeological probability. Additionally, areas of steep slopes and potential instability are shown on GIS mapping. There is one Oregon white oak tree that is considered priority habitat on site.

i. How many people would reside or work in the completed project?

It is currently planned that this development will contain 71 lots/homes. At 2.8 people per household there would be a total of approximately 199 people residing within this development at the time of full buildout.

j. How many people would the completed project displace?

This project could potentially displace up to 3 people.

k. Please list proposed measures to avoid or reduce displacement impacts:

The construction of 71 new homes will compensate for the displacement impacts.

l. List proposed measures to ensure the proposal is compatible with existing and projected land uses and plans:

By complying with the zoning designation, the comprehensive plan, and the La Center Municipal Code, the proposal will be compatible with the existing and projected land uses.

9. Housing

a. Approximately how many units would be provided? Indicate whether it's high, middle, or low-income housing.

71 new housing units are proposed. It is unknown at this time whether they will be high, middle or low-income housing.

b. Approximately how many units, if any, would be eliminated? Indicate whether it's high, middle, or low-income housing.

This development will eliminate one existing home that is considered middle income housing.

c. List proposed measures to reduce or control housing impacts:

The applicant will pay all impact fees associated with the development at the time of building permit.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas? What is proposed as the principal exterior building materials?

All new home construction will meet City of La Center building codes for residential housing development and not exceed height limits of 35'. Exterior building materials are unknown at this time.

b. What views in the immediate vicinity would be altered or obstructed?

Approximately 20 acres of land will be converted into a residential subdivision.

c. Proposed measures to reduce or control aesthetic impacts:

The single-family homes will be landscaped with grass lawns and other appealing landscaping. The open space tract and park area will add additional attractive landscape.

11. Light and glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

When homes are constructed on the proposed lots, there will most likely be light produced from houses, yards, and porch lights during evenings and early mornings.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

N*o, light or glare from the finished project will not be a safety hazard or interfere with views.*

c. What existing off-site sources of light or glare may affect your proposal?

There are existing off-site sources of light from adjacent homes and roadways, but they should not affect the proposal.

d. Proposed measures to reduce or control light and glare impacts:

The project proposes shielding of porch lights and streetlights to reduce light and glare impacts offsite.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

Holley Park is a community park that is approximately 1,640 feet to the west of the site.

b. Would the project displace any existing recreational uses? If so, please describe.

There will be no recreational uses displaced with this proposal.

c. Proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant:

The development proposes to construct a neighborhood park and trail areas that will include a play structure, picnic tables, benches and bike racks.

---

13. Historic and cultural preservation

a. Are there any places or objects on or near the site which are listed or proposed for national, state, or local preservation registers? If so, please describe.

There are no known places or objects on or near the site that are listed or proposed for national, state or local preservation registers.

b. Please describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

One isolated flake fragment was found during the field study performed by Archaeological Services, LLC on 8/23/21 and 8/24/21.

c. Proposed measures to reduce or control impacts:

None proposed as the Archaeological Predetermination for the site recommended no further work. If during the course of construction any artifacts are discovered, all work will cease, and proper notification shall be given to City of La Center and DAHP.

---

14. Transportation

a. Identify the public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

Access to the site is provided by Lockwood Creek Road and NE 24th Avenue, both public roadways.

b. Is the site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

The site is not currently served by public transit. C-Tran operates The Connector to serve outlying communities. A stop exists in La Center approximately 1,600 feet to the west across from Holley Park.

c. How many parking spaces would the completed project have? How many would the project eliminate?

Approximately 2-3 parking spaces per single-family home are proposed. This project will eliminate 2-4 existing parking spaces.

d. Will the proposal require new roads or streets, or improvements to existing roads or streets, not including driveways? If so, please describe and indicate whether it's public or private.

Yes. East 3rd Court, East 4th Street, East 5th Street, NE 21st Avenue, NE 23rd Avenue, East Upland Avenue and East White Oak Avenue are proposed public Local Access roadways. Frontage improvements will be provided to NE 24th Avenue and NE Lockwood Creek Road, both of which are public roads.

e. Will the project use water, rail, or air transportation? If so, please describe.

The site will not use water, rail or air transportation and is not located in the immediate vicinity of those types of transportation facilities.

f. How many vehicular trips per day would be generated by the completed project? Indicate when peak traffic volumes would occur.

The development of this project is expected to generate 670 new daily trips. Peak volumes are expected to occur in the PM peak hour (4:00 – 6:00). Per the Traffic Analysis Report and Trip Generation Update and Assessment prepared by Charbonneau Engineering for the project, trip rates presented in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition (year 2017) were utilized to estimate the site's trip generation for 71 homes. ITE land use code #210 (Single-Family) was applied.

g. Proposed measures to reduce or control transportation impacts:

The applicant will pay transportation impact fees.

15. Public services

a. Would the project result in an increased need for public services (e.g., fire protection, police protection, health care, schools, other)? If so, please describe.

Yes. The completion of this development and the construction of new homes will increase the need for public services in the area.

b. Proposed measures to reduce or control direct impacts on public services:

This project will pay impact fees for schools and traffic at the time of building permit.

16. Utilities

a. Circle the utilities currently available at the site: ***electricity, natural gas***, ***water, refuse service, telephone, sanitary sewer***, ***septic system***, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on or near the site:

- *Sanitary sewer-La Center*
- *Water-Clark Public Utilities*
- *Electricity-Clark PUD*
- *Natural Gas-Northwest Natural*
- *Telephone- Comcast, TDS*
- *Garbage/Recycling-Waste Connections*

C. Signature

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: N Sicilia Date Submitted: 1/19/22

Exhibit A.10

Geotechnical Site Investigation

Lockwood Meadows Subdivision

La Center, Washington

September 23, 2021

Geotechnical ■ Environmental ■ Special Inspections

Columbia West

Engineering, Inc

11917 NE 95th Street
Vancouver, Washington
98682
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Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West Engineering, Inc

GEOTECHNICAL SITE INVESTIGATION
LOCKWOOD MEADOWS SUBDIVISION
LA CENTER, WASHINGTON

Prepared For:	**PLS Engineering** **Attn: Nicolle Sicilia** **604 W Evergreen Blvd** **Vancouver, Washington 98660**
Site Location:	**2000 NE Lockwood Creek Road** **Parcel No. 209113000** **La Center, Washington**
Prepared By:	**Columbia West Engineering, Inc.** **11917 NE 95th Street** **Vancouver, Washington 98682** **Phone: 360-823-2900** **W.O. No. 21172**
Date Prepared:	**September 23, 2021**

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GEOTECHNICAL SITE INVESTIGATION
LOCKWOOD MEADOWS SUBDIVISION
LA CENTER, WASHINGTON

1.0 INTRODUCTION

Columbia West Engineering, Inc. (Columbia West) was retained by PLS Engineering to conduct a geotechnical site investigation for the proposed Lockwood Meadows Subdivision project located in La Center, Washington. The purpose of the investigation was to observe and assess subsurface soil conditions at specific locations and provide geotechnical engineering analyses, planning, and design recommendations for proposed development. The specific scope of services was outlined in a proposal contract dated July 12, 2021. This report summarizes the investigation and provides field assessment documentation and laboratory analytical test reports. This report is subject to the limitations expressed in Section 7.0, *Conclusion and Limitations*, and Appendix E.

1.1 General Site Information

As indicated on Figures 1, 2 and 2A, the subject site is located at 2000 NE Lockwood Creek Road in La Center, Washington. The site is comprised of tax parcel number 209113000 totaling approximately 20 acres. The approximate latitude and longitude are N 45° 51' 42" and W 122° 38' 55", and the legal description is a portion of the NE ¼ of Section 02, T4N, R1E, Willamette Meridian. The current regulatory jurisdictional agency is the City of La Center.

1.2 Proposed Development

Correspondence with the design team and review of the preliminary site plan shown on Figure 2A indicates that proposed development at the Lockwood Meadows Subdivision includes the division of the referenced parcel into 71 new single-family residential lots, private asphalt access drives, public asphalt roadways, underground utilities, and stormwater facilities. Columbia West has not reviewed preliminary grading plans but understands that cut and fill may be proposed at the subject site. This report is based upon proposed development as described above and may not be applicable if modified.

2.0 REGIONAL GEOLOGY AND SOIL CONDITIONS

The subject site lies within the Willamette Valley/Puget Sound Lowland, a wide physiographic depression flanked by the mountainous Coast Range on the west and the Cascade Range on the east. Inclined or uplifted structural zones within the Willamette Valley/Puget Sound Lowland constitute highland areas and depressed structural zones form sediment-filled basins. The site is located in the northern portion of the Portland/Vancouver Basin, an open, somewhat elliptical, northwest-trending syncline approximately 60 miles wide.

According to the *Geologic Map of the Ridgefield Quadrangle, Clark and Cowlitz Counties, Washington* (Russell C. Evarts, USGS Geological Survey Scientific Investigation Map 2844, 2004), near-surface soils are expected to consist of Pleistocene-aged, unconsolidated, rhythmically bedded, periglacial clay, silt, and fine- to medium-textured sand deposits derived from catastrophic outburst floods of Glacial Lake Missoula (Qfs). Fine-textured flood deposits are underlain by Pleistocene to Pliocene, unconsolidated to cemented, deeply weathered, pebble to boulder sedimentary conglomerate (QTc).

The Web Soil Survey (United States Department of Agriculture, Natural Resource Conservation Service [USDA NRCS], 2021 Website) identifies surface soils as Gee silt loam, Odne silt loam, and Hillsboro silt loam. Although soil conditions may vary from the broad USDA descriptions, Gee, Odne, and Hillsboro series soils are generally fine-textured clays and silts with very low permeability, moderate to high water capacity, and low shear strength. Gee, Odne, and Hillsboro soils are generally moisture sensitive, somewhat compressible, and described as having low to moderate shrink-swell potential. The erosion hazard is slight primarily based upon slope grade.

3.0 REGIONAL SEISMOLOGY

Recent research and subsurface mapping investigations within the Pacific Northwest appear to suggest the historic potential risk for a large earthquake event with strong localized ground movement may be underestimated. Past earthquakes in the Pacific Northwest appear to have caused landslides and ground subsidence, in addition to severe flooding near coastal areas. Earthquakes may also induce soil liquefaction, which occurs when elevated horizontal ground acceleration and velocity cause soil particles to interact as a fluid as opposed to a solid. Liquefaction of soil can result in lateral spreading and temporary loss of bearing capacity and shear strength.

There are at least four major known fault zones in the vicinity of the site that may be capable of generating potentially destructive horizontal accelerations. These fault zones are described briefly in the following text.

<u>Portland Hills Fault Zone</u>

The Portland Hills Fault Zone consists of several northwest-trending faults located along the northeastern margin of the Tualatin Mountains, also known as the Portland Hills, and the southwest margin of the Portland Basin. The fault zone is approximately 25 to 30 miles in length and is located approximately 17 miles southwest of the site. According to *Seismic Design Mapping, State of Oregon* (Geomatrix Consultants, 1995), there is no definitive consensus among geologists as to the zone fault type. Several alternate interpretations have been suggested.

According to the *USGS Earthquake Hazards Program*, the fault was originally mapped as a down-to-the-northeast normal fault but has also been mapped as part of a regional-scale zone of right-lateral, oblique slip faults, and as a steep escarpment caused by asymmetrical folding above a south-west dipping, blind thrust fault. The Portland Hills fault offsets Miocene Columbia River Basalts, and Miocene to Pliocene sedimentary rocks of the Troutdale Formation. No fault scarps on surficial Quaternary deposits have been described along the fault trace, and the fault is mapped as buried by the Pleistocene-aged Missoula flood deposits.

However, evidence suggests that fault movement has impacted shallow Holocene deposits and deeper Pleistocene sediments. Seismologists recorded a M3.2 earthquake thought to be associated with the fault zone near Kelly Point Park in November 2012, a M3.9 earthquake thought to be associated with the fault zone near Kelly Point Park in April 2003, and a M3.5 earthquake possibly associated with the fault zone approximately 1.3 miles east of the fault in 1991. Therefore, the Portland Hills Fault Zone is generally thought to be potentially active and capable of producing possible damaging earthquakes.

<u>Gales Creek-Newberg-Mt. Angel Fault Zone</u>

Located approximately 33 miles southwest of the site, the northwest-striking, approximately 50-mile long Gales Creek-Newberg-Mt. Angel Structural Zone forms the northwestern boundary between the Oregon Coast Range and the Willamette Valley, and consists of a series of discontinuous northwest-trending faults. The southern end of the fault zone forms the southwest margin of the Tualatin basin. Possible late-Quaternary geomorphic surface deformation may exist along the structural zone (Geomatrix Consultants, 1995).

According to the *USGS Earthquake Hazards Program*, the Mount Angel fault is mapped as a high-angle, reverse-oblique fault, which offsets Miocene rocks of the Columbia River Basalts, and Miocene and Pliocene sedimentary rocks. The fault appears to have controlled emplacement of the Frenchman Spring Member of the Wanapum Basalts, and thus must have a history that predates the Miocene age of these rocks. No unequivocal evidence of deformation of Quaternary deposits has been described as a thick sequence of sediments deposited by the Missoula floods covers much of the southern part of the fault trace.

Although no definitive evidence of impacts to Holocene sediments have clearly been identified, the Mount Angel fault appears to have been the location of minor earthquake swarms in 1990 near Woodburn, Oregon, and a M5.6 earthquake in March 1993 near Scotts Mills, approximately four miles south of the mapped extent of the Mt. Angel fault. It is unclear if the earthquake occurred along the fault zone or a parallel structure. Therefore, the Gales Creek-Newberg-Mt. Angel Structural Zone is considered potentially active.

<u>Lacamas Lake-Sandy River Fault Zone</u>

The northwest-trending Lacamas Lake Fault and northeast-trending Sandy River Fault intersect north of Camas, Washington approximately 21 miles southeast of the site, and form part of the northeastern margin of the Portland basin. According to *Geology and Groundwater Conditions of Clark County Washington* (USGS Water Supply Paper 1600, Mundorff, 1964) and the *Geologic Map of the Lake Oswego Quadrangle* (Oregon DOGAMI Series GMS-59, 1989), the Lacamas Lake fault zone consists of shear contact between the Troutdale Formation and underlying Oligocene andesite-basalt bedrock. Secondary shear contact associated with the fault zone may have produced a series of prominent northwest-southeast geomorphic lineaments in proximity to the site.

According to the *USGS Earthquake Hazards Program* the fault has been mapped as a normal fault with down-to-the-southwest displacement and has also been described as a steeply northeast or southwest-dipping, oblique, right-lateral, slip-fault. The trace of the Lacamas Lake fault is marked by the very linear lower reach of Lacamas Creek. No fault scarps on Quaternary surficial deposits have been described. The Lacamas Lake fault offsets Pliocene-aged sedimentary conglomerates generally identified as the Troutdale formation, and Pliocene- to Pleistocene-aged basalts generally identified as the Boring Lava formation.

Recent seismic reflection data across the probable trace of the fault under the Columbia River yielded no unequivocal evidence of displacement underlying the Missoula flood deposits, however, recorded mild seismic activity during the recent past indicates this area may be potentially seismogenic.

Cascadia Subduction Zone

The Cascadia Subduction Zone has recently been recognized as a potential source of strong earthquake activity in the Portland/Vancouver Basin. This phenomenon is the result of the earth's large tectonic plate movement. Geologic evidence indicates that volcanic ocean floor activity along the Juan de Fuca ridge in the Pacific Ocean causes the Juan de Fuca Plate to perpetually move east and subduct under the North American Continental Plate. The subduction zone results in historic volcanic and potential earthquake activity in proximity to the plate interface, believed to lie approximately 20 to 50 miles west of the general location of the Oregon and Washington coast (Geomatrix Consultants, 1995).

4.0 GEOTECHNICAL AND GEOLOGIC FIELD INVESTIGATION

A geotechnical field investigation consisting of visual reconnaissance, nine test pits (TP-1 through TP-8 and STP-1) and two infiltration tests (IT-1 and IT-2) was conducted at the site on July 27, 2021. The test pits were explored with a track-mounted excavator. Subsurface soil profiles were logged in accordance with Unified Soil Classification System (USCS) specifications. Disturbed soil samples were collected from relevant soil horizons and submitted for laboratory analysis. Analytical laboratory test results are presented in Appendix A. Exploration locations are indicated on Figure 2. Subsurface exploration logs are presented in Appendix B. Soil descriptions and classification information are provided in Appendix C. A photo log is presented in Appendix D.

4.1 Surface Investigation and Site Description

The subject site is located at 2000 NE Lockwood Creek Road in La Center, Washington and is comprised of tax parcel 209113000, totaling approximately 20 acres. Site observations during exploration indicate the west half of the site is generally open and vegetated with grass and brush. An existing residence and appurtenant farm structures are located in the southwest area of the site. Surface water and hydrophytic vegetation were observed in lowland areas proposed for stormwater management at the approximate south-center of the site. Rows of young conifers occupying approximately 6 to 7 acres were observed on the eastern half of the property. An approximate one to- three-foot earth berm was observed at the northern property boundary on the eastern half of the site. Berm material may be associated with development of Sunrise Terrace residential subdivision directly north of the subject site. The site is bounded by NE Lockwood Creek Road to the south, NE 24th Avenue to the east, and the Sunrise Terrace residential subdivision to the north and west. Field reconnaissance and review of site topographic mapping indicate the presence of south- and southwest-facing slopes with grades between 5 and 25 percent. Site elevations in the proposed development area range from 150 feet amsl at the southwest property corner to 250 feet amsl at the northeast property corner. Slope geometry and geomorphic features are discussed in greater detail in Section 5.2.2, *Slope Reconnaissance and Slope Stability Assessment*.

4.2 Subsurface Exploration and Investigation

Test pits were explored to a maximum depth of approximately 14 feet below ground surface (bgs). Exploration locations were selected to observe subsurface soil characteristics in proximity to proposed development areas and are indicated on Figure 2.

4.2.1 Soil Type Description

The field investigation indicated the presence of approximately 8 to 14 inches of sod and topsoil in the observed locations. Underlying the topsoil layer, subsurface soils resembling geologically mapped unconsolidated to compact glacial till (Qat) and native USDA Gee, Odne and Hillsboro soil series description were encountered. Subsurface lithology may generally be described by soil types identified in the following text. Field logs and observed stratigraphy for the encountered materials are presented in Appendix B, *Subsurface Exploration Logs*.

Soil Type 1 - Existing FILL

Soil Type 1 was observed to primarily consist of light brown to brown/gray, moist, apparent native soils and trace organic debris. Soil Type 1 was observed at the ground surface in STP-1 and along the northern property boundary on the eastern half of the site, extending to apparent depths of approximately one to- three feet bgs.

Soil Type 2 - SILT with Sand / Sandy SILT

Soil Type 2 was observed to consist of light brown to brown/gray, damp to moist, SILT with sand and sandy SILT. Soil Type 2 was observed below the topsoil layer in test pits TP-1 through TP-7 and extended to observed depths of approximately 7 to 14 feet bgs.

Soil Type 3 - Lean CLAY with Sand

Soil Type 3 was observed to primarily consist of brown and gray, moist, lean CLAY with sand. Soil Type 3 was observed below the topsoil layer in test pit TP-8, below Soil Type 2 in test pits TP-3 through TP-6, and interbedded in Soil Type 2 in test pit TP-7. Soil Type 3 extended to depths of approximately 13 to 14 feet bgs in the areas observed.

Soil Type 4 - Fat CLAY

Soil Type 4 was observed to primarily consist of brown and gray, moist, fat CLAY. Soil Type 4 was observed below Soil Type 3 in test pits TP-5 and TP-6 and extended to the maximum depths of exploration.

4.2.2 Groundwater

Groundwater was not encountered within test pit explorations to a maximum explored depth of approximately 14 feet bgs on July 27, 2021. Groundwater levels are often subject to seasonal variance and may rise during extended periods of increased precipitation or flooding.

Seeps and springs may become evident during site grading, primarily along slopes or in areas cut below existing grade. Structures, roads, and drainage design should be planned accordingly. Piezometer installation and long-term monitoring, beyond the scope of this investigation, would be necessary to provide more detailed groundwater information.

5.0 GEOLOGIC HAZARDS

City of La Center Municipal Code (*LCMC Development Code Section 18.300*) defines geologic hazard requirements for proposed development in areas subject to the City of La Center jurisdiction. Three potential geologic hazards are identified: (1) erosion hazard areas, (2) landslide hazard and steep slope areas, and (3) seismic hazard areas. Hazard mapping obtained from *Clark County Maps Online* indicates the presence of site slope grades of up to 25 percent at the northeast site corner.

Columbia West conducted a geologic hazard review to assess whether a geologic hazard is present at the site proposed for development, and if so, to provide mitigation recommendations. The geologic hazard review was based upon physical and visual reconnaissance, subsurface exploration, and review of maps and other published technical literature. The results of the geologic hazard review for potential geologic hazards are discussed in the following sections.

5.1 Erosion Hazard Areas

According to *Clark County Maps Online*, the *Soil Survey of Clark County, Washington* and field observations, an erosion hazard is not present on the subject site. Therefore, according to the *City of La Center Development Code,* a soil erosion hazard area is not present at the site. However, if there are erosion concerns, erosion can be successfully mitigated by preparation and adherence to a site-specific erosion control plan that identifies BMPs to be utilized to reduce potential impacts on site soils during construction. Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Erosion control measures are discussed further in Section 6.15, *Erosion Control Measures*.

5.2 Landslide Hazard and Steep Slope Areas

To evaluate steep slope areas and assess whether landslide hazards are present at the site, Columbia West conducted a review of literature, subsurface exploration, and physical slope reconnaissance. As mentioned previously, slope grades of up to 25 percent were observed at the northeast site corner.

5.2.1 Geologic Literature Review

Columbia West reviewed *Slope Stability of Clark County* (Washington Department of Natural Resources, Division of Geology and Earth Resources, Fiksdal, 1975) to assess site slope characteristics. The Fiksdal report identifies four levels of potential slope instability within Clark County: (1) stable areas – no slides or unstable slopes, (2) areas of potential instability because of underlying geologic conditions and physical characteristics associated with steepness, (3) areas of historical or still active landslides, and (4) older landslide debris. The site is mapped as (1) stable areas – no slides or unstable slopes.

Columbia West also reviewed the *Geologic Map of the Ridgefield Quadrangle, Clark County, Washington* (R.C. Evarts, Washington Division of Geology and Earth Resources, Scientific Investigations Map 2844, 2004), which indicates that no landslide deposits are mapped at the subject site or in the surrounding vicinity.

5.2.2 Slope Reconnaissance and Slope Stability Assessment

Review of topographic mapping published by *Clark County Maps Online* indicates that the subject site is located in an area that slopes regionally downgradient from north to south with no apparent toe or crest observed on the property or adjacent parcels.

The maximum grade change between the north and south property boundaries is approximately 100 feet with slope grades generally ranging from 5 to 25 percent. Slopes appear planar with no observed evidence of instability. There was no observed direct evidence of large-scale, mass slope movements or historic landslides. No landslide debris was observed within subsurface soils explored onsite and groundwater seeps or springs were not observed.

City of La Center Municipal Code defines a landslide hazard as areas meeting all three of the following characteristics: 1) slopes steeper than 15 percent; 2) hillsides intersecting geologic contacts with permeable sediment overlying low permeability sediment or bedrock, and; 3) any springs or groundwater seepage. The above-mentioned criteria were not observed during our field investigation or site research. Based upon the results of slope reconnaissance, subsurface exploration, and site research, slopes on the subject site do not appear to meet the definition of a landslide hazard according to *City of La Center Municipal Code*.

5.3 Seismic Hazard Areas

Seismic hazards include areas subject to severe risk of earthquake-induced damage. Damage may occur due to soil liquefaction, dynamic settlement, ground shaking amplification, or surface faulting rupture. These seismic hazards are discussed below.

5.3.1 Soil Liquefaction and Dynamic Settlement

According to the *Liquefaction Susceptibility Map of Clark County Washington* (Washington State Department of Natural Resources, 2004), the site is mapped as very low susceptibility for liquefaction. Liquefaction, defined as the transformation of the behavior of a granular material from a solid to a liquid due to increased pore-water pressure and reduced effective stress, may occur when granular materials quickly compact under cyclic stresses caused by a seismic event. The effects of liquefaction may include immediate ground settlement and lateral spreading.

Soils most susceptible to liquefaction are generally saturated, cohesionless, loose to medium-dense sands within 50 feet of the ground surface. Recent research has also indicated that low plasticity silts and clays may also be subject to sand-like liquefaction behavior if the plasticity index determined by the Atterberg Limits analysis is less than 8. Potentially liquefiable soils located above the existing, historic, or expected ground water levels do not generally pose a liquefaction hazard. It is important to note that changes in perched ground water elevation may occur due to project development or other factors not observed at the time of investigation.

Based upon results of literature review, site-specific testing, and laboratory analysis, the potential for soil liquefaction is considered to be low.

5.3.2 Ground Shaking Amplification

Review of the *Site Class Map of Clark County, Washington* (Washington State Department of Natural Resources, 2004), indicates that site soils may be represented by Site Classes C and D as defined by the *ASCE 7, Chapter 20, Table 20.3-1*. However, subsurface exploration, in situ soil testing, and review of local well logs and geologic maps indicated that site soils exhibit characteristics of Site Class D. A designation of Site Class D indicates that minor amplification of seismic energy may occur during a seismic event due to subsurface conditions. However, this is typical for many areas within Clark County, does not constitute a geologic hazard in Columbia West's opinion, and will not prohibit development if properly accounted for during the design process.

5.3.3 Fault Rupture

Because there are no known geologic seismic faults within the site boundaries, fault rupture is unlikely.

6.0 DESIGN RECOMMENDATIONS

The geotechnical site investigation suggests the proposed development is generally compatible with surface and subsurface soils, provided the recommendations presented in this report are utilized and incorporated into the design and construction processes. The primary geotechnical concerns associated with the site are shallow groundwater, and fine-textured soils and drainage. Design recommendations are presented in the following text sections.

6.1 Site Preparation and Grading

Vegetation, organic material, unsuitable fill, and deleterious material that may be encountered should be cleared from areas identified for structures and site grading. Vegetation, other organic material, and debris should be removed from the site. Stripped topsoil should also be removed or used only as landscape fill in nonstructural areas with slopes less than 25 percent. The stripping depth for sod and highly organic topsoil is anticipated to vary between approximately 8 and 14 inches. The required stripping depth may increase in areas of existing fill, heavy organics, or previously existing structures. Actual stripping depths should be determined based upon visual observations made during construction when soil conditions are exposed. The post-construction maximum depth of landscape fill placed or spread at any location onsite should not exceed one foot.

Previously disturbed soil, debris, or unconsolidated fill encountered during grading or construction activities should be removed completely and thoroughly from structural areas. This includes old remnant foundations, basement walls, utilities, associated soft soils, and debris. These materials and associated disturbed soils should also be completely removed from structural areas. Excavation areas should be backfilled with engineered structural fill.

The test pits excavated during site exploration were backfilled loosely with onsite soils. The test pits should be located and properly backfilled with structural fill during site improvements construction. Trees, stumps, and associated roots should also be removed from structural areas, individually and carefully. Resulting cavities and excavation areas should be backfilled with engineered structural fill.

Site grading activities should be performed in accordance with requirements specified in the *2018 International Building Code* (IBC), Chapter 18 and Appendix J, with exceptions noted in the text herein. Site preparation, soil stripping, and grading activities should be observed and documented by Columbia West.

6.1.1 Existing Fill

As previously discussed, and indicated on Figure 2, existing fill was observed in test pit exploration STP-1. Test pit exploration and field reconnaissance indicate that existing fill primarily consists of light brown to brown/gray, moist, apparent native soils and trace organic debris. Soil Type 1 was observed at the ground surface in STP-1 and along the northern property boundary on the eastern half of the site, extending to apparent depths of approximately one to- three feet bgs.

Existing fill and other previously disturbed soils or debris should be removed completely and thoroughly from structural areas. In some areas, existing fill may directly overlie vegetation and the original topsoil layer. This material should also be removed completely from structural areas. Upon removal of existing fill, Columbia West should observe the exposed subgrade. It should be noted that the limited scope of exploration conducted for this investigation cannot wholly eliminate uncertainty regarding the presence of unsuitable soils in areas not explored.

Based upon Columbia West's investigation, existing fill soils are not acceptable for reuse as structural fill.

6.2 Engineered Structural Fill

Areas proposed for fill placement should be appropriately prepared as described in the preceding text. Surface soils should be scarified and compacted prior to additional fill placement. Engineered structural fill should be placed in loose lifts not exceeding 12 inches in depth and compacted using standard conventional compaction equipment. The soil moisture content should be within two percentage points of optimum conditions. A field density at least equal to 95 percent of the maximum dry density, obtained from the standard Proctor moisture-density relationship test (ASTM D698), is recommended for structural fill placement and scarified and recompacted subgrade.

Compaction of engineered structural fill should be verified by nuclear gauge field compaction testing performed in accordance with *ASTM D6938*. Field compaction testing should be performed for each vertical foot of engineered fill placed. Engineered fill placement should be observed by Columbia West.

Engineered structural fill placement activities should be performed during dry summer months if possible. Most clean native soils may be suitable for use as structural fill if adequately dried or moisture-conditioned to achieve recommended compaction specifications. Native clay soils with a plasticity index greater than 25 (Soil Type 4) should be evaluated and approved by Columbia West prior to use as structural fill. Native soils may require addition of moisture during periods of dry weather. Compacted fill soils should be covered shortly after placement.

Because they are moisture-sensitive, fine-textured soils are often difficult to excavate and compact during wet weather conditions. If adequate compaction is not achievable with clean native soils, import structural fill consisting of granular fill meeting WSDOT specifications for *Gravel Borrow 9-03.14*(*1*) is recommended.

Representative samples of proposed engineered structural fill should be submitted for laboratory analysis and approval by Columbia West prior to placement. Laboratory analyses should include particle-size gradation and standard Proctor moisture-density analysis.

6.3 Cut and Fill Slopes

Fill placed on existing grades steeper than 5H:1V should be horizontally benched at least 10 feet into the slope. Fill slopes greater than six feet in height should be vertically keyed into existing subsurface soil. A typical fill slope cross-section is shown in Figure 3. Drainage implementations, including subdrains or perforated drainpipe trenches, may also be necessary in proximity to cut and fill slopes if seeps or springs are encountered. Drainage design may be performed on a case-by-case basis. Extent, depth, and location of drainage may be determined in the field by Columbia West during construction when soil conditions are exposed. Failure to provide adequate drainage may result in soil sloughing, settlement, or erosion.

Final cut or fill slopes at the site should not exceed 2H:1V or 10 feet in height without individual slope stability analysis. The values above assume a minimum horizontal setback for loads of 10 feet from top of cut or fill slope face or overall slope height divided by three (H/3), whichever is greater. A minimum slope setback detail for structures is presented in Figure 4.

Concentrated drainage or water flow over the face of slopes should be prohibited, and adequate protection against erosion is required. Fill slopes should be constructed by placing fill material in maximum 12-inch level lifts, compacting as described in Section 6.2, *Engineered Structural Fill* and horizontally benching where appropriate. Fill slopes should be overbuilt, compacted, and trimmed at least two feet horizontally to provide adequate compaction of the outer slope face. Proper cut and fill slope construction is critical to overall project stability and should be observed and documented by Columbia West.

6.4 Foundations

Foundations for proposed structures are anticipated to consist of shallow continuous perimeter or column spread footings. Footings should be designed by a licensed structural engineer and conform to the recommendations below. Typical building loads are not expected to exceed approximately 3 kips per foot for perimeter footings or 10 kips per column. If actual loading exceeds anticipated loading, additional analysis should be conducted for the specific load conditions and proposed footing dimensions.

The existing ground surface should be prepared as described in Section 6.1, *Site Preparation and Grading*, and Section 6.2, *Engineered Structural Fill*. Foundations should bear upon firm native soil or engineered structural fill.

To evaluate bearing capacity for proposed structures, serviceability and reliability of shear resistance for subsurface soils was considered. Allowable bearing capacity is typically a function of footing dimension and subsurface soil properties, including settlement and shear resistance. Based upon in situ field testing and laboratory analysis, the estimated allowable bearing capacity for well-drained foundations prepared as described above is 1,500 psf. Bearing capacity may be increased by one-third for transient lateral forces such as seismic or wind. The estimated coefficient of friction between in situ compacted native soil or engineered structural fill and in-place poured concrete is 0.35. Lateral forces may also be resisted by an assumed passive soil equivalent fluid pressure of 250 psf/f against embedded footings. The upper six inches of soil should be neglected in passive pressure calculations.

Footings should extend to a depth at least 18 inches below lowest adjacent grade to provide adequate bearing capacity and protection against frost heave. Foundations constructed during wet weather conditions will require over-excavation of saturated subgrade soils and granular structural backfill prior to concrete placement. Over-excavation recommendations should be provided by Columbia West during foundation excavation and construction. Excavations adjacent to foundations should not extend within a 2H:1V angle projected down from the outside bottom footing edge without additional geotechnical analysis.

Foundations should not be permitted to bear upon undocumented fill or disturbed soil. Columbia West should observe foundation excavations prior to placing forms or reinforcing bar to verify subgrade support conditions are as anticipated in this report.

6.5 Slabs on Grade

Proposed structures may have slab-on-grade floors. Slabs should be supported on firm, competent, in situ soil or engineered structural fill. Disturbed soils and unsuitable fills in proposed slab locations should be removed and replaced with structural fill.

Preparation beneath slabs should be performed in accordance with the recommendations presented in Section 6.1, *Site Preparation and Grading* and Section 6.2, *Engineered Structural Fill*. Slabs should be underlain by at least 6 inches of 1 ¼"-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*). Geotextile filter fabric conforming to *WSDOT 2010 Standard Specification M 41-10, 9-33.2*(*1*), *Geotextile Properties, Table 3: Geotextile for Separation or Soil Stabilization* may be used below the crushed aggregate to increase subgrade support. Base aggregate should be compacted to at least 95 percent of maximum dry density determined by the modified Proctor moisture-density relationship test (ASTM D1557).

For lightly loaded slabs not exceeding 200 psf, the modulus of subgrade reaction is estimated to be 150 psi/inch. Columbia West should be contacted for additional analysis if slab loading exceeds 200 psf. If desired, a moisture barrier may be constructed beneath the slabs. Slabs should be appropriately waterproofed in accordance with the desired type of finished flooring. Slab thickness and reinforcement should be designed by an experienced structural engineer in accordance with anticipated loads.

6.6 Static Settlement

Total long-term static footing displacement for shallow foundations constructed as described in this report is not anticipated to exceed approximately 1 inch. Differential settlement between comparably loaded footing elements is not expected to exceed approximately ½ inch over a span of 50 feet. The resulting vertical displacement after loading may be due to elastic distortion, dissipation of excess pore pressure, or soil creep.

6.7 Excavation

Soils at the site were explored to a maximum depth of 14 feet using a track-mounted excavator. Bedrock was not encountered and blasting or specialized rock-excavation techniques are not anticipated. Perched groundwater layers may exist at shallower depths depending on seasonal fluctuations in the water table. Recommendations as presented in Section 6.8, *Dewatering* should be considered where below-grade construction intersects the shallow groundwater table.

Based upon laboratory analysis and field testing, near-surface soils may be Washington State Industrial Safety and Health Administration (WISHA) Type C. For temporary open-cut excavations deeper than four feet, but less than 20 feet in soils of these types, the maximum allowable slope is 1.5H:1V. WISHA soil type should be confirmed during field construction activities by the contractor. Soil is often anisotropic and heterogeneous, and it is possible that WISHA soil types determined in the field may differ from those described above.

Site-specific shoring design may be required if open-cut excavations are infeasible or if excavations are proposed adjacent to existing infrastructure. Typical methods for stabilizing excavations consist of soldier piles and timber lagging, sheet pile walls, tiebacks and shotcrete, or pre-fabricated hydraulic shoring. Because lateral earth pressure distributions acting on below-grade structures are dependent upon the type of shoring system used, Columbia West should be contacted to conduct additional analysis when shoring type, excavation depths, and locations are known.

The contractor should be held responsible for site safety, sloping, and shoring. Columbia West is not responsible for contractor activities and excavation should be conducted in accordance with all applicable local, state, and federal laws.

6.8 Dewatering

Groundwater elevation and hydrostatic pressure should be carefully considered during design of utilities, retaining walls, or other structures that require below-grade excavation. Utility trenches in shallow groundwater areas or excavations and cuts that remain open for even short periods of time may undermine or collapse due to groundwater effects. Placement of layers of riprap or quarry spalls in localized areas on shallow excavation side slopes may be required to limit instability. Over-excavation and stabilization of pipe trenches or other excavations with imported crushed aggregate or gabion rock may also be necessary to provide adequate subgrade support.

Significant pumping and dewatering may be required to temporarily reduce the groundwater elevation to allow construction of proposed below-grade structures, installation of utilities, or placement of structural fills. Dewatering via a sump within excavation zones may be insufficient to control groundwater and provide excavation side slope stability. Dewatering may be more feasibly conducted by installing a system of temporary well points and pumps around proposed excavation areas or utility trenches. Depending on proposed utility depths, a site-specific dewatering plan may be necessary. Well pumps should remain functioning at all times during the excavation and construction period. Suitable back-up pumps and power supplies should be available to prevent unanticipated shut-down of dewatering equipment. Failure to operate pumps full-time may result in flooding of the excavation zones, resulting in damage to forms, slopes, or equipment.

6.9 Lateral Earth Pressure

Lateral earth pressures should be considered during design of retaining walls and below grade structures. Hydrostatic pressure and additional surcharge loading should also be considered. Wall foundation construction and bearing capacity should adhere to specifications provided previously in Section 6.4, *Foundations*. Retained material may include engineered structural backfill or undisturbed native soil. Structural wall backfill should consist of imported granular material meeting *Section 9-03.12*(*2*) of *WSDOT Standard Specifications*. Backfill should be prepared and compacted to at least 95 percent of maximum dry density as determined by the modified Proctor test (ASTM D1557). Recommended parameters for lateral earth pressures for retained soils and engineered structural backfill consisting of imported granular fill meeting WSDOT specifications for *Gravel Backfill for Walls 9-03.12*(*2*) are presented in Table 1.

The design parameters presented in Table 1 are valid for static loading cases only and are based upon in situ undisturbed native soils or compacted granular fill. The recommended earth pressures do not include surcharge loads, dynamic loading, hydrostatic pressure, or seismic design. If sloped backfill conditions are proposed, Columbia West should be contacted for additional analysis and associated recommendations.

If seismic design is required for unrestrained walls, seismic forces may be calculated by superimposing a uniform lateral force of $10H^2$ pounds per lineal foot of wall, where H is the total wall height in feet. The resultant force should be applied at 0.6H from the base of the wall.

Table 1. Recommended Lateral Earth Pressure Parameters for Level Backfill

Retained Soil	Equivalent Fluid Pressure for Level Backfill			Wet Density	Drained Internal Angle of Friction
	At-rest	Active	Passive		
Undisturbed native SILT with Sand and Sandy SILT (Soil Type 2)	61 pcf	42 pcf	319 pcf	115 pcf	28°
Undisturbed native Lean CLAY with Sand (Soil Type 3)	60 pcf	41 pcf	293 pcf	110 pcf	27°
Undisturbed Native Fat CLAY (Soil Type 4)	65 pcf	46 pcf	261 pcf	110 pcf	24°
Approved Structural Backfill Material WSDOT 9-03.12(2) compacted aggregate backfill	56 pcf	35 pcf	520 pcf	135 pcf	36°

**The upper 6 inches of soil should be neglected in passive pressure calculations. If exterior grade from top or toe of retaining wall is sloped, Columbia West should be contacted to provide location-specific lateral earth pressures.*

A continuous one-foot-thick zone of free-draining, washed, open-graded 1-inch by 2-inch drain rock and a 4-inch perforated gravity drainpipe is assumed behind retaining walls. Geotextile filter fabric should be placed between the drain rock and backfill soil. Specifications for drainpipe design are presented in Section 6.12, *Drainage*. If walls cannot be gravity drained, saturated base conditions and/or applicable hydrostatic pressures should be assumed.

Final retaining wall design should be reviewed and approved by Columbia West. Retaining wall subgrade and backfill activities should also be observed and tested for compliance with recommended specifications by Columbia West during construction.

6.10 Seismic Design Considerations

According to the *ASCE 7 Hazard Tool,* the anticipated peak ground and maximum considered earthquake spectral response accelerations resulting from seismic activity for the subject site are summarized in Table 2.

Table 2. Approximate Probabilistic Ground Motion Values for 'firm rock' sites based on subject property longitude and latitude

	2% Probability of Exceedance in 50 yrs
Peak Ground Acceleration	0.360 g
0.2 sec Spectral Acceleration	0.797 g
1.0 sec Spectral Acceleration	0.374 g

The listed probabilistic ground motion values are based upon "firm rock" sites with an assumed shear wave velocity of 2,500 ft/s in the upper 100 feet of soil profile. These values should be adjusted for site class effects by applying site coefficients F_a and F_v and F_{PGA} as defined by *ASCE 7-16 and associated ASCE 7-16 Supplement 1, dated December 12, 2018, Tables 11.4-1, 11.4-2, and 11.8-1*. The site coefficients are intended to more accurately characterize estimated peak ground and respective earthquake spectral response accelerations by considering site-specific soil characteristics and index properties.

Localized peak ground accelerations exceeding the adjusted values may occur in some areas in direct proximity to an earthquake's origin. This may be a result of amplification of seismic energy due to depth to competent bedrock, compression and shear wave velocity of bedrock, presence and thickness of loose, unconsolidated alluvial deposits, soil plasticity, grain size, and other factors.

Identification of specific seismic response spectra is beyond the scope of this investigation. If site structures are designed in accordance with recommendations specified in the *2018 IBC*, the potential for peak ground accelerations in excess of the adjusted and amplified values should be understood.

6.11 Infiltration Testing Results and Soil Group Classification

To investigate the feasibility of subsurface disposal of stormwater, Columbia West conducted in situ infiltration testing at two locations within the project area on July 27, 2021. Results of in situ infiltration testing are presented in Table 3. The soil classification presented in Table 3 is based upon laboratory analysis. The infiltration rate is presented as a recommended coefficient of permeability (k) and has been reported without application of a factor of safety.

As indicated in Table 3, the tests were conducted in test pits TP-1 and TP-8 at a depth of approximately one-foot bgs. Soils in the tested location were observed and sampled to adequately characterize the subsurface profile. Tested native soils are classified as SILT with sand (ML) and lean CLAY with sand (CL) according to USCS specifications. Soil laboratory analytical test reports are provided in Appendix A.

Single-ring, falling head infiltration testing was performed by inserting a three-inch diameter pipe into the soil at the noted depth. The test was conducted by filling the apparatus with water and measuring time relative to changes in hydraulic head at regular intervals. Using Darcy's Law for saturated flow in homogenous media, the coefficient of permeability (k) was then calculated.

Table 3. Infiltration Test Results

Test Number	Location	Test Depth (feet bgs)	Groundwater Depth on 07/27/21 (feet bgs)	USCS Soil Type (*Indicates Visual Soil Classification)	Passing No. 200 Sieve (%)	WWHM Soil Group Classification**	Infiltration Rate (Coefficient of Permeability, k) (inches/hour)
IT-1.1	TP-1	1	Not Observed	ML, SILT with Sand*	-	4	< 0.06
IT-8.1	TP-8	1	Not Observed	CL, Lean CLAY with Sand*	-	4	< 0.06

** WWHM Classifications are Based Upon Subsurface Investigation and Infiltration Testing Conducted at the Locations Shown.

Columbia West also classified tested near-surface soils into a representative soil group based upon site-specific infiltration test results and review of published literature. As indicated in Table 3, observed near-surface infiltration rates were less than 0.06 inches per hour in the tested locations. Based upon review of USDA hydrologic soil group criteria (USDA, 2007), Appendix 2-A of the *2021 Clark County Stormwater Manual,* and the *Clark County WWHM Soil Groupings Memorandum* (Otak, 2010), measured infiltration rates generally meet the criteria for WWHM Soil Group 4. Therefore, based upon site-specific infiltration testing and review of published literature, tested near-surface soils may be appropriately classified as presented in Table 3.

Due to the presence of fine-textured, low permeability soils at the site, subsurface disposal of concentrated stormwater via infiltration is likely infeasible and is not recommended without further study.

6.12 Drainage

At a minimum, site drainage should include surface water collection and conveyance to properly designed stormwater management structures and facilities. Drainage design in general should conform to City of La Center regulations. Finished site grading should be conducted with positive drainage away from structures. Depressions or shallow areas that may retain ponding water should be avoided. Roof drains, low-point drains, and perimeter foundation drains are recommended for structures. Drains should consist of separate systems and gravity flow with a minimum two-percent slope away from foundations into an approved discharge location.

Perimeter foundation drains should consist of 3-inch perforated PVC pipe surrounded by a minimum of 1 ft^3 of clean, washed drain rock per linear foot of pipe and wrapped with geotextile filter fabric. Open-graded drain rock with a maximum particle size of 3 inches and less than 2 percent passing the No. 200 sieve is recommended. Geotextile filter fabric should consist of Mirafi 140N or approved equivalent, with AOS between No. 70 and No. 100 sieve. The water permittivity should be greater than 1.5/sec. Figure 5 presents a typical foundation drain. Perimeter drains may limit increased hydrostatic pressure beneath footings and assist in reducing potential perched moisture areas.

Subdrains should also be considered if portions of the site are cut below surrounding grades. Shallow groundwater, springs, or seeps should be conveyed via drainage channel or perforated pipe into an approved discharge. Recommendations for design and installation of perforated drainage pipe may be performed on a case-by-case basis by Columbia West during construction. Failure to provide adequate surface and sub-surface drainage may result in soil slumping or unanticipated settlement of structures exceeding tolerable limits. A typical perforated drainpipe trench detail is presented in Figure 6.

Site improvements construction in some areas may occur at or near the shallow groundwater table, particularly if work is conducted during wet-weather conditions. Dewatering may be necessary, and a drainage mat may be required to achieve sufficient elevation for fill placement. A typical drainage mat is shown on Figure 7. Columbia West should determine drainage mat location, extent, and thickness when subsurface conditions are exposed. Drainage mats may need to be constructed in conjunction with subdrains to convey captured water to an approved discharge location.

Drains should be closely monitored after construction to assess their effectiveness. If additional surface or shallow subsurface seeps become evident, the drainage provisions may require modification or additional drains. Columbia West should be consulted to provide appropriate recommendations.

6.13 Bituminous Asphalt and Portland Cement Concrete

Based upon correspondence with the client, proposed development will include new public asphalt-paved roadways. Columbia West recommends adherence to City of La Center paving guidelines for roadway improvements in the public right-of-way.

For dry weather construction, pavement surface sections should bear upon competent subgrade consisting of scarified and compacted native soil or engineered structural fill. Wet weather pavement construction is discussed in Section 6.14, *Wet Weather Construction Methods and Techniques*. Subgrade conditions should be evaluated and tested by Columbia West prior to placement of crushed aggregate base. Subgrade evaluation should include nuclear gauge density testing and wheel proof-roll observations conducted with a loaded 12-cubic yard, double-axle dump truck or equivalent. Nuclear gauge density testing should be conducted at 150-foot intervals or as determined by the onsite geotechnical engineer. Subgrade soil should be compacted to at least 95 percent of the modified Proctor dry density, as determined by *ASTM D1557*. Areas of observed deflection or rutting during proof-roll evaluation should be excavated to a firm surface and replaced with compacted crushed aggregate.

Aggregate base should consist of 1 ¼"-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*) and be compacted to at least 95 percent of maximum dry density as determined by *ASTM D1557*. Aggregate base should also be subject to proof-roll observations as described above. Asphalt concrete pavement should be compacted to at least 91 percent of maximum Rice density. Nuclear gauge density testing should be conducted to verify adherence to recommended specifications. Testing frequency should be in accordance with WSDOT and City of La Center specifications.

Portland cement concrete curbs and sidewalks should be installed in accordance with City of La Center specifications. Curb and sidewalk aggregate base should consist of 1 ¼”-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*) and be compacted to at least 95 percent of maximum dry density as determined by *ASTM D1557*. Curb and sidewalk base should also be subject to proof-roll observations as described above. Soft areas that deflect or rut should be stabilized prior to pouring concrete. Concrete should be tested during installation in accordance with *ASTM C171, C138, C231, C143, C1064, and C31*. This includes casting of cylinder specimen at a frequency of four cylinders per 100 cubic yards of poured concrete. Recommended field concrete testing includes slump, air entrainment, temperature, and unit weight.

6.14 Wet Weather Construction Methods and Techniques

Wet weather construction often results in significant shear strength reduction and soft areas that may rut or deflect. Installation of granular working layers may be necessary to provide a firm support base and sustain construction equipment. Granular layers should consist of all-weather gravel, 2x4-inch gabion, or other similar material (six-inch maximum size with less than five percent passing the No. 200 sieve).

Construction equipment traffic across exposed soil should be minimized. Equipment traffic induces dynamic loading, which may result in weak areas and significant reduction in shear strength for wet soils. Wet weather construction may also result in generation of significant excess quantities of soft wet soil. This material should be removed from the site or stockpiled in a designated area.

Construction during wet weather conditions may require increased base thickness. Over-excavation of subgrade soils or subgrade amendment with lime and/or cement may be necessary to provide a firm base upon which to place crushed aggregate. Geotextile filter fabric is also recommended. If soil amendment with lime or cement is considered, Columbia West should be contacted to provide appropriate recommendations based upon observed field conditions and desired performance criteria.

Crushed aggregate base should be installed in a single lift with trucks end-dumping from an advancing pad of granular fill. During extended wet periods, stripping activities may also need to be conducted from an advancing pad of granular fill. Once installed, the crushed aggregate base should be compacted with several passes from a static drum roller. A vibratory compactor is not recommended because it may further disturb the subgrade. Subdrains may also be necessary to provide subgrade drainage and maintain structural integrity.

Aggregate base should consist of 1 ¼”-0 crushed aggregate meeting *WSDOT 9-03.9*(*3*) and be compacted to at least 95 percent of maximum dry density according to the modified Proctor density test (ASTM D1557). Compaction should be verified by nuclear gauge density testing, conducted at 150-foot intervals or as determined by the onsite geotechnical engineer. Observation of a proof-roll with a loaded dump truck is also recommended as an indication of the compacted aggregate’s performance.

It should be understood that wet weather construction is risky and costly. Columbia West should observe and document wet weather construction activities. Proper construction methods and techniques are critical to overall project integrity.

6.15 Erosion Control Measures

Based upon field observations and laboratory testing, the erosion hazard for site soils in flat to shallow-gradient portions of the property is likely to be low. The potential for erosion generally increases in sloped areas. Therefore, disturbance to vegetation in sloped areas should be minimized during construction activities. Soil is also prone to erosion if unprotected and unvegetated during periods of increases precipitation. Erosion can be minimized by performing construction activities during dry summer months.

Site-specific erosion control measures should be implemented to address the maintenance of exposed areas. This may include silt fence, biofilter bags, straw wattles, or other suitable methods. During construction activities, exposed areas should be well-compacted and protected from erosion with visqueen, surface tackifier, or other means, as appropriate. Temporary slopes or exposed areas may be covered with straw, crushed aggregate, or riprap in localized areas to minimize erosion. Erosion and water runoff during wet weather conditions may be controlled by application of strategically placed channels and small detention depressions with overflow pipes.

After grading, exposed surfaces should be vegetated as soon as possible with erosion-resistant native vegetation. Jute mesh or straw may be applied to enhance vegetation. Once established, vegetation should be properly maintained. Disturbance to existing native vegetation and surrounding organic soil should also be minimized during construction activities.

6.16 Soil Shrink/Swell Potential

Based upon laboratory analysis, near-surface soils contain as much as approximately 90 percent by weight passing the No. 200 sieve and exhibit a plasticity index ranging from 5 to 31 percent. This indicates the potential for soil shrinking or swelling and underscores the importance of proper moisture conditioning during fill placement. Medium to high plasticity soils should be placed and compacted at a moisture content approximately two percent above optimum as determined by laboratory analysis. As discussed previously in Section 6.2, *Engineered Structural Fill,* Columbia West should evaluate and assess all soils proposed for use as structural fill, particularly those with a plasticity index greater than 25, to determine suitability for the proposed end use.

6.17 Utility Installation

Utility installation may require subsurface excavation and trenching. Excavation, trenching and shoring should conform to federal (Occupational Safety and Health Administration) (OSHA) (29 CFR, Part 1926) and WISHA (WAC, Chapter 296-155) regulations. Site soils may slough when cut vertically and sudden precipitation events or perched groundwater may result in accumulation of water within excavation zones and trenches.

Utilities should be installed in general accordance with manufacturer's recommendations. Utility trench backfill should consist of *WSDOT 9-03.19 Bank Run Gravel for Trench Backfill* or *WSDOT 9-03.14(2) Select Borrow* with a maximum particle size of 2 ½-inches. Trench backfill material within 18 inches of the top of utility pipes should be hand compacted (i.e., no heavy compaction equipment). The remaining backfill should be compacted to at least 95 percent of maximum dry density as determined by the standard Proctor moisture-density test (ASTM D698). Clean, free-draining, fine bedding sand is recommended for use in the pipe zone. With exception of the pipe zone, backfill should be placed in loose lifts not exceeding 12 inches in thickness.

Compaction of utility trench backfill material should be verified by nuclear gauge field compaction testing performed in accordance with *ASTM D6938*. Field compaction testing should be performed at 200-foot intervals along the utility trench centerline at the surface and midpoint depth of the trench. Compaction frequency and specifications may be modified for non-structural areas in accordance with recommendations of the site geotechnical engineer.

7.0 CONCLUSION AND LIMITATIONS

This geotechnical site investigation report was prepared in accordance with accepted standard conventional principles and practices of geotechnical engineering. This investigation pertains only to material tested and observed as of the date of this report and is based upon proposed site development as described in the text herein. This report is a professional opinion containing recommendations established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. Soil conditions may differ between tested locations or over time. Slight variations may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions are as anticipated in this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Columbia West cannot accept responsibility for deviations from recommendations described in this report. Future performance of structural facilities is often related to the degree of construction observation by qualified personnel. These services should be performed to the full extent recommended.

This report is not an environmental assessment and should not be construed as a representative warranty of site subsurface conditions. The discovery of adverse environmental conditions, or subsurface soils that deviate from those described in this report, should immediately prompt further investigation. The above statements are in lieu of all other statements expressed or implied.

This report was prepared solely for the client and is not to be reproduced without prior authorization from Columbia West. Final engineering plans and specifications for the project should be reviewed and approved by Columbia West as they relate to geotechnical and grading issues prior to final design approval. Columbia West is not responsible for independent conclusions or recommendations made by other parties based upon information presented in this report. Unless a particular service was expressly included in the scope, it was not performed and there should be no assumptions based upon services not provided. Additional report limitations and important information about this document are presented in Appendix E. This information should be carefully read and understood by the client and other parties reviewing this document.

Sincerely,

COLUMBIA WEST ENGINEERING, Inc.

Daniel E. Lehto, PE, GE
Principal

DANIEL E. LEHTO
STATE OF WASHINGTON
44702
REGISTERED
PROFESSIONAL ENGINEER

9-23-21

expires: 6-5-23

REFERENCES

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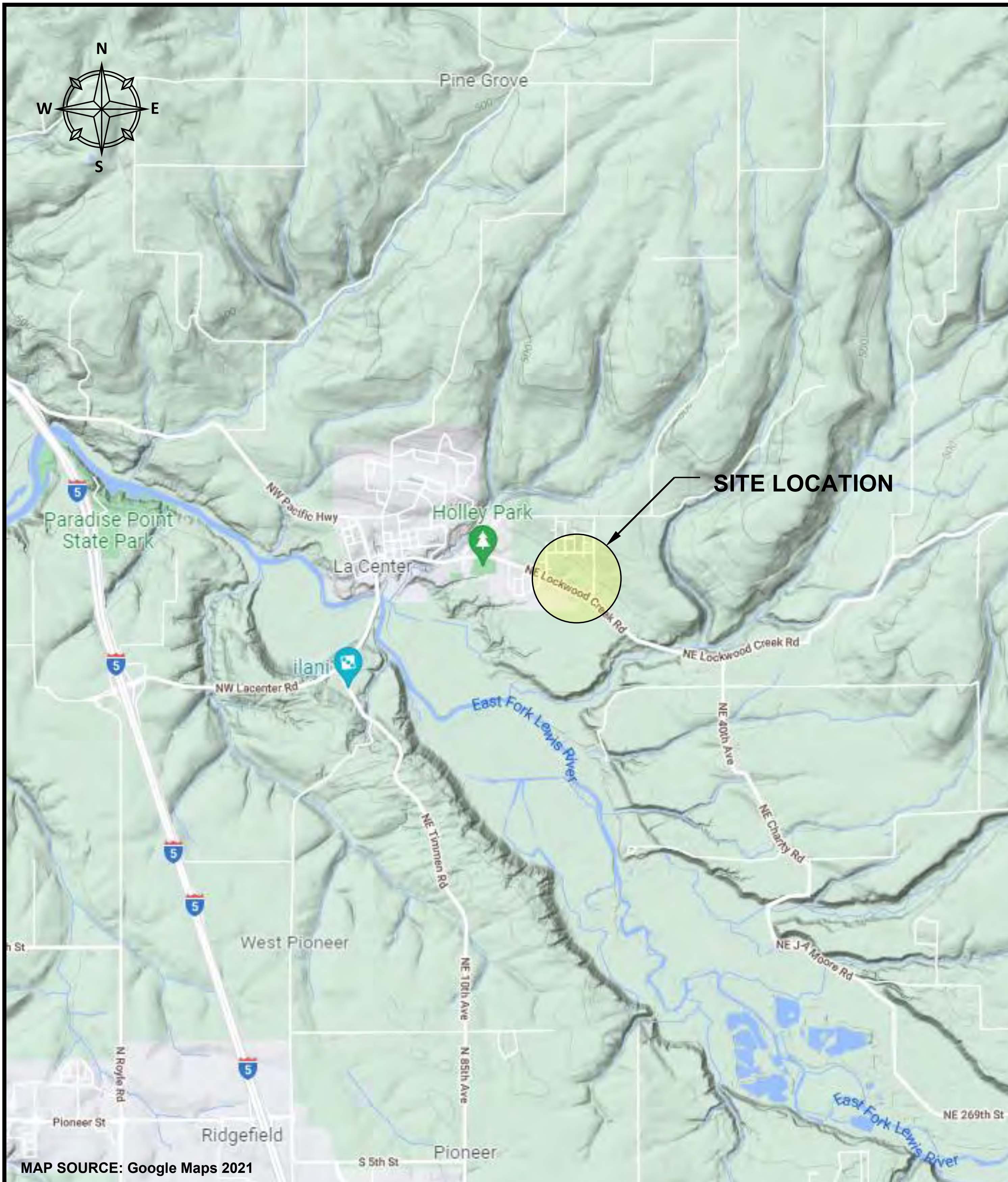
FIGURES



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	Job No: 21172 Date: 8/6/21 Drawn: CWS Checked: DEL	SITE LOCATION MAP LOCKWOOD MEADOWS SUBDIVISION LA CENTER, WASHINGTON	FIGURE 1

Test Number	Location	Test Depth (feet bgs)	Groundwater Depth on 07/27/21 (feet bgs)	USCS Soil Type (*Indicated Visual Soil Classification)	Passing No. 200 Sieve (%)	WWHM Soil Group Classification **	Infiltration Rate (Coefficient of Permeability, k) (inches/hour)
IT-1.1	TP-1	1	Not Observed	ML, SILT with Sand*	-	4	< 0.06
IT-8.1	TP-8	1	Not Observed	CL, Lean CLAY with Sand*	-	4	< 0.06

SITE BOUNDARY
LOCATION OF TEST PIT
LOCATION OF INFILTRATION TEST

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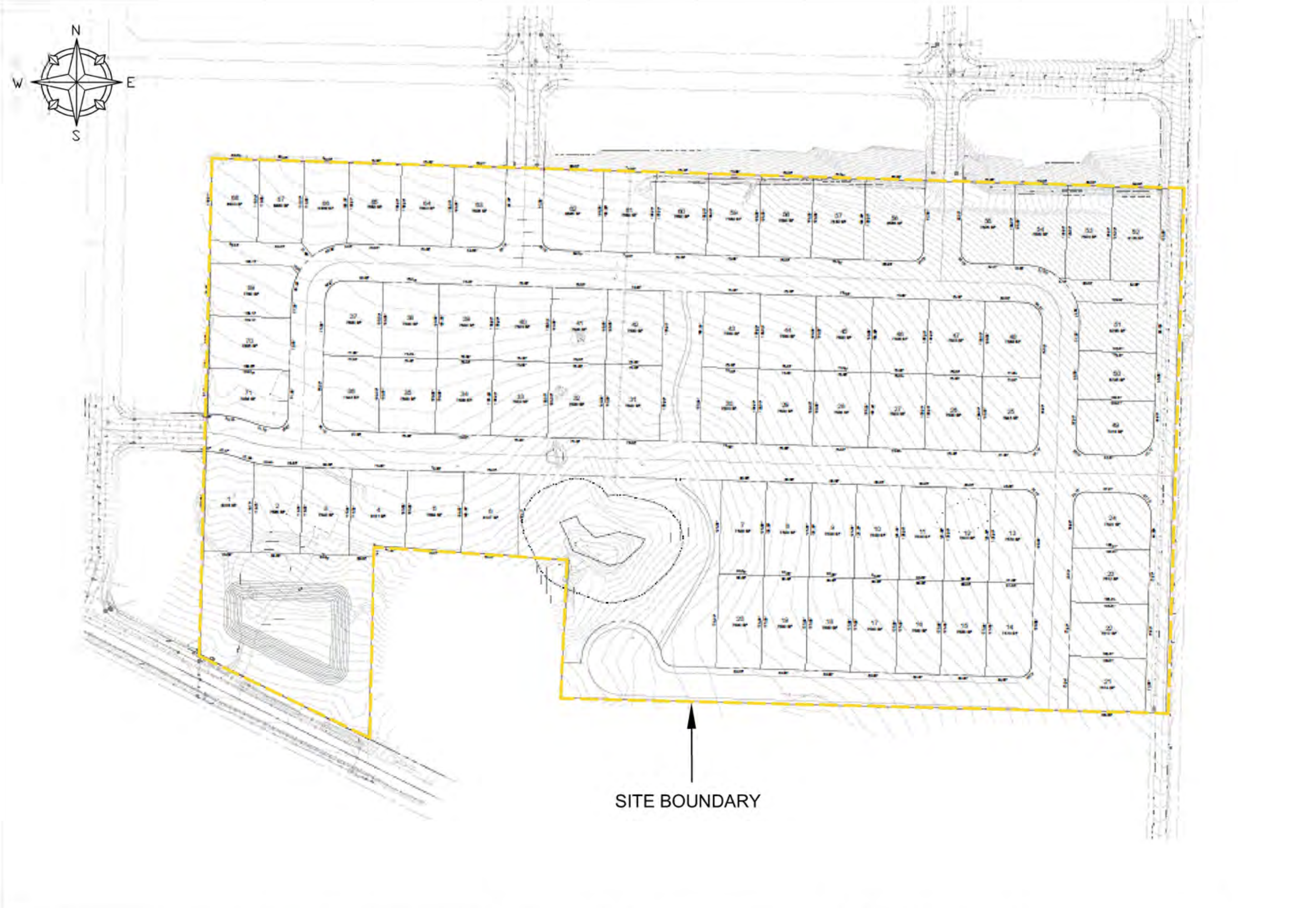
Job No: 21172
Date: 07/28/21
Drawn: EMU
Checked: CWS

EXPLORATION LOCATION MAP
LOCKWOOD MEADOWS SUBDIVISION

NOTES:
1. SITE LOCATION: 2000 NE LOCKWOOD CREEK ROAD IN LA CENTER, WASHINGTON.
2. SITE CONSISTS OF TAX PARCEL 209113000, TOTALING APPROXIMATELY 20 ACRES.
3. AERIAL PHOTO SOURCED FROM GOOGLE EARTH.
4. EXPLORATION LOCATIONS ARE APPROXIMATE AND NOT SURVEYED.
5. TEST PITS BACKFILLED LOOSELY WITH ONSITE SOILS ON JULY 27, 2021.

FIGURE
2



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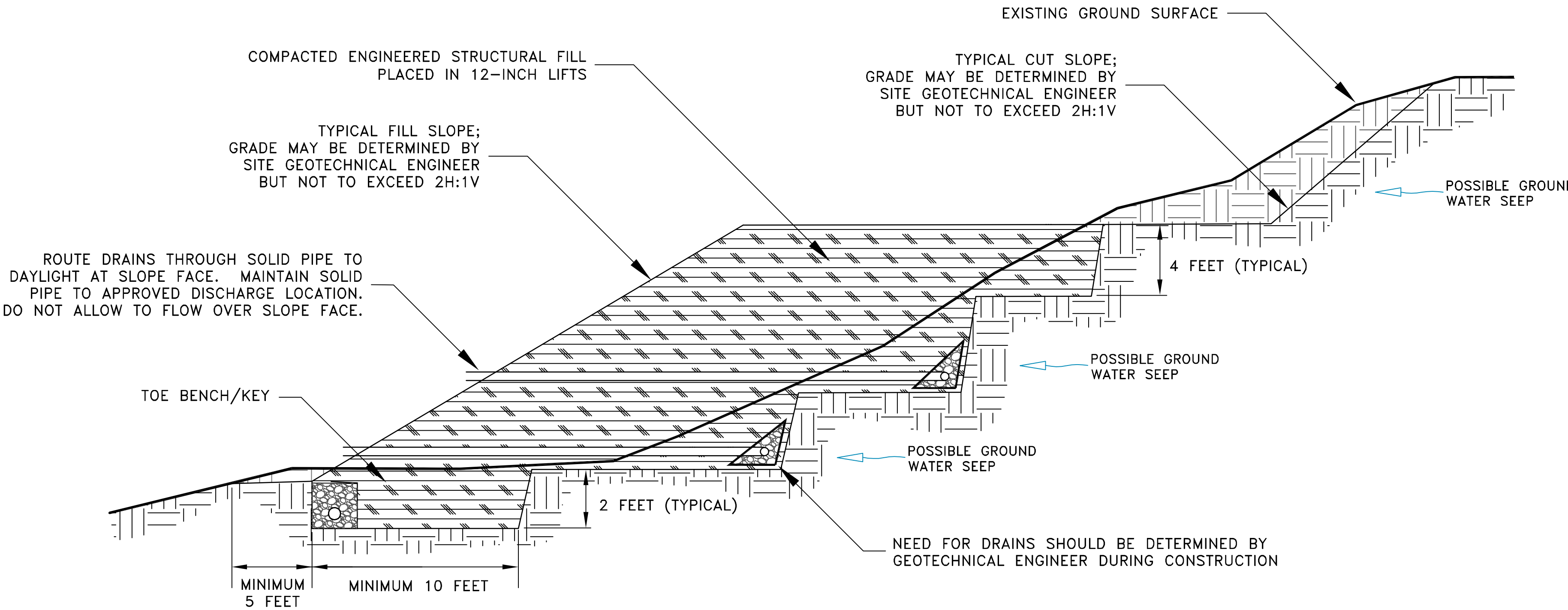
Job No: 21172
Date: 08/25/21
Drawn: EMU
Checked: CWS

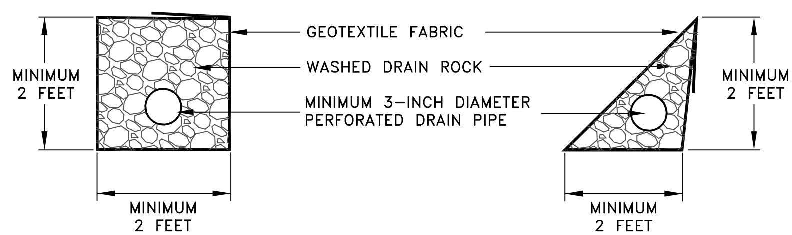
PRELIMINARY SITE PLAN
LOCKWOOD MEADOWS
SUBDIVISION

NOTES:
1. PRELIMINARY SITE PLAN PROVIDED BY PLS ENGINEERING
2. SITE PLAN APPLIES TO PARCEL NO. 209113000

FIGURE
2A



TYPICAL DRAIN SECTION DETAIL



DRAIN SPECIFICATIONS

GEOTEXTILE FABRIC SHALL CONSIST OF MIRAFI 140N OR APPROVED EQUIVALENT WITH AOS BETWEEN No. 70 AND No. 100 SIEVE.

WASHED DRAIN ROCK SHALL BE OPEN-GRADED ANGULAR DRAIN ROCK WITH LESS THAN 2 PERCENT PASSING THE No. 200 SIEVE AND A MAXIMUM PARTICLE SIZE OF 3 INCHES.

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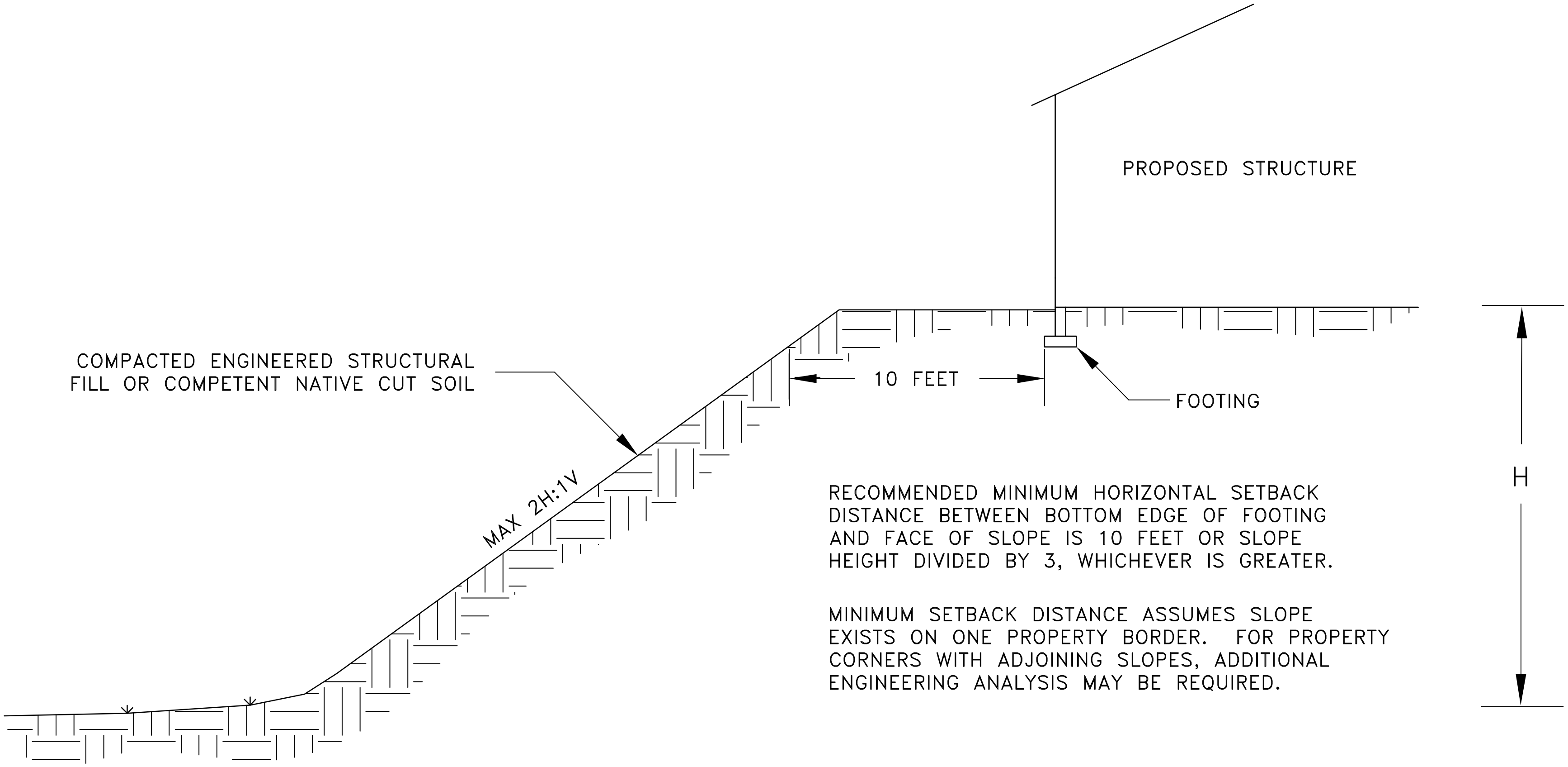
TYPICAL CUT AND FILL SLOPE CROSS SECTION

NOTES:
1. DRAWING IS NOT TO SCALE.
2. DRAWING REPRESENTS TYPICAL CUT AND FILL SLOPE CROSS SECTION AND MAY NOT BE SITE-SPECIFIC.

FIGURE 3



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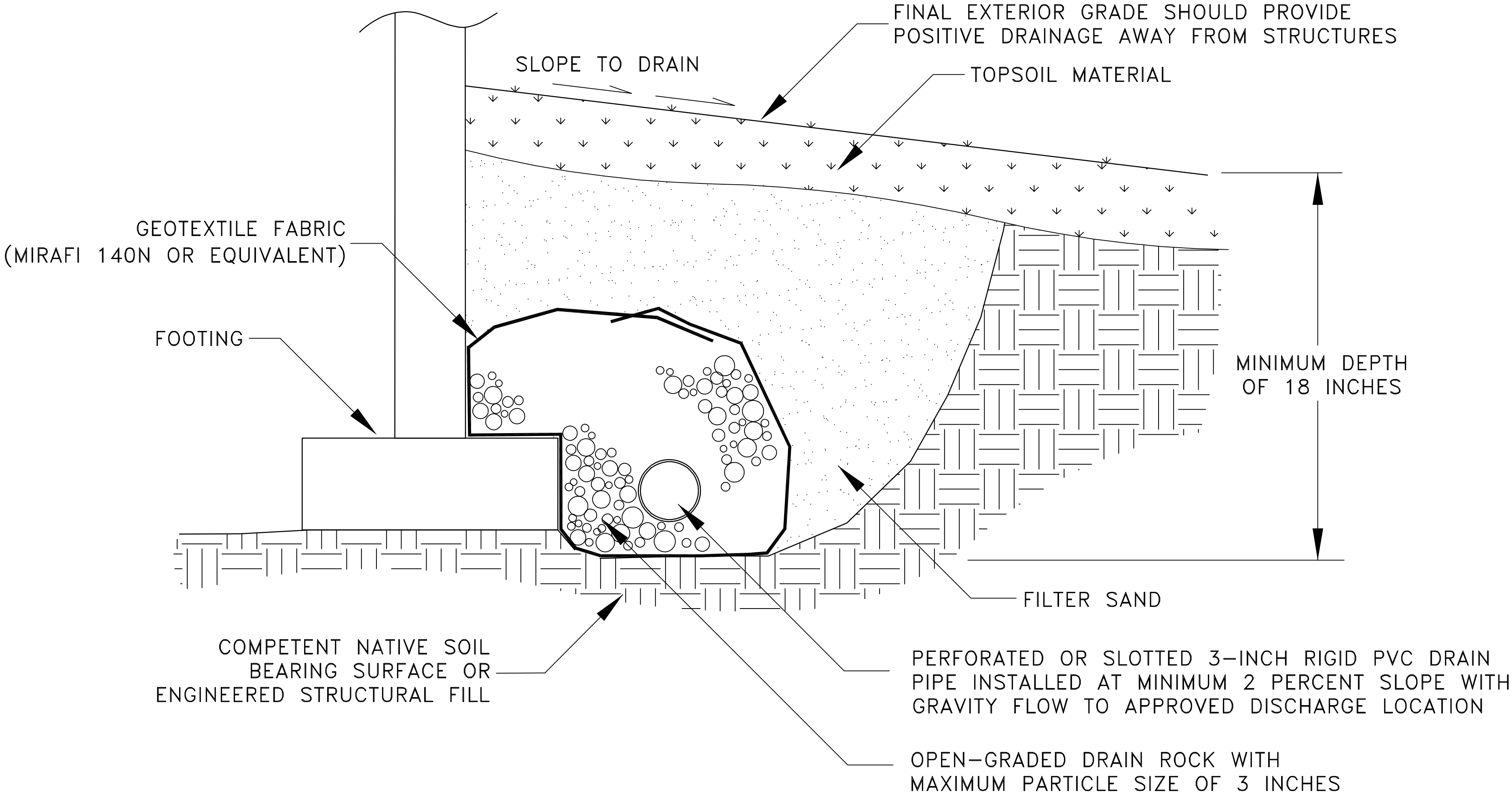
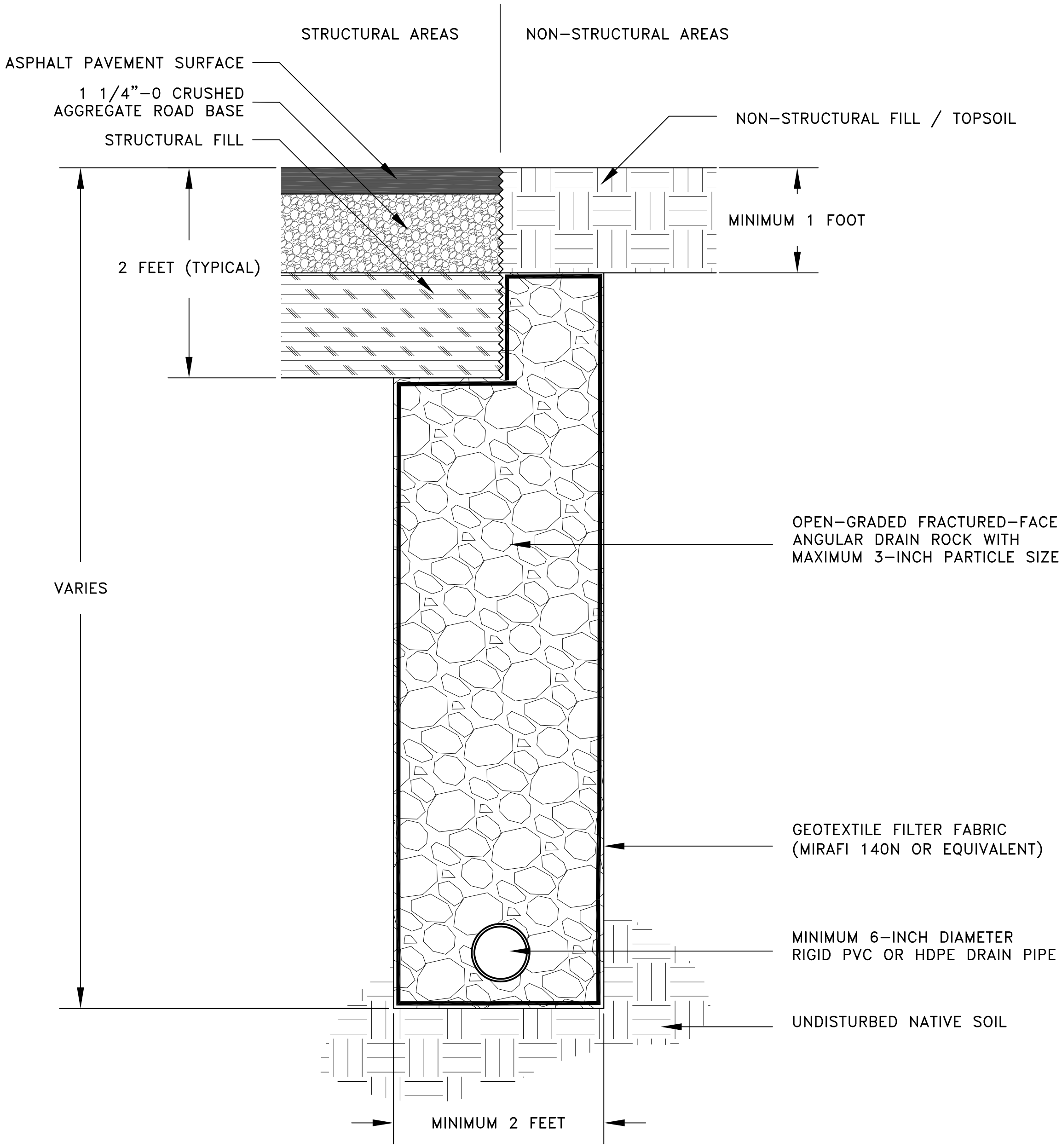
TYPICAL MINIMUM FOUNDATION SLOPE SETBACK DETAIL

NOTES:
1. DRAWING IS NOT TO SCALE.
2. SLOPES AND PROFILES SHOWN ARE APPROXIMATE.
3. DRAWING REPRESENTS TYPICAL FOUNDATION SETBACK DETAIL AND MAY NOT BE SITE-SPECIFIC.

FIGURE 4



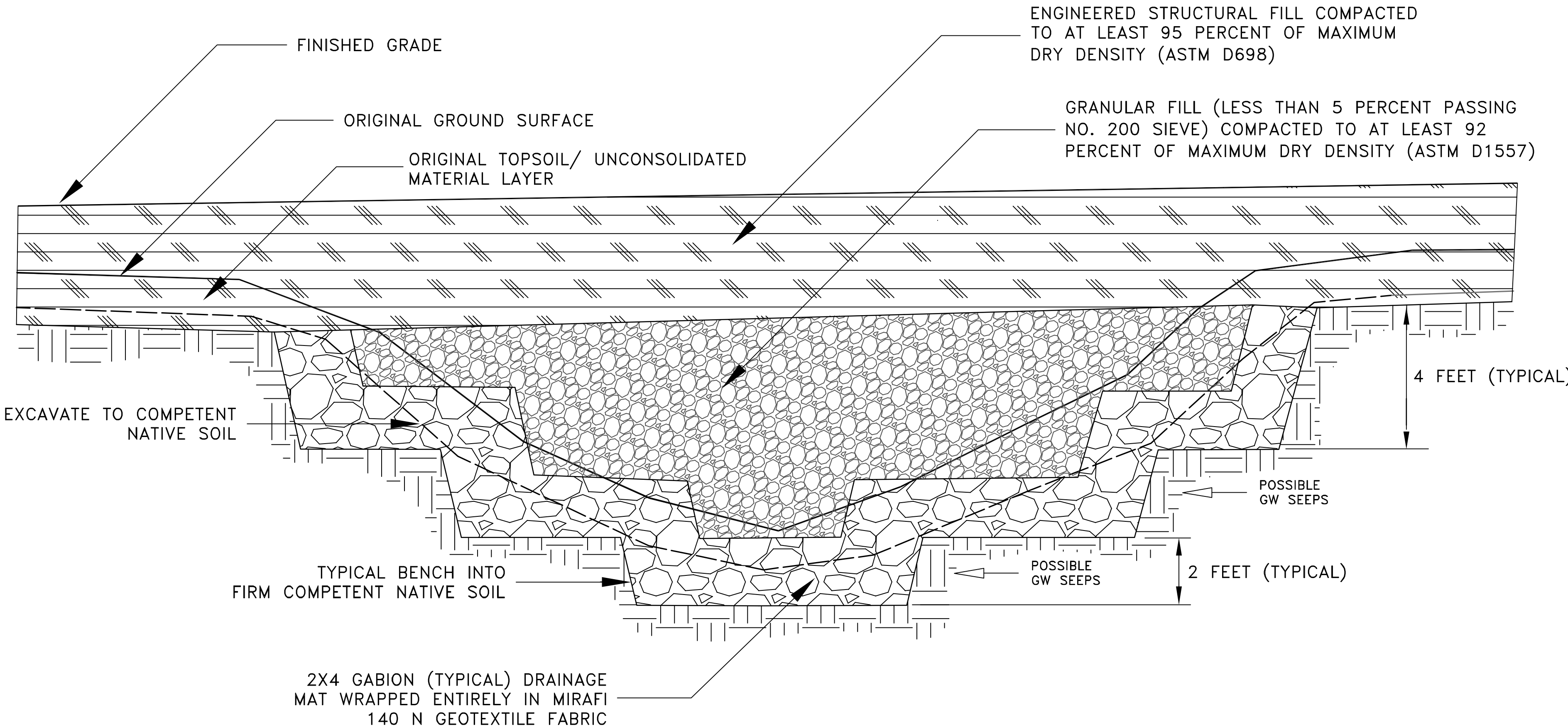
Geotechnical ■ Environmental ■ Special Inspections **Columbia West** Engineering, Inc	TYPICAL PERIMETER FOOTING DRAIN DETAIL	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL PERIMETER FOOTING DRAIN DETAIL AND MAY NOT BE SITE-SPECIFIC.	FIGURE 5



NOTE: LOCATION, INVERT ELEVATION, DEPTH OF TRENCH, AND EXTENT OF PERFORATED PIPE REQUIRED MAY BE MODIFIED BY THE GEOTECHNICAL ENGINEER DURING CONSTRUCTION BASED UPON FIELD OBSERVATION AND SITE-SPECIFIC SOIL CONDITIONS.

Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	TYPICAL PERFORATED DRAINPIPE TRENCH DETAIL	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL PERFORATED DRAIN PIPE TRENCH DETAIL AND MAY NOT BE SITE-SPECIFIC.	FIGURE 6

TYPICAL DRAINAGE MAT CROSS-SECTION



Geotechnical ▪ Environmental ▪ Special Inspections Columbia West Engineering, Inc	TYPICAL DRAINAGE MAT CROSS SECTION	NOTES: 1. DRAWING IS NOT TO SCALE. 2. DRAWING REPRESENTS TYPICAL DRAINAGE MAT SECTION AND MAY NOT BE SITE-SPECIFIC.	FIGURE 7

APPENDIX A
LABORATORY TEST RESULTS

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0665
		REPORT DATE: 08/20/21	FIELD ID: TP1.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
SILT with Sand	Test Pit, TP-01 depth = 10 feet	ML, Silt with Sand

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-4(4)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

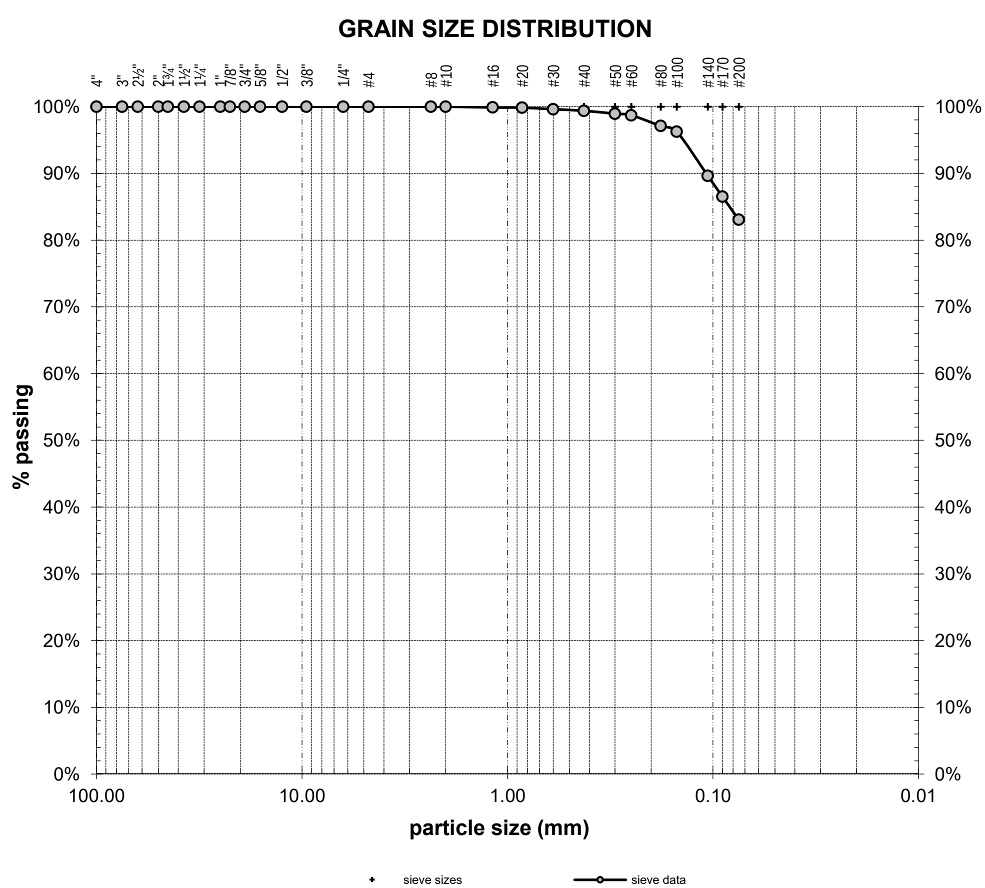
ADDITIONAL DATA

initial dry mass (g) =	164.39		
as-received moisture content =	35.0%	coefficient of curvature, C_C =	n/a
liquid limit =	32	coefficient of uniformity, C_U =	n/a
plastic limit =	27	effective size, $D_{(10)}$ =	n/a
plasticity index =	5	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 16.9%
% silt and clay = 83.1%

	SIEVE SIZE		PERCENT PASSING			
			SIEVE		SPECS	
	US	mm	act.	interp.	max	min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		100%		
	#20	0.850	100%			
	#30	0.600		100%		
	#40	0.425	99%			
	#50	0.300		99%		
	#60	0.250	99%			
	#80	0.180		97%		
	#100	0.150	96%			
	#140	0.106		90%		
	#170	0.090		87%		
	#200	0.075	83%			



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
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		REPORT DATE 08/20/21	FIELD ID TP1.1
		DATE SAMPLED 07/27/21	SAMPLED BY EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
SILT with Sand	Test Pit, TP-01 depth = 10 feet	ML, Silt with Sand

LABORATORY TEST DATA

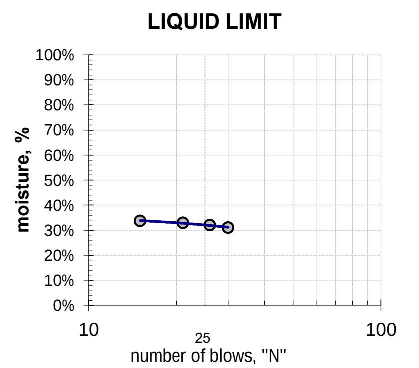
LABORATORY EOUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

ATTERBERG LIMITS

liquid limit =	32
plastic limit =	27
plasticity index =	5

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	32.88	32.08	32.21	32.61
dry soil + pan weight, g =	30.04	29.37	29.41	29.70
pan weight, g =	20.87	20.91	20.89	21.06
N (blows) =	30	26	21	15
moisture, % =	31.0 %	32.0 %	32.9 %	33.7 %

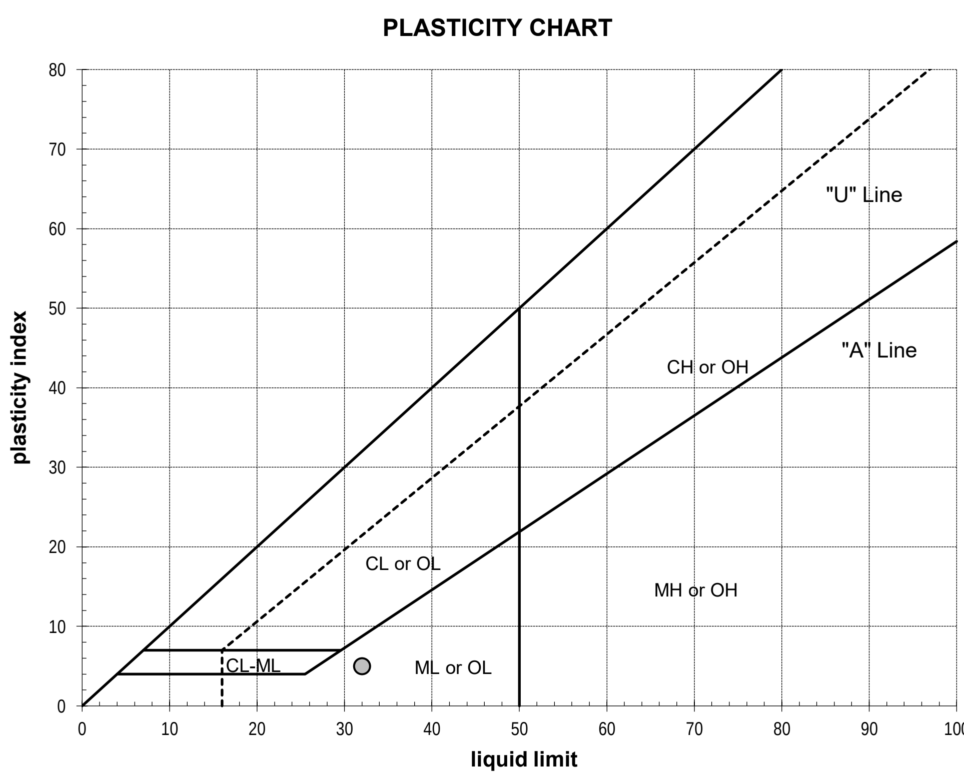


SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.63	27.72		
dry soil + pan weight, g =	26.19	26.25		
pan weight, g =	20.95	20.79		
moisture, % =	27.5 %	26.9 %		



ADDITIONAL DATA

% gravel =	0.0%
% sand =	16.9%
% silt and clay =	83.1%
% silt =	n/a
% clay =	n/a
moisture content =	35.0%

DATE TESTED	TESTED BY
08/19/21	KMS

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0666
		REPORT DATE: 08/20/21	FIELD ID: TP3.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Sandy SILT	Test Pit, TP-03 depth = 4 feet	ML, Sandy Silt

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-6(8)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

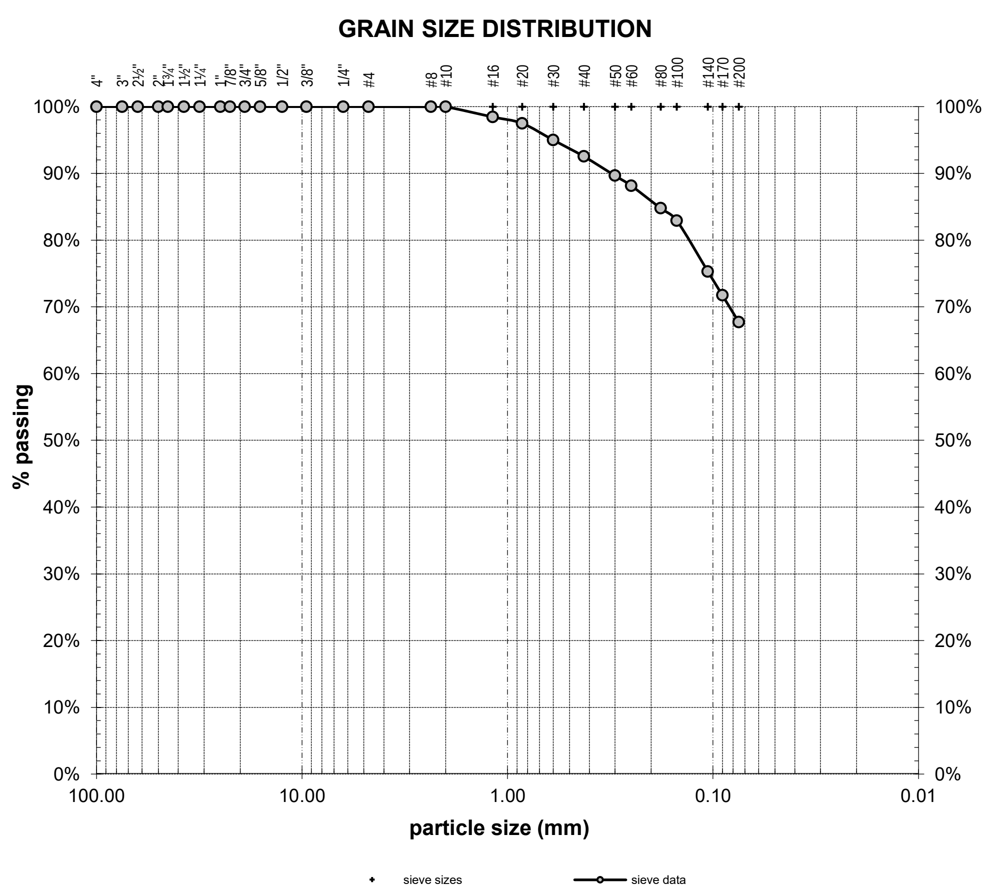
ADDITIONAL DATA

initial dry mass (g) =	162.94		
as-received moisture content =	35.6%	coefficient of curvature, C_C =	n/a
liquid limit =	40	coefficient of uniformity, C_U =	n/a
plastic limit =	27	effective size, $D_{(10)}$ =	n/a
plasticity index =	13	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 32.3%
% silt and clay = 67.7%

	SIEVE SIZE US	SIEVE SIZE mm	PERCENT PASSING SIEVE act.	SIEVE interp.	SPECS max	SPECS min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		98%		
	#20	0.850	97%			
	#30	0.600		95%		
	#40	0.425	93%			
	#50	0.300		90%		
	#60	0.250	88%			
	#80	0.180		85%		
	#100	0.150	83%			
	#140	0.106		75%		
	#170	0.090		72%		
	#200	0.075	68%			



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0666
		REPORT DATE: 08/20/21	FIELD ID: TP3.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Sandy SILT	Test Pit, TP-03 depth = 4 feet	ML, Sandy Silt

LABORATORY TEST DATA

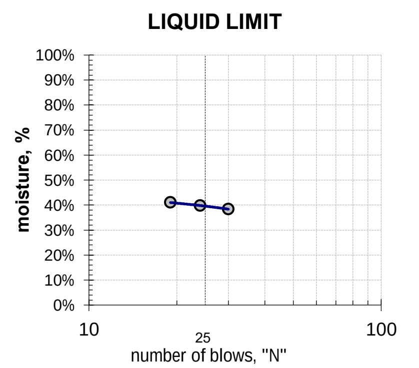
LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

ATTERBERG LIMITS

liquid limit =	40
plastic limit =	27
plasticity index =	13

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	31.74	32.02	32.52	
dry soil + pan weight, g =	28.71	28.77	29.15	
pan weight, g =	20.81	20.61	20.93	
N (blows) =	30	24	19	
moisture, % =	38.4 %	39.8 %	41.0 %	

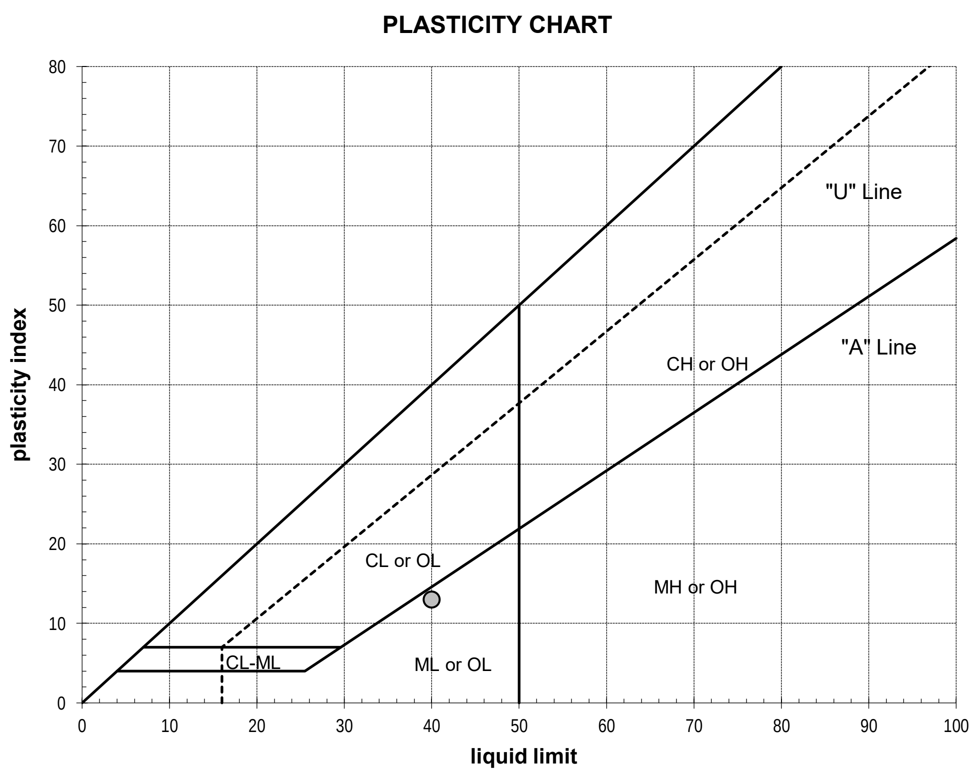


SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.19	27.47		
dry soil + pan weight, g =	25.87	26.05		
pan weight, g =	20.91	20.76		
moisture, % =	26.6 %	26.8 %		



ADDITIONAL DATA

% gravel =	0.0%
% sand =	32.3%
% silt and clay =	67.7%
% silt =	n/a
% clay =	n/a
moisture content =	35.6%

DATE TESTED	TESTED BY
08/19/21	KMS

Jared Coon [signature]

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0667
		REPORT DATE: 08/20/21	FIELD ID: TP6.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Fat CLAY	Test Pit, TP-06 depth = 12 feet	CH, Fat Clay

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-7-6(30)

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

ADDITIONAL DATA

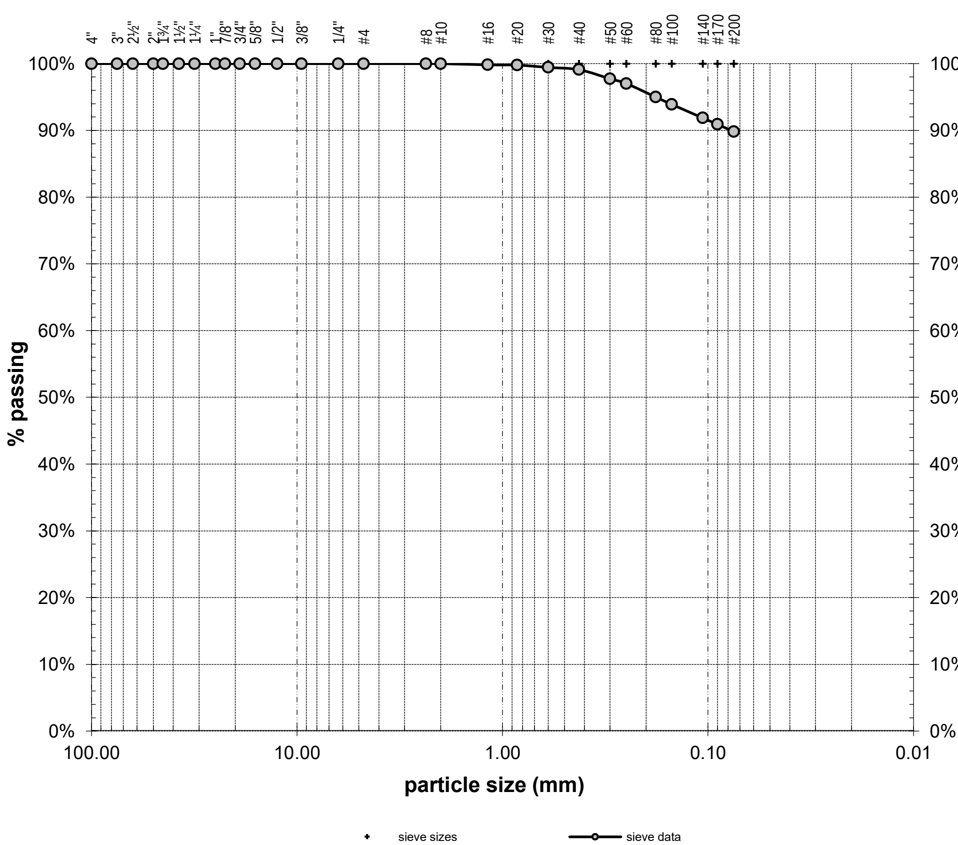
initial dry mass (g) =	168.09		
as-received moisture content =	35.3%	coefficient of curvature, C_C =	n/a
liquid limit =	52	coefficient of uniformity, C_U =	n/a
plastic limit =	21	effective size, $D_{(10)}$ =	n/a
plasticity index =	31	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 10.2%
% silt and clay = 89.8%

	SIEVE SIZE US	SIEVE SIZE mm	PERCENT PASSING SIEVE act.	PERCENT PASSING SIEVE interp.	SPECS max	SPECS min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		100%		
	#20	0.850	100%			
	#30	0.600		99%		
	#40	0.425	99%			
	#50	0.300		98%		
	#60	0.250	97%			
	#80	0.180		95%		
	#100	0.150	94%			
	#140	0.106		92%		
	#170	0.090		91%		
	#200	0.075	90%			

GRAIN SIZE DISTRIBUTION



DATE TESTED	TESTED BY
08/19/21	KMS/MKL

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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0667
		REPORT DATE: 08/20/21	FIELD ID: TP6.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Fat CLAY	Test Pit, TP-06 depth = 12 feet	CH, Fat Clay

LABORATORY TEST DATA

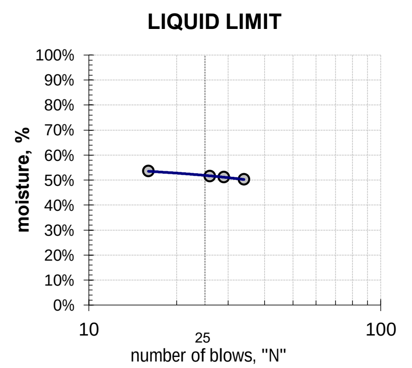
LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

ATTERBERG LIMITS

liquid limit =	52
plastic limit =	21
plasticity index =	31

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	34.55	32.22	33.27	31.98
dry soil + pan weight, g =	29.95	28.41	29.07	28.08
pan weight, g =	20.81	20.96	20.92	20.80
N (blows) =	34	29	26	16
moisture, % =	50.3 %	51.1 %	51.5 %	53.6 %

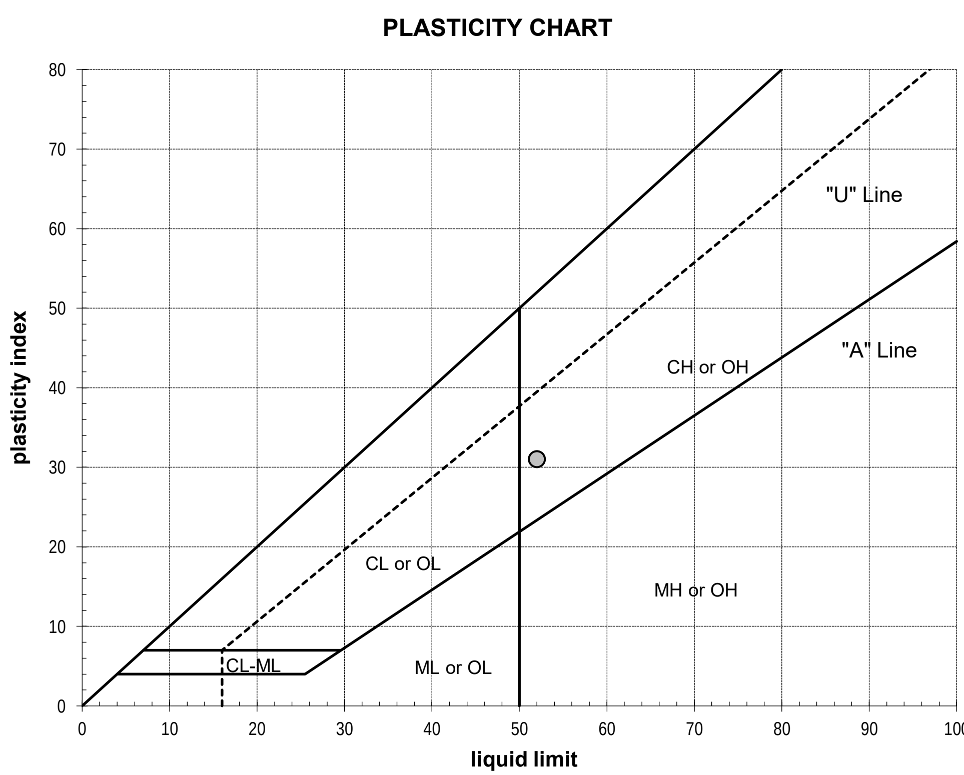


SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.61	28.19		
dry soil + pan weight, g =	26.39	26.91		
pan weight, g =	20.61	20.79		
moisture, % =	21.1 %	20.9 %		



ADDITIONAL DATA

% gravel =	0.0%
% sand =	10.2%
% silt and clay =	89.8%
% silt =	n/a
% clay =	n/a
moisture content =	35.3%

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PARTICLE-SIZE ANALYSIS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0668
		REPORT DATE: 08/20/21	FIELD ID: TP8.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Lean CLAY with Sand	Test Pit, TP-08 depth = 5 feet	CL, Lean Clay with Sand

SPECIFICATIONS	AASHTO CLASSIFICATION
none	A-6(11)

LABORATORY TEST DATA

LABORATORY EOUIPMENT	TEST PROCEDURE
Rainhart "Mary Ann" Sifter, moist prep, hand washed, 12" single sieve-set	ASTM D6913, Method A

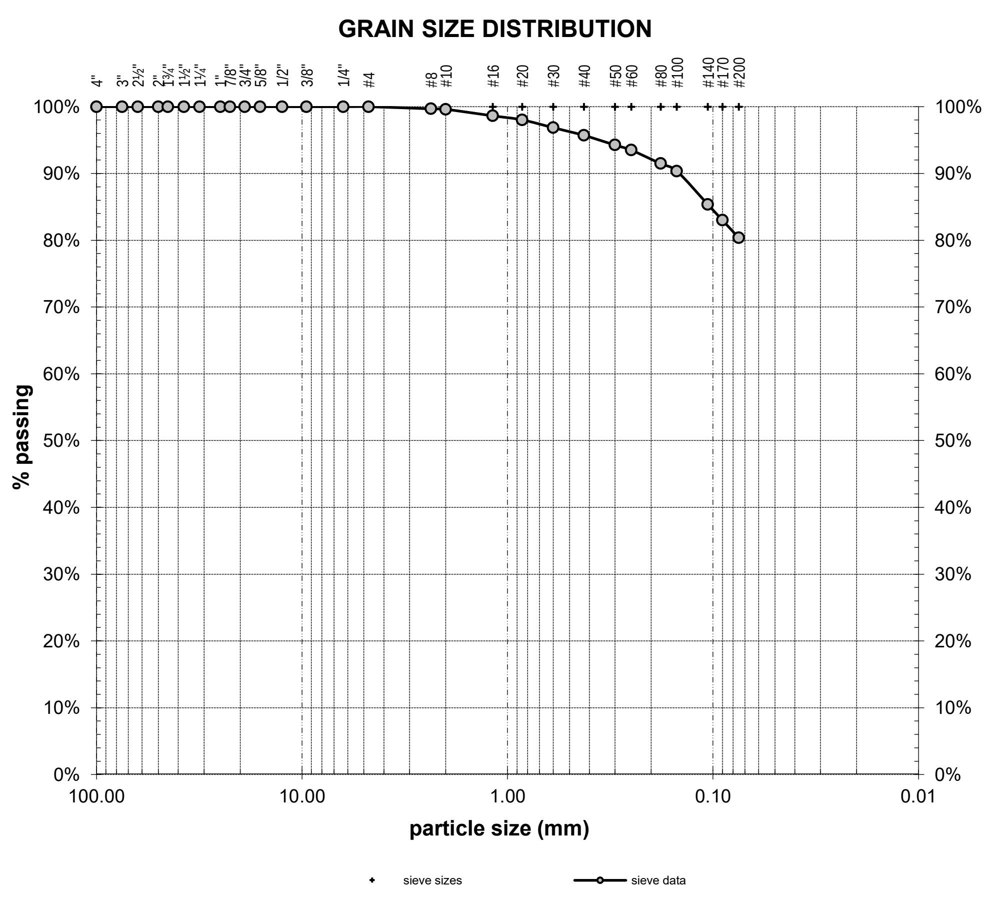
ADDITIONAL DATA

initial dry mass (g) =	177.81		
as-received moisture content =	29.0%	coefficient of curvature, C_C =	n/a
liquid limit =	37	coefficient of uniformity, C_U =	n/a
plastic limit =	23	effective size, $D_{(10)}$ =	n/a
plasticity index =	14	$D_{(30)}$ =	n/a
fineness modulus =	n/a	$D_{(60)}$ =	n/a

SIEVE DATA

% gravel = 0.0%
% sand = 19.6%
% silt and clay = 80.4%

	SIEVE SIZE US	SIEVE SIZE mm	PERCENT PASSING SIEVE act.	PERCENT PASSING SIEVE interp.	SPECS max	SPECS min
GRAVEL	6.00"	150.0		100%		
	4.00"	100.0		100%		
	3.00"	75.0		100%		
	2.50"	63.0		100%		
	2.00"	50.0		100%		
	1.75"	45.0		100%		
	1.50"	37.5		100%		
	1.25"	31.5		100%		
	1.00"	25.0		100%		
	7/8"	22.4		100%		
	3/4"	19.0		100%		
	5/8"	16.0		100%		
	1/2"	12.5		100%		
	3/8"	9.50		100%		
	1/4"	6.30		100%		
	#4	4.75	100%			
SAND	#8	2.36		100%		
	#10	2.00	100%			
	#16	1.18		99%		
	#20	0.850	98%			
	#30	0.600		97%		
	#40	0.425	96%			
	#50	0.300		94%		
	#60	0.250	93%			
	#80	0.180		91%		
	#100	0.150	90%			
	#140	0.106		85%		
	#170	0.090		83%		
	#200	0.075	80%			



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ATTERBERG LIMITS REPORT

PROJECT	CLIENT	PROJECT NO.	LAB ID
Lockwood Meadows Subdivision La Center, Washington	PLS Engineering 604 W Evergreen Blvd Vancouver, Washington 98660	21172	S21-0668
		REPORT DATE: 08/20/21	FIELD ID: TP8.1
		DATE SAMPLED: 07/27/21	SAMPLED BY: EMU/CWS

MATERIAL DATA

MATERIAL SAMPLED	MATERIAL SOURCE	USCS SOIL TYPE
Lean CLAY with Sand	Test Pit, TP-08 depth = 5 feet	CL, Lean Clay with Sand

LABORATORY TEST DATA

LABORATORY EQUIPMENT	TEST PROCEDURE
Liquid Limit Machine, Hand Rolled	ASTM D4318

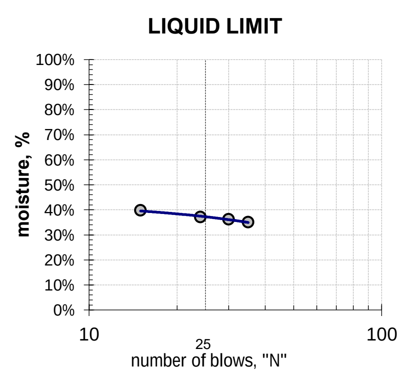
ATTERBERG LIMITS

liquid limit =	37
plastic limit =	23
plasticity index =	14

LIQUID LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	33.40	33.03	32.47	33.44
dry soil + pan weight, g =	30.11	29.69	29.31	29.86
pan weight, g =	20.71	20.48	20.78	20.85
N (blows) =	35	30	24	15
moisture, % =	35.0 %	36.3 %	37.1 %	39.7 %

LIQUID LIMIT



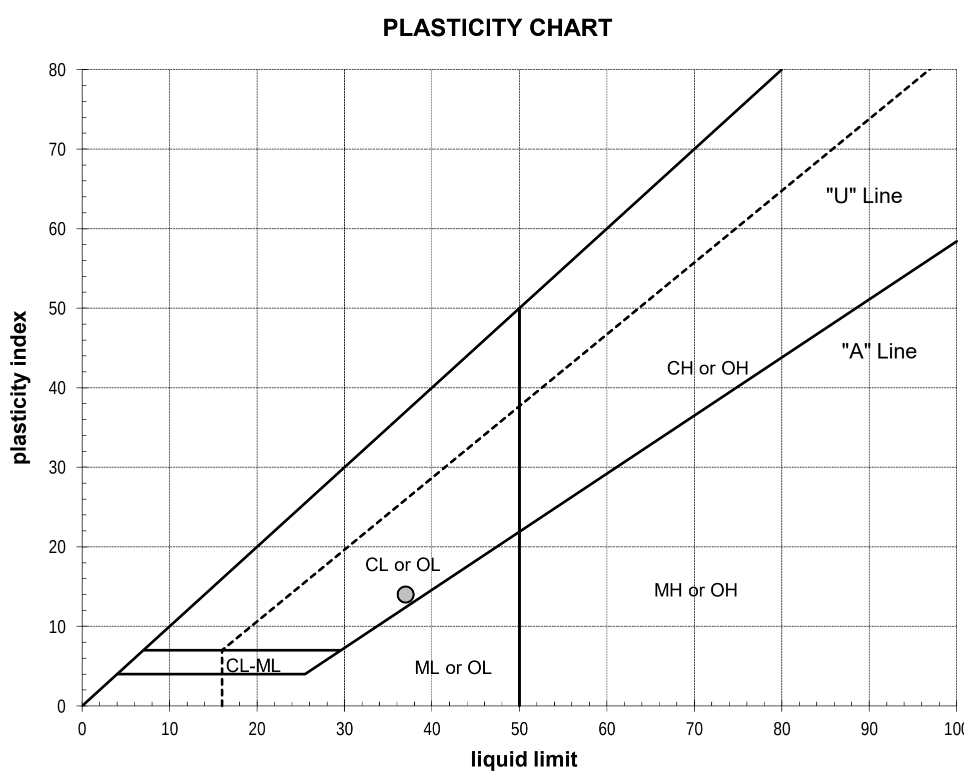
SHRINKAGE

shrinkage limit =	n/a
shrinkage ratio =	n/a

PLASTIC LIMIT DETERMINATION

	❶	❷	❸	❹
wet soil + pan weight, g =	27.93	27.28		
dry soil + pan weight, g =	26.59	26.07		
pan weight, g =	20.80	20.60		
moisture, % =	23.1 %	22.1 %		

PLASTICITY CHART



ADDITIONAL DATA

% gravel =	0.0%
% sand =	19.6%
% silt and clay =	80.4%
% silt =	n/a
% clay =	n/a
moisture content =	29.0%

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APPENDIX B
SUBSURFACE EXPLORATION LOGS

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-1
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	156 ft amsl	Not Observed	0819	0842

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Hillsboro Silt Loam	A-4(4)	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					TP1.1 D = 1.0-ft k < 0.06 in/hr
5											
10	TP1.1					Becomes gray and moist at 10 feet.	35.0	83.1	32	5	
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-2
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	188 ft amsl	Not Observed	0850	0920

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to gray, mottled, damp to moist, SILT with sand [Soil Type 2].					
						Becomes brown and moist at 2.5 feet.					
5											
10											
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-3
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	190 ft amsl	Not Observed	0923	0947

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Odne Silt Loam	A-6(8)	ML		Light brown, damp to moist, sandy SILT [Soil Type 2].					
						Becomes brown, mottled, and moist at 3 feet.					
	TP3.1						35.6	67.7	40	13	
5											
10			A-6	CL		Brown, moist, lean CLAY with sand [Soil Type 3].					
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-4
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	182 ft amsl	Not Observed	0949	1015

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 12 to 14 inches of grass and topsoil.					
		Odne Silt Loam	A-6	ML		Light brown to brown, mottled, damp to moist, sandy SILT [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
						Bottom of test pit at 13 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-5
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	184 ft amsl	Not Observed	1022	1042

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 12 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
			A-7	CH		Brown, moist, fat CLAY [Soil Type 4].					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-6
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	184 ft amsl	Not Observed	1045	1102

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Gee Silt Loam	A-4	ML		Light brown to gray, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown, moist, lean CLAY with sand [Soil Type 3].					
10											
	TP6.1		A-7-6(30)	CH		Gray, moist, fat CLAY [Soil Type 4].	35.3	89.8	52	31	
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-7
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	200 ft amsl	Not Observed	1117	1140

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Odne Silt Loam	A-4	ML		Light brown to brown, mottled, damp to moist, SILT with sand [Soil Type 2].					
5											
			A-6	CL		Brown to gray, moist, lean CLAY with sand [Soil Type 3].					
10											
			A-4	ML		Brown to gray, moist, SILT with sand [Soil Type 2].					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

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TEST PIT LOG

PROJECT NAME	CLIENT		PROJECT NO.	TEST PIT NO.
Lockwood Meadows Subdivision	PLS Engineering		21172	TP-8
PROJECT LOCATION	CONTRACTOR	EQUIPMENT	ENGINEER/GEOLOGIST	DATE
La Center, Washington	L&S Contractors	Excavator	EMU / CWS	07/27/21
TEST PIT LOCATION	APPROX. SURFACE ELEVATION	GROUNDWATER DEPTH	START TIME	FINISH TIME
See Figure 2	228 ft amsl	Not Observed	1145	1205

Depth (feet)	Sample Field ID	SCS Soil Survey Description	AASHTO Soil Type	USCS Soil Type	Graphic Log	LITHOLOGIC DESCRIPTION AND REMARKS	Moisture Content (%)	Passing No. 200 Sieve (%)	Liquid Limit	Plasticity Index	Infiltration Testing
0						Approximately 8 to 10 inches of grass and topsoil.					
		Hillsboro Silt Loam	A-6(11)	CL		Brown, mottled, damp to moist, lean CLAY with sand [Soil Type 3].					TP8.1 D = 1.0-ft k < 0.06 in/hr
5	TP8.1						29.0	80.4	37	14	
10						Becomes moist at 10 feet.					
						Bottom of test pit at 14 feet bgs. Groundwater not observed on 07/27/21.					
15											

APPENDIX C
SOIL CLASSIFICATION INFORMATION

SOIL DESCRIPTION AND CLASSIFICATION GUIDELINES

Particle-Size Classification

COMPONENT	ASTM/USCS size range	ASTM/USCS sieve size range	AASHTO size range	AASHTO sieve size range
Cobbles	> 75 mm	greater than 3 inches	> 75 mm	greater than 3 inches
Gravel	75 mm – 4.75 mm	3 inches to No. 4 sieve	75 mm – 2.00 mm	3 inches to No. 10 sieve
Coarse	75 mm – 19.0 mm	3 inches to 3/4-inch sieve	-	-
Fine	19.0 mm – 4.75 mm	3/4-inch to No. 4 sieve	-	-
Sand	4.75 mm – 0.075 mm	No. 4 to No. 200 sieve	2.00 mm – 0.075 mm	No. 10 to No. 200 sieve
Coarse	4.75 mm – 2.00 mm	No. 4 to No. 10 sieve	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve
Medium	2.00 mm – 0.425 mm	No. 10 to No. 40 sieve	-	-
Fine	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve	0.425 mm – 0.075 mm	No. 40 to No. 200 sieve
Fines (Silt and Clay)	< 0.075 mm	Passing No. 200 sieve	< 0.075 mm	Passing No. 200 sieve

Consistency for Cohesive Soil

CONSISTENCY	SPT N-VALUE (BLOWS PER FOOT)	POCKET PENETROMETER (UNCONFINED COMPRESSIVE STRENGTH, tsf)
Very Soft	2	less than 0.25
Soft	2 to 4	0.25 to 0.50
Medium Stiff	4 to 8	0.50 to 1.0
Stiff	8 to 15	1.0 to 2.0
Very Stiff	15 to 30	2.0 to 4.0
Hard	30 to 60	greater than 4.0
Very Hard	greater than 60	-

Relative Density for Granular Soil

RELATIVE DENSITY	SPT N-VALUE (BLOWS PER FOOT)
Very Loose	0 to 4
Loose	4 to 10
Medium Dense	10 to 30
Dense	30 to 50
Very Dense	more than 50

Moisture Designations

TERM	FIELD IDENTIFICATION
Dry	No moisture. Dusty or dry.
Damp	Some moisture. Cohesive soils are usually below plastic limit and are moldable.
Moist	Grains appear darkened, but no visible water is present. Cohesive soils will clump. Sand will bulk. Soils are often at or near plastic limit.
Wet	Visible water on larger grains. Sand and silt exhibit dilatancy. Cohesive soil can be readily remolded. Soil leaves wetness on the hand when squeezed. Soil is much wetter than optimum moisture content and is above plastic limit.

AASHTO SOIL CLASSIFICATION SYSTEM

TABLE 1. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing .075 mm)			Silt-Clay Materials (More than 35 Percent Passing 0.075)			
Group Classification	A-1	A-3	A-2	A-4	A-5	A-6	A-7
Sieve analysis, percent passing:							
2.00 mm (No. 10)	-	-	-				
0.425 mm (No. 40)	50 max	51 min	-	-	-	-	-
0.075 mm (No. 200)	25 max	10 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)							
Liquid limit				40 max	41 min	40 max	41 min
Plasticity index	6 max	N.P.		10 max	10 max	11 min	11 min
General rating as subgrade	Excellent to good			Fair to poor			

Note: The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

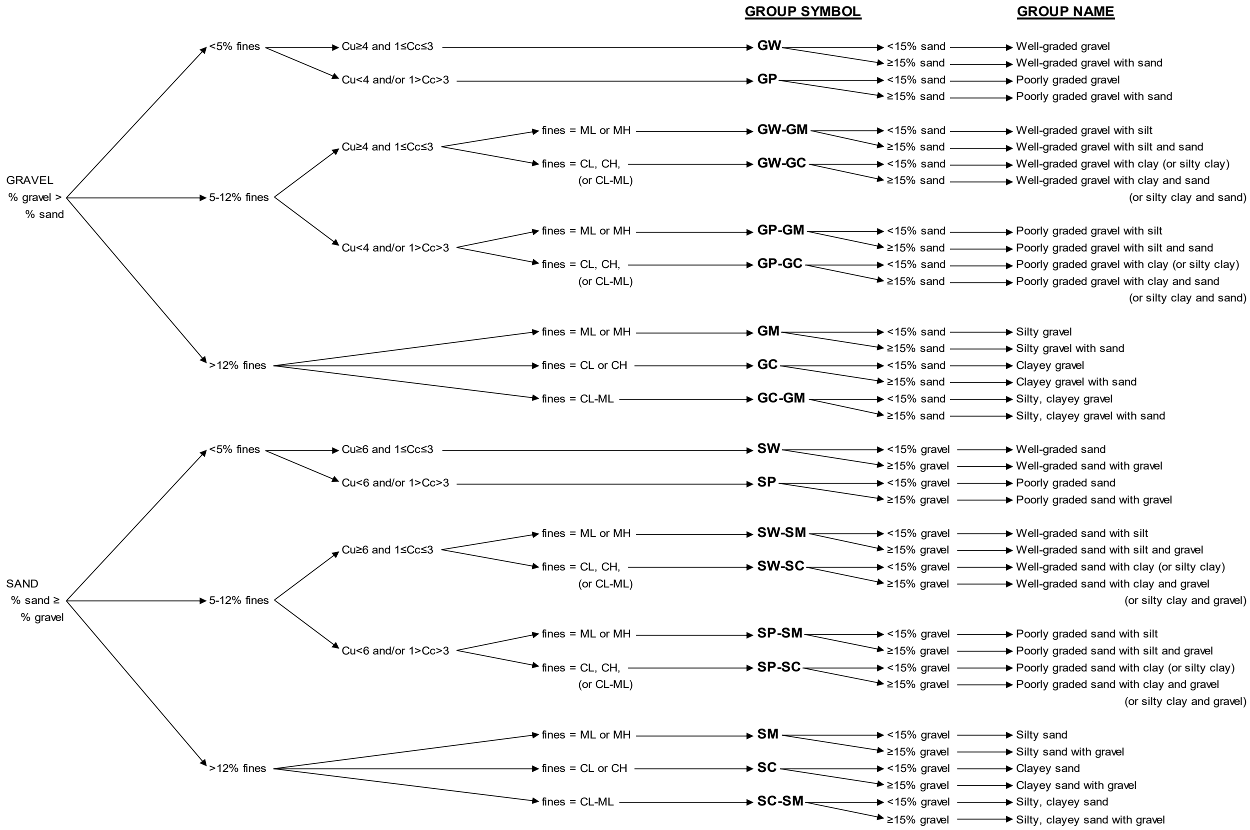
TABLE 2. Classification of Soils and Soil-Aggregate Mixtures

General Classification	Granular Materials (35 Percent or Less Passing 0.075 mm)							Silt-Clay Materials (More than 35 Percent Passing 0.075 mm)			
	A-1			A-2							A-7
Group Classification	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5, A-7-6
Sieve analysis, percent passing:											
2.00 mm (No. 10)	50 max	-	-	-	-	-	-	-	-	-	-
0.425 mm (No. 40)	30 max	50 max	51 min	-	-	-	-	-	-	-	-
0.075 mm (No. 200)	15 max	25 max	10 max	35 max	35 max	35 max	35 max	36 min	36 min	36 min	36 min
Characteristics of fraction passing 0.425 mm (No. 40)											
Liquid limit				40 max	41 min	40 max	41 min	40 max	41 min	40 max	41 min
Plasticity index	6 max		N.P.	10 max	10 max	11 min	11 min	10 max	10 max	11 min	11min
Usual types of significant constituent materials	Stone fragments, gravel and sand		Fine sand	Silty or clayey gravel and sand				Silty soils		Clayey soils	
General ratings as subgrade	Excellent to Good							Fair to poor			

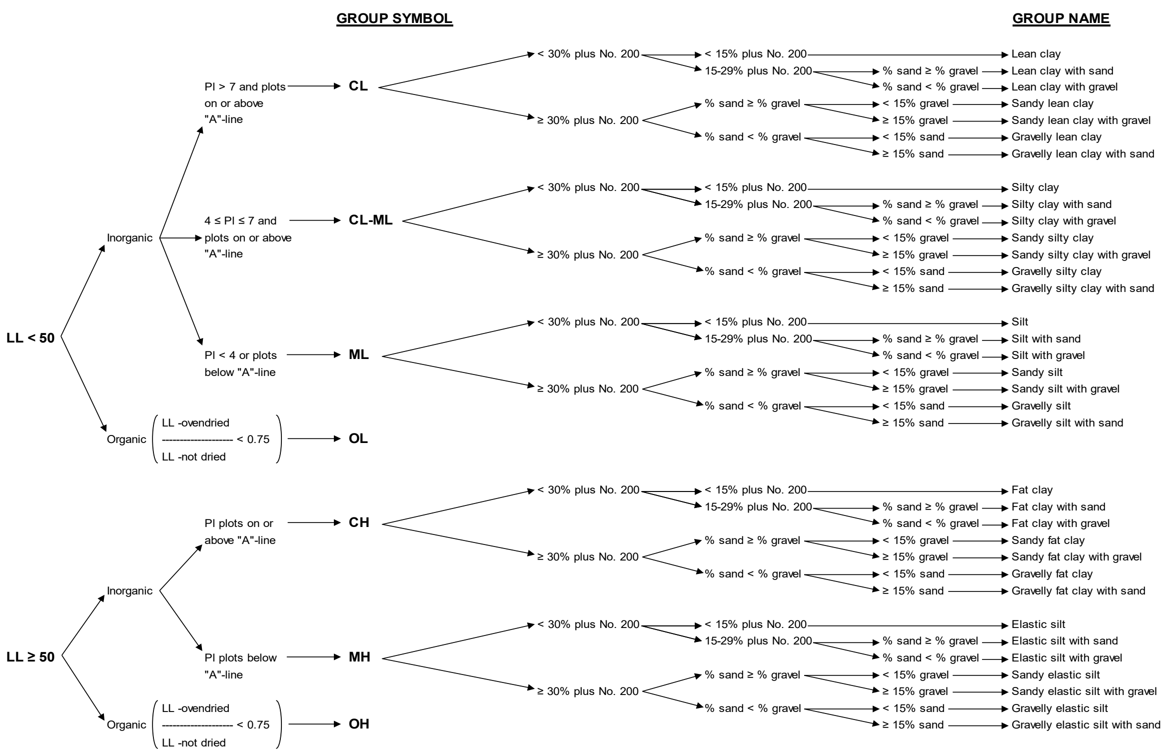
Note: Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30 (see Figure 2).

AASHTO = American Association of State Highway and Transportation Officials

USCS SOIL CLASSIFICATION SYSTEM



Flow Chart for Classifying Coarse-Grained Soils (More Than 50% Retained on No. 200 Sieve)



Flow Chart for Classifying Fine-Grained Soil (50% or More Passes No. 200 Sieve)

APPENDIX D
PHOTO LOG

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

North Site View, Facing East

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

East Site View, Facing West

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

Central Site Area, Facing West

LOCKWOOD MEADOWS SUBDIVISION

JULY, 2021

LA CENTER, WASHINGTON

Typical Soil Profile, TP-5

APPENDIX E
REPORT LIMITATIONS AND IMPORTANT INFORMATION

Geotechnical ▪ Environmental ▪ Special Inspections
Columbia West
Engineering, Inc

Date: September 23, 2021
Project: Lockwood Meadows Subdivision
La Center, Washington

Geotechnical and Environmental Report Limitations and Important Information

Report Purpose, Use, and Standard of Care

This report has been prepared in accordance with standard fundamental principles and practices of geotechnical engineering and/or environmental consulting, and in a manner consistent with the level of care and skill typical of currently practicing local engineers and consultants. This report has been prepared to meet the specific needs of specific individuals for the indicated site. It may not be adequate for use by other consultants, contractors, or engineers, or if change in project ownership has occurred. It should not be used for any other reason than its stated purpose without prior consultation with Columbia West Engineering, Inc. (Columbia West). It is a unique report and not applicable for any other site or project. If site conditions are altered, or if modifications to the project description or proposed plans are made after the date of this report, it may not be valid. Columbia West cannot accept responsibility for use of this report by other individuals for unauthorized purposes, or if problems occur resulting from changes in site conditions for which Columbia West was not aware or informed.

Report Conclusions and Preliminary Nature

This geotechnical or environmental report should be considered preliminary and summary in nature. The recommendations contained herein have been established by engineering interpretations of subsurface soils based upon conditions observed during site exploration. The exploration and associated laboratory analysis of collected representative samples identifies soil conditions at specific discreet locations. It is assumed that these conditions are indicative of actual conditions throughout the subject property. However, soil conditions may differ between tested locations at different seasonal times of the year, either by natural causes or human activity. Distinction between soil types may be more abrupt or gradual than indicated on the soil logs. This report is not intended to stand alone without understanding of concomitant instructions, correspondence, communication, or potential supplemental reports that may have been provided to the client.

Because this report is based upon observations obtained at the time of exploration, its adequacy may be compromised with time. This is particularly relevant in the case of natural disasters, earthquakes, floods, or other significant events. Report conclusions or interpretations may also be subject to revision if significant development or other manmade impacts occur within or in proximity to the subject property. Groundwater conditions, if presented in this report, reflect observed conditions at the time of investigation. These conditions may change annually, seasonally or as a result of adjacent development.

Additional Investigation and Construction QA/QC

Columbia West should be consulted prior to construction to assess whether additional investigation above and beyond that presented in this report is necessary. Even slight variations in soil or site conditions may produce impacts to the performance of structural facilities if not adequately addressed. This underscores the importance of diligent QA/QC construction observation and testing to verify soil conditions do not differ materially or significantly from the interpreted conditions utilized for preparation of this report.

Therefore, this report contains several recommendations for field observation and testing by Columbia West personnel during construction activities. Actual subsurface conditions are more readily observed and discerned during the earthwork phase of construction when soils are exposed. Columbia West cannot accept responsibility for deviations from recommendations described in this report or future performance of structural facilities if another consultant is retained during the construction phase or Columbia West is not engaged to provide construction observation to the full extent recommended.

Collected Samples

Uncontaminated samples of soil or rock collected in connection with this report will be retained for thirty days. Retention of such samples beyond thirty days will occur only at client's request and in return for payment of storage charges incurred. All contaminated or environmentally impacted materials or samples are the sole property of the client. Client maintains responsibility for proper disposal.

Report Contents

This geotechnical or environmental report should not be copied or duplicated unless in full, and even then only under prior written consent by Columbia West, as indicated in further detail in the following text section entitled *Report Ownership*. The recommendations, interpretations, and suggestions presented in this report are only understandable in context of reference to the whole report. Under no circumstances should the soil boring or test pit excavation logs, monitor well logs, or laboratory analytical reports be separated from the remainder of the report. The logs or reports should not be redrawn or summarized by other entities for inclusion in architectural or civil drawings, or other relevant applications.

Report Limitations for Contractors

Geotechnical or environmental reports, unless otherwise specifically noted, are not prepared for the purpose of developing cost estimates or bids by contractors. The extent of exploration or investigation conducted as part of this report is usually less than that necessary for contractor's needs. Contractors should be advised of these report limitations, particularly as they relate to development of cost estimates. Contractors may gain valuable information from this report, but should rely upon their own interpretations as to how subsurface conditions may affect cost, feasibility, accessibility and other components of the project work. If believed necessary or relevant, contractors should conduct additional exploratory investigation to obtain satisfactory data for the purposes of developing adequate cost estimates. Clients or developers cannot insulate themselves from attendant liability by disclaiming accuracy for subsurface ground conditions without advising contractors appropriately and providing the best information possible to limit potential for cost overruns, construction problems, or misunderstandings.

Report Ownership

Columbia West retains the ownership and copyright property rights to this entire report and its contents, which may include, but may not be limited to, figures, text, logs, electronic media, drawings, laboratory reports, and appendices. This report was prepared solely for the client, and other relevant approved users or parties, and its distribution must be contingent upon prior express written consent by Columbia West. Furthermore, client or approved users may not use, lend, sell, copy, or distribute this document without express written consent by Columbia West. Client does not own nor have rights to electronic media files that constitute this report, and under no circumstances should said electronic files be distributed or copied. Electronic media is susceptible to unauthorized manipulation or modification, and may not be reliable.

Consultant Responsibility

Geotechnical and environmental engineering and consulting is much less exact than other scientific or engineering disciplines, and relies heavily upon experience, judgment, interpretation, and opinion often based upon media (soils) that are variable, anisotropic, and non-homogenous. This often results in unrealistic expectations, unwarranted claims, and uninformed disputes against a geotechnical or environmental consultant. To reduce potential for these problems and assist relevant parties in better understanding of risk, liability, and responsibility, geotechnical and environmental reports often provide definitive statements or clauses defining and outlining consultant responsibility. The client is encouraged to read these statements carefully and request additional information from Columbia West if necessary.

Exhibit A.11

Clark Public Utilities
Customer-owned, customer-focused

REQUEST FOR UTILITY REVIEW – WATER AVAILABILITY
P. O. Box 8900 (8600 N.E. 117 Ave) Vancouver, WA 98668
(360) 992-8022 Email: wateradmin@clarkpud.com

APPLICANT INFORMATION

DATE: 6/4/2021

NAME Travis Johnson/ PLS Engineering
ADDRESS 604 W Evergreen Blvd
CITY Vancouver STATE WA ZIP 98660
TELEPHONE (360) 944-6519 EMAIL pm@plsengineering.com

Notification Method: Email Type of Development: Subdivision
Number of Units: 74

Property Location

Serial Acct. No 209113-000
Property Address 2000 NW Lockwood Creek Rd, La Center (or nearest cross street)
Property Size 19.8 ACRES Required Fire Flow TBD GPM

PLEASE SUBMIT PLAT MAP WITH REQUEST

GENERAL CONDITIONS FOR SERVICE (CPU Staff Only)

Clark Public Utilities (CPU) is the water purveyor for this site. CPU Water distribution maps indicate that there are existing 8" PVC water main within E 4th Way, E Upland Ave, E White Oaks Ave, NE Lockwood Creek Rd, and NE 24th Ave and a fire hydrant located along the eastern property frontage. See attached CPU water distribution map for reference. Utility drawings are for reference only and project engineer should verify existing conditions in the field prior to final design.

The fire flow at FH – 7472, located near the intersection of E 5th St and E Spruce Ave was previously calculated at 1,954 gpm at 20 psi. Static water pressure is expected to vary, around 135 psi depending on site elevation, system demand and reservoir levels. Due to high anticipated pressure it is recommended that a private plumber be consulted regarding installing privately owned and operated pressure reducing valves. If updated fire flow data is required, please contact Water Services at (360) 992-8022.

For this development, depending on site access and layout, plan to connect to the existing 8" water mains within E 4th Way, E Upland Ave, E White Oak Ave, and NE 24th Ave. If fire protection is required, extend a minimum 8" water main within the public right-of-way to the site. If fire protection is not required, a minimum 4" water main may be acceptable. Install proper fire protection (i.e. hydrants and building sprinkler systems) as required by the Fire Marshal. Any existing, unused services shall be properly capped and abandoned. All water mains and services (up to the meter) located within private property, shall be included in an easement granted to Clark Public Utilities.

Proper state approved backflow devices will be required for all domestic, fire and landscape water services. All hot taps shall be performed by a Utility approved contractor. The Developer is responsible for costs associated with the service and fire protection installation, right-of-way permitting, and any other needed water improvements.

Submit full engineering plan set for further requirements and comments.

- ☒ Licensed Civil Eng. Drawing Required for Clark Public Utilities approval prior to construction
- ☒ Easement Required
- ☒ Clark Public Utilities has the capacity to serve, if the above conditions are met
- ☒ Developer/Owner shall pay County Right-of-Way fees based on off-site improvements

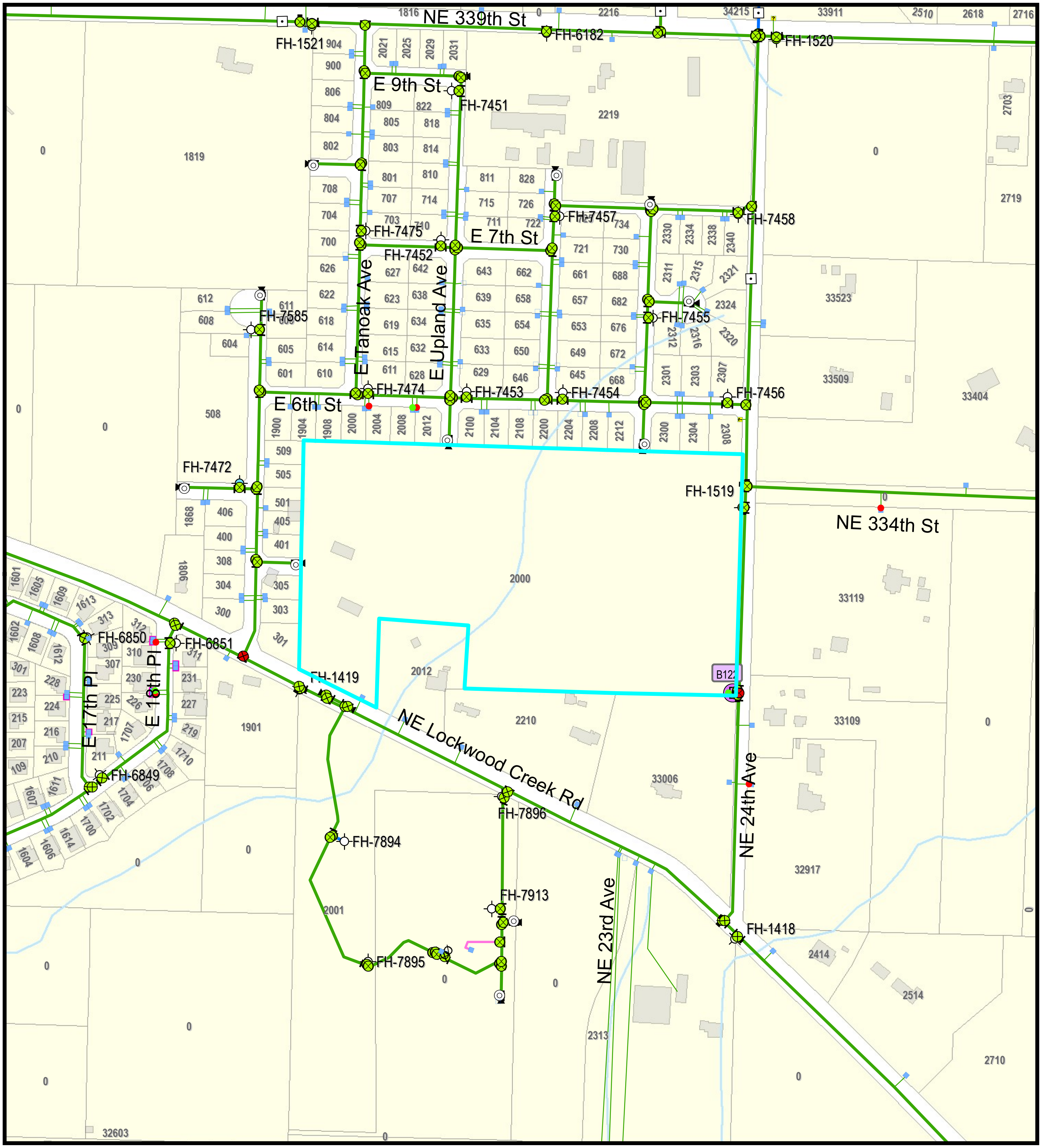
Review comments are subject to modification during detailed plan check and review.
This utility review is valid for six months after the date of signature below.

Tonya Dow Tonya Dow

REVIEWED BY______________________________________ DATE 6/4/21

Tonya Dow, PE

Revised 3/10/17 rk



Legend

Unknown	8"	Butterfly, Closed	Air Release	Cross	Reservoir	Fire Flow At 20psi
2"	10"	Butterfly, Open	Check	Tee	Booster Pumping Station	Not Tested
3"	12"	Gate, Closed	Double Check	Cap and Thrust Block	Satellite Well	1 - 499
4"	14"	Gate, Open	Blow Off	Reducer	Production Well	500 - 999
6"	16"	Abandoned Valve	Pressure Regulating Valve	Coupling		1000 - 1499
Water Service		Water Meter	Valve Book	Tapping Sleeve		1500 - 7981

1 inch = 400 feet

N

OPERATIONS MAP

Printed on: 6/4/2021 Printed by: TonyaD

MAP NUMBER

4102-N

Exhibit A.12

CLARK COUNTY WASHINGTON
PUBLIC HEALTH

clark.wa.gov

1601 E Fourth Plain Blvd, Bldg 17
PO Box 9825
Vancouver, WA 98666-8825
360.397.8000

August 10th, 2021

Susanna Hung
701 Columbia Street, #414
Vancouver, WA 98660

RE: Conditional Development Review Evaluation for "Lockwood Meadows Subdivision" located at 2000 NE Lockwood Creek Road, La Center, WA 98629 (SR46422; Tax Parcel 209113000; 2021-016-PAC)
****Final Approval Required by Clark County Public Health****

The Development Review Evaluation for which you applied has been completed by Clark County Public Health (CCPH). This evaluation is limited to the area of the proposed development.

On-Site Sewage Treatment Systems (CCC 24.17, WAC 246-272A, CCC 40.370, RCW 58.17):

A municipal sewage system is proposed and required for this development. An operational on-site sewage system (OSS) is confirmed in county records (ON0021221). The system was observed in the field by CCPH with a concrete lid and is located east of the existing dwelling. This on-site sewage system and any other sewage systems discovered during development must be properly abandoned with written verification submitted to Clark County Public Health.

Please submit to CCPH a Notification of Abandonment form with a written description of the actions taken to legally abandon the system with an Online RME Pumper Report attached. Proper abandonment of the systems requires tank pumping by a licensed pumper, breaking in the tank lids, and filling the cavities with compacted soil. Also, note that any cesspools, drywells, or pump chambers discovered during development must also be abandoned in this manner.

The proposed development must connect to an approved public sewer system.

Water Systems (WAC 173-160, WAC 246-290, CCC 40.370, RCW 58.17):

A municipal water supply is proposed and required for this development. No existing water well is noted in the application and no water well was observed in the field by CCPH or identified in Clark County Public Health record.

Any wells discovered during development must be properly decommissioned by a licensed well driller, per WAC 173-160-381. Written verification must be submitted to Public Health prior to final plat approval. Decommissioned well location must be marked on the final plat (Mylar).

The proposed development must connect to an approved public water system.

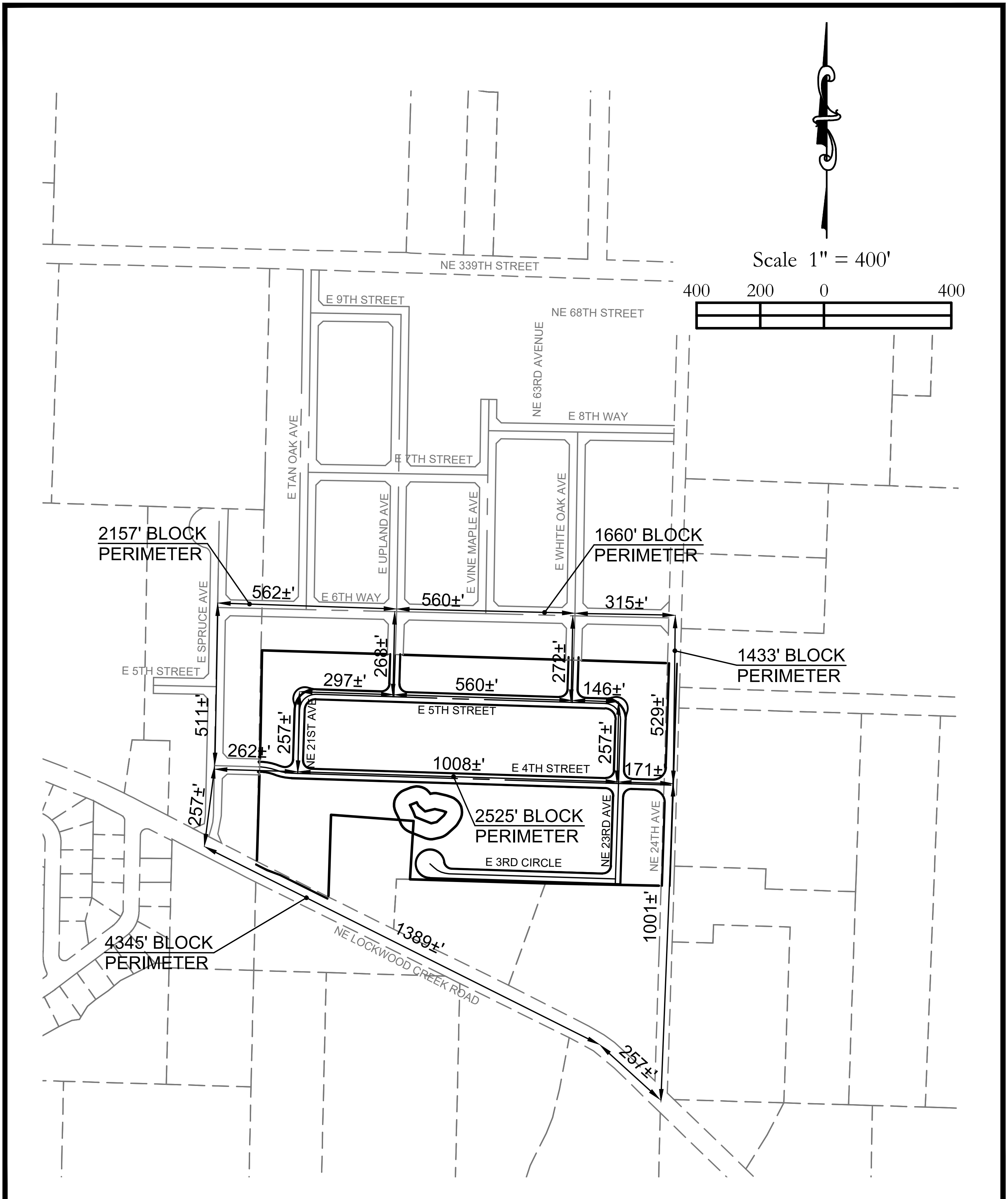
If you have any questions concerning this letter, please contact me at (564) 397-8428.

Sincerely,

Environmental Health Specialist II

CC: City of La Center, Washington

Exhibit A.13



PLS ENGINEERING

604 W Evergreen Boulevard
Vancouver, WA 98660
PH: (360) 944-6519 Fax: (360) 944-6539

Lockwood Meadows Subdivision

SCALE: 1" = 400'	**DATE:** October 2021
JOB NO.: 3094	**DRAWING:** Circulation Plan

Exhibit A.14

Lockwood Meadows 2021-016-PAC
Road Modification Narrative

Per City of La Center Municipal Code (LCMC) 12.10.310 (Modifications), the applicant is requesting two road modifications for the proposed Lockwood Meadows Subdivision.

Road Modification Request

1. The applicant is requesting a road modification to section LCMC 12.10.210 - Crossroads, as allowed by La Center Municipal Code (LCMC) 12.10.310, to allow intersection spacing exceeding the maximum distance within the development. The proposed East 4th Street is 1008' long, which exceeds the 500-foot maximum intersection spacing required by code. A portion of East 5th Street is 560' which also exceeds the maximum spacing. LCMC 12.10.210 states,

   "On all dedicated rights-of-way exceeding 500 feet in length, cross streets shall be provided at intervals not greater than 500 feet in the urban or city area; provided, in order to minimize through traffic in residential neighborhoods, an overall development plan providing longer intersection intervals may be approved so long as it provides adequate vehicular circulation in the vicinity of the development; and provided further, that when cross street spacing exceeds 500 feet, pedestrian walkways connecting streets may be required."

2. The applicant proposes to provide detached sidewalk on all new proposed streets rather than attached sidewalk as shown in Standard Drawing ST-15 for Local Access Streets.

Approval Criteria

To be granted modifications to the standards, the applicant must demonstrate at least one of the following conditions per LCMC 12.10.310 (4):

(a) Topography, right-of-way, existing construction or physical conditions, or other geographic conditions impose an unusual hardship on the applicant and an equivalent alternative which can accomplish the same design is available.

(b) A minor change to a specification or standard is required to address a specific design or construction problem which, if not enacted, will result in an unusual hardship.

(c) An alternative design is proposed which will provide a plan equal to or superior to these standards.

(d) Application of the standards of this chapter to the development would be grossly disproportional to the impacts created.

Road Modification Justification

Justification for Request 1
The proposed modification to intersection spacing is justified utilizing both criteria A and C above.

Criteria A states, "Topography, right-of-way, existing construction or physical conditions, or other geographic conditions impose an unusual hardship on the applicant and an equivalent alternative which can accomplish the same design is available." The location of the wetland within Tract B makes it impractical to provide a north/south street connection to break up the East 4th Street block length as any north/south connection to break up this block will not be able to continue to the south without impacting the wetland. The portion of East 5th Street that exceeds block length does so in order to meet existing stub streets from the north, which is existing construction.

Criteria C states, "An alternative design is proposed which will provide a plan equal to or superior to these standards." Tract A is proposed where a crossroad would most likely be located and provides a north/south pedestrian connection to break up this block. Block length/intersection spacing is exceeded for vehicular movements, however there are sufficient east/west circulation patterns to keep traffic moving, and the pedestrian connection within Tract A provides an alternative design which is equal to or superior to the standard.

Justification for Request 2
The proposed modification to provide detached sidewalk rather than attached sidewalk is justified utilizing criteria c above.

Criteria C states, "An alternative design is proposed which will provide a plan equal to or superior to these standards." The proposed design offers the same sidewalk width and planter strip as the standard shown in detail ST-15, however detached sidewalk allows a continuous sidewalk without driveway drops affecting the pedestrian movement. This creates a plan that is equal to or superior to the standard.

Conclusion
If you have any questions or concerns, please contact me at (360) 944-6519 or by email at nicolle@plsengineering.com.

Sincerely,

N Sicilia

Nicolle Sicilia
PLS Engineering

Exhibit A.15

CHARBONNEAU
ENGINEERING LLC

MEMORANDUM

Date: October 26, 2021

To: Nicolle Sicilia
PLS Engineering

From: Frank Charbonneau, PE, PTOE

Subject: Trip Generation Update & Assessment FL2182
Lockwood Meadows Subdivision
Lockwood Creek Road, La Center

As requested a trip generation update and assessment has been prepared to document the Lockwood Meadows Subdivision site trip generation associated with reducing the number units from 74 housing units to 71 units.

In August 2021 the traffic impact analysis was issued for the development project that planned for 74 single-family housing units. The trip generation identified in the report specified the ADT at 699 daily trips with 55 trips in the AM peak hour and 73 trips in the PM peak hour.

The proposed reduction in housing to 71 units will generate the following number of trips.

Trip Generation Summary for 71 Housing Units

ITE Land Use	Units (#)	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Single-Family (#210)	71							
Generation Rate [1]		9.44	0.74	25%	75%	0.99	63%	37%
Site Trips		**670**	**53**	13	40	**70**	44	26

[1] Source: *Trip Generation*, 10th Edition, ITE, 2017, average rates.

By reducing the number of lots from 74 to 71 units the site's trip generation will be reduced by 29 ADT trips, two AM peak hour trips, and three PM peak hour trips. Therefore, the trip distribution and assignments to the project's surrounding study intersections will be less and not result in any additional impacts beyond those identified in the original traffic report.

If you should have any questions, please contact Frank Charbonneau, PE, PTOE at 503.293.1118 or email Frank@CharbonneauEngineer.com.

Exhibit A.16

TRAFFIC ANALYSIS REPORT

FOR

LOCKWOOD MEADOWS SUBDIVISION

LOCKWOOD CREEK ROAD

LA CENTER

SUBMITTED BY

CHARBONNEAU
ENGINEERING LLC

August 2021

Project 21-25

TRAFFIC ANALYSIS REPORT

FOR

LOCKWOOD MEADOWS SUBDIVISION

LOCKWOOD CREEK ROAD

LA CENTER

Prepared By

CHARBONNEAU Engineering LLC

8-5-21

F. R. CHARBONNEAU
STATE OF WASHINGTON
17586
REGISTERED
PROFESSIONAL ENGINEER

Renews 9-30-22

August 2021

Project 21-25

10211 SW Barbur Blvd, Suite 210A, Portland, OR 97219 Phone: (503) 293-1118

TABLE OF CONTENTS

FL2164

INTRODUCTION

This traffic study has been prepared to evaluate and document the operations and safety conditions for the Lockwood Meadows Subdivision development being planned in La Center, Washington. The development will build 74 single-family homes. The project site is located in north La Center on the north side of Lockwood Creek Road between East Spruce Avenue and NE 24th Avenue. Figure 'a' in the appendix is a vicinity map highlighting the project location.

In accordance with the City's requirements the study area was defined as the surrounding neighborhood including several key intersections along Lockwood Creek Road, East 4th Street, and La Center Road.

TRAFFIC ANALYSIS CONSIDERATIONS

In the project scope established with City of La Center staff, a number of important elements were identified and considered in the study.

- Inventory and record pertinent information such as traffic control devices, circulation patterns, lane conditions, pedestrian & bicycle facilities, transit zones, parking, and street characteristics.
- Record data on typical weekdays during the AM & PM peak traffic hours.
- Obtain traffic counts for the six study intersections on Lockwood Creek Road, East 4th Street, and La Center Road.
- The project buildout is estimated to occur in year 2024. Three years of traffic growth at 3% per year was applied to establish the year 2024 background volumes. The City confirmed that in-process traffic was applicable for the project and furnished the data.
- Prepare trip generation for 74 single-family homes using the latest edition of the ITE Trip Generation manual (10th edition, Year 2021).
- Level of service (LOS) analysis of the study intersections to measure the approach delays and LOS for comparison to City of La Center standards.
- Review intersection sight distance at the proposed accesses on East Spruce Avenue and on NE 24th Avenue.
- Prepare peak hour signal warrant and left turn lane warrant.
- Review crash data furnished by WSDOT. Identify crash rates at the study intersections.
- Review the WSDOT Six Year Transportation Improvement Program from 2016 to 2021 to identify future projects covered in La Center.
- Review of the City's Capital Facilities Plan – Transportation to identify programmed street improvement projects relative to the Lockwood Meadows Subdivision development.

SITE DESCRIPTION, STREETS, ACCESS, AND CRITICAL INTERSECTIONS
Development of the Lockwood Meadows Subdivision project will include construction of 74 single-family homes. The project's location is situated on a 19.8 acre parcel (#209113000) on the north side of Lockwood Creek Road between East Spruce Street and NE 24th Avenue. The address is 2000 NW Lockwood Creek Road, La Center. The property is currently vacant.

Access to the proposed development includes street connections to the north, east, and west. The project site plan (Figure 'b') illustrates the access locations. These include two street approaches to an existing street to the north, a street approach to East Spruce Avenue on the property's west side, and a street approach to NE 24th Avenue on the site's east side. The development's internal streets will include sidewalks for pedestrian circulation purposes.

The study intersections on Lockwood Creek Road include Ivy Avenue/Highland Avenue, John Storm Avenue, East Spruce Avenue, and NE 24th Avenue. Additionally the intersections at East 4th Street/Cedar Avenue and La Center Road at Timmen Road were analyzed. All of the study intersections are controlled by stop signing on the side street approaches.

In the future according to WSDOT's Six Year TIP for 2016-2021 and the City's Capital Facilities Plan – Transportation the intersection of La Center Road at Timmen Road will become signalized or converted to a roundabout.

The intersection of La Center Road at Paradise Park Road was assessed for trip distribution purposes only.

The existing and proposed lane configurations and traffic control are presented in Figures 'c1' and `c2`.

Lockwood Creek Road adjacent to the site is classified as a major collector and contains one travel lane in each direction. The travel speed is posted at 35 MPH. There are no bike lanes or sidewalks on the street in vicinity of the development site. No on-street parking is permitted. Based on AASHTO standards the required intersection sight distance along Lockwood Creek Road is 390 feet.

East Spruce Avenue is a local street serving residential properties north of Lockwood Creek Road. The street is unmarked and includes curb and sidewalk on both sides. By statute, the legal travel speed is 25 MPH as the speed limit is not posted.

Northeast 24th Avenue is a minor collector with two-way traffic flow. The street is unmarked and has pavement edges and narrow grass/gravel shoulders. There is no posted speed limit and by statute the legal travel speed is 25 MPH.

East 4th Street at Cedar Avenue is a tee-shaped intersection without separate turn lanes. Cedar Avenue serves residential properties to the north and the street's approach to East 4th Street is controlled by stop signing. Pedestrian crosswalks are marked at the intersection.

East 4th Street/Lockwood Creek Drive at Highland Avenue/Ivy Avenue is a four-way intersection with stop control on the north and south approaches. Separate left turn lanes are in place on all four approaches. Pedestrian crosswalks are marked at the intersection and sidewalks exist on the streets. School facilities are present in the area.

Lockwood Creek Road at John Storm Avenue is tee-shaped intersection with stop control on the south approach. There are no separate turn lanes at this location. Sidewalks exist on the south side of Lockwood Creek Road and on both sides of John Storm Avenue. A marked crosswalk is present on the intersection's south leg.

Lockwood Creek Road at East Spruce Avenue is tee-shaped intersection with stop control on the north approach. There are no separate turn lanes at this location. Sidewalks exist on along East Spruce Street and in the intersection's corner radii on the north side. There is a marked crosswalk across Lockwood Creek Road approximately 90 feet west of the intersection. East Spruce Avenue feeds into residential development to the north.

Lockwood Creek Road at NE 24th Avenue is tee-shaped intersection with stop control on the north approach. There are no separate turn lanes at this location. No sidewalk is present. Northeast 24th Avenue feeds into residential development to the north and has no lane markings.

La Center Road at Timmen Road is configured as a tee-shaped intersection containing stop signing on the Timmen Road approach where there are separate left and right turn lanes. There is a separate westbound left turn lane on La Center Road. The travel speed is posted at 40 MPH on Lockwood Creek Road. There are no bike lanes or sidewalks at this location.

TRAFFIC OPERATIONAL ANALYSIS

In order to evaluate traffic flow and delay at the study intersections it was necessary to perform level of service (LOS) analyses and assess safety conditions. The intersections evaluated included Lockwood Creek Road at Ivy Avenue/Highland Avenue, John Storm Avenue, East Spruce Avenue, and NE 24th Avenue. Additionally the intersections at East 4th Street/Cedar Avenue and La Center Road at Timmen Road were analyzed. The results included identification of the LOS and average delay per vehicle in the peak hours for the following scenarios:

- Year 2021 Existing Traffic
- Year 2024 Background Traffic
- Year 2024 Total Traffic

To perform the LOS analysis at the study intersections required obtaining recent historical data at two locations and performing new video traffic counts at four other intersections. The counts were conducted during the AM peak (7:00-9:00AM) & PM peak (4:00-6:00 PM) traffic hours. Figures 1a & 1b depict the year 2021 existing AM & PM peak hour traffic volumes. The year 2018 and year 2019 historical data used for the intersections of East 4th Street at Cedar Avenue and East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue were factored by a growth rate of 3.9% per year based on annual population growth to equate to year 2021 volumes.

Three years of traffic growth (3% per year) plus in-process traffic has been added to the year 2021 existing volumes to account for the background traffic volumes. The in-process traffic consisted of several projects including Teresa's Little School, New Middle School, and the Minit Management Development as referenced according to City staff. The associated trips are shown on Figures 2a & 2b. The Year 2024 background traffic volumes are illustrated on Figure 3a & 3b for the AM & PM peak hours, respectively.

The Year 2024 total traffic scenario (background plus site generated traffic) is presented in Figures 6a & 6b for the AM & PM peak hour, respectively.

VEHICULAR TRIP GENERATION

Trip rates presented in the Institute of Transportation Engineers (ITE) Trip Generation manual 10th edition (Year 2021) were utilized to estimate the site's trip generation. Single-Family housing and land-use code #210 was applied. The trip generation is summarized in Table 1.

Table 1 Trip Generation Summary

ITE Land Use	Units (#)	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Single-Family (#210)	74							
Generation Rate [1]		9.44	0.74	25%	75%	0.99	63%	37%
Site Trips		**699**	**55**	14	41	**73**	46	27

[1] Source: *Trip Generation*, 10th Edition, ITE, 2017, average rates.

The proposed development is expected to generate 699 daily trips, 55 AM peak hour trips, and 73 PM peak hour trips.

The trip distribution was based on the existing traffic counts, intersection traffic control, site access locations, and engineering judgment. Figure 4 presents the trip distribution results and Figures 5a & 5b display the trip assignments for the AM & PM peak hours, respectively.

CAPACITY ANALYSIS

Capacity analyses were performed to determine the levels of service for the weekday peak hours. Synchro v11.1 software based on the year 2010 Highway Capacity Manual methodology was used to determine the LOS and approach delays for the study intersections. The results are summarized in the following table. Copies of the capacity analysis summaries are included in the appendix.

Table 2 Capacity Analysis Summary

Intersection	Type of Control	Peak Hour	Traffic Scenario											
			Year 2021				2024 Background				2024 Total			
			Crit. Mov't	LOS	Delay	v/c	Crit. Mov't	LOS	Delay	v/c	Crit. Mov't	LOS	Delay	v/c
Cedar Avenue & E 4th Street	Two-way Stop	AM	SB	B	10.7	0.04	SB	B	12.4	0.08	SB	B	12.9	0.08
		PM	SB	B	13.2	0.10	SB	B	14.6	0.13	SB	C	15.5	0.14
Highland/ Ivy Avenue & E 4th Street/ Lockwood Creek Rd	Two-way Stop	AM	NB	F	87.9	0.10	NB	F	185.1	0.05	NB	F	257.6	0.05
		PM	NB	C	21.5	0.09	NB	D	25.7	0.09	NB	D	28.6	0.11
	Mitigated[1]	*AM*	-	-	-	-	-	A	7.5	0.21	-	A	8.0	0.22
		PM	-	-	-	-	-	-	-	-	-	-	-	-
	Mitigated[2]	*AM*	-	-	-	-	-	A	8.8	0.35	-	A	*9.0*	*0.37*
		PM	-	-	-	-	-	-	-	-	-	-	-	-
John Storm Road & Lockwood Creek Rd	Two-way Stop	AM	NB	B	10.8	0.10	NB	B	14.4	0.19	NB	C	15.3	0.21
		PM	NB	B	11.5	0.11	NB	B	12.6	0.14	NB	B	13.3	0.15
E Spruce Avenue & Lockwood Creek Rd	Two-way Stop	AM	SB	A	9.3	0.02	SB	B	10.9	0.05	SB	B	11.0	0.07
		PM	SB	A	9.3	0.02	SB	A	9.9	0.03	SB	B	10.0	0.04
NE 24th Avenue & Lockwood Creek Rd	Two-way Stop	AM	SB	A	9.5	0.01	SB	A	9.6	0.02	SB	A	9.8	0.05
		PM	SB	B	10.4	0.02	SB	B	10.6	0.02	SB	B	10.5	0.04
Timmen Road and La Center Rd	Two-way Stop	AM	NB	B	12.3	0.11	NB	B	13.5	0.07	NB	B	13.7	0.07
		PM	NB	C	18.2	0.25	NB	C	21.5	0.31	NB	C	22.4	0.33

Notes: 2016 Highway Capacity Manual methodology used in analysis, Synchro v11. NB - Northbound, SB - Southbound, Crit. Mov't - Critical movement or critical approach.

[1] Construct roundabout.

[2] Install traffic signal.

According to the City's Comprehensive Plan policy the minimum acceptable level of service mobility standard for stop controlled intersections is LOS `E`. As documented in the Table 2 all of the study intersections except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue will operate at LOS `E` or better through the Year 2024 total traffic scenario.

The intersection of East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue will maintain LOS `D` or better in the peak hours through the year 2024 total traffic scenario.

Currently the intersection experiences LOS `F` with 88 seconds of delay in the AM peak hour and will continue to fail through the year 2024 background and total traffic scenarios. The failing approach is the northbound stop controlled movement. The potential mitigation is either to install a traffic signal or construct a roundabout. However, mitigating the failing condition is not proposed in conjunction with the Lockwood Meadows Subdivision development for several reasons;

- In the failing AM peak hour the proposed development distributes no trips to the failing northbound approach.
- There is only a 4% impact when comparing the number of site trips distributed at the intersection to the year 2024 background traffic conditions.
- The City's Capital Facilities Plan documents that the intersection fails and proposes no mitigation through the year 2036. The Capital Facilities Plan surmises that future street connectivity improvements including local street extensions will further alleviate some of the motor vehicle trip demand in the area and yield reduced delay times at the intersection. Even a small shift in such trips would be sufficient to mitigate the condition.

Generally, LOS 'A', 'B', 'C', and 'D' are desirable service levels ranging from no vehicle delays to average or longer than average delays in the peak hours. Level 'E' represents longer delays and is considered to be the limit of acceptable delay for unsignalized and signalized intersections. Signalization warrants need to be reviewed and signals considered only if warrants are met. Level 'F' indicates that intersection improvements, such as widening and signalization, may be required. According to the Highway Capacity Manual (HCM*)*, the following delay times are associated with the LOS at stop controlled unsignalized and signalized intersections.

Level of Service criteria defined in Highway Capacity Manual

Level of Service (LOS)	Unsignalized Control Stopped Delay (sec/veh)	Signalized Control Stopped Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

QUEUING ANALYSIS

Queue length demand at the study intersections was determined with the capacity analyses. The results based on the 95th percentile queue rating for the Year 2024 total traffic scenario established that queues on the stop approaches in the AM & PM peak hours will not exceed one to two vehicles except at the intersection of East 4th Street/Lockwood Creek Road and Highland Avenue/Ivy Avenue. At this location the queues were projected to be three to four cars in the AM peak hour and two to three cars in the PM peak hour.

The LOS reports containing the queue results are contained in the appendix.

SIGHT DISTANCE

Intersection sight distance at the proposed access points on East Spruce Avenue and on NE 24th Avenue was reviewed in the field in accordance with the AASHTO standards. Using the posted travel speed of 25 MPH on Spruce Street requires an intersection sight distance of 280 feet in both directions. No restrictions to the sightlines are present on East Spruce Street and the sight distance standard is met.

Northeast 24th Avenue between Lockwood Creek Road and NE 339th Avenue does not have a posted travel speed and the traffic speeds were gauged by performing test drives following local traffic. The speeds typically ranged from 35 MPH to 40 MPH. The AASHTO standard for the higher speed is 445 feet. The available intersection sight distance was measured at 580 feet north of the access approach and in excess of 600 feet to the south. Therefore, the intersection sight distance standard is met.

When the development is constructed it will be necessary to maintain the required sight distance. Placement of any objects such as building structures, walls, signing, parking, above ground utilities, or landscaping that obstruct the sightlines is not permitted for safety purposes.

LEFT TURN LANE REQUIREMENTS

Left turn lane needs were evaluated for the peak hour conditions on Lockwood Creek Road at East Spruce Avenue and at NE 24th Avenue. Based on the warrant results eastbound left turn lanes are not warranted on Lockwood Creek Road in the peak hours through the year 2024 total traffic scenario. The warrant curve results are included in the appendix.

TRAFFIC SIGNAL WARRANTS

The peak hour signal warrant was evaluated for the stop controlled study intersections. The peak hour warrant data is included in the appendix.

The intersection at La Center Road and Timmen Road marginally meets the peak hour signal warrant in the PM peak hour for the year 2024 background and year 2024 total traffic scenarios. However, with a 14% reduction of the Timmen Road approach volume for right turn traffic (a separate northbound right turn lane is present on the Timmen Road approach) the warrant is not met and signalization is not recommended in conjunction with the proposed development. Another factor that must be noted is that according to WSDOT's Six Year TIP for 2016-2021 and the City's Capital Facilities Plan – Transportation a traffic signal or roundabout improvement has been programmed at this location.

ACCIDENT HISTORY

Crash data for the study intersections on Lockwood Creek Road, East 4th Street, La Center Road was obtained from WSDOT staff and reviewed to identify potential safety issues. The latest available data covered the years 2016 - 2020.

The accident rates presented in Table 3 below are based on the number of accidents per million entering vehicles (MEV) per year. Typically, an intersection is not considered unsafe unless the crash rate exceeds the threshold value of 1.0 accidents per MEV.

Table 3 Crash Rate Results

Intersection	Crash History (Years)	Number of Crashes	Crashes per year	Annual Traffic Entering (veh/yr)	Crash rate per M.E.V.*
Cedar Avenue & E 4th Street	5	1	0.2	2604161	**0.08**
Highland/Ivy Ave & E 4th St/Lockwood Cr. Rd.	5	5	1.0	3016882	**0.33**
John Storm Road & Lockwood Cr. Rd.	5	1	0.2	1782371	**0.11**
E Spruce Avenue & Lockwood Cr. Rd.	5	0	0.0	1413479	**0.00**
NE 24th Avenue & Lockwood Cr. Rd.	5	0	0.0	1249121	**0.00**
Timmen Road and La Center Rd.	5	5	1.0	4572805	**0.22**

* M.E.V. - million entering vehicles.

None of the intersections experienced a crash rate above 0.33 crashes per MEV per year indicating safety mitigation is not necessary.

PEDESTRIANS, BICYCLES, & BUSES

Sidewalk will be provided along both sides of the streets constructed internally within development site. Sidewalk will also be constructed along the site's frontage adjacent to Lockwood Creek Road and NE 24th Avenue.

No bicycle lanes are provided on Lockwood Creek Road along the development's frontage. New bike lanes are not planned with the project.

C-Tran provides limited service to La Center with the Connector route which runs on weekdays only. The service operates between downtown La Center with a stop at the 4th Street Park & Ride to the 99th Street Transit Center in Vancouver.

SUMMARY AND RECOMMENDATIONS

The traffic study for Lockwood Meadows Subdivision has been prepared to determine the potential impacts at several study intersections along Lockwood Creek Road, East 4th Street, and La Center Road. Development of the site includes 74 single-family homes. Trip generation is projected to be 699 daily trips with 55 AM peak hour trips and 73 PM peak hour trips.

Intersection sight distance at the proposed access points on East Spruce Avenue and on NE 24th Avenue was reviewed in accordance with the AASHTO standards. A travel speed of 25 MPH on Spruce Street requires an intersection sight distance of 280 feet in both directions. No restrictions to the sightlines are present on East Spruce Street and the sight distance standard is met. Northeast 24th Avenue between Lockwood Creek Road and NE 339th Avenue does not have a posted travel speed and the traffic speeds were gauged by performing test drives following local traffic. The speeds typically ranged from 35 MPH to 40 MPH. The AASHTO standard for the higher speed is 445 feet. The available intersection sight distance was measured to be 580 feet north of the access approach and in excess of 600 feet to the south. Therefore, the intersection sight distance standard is met.

When the development is constructed it will be necessary to maintain the required sight distance. Placement of any objects such as building structures, walls, signing, parking, above ground utilities, or landscaping that obstruct the sightlines is not permitted for safety purposes.

According to the City's Comprehensive Plan policy the minimum acceptable level of service mobility standard for stop controlled intersections is LOS `E`. The analysis has determined that all of the study intersections except East 4th Street/Lockwood Creek Road at Highland Avenue/Ivy Avenue will operate at LOS `D` or better through the Year 2024 total traffic scenario. This intersection will maintain LOS `D` or better in the PM peak hour through the year 2024 total traffic scenario. Currently the intersection experiences LOS `F` with 88 seconds of delay in the AM peak hour and will continue to fail through the year 2024 background and total traffic scenarios. The failing approach is the northbound stop controlled movement. The failing condition would be mitigated by signalizing the intersection or constructing a roundabout. However, mitigating the failing condition is not proposed in conjunction with the Lockwood Meadows Subdivision development for several reasons;

- In the failing AM peak hour the proposed development distributes no trips to the failing northbound approach.

- There is only a 4% impact when comparing the number of site trips distributed at the intersection to the year 2024 background traffic conditions.
- The City's Capital Facilities Plan documents that the intersection fails and proposes no mitigation through the year 2036. The Capital Facilities Plan surmises that future street connectivity improvements including local street extensions will further alleviate some of the motor vehicle trip demand in the area and yield reduced delay times at the intersection. Even a small shift in such trips would be sufficient to mitigate the condition.

Queue length demand at the study intersections was determined with the capacity analyses. The results based on the 95th percentile queue rating for the Year 2024 total traffic scenario established that queues on the stop approaches in the AM & PM peak hours will not exceed one to two vehicles except at the intersection of East 4th Street/Lockwood Creek Road and Highland Avenue/Ivy Avenue. At this location the queues were projected to be three to four cars in the AM peak hour and two to three cars in the PM peak hour.

Crash data for the study intersections was obtained from WSDOT staff and reviewed to identify potential safety issues. The latest five years of available data was reviewed. None of the intersection crash rates exceed 0.33 accidents per MEV per year indicating safety mitigation is not necessary.

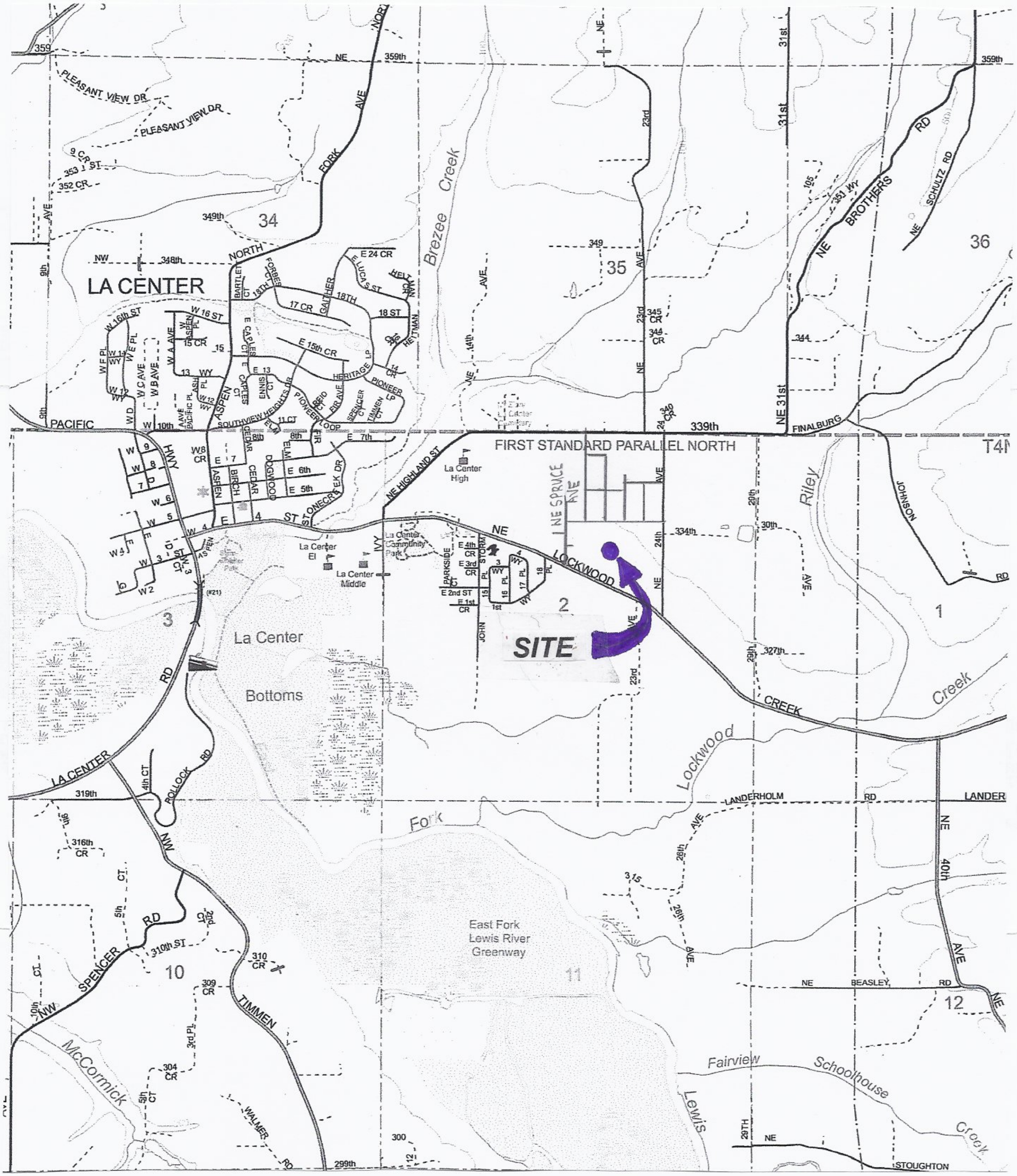
Based on evaluation of the study intersections including level of service conditions, vehicle delays, crash history, and warrants no intersection improvements beyond those planned at the site access approaches to East Spruce Avenue and NE 24th Avenue and the frontage improvements along Lockwood Creek Road and NE 24th Avenue are required in conjunction with the proposed development. The site access approaches to East Spruce Avenue and NE 24th Avenue will require stop sign control and stop bar pavement markings.

APPENDIX

- Vicinity Map — Figure 'a'
- Site Plan — Figure 'b'
- Lane Configurations and Traffic Control — Figures 'c1' & `c2`
- Traffic Flow Diagrams

Figures 1a & 1b	Year 2021 Existing Traffic (AM & PM)
Figures 2a & 2b	In-Process Traffic (AM & PM)
Figures 3a & 3b	Year 2024 Background Traffic (AM & PM)
Figure 4	Trip Distribution
Figures 5a & 5b	Trip Assignment (AM & PM)
Figures 6a & 6b	Year 2024 Total Traffic (AM & PM)

- Traffic Count Data
- In-Process Traffic
- Left Turn Lane Warrant Worksheets
- Peak Hour Signal Warrant
- Crash History Summary (furnished by WSDOT)
- La Center Capital Facilities Plan – Transportation, document excerpts
- Synchro v11.1 Capacity Analysis Worksheets



FILE NAME: 2125flow.dwg

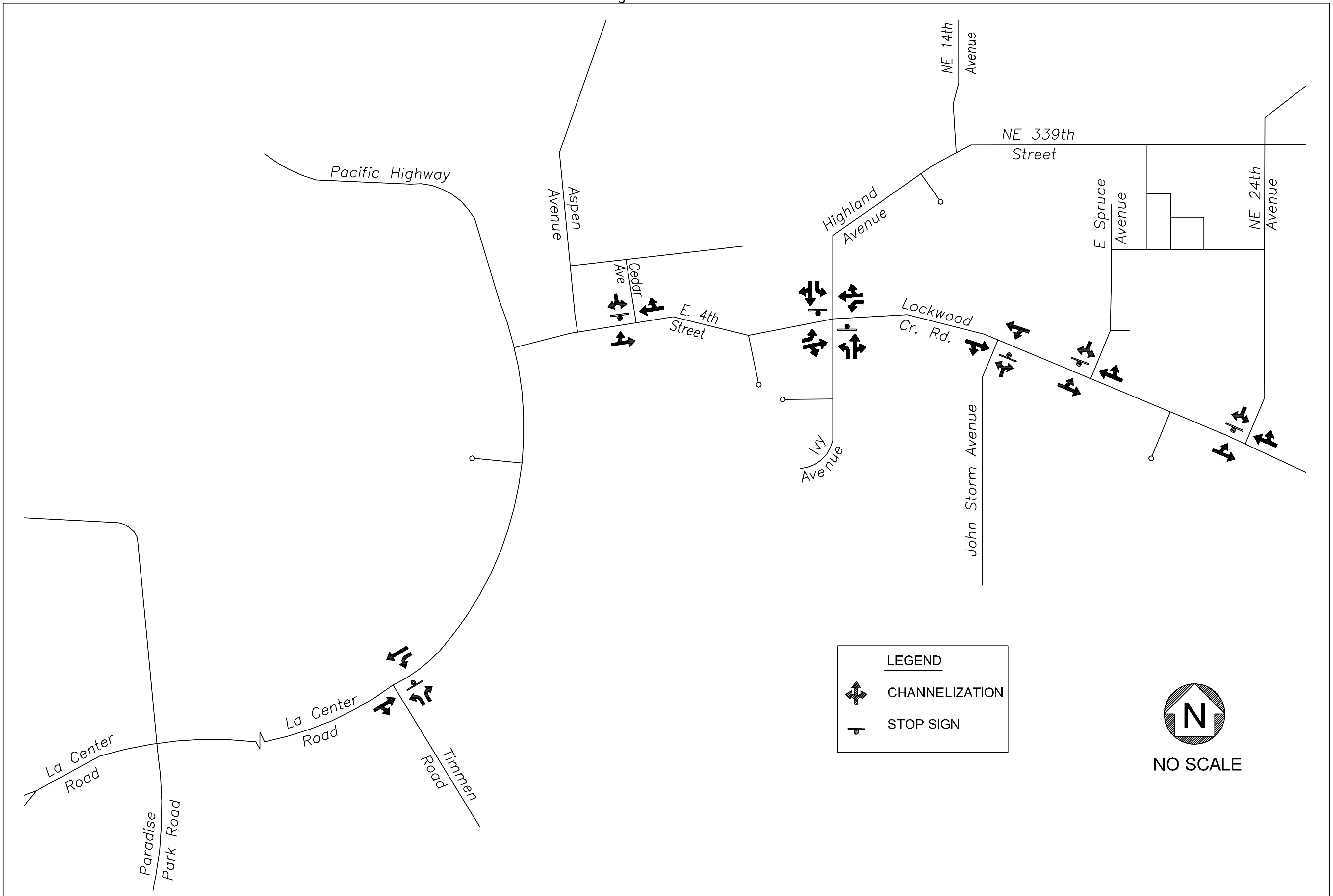
PLOT DATE: 08.01.21

CHARBONNEAU ENGINEERING LLC PROJECT: 21-25	NOTES: NO SCALE	N	VICINITY MAP LOCKWOOD MEADOWS	FIGURE a

PLOT DATE: 07.28.21 FILE: 2125flow.dwg

CHARBONNEAU ENGINEERING LLC PROJECT: 21-25	NOTES: Site plan provided by PLS Engineering.	SITE PLAN LOCKWOOD MEADOWS	FIGURE b

PLOT DATE: 07.28.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

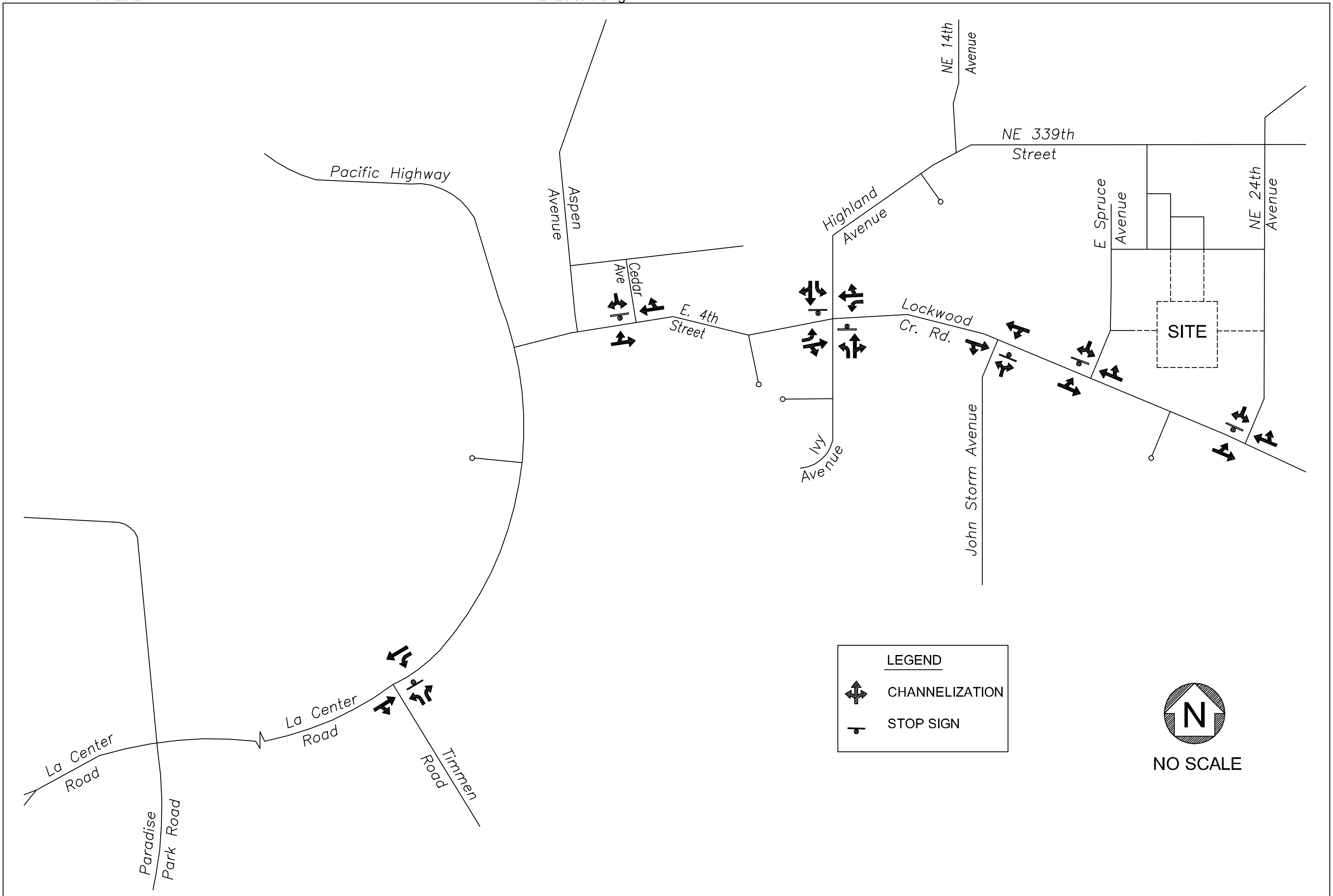
PROJECT: 21-25

NOTES:

EXISTING LANE CONFIGURATIONS AND TRAFFIC CONTROL
LOCKWOOD MEADOWS

FIGURE c1

PLOT DATE: 07.28.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

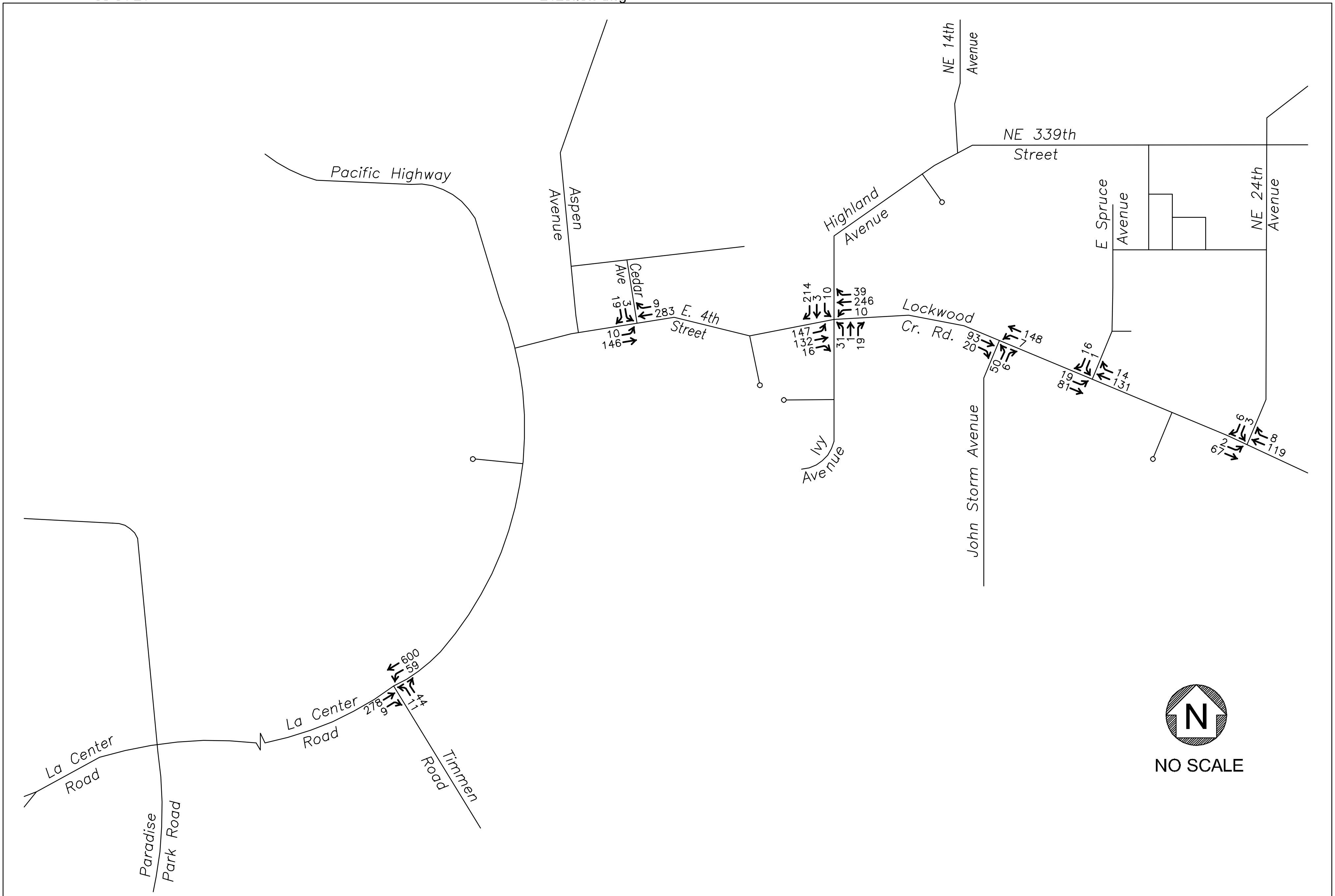
PROJECT: 21-25

NOTES:

PROPOSED LANE CONFIGURATIONS AND TRAFFIC CONTROL
LOCKWOOD MEADOWS

FIGURE c2

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

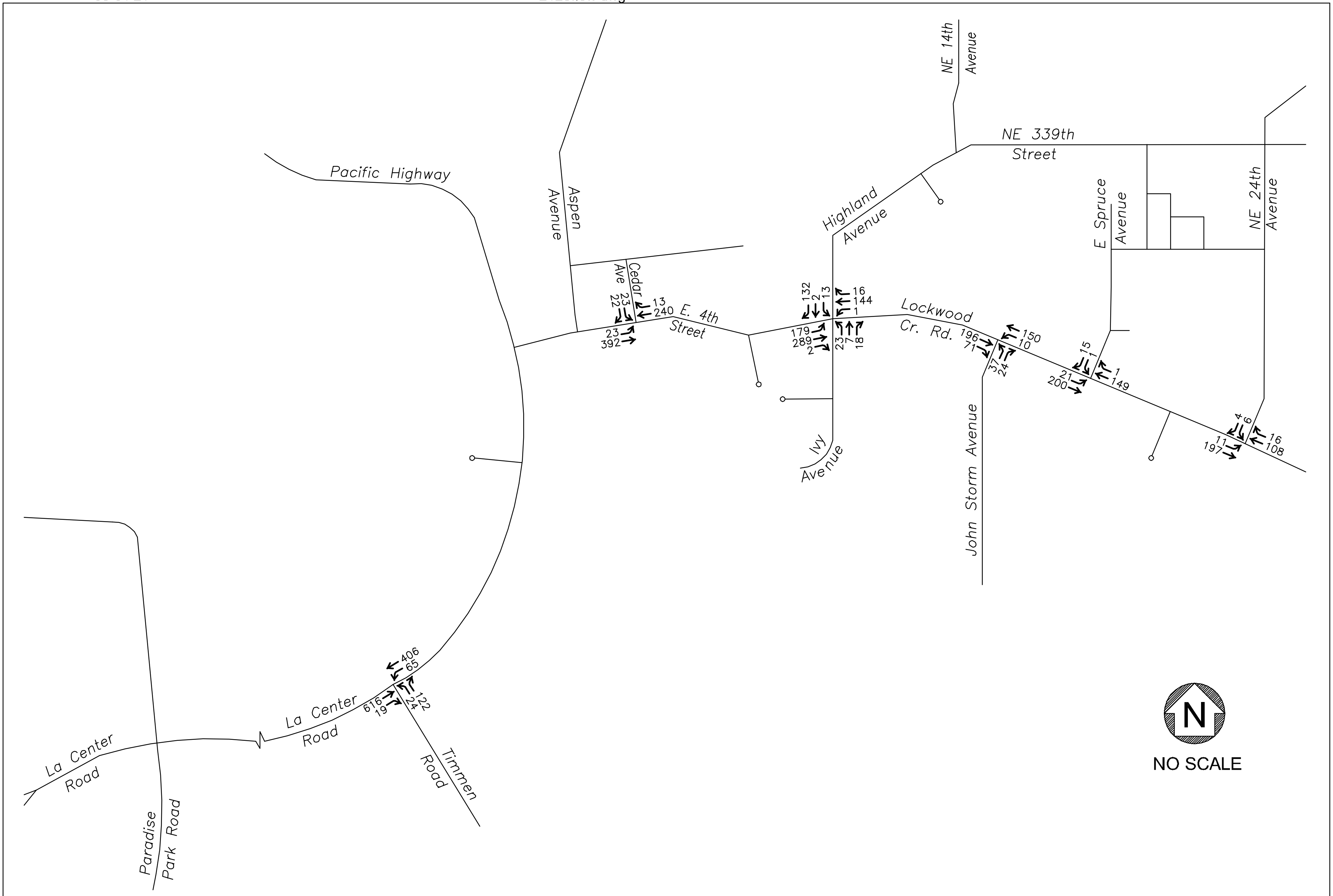
PROJECT: 21-25

NOTES: Historical count data factored by La Center traffic growth rate (calculated as 3.89%/year).

YEAR 2021 TRAFFIC
AM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 1a

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

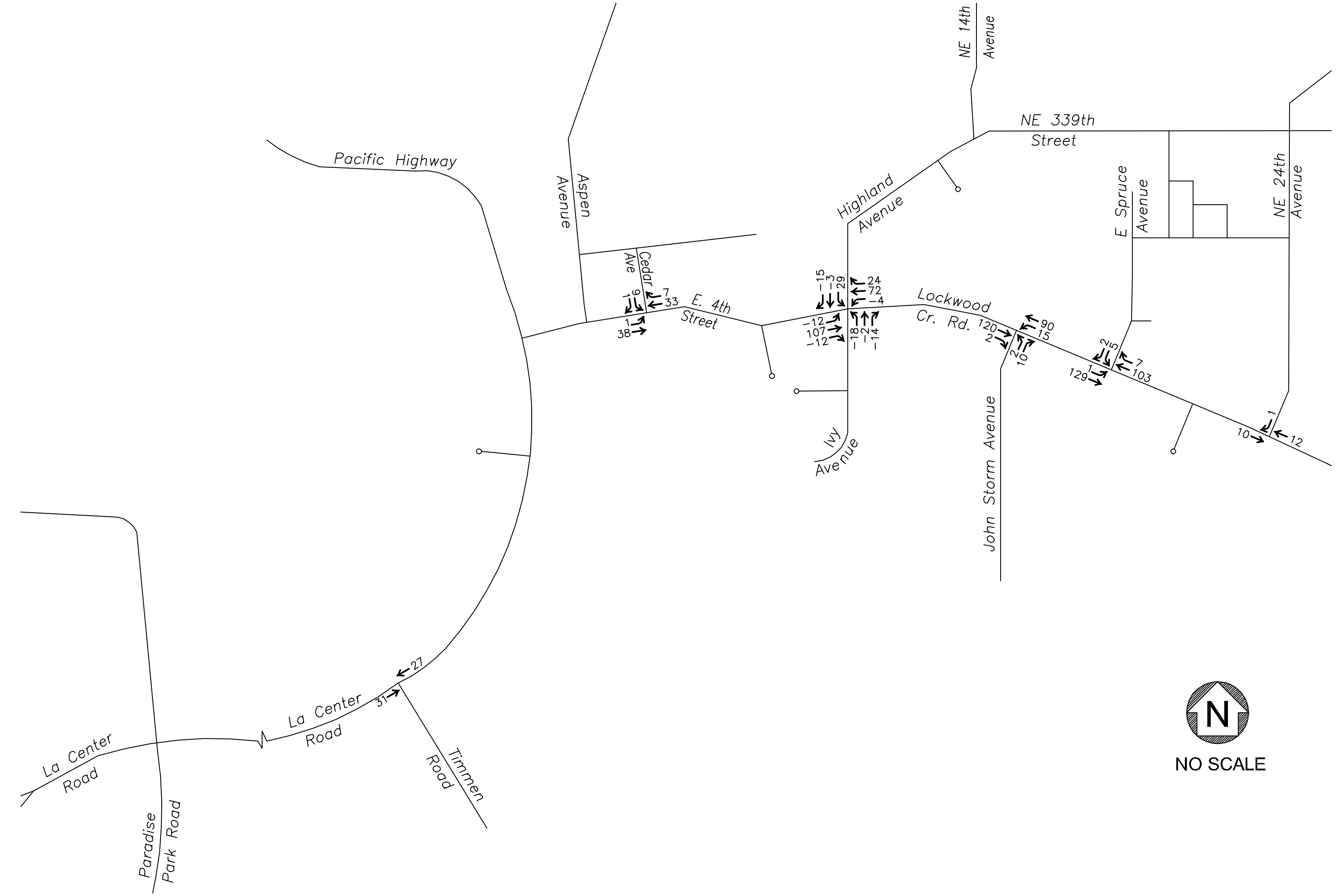
PROJECT: 21-25

NOTES: Historical count data factored by La Center traffic growth rate (calculated as 3.89%/year).

YEAR 2021 TRAFFIC
PM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 1b

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

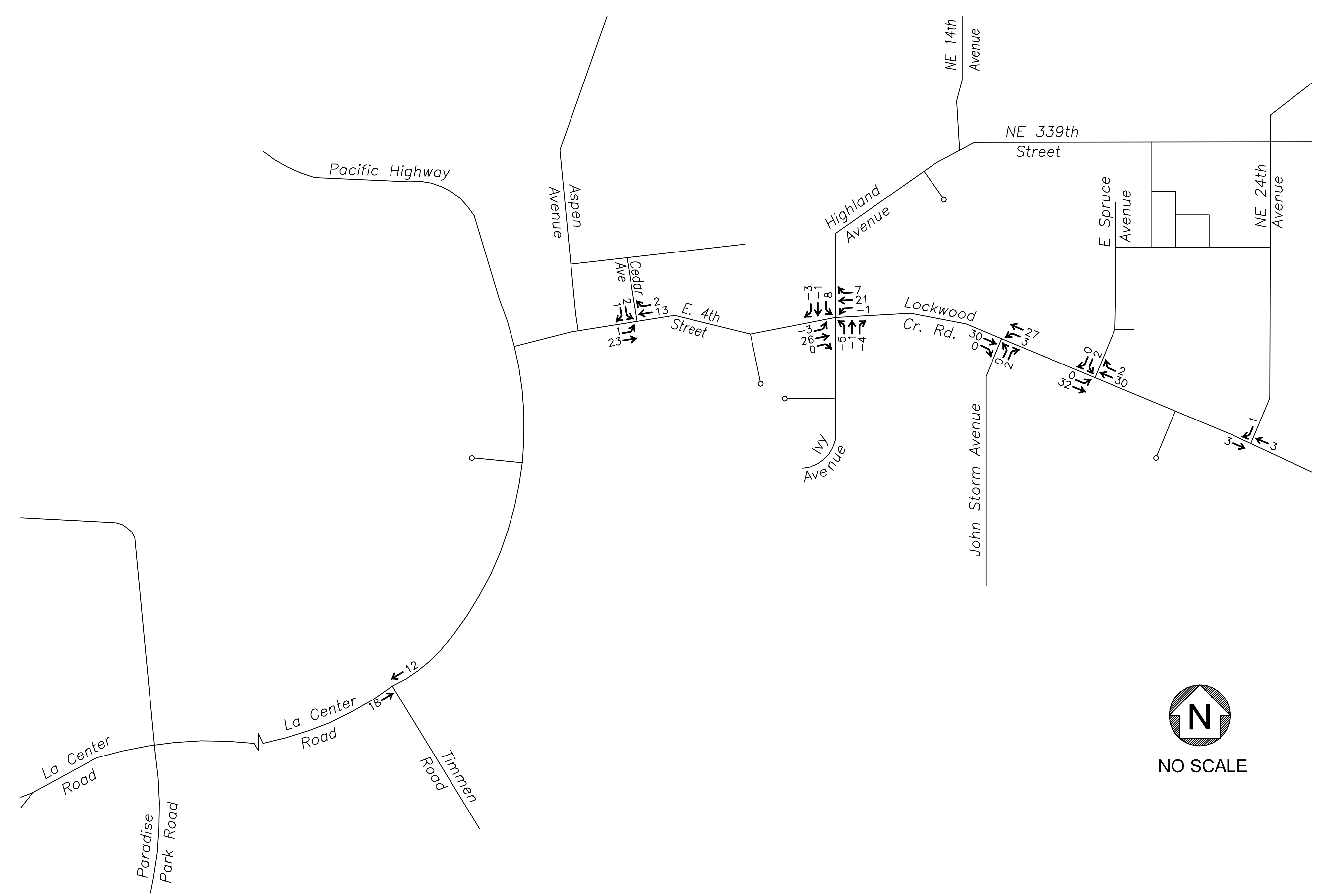
PROJECT: 21-25

NOTES: In-process traffic includes trips generated by La Center Middle School. Heritage Bldg 'B', and Minit Management sites.

IN-PROCESS TRAFFIC
AM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 2a

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

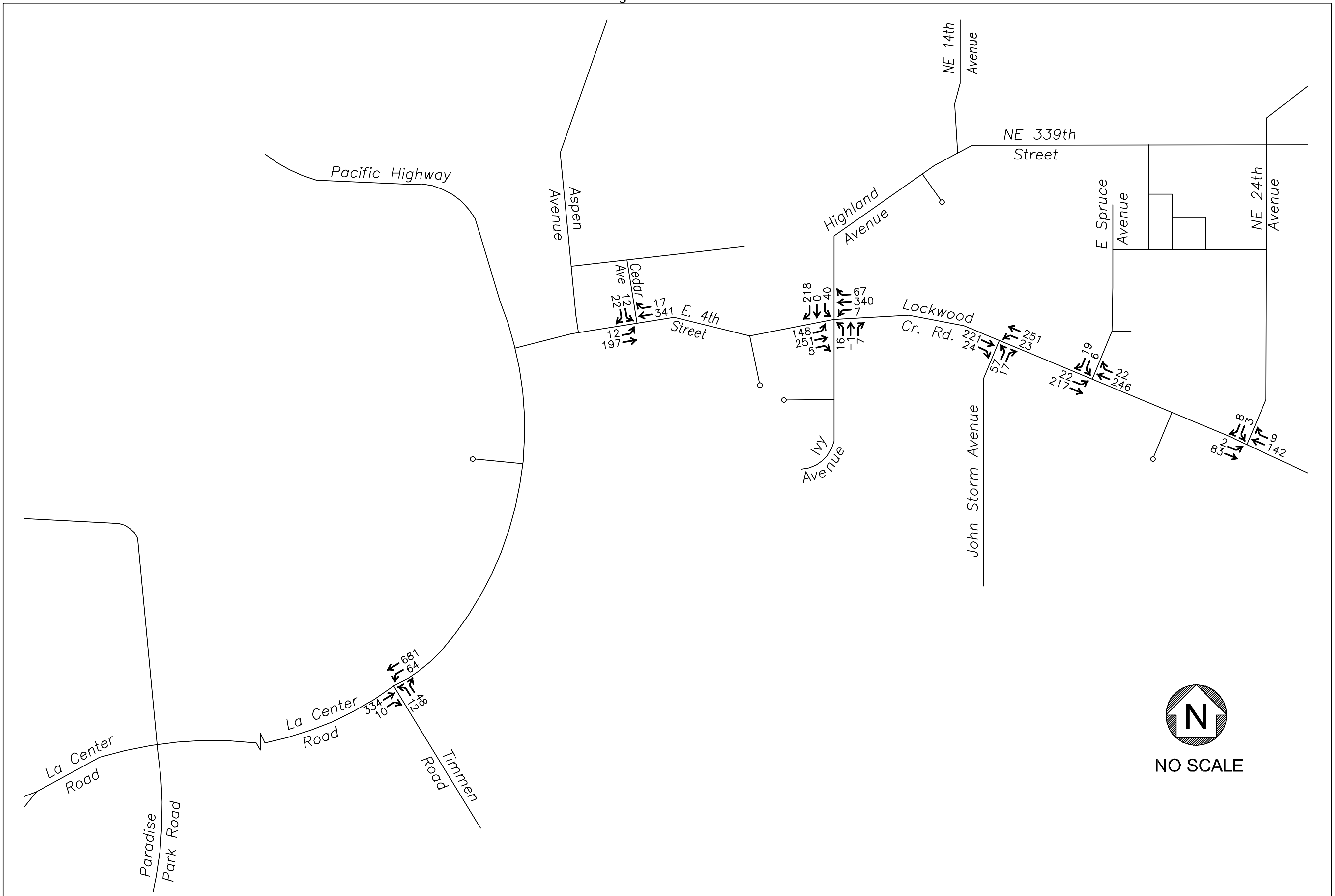
PROJECT: 21-25

NOTES: In-process traffic includes trips generated by La Center Middle School. Heritage Bldg 'B', and Minit Management sites.

IN-PROCESS TRAFFIC
PM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 2b

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

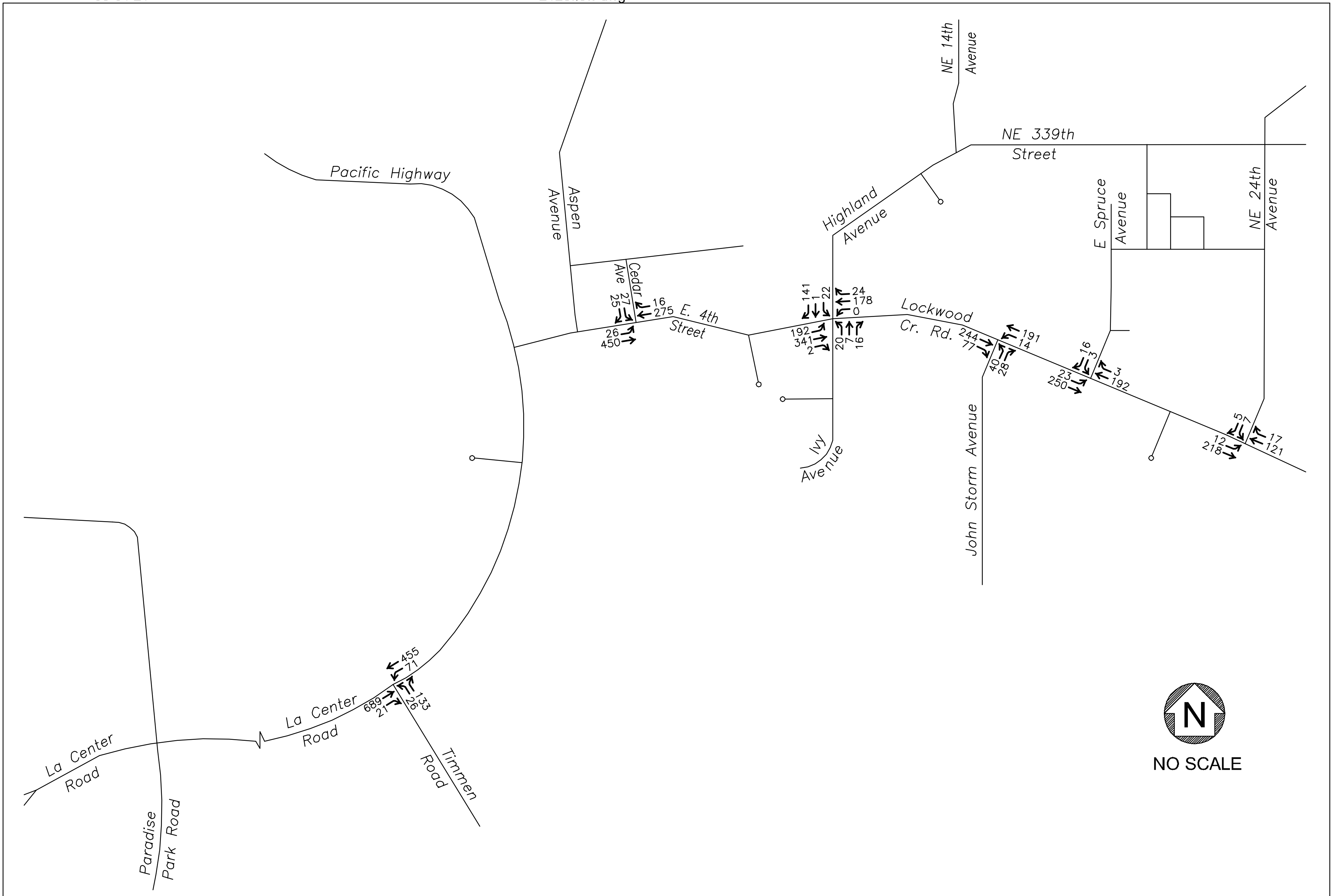
PROJECT: 21-25

NOTES: 2024 Background Traffic = Year 2021 Traffic + annual growth (3%/yr for 3 yrs) + In-process Traffic.

2024 BACKGROUND TRAFFIC
AM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 3a

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

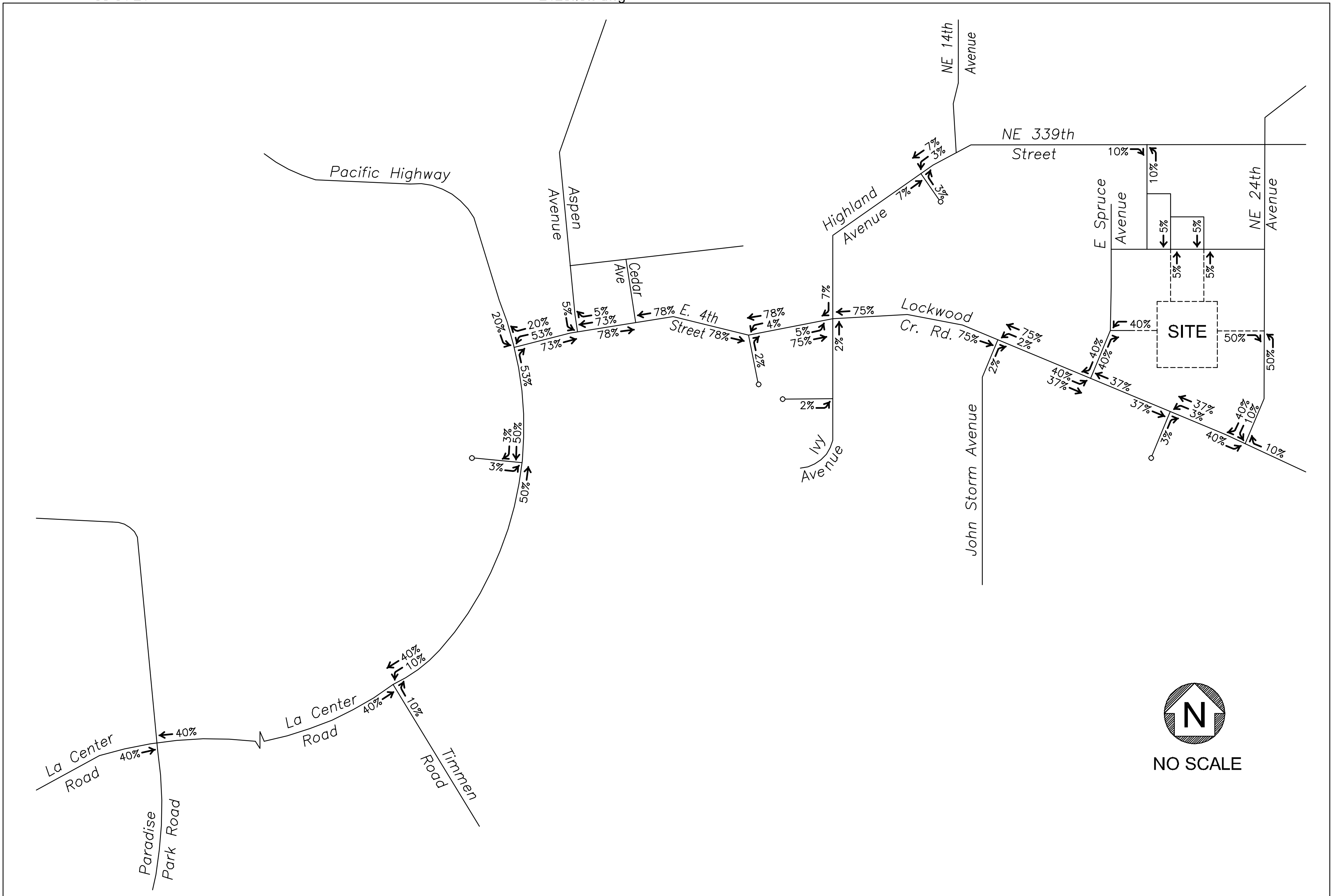
PROJECT: 21-25

NOTES: 2024 Background Traffic = Year 2021 Traffic + annual growth (3%/yr for 3 yrs) + In-process Traffic.

2024 BACKGROUND TRAFFIC
PM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 3b

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

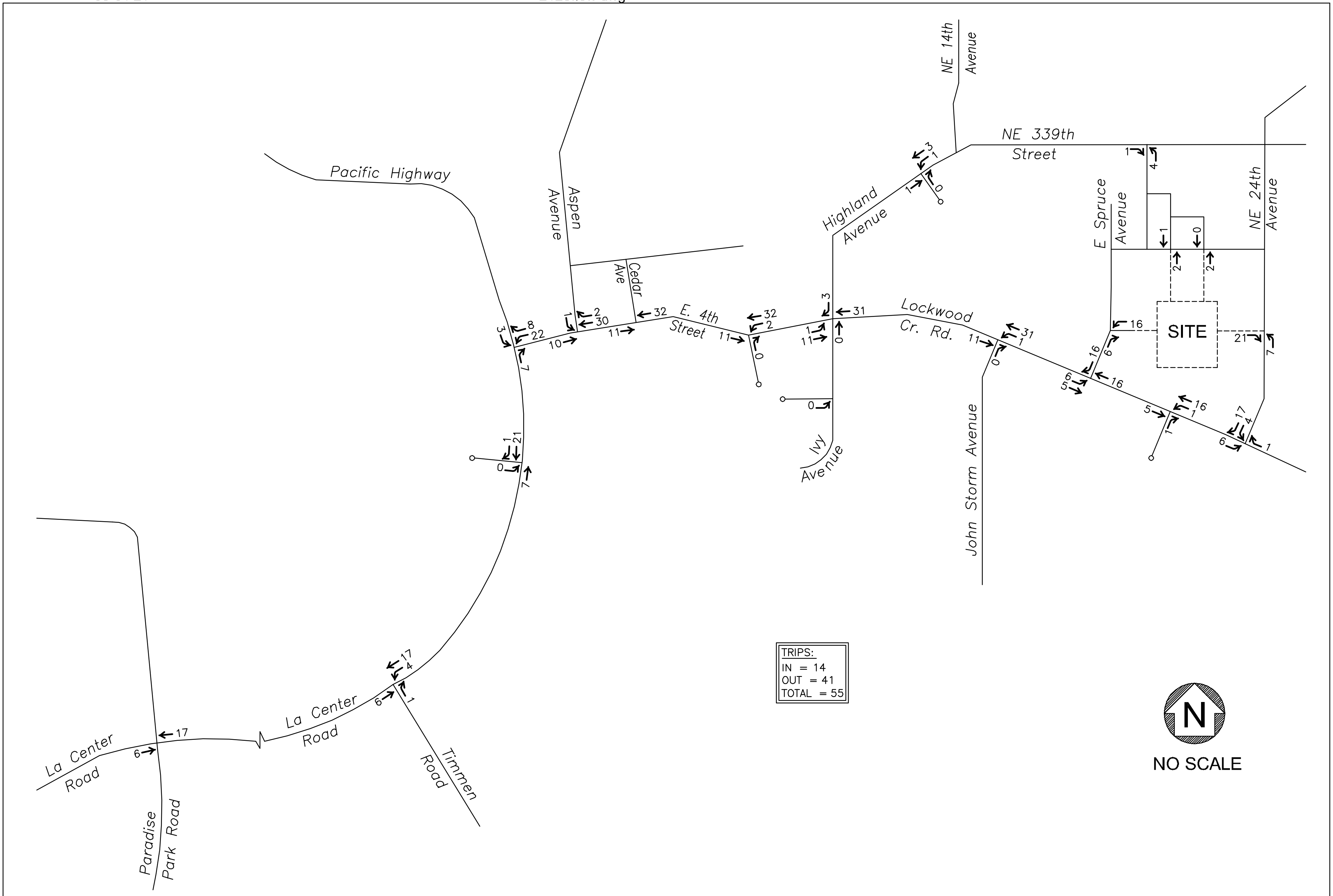
PROJECT: 21-25

NOTES: Trip distribution for the site is based on engineering judgment.

TRIP DISTRIBUTION
AM PEAK HOUR & PM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 4

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

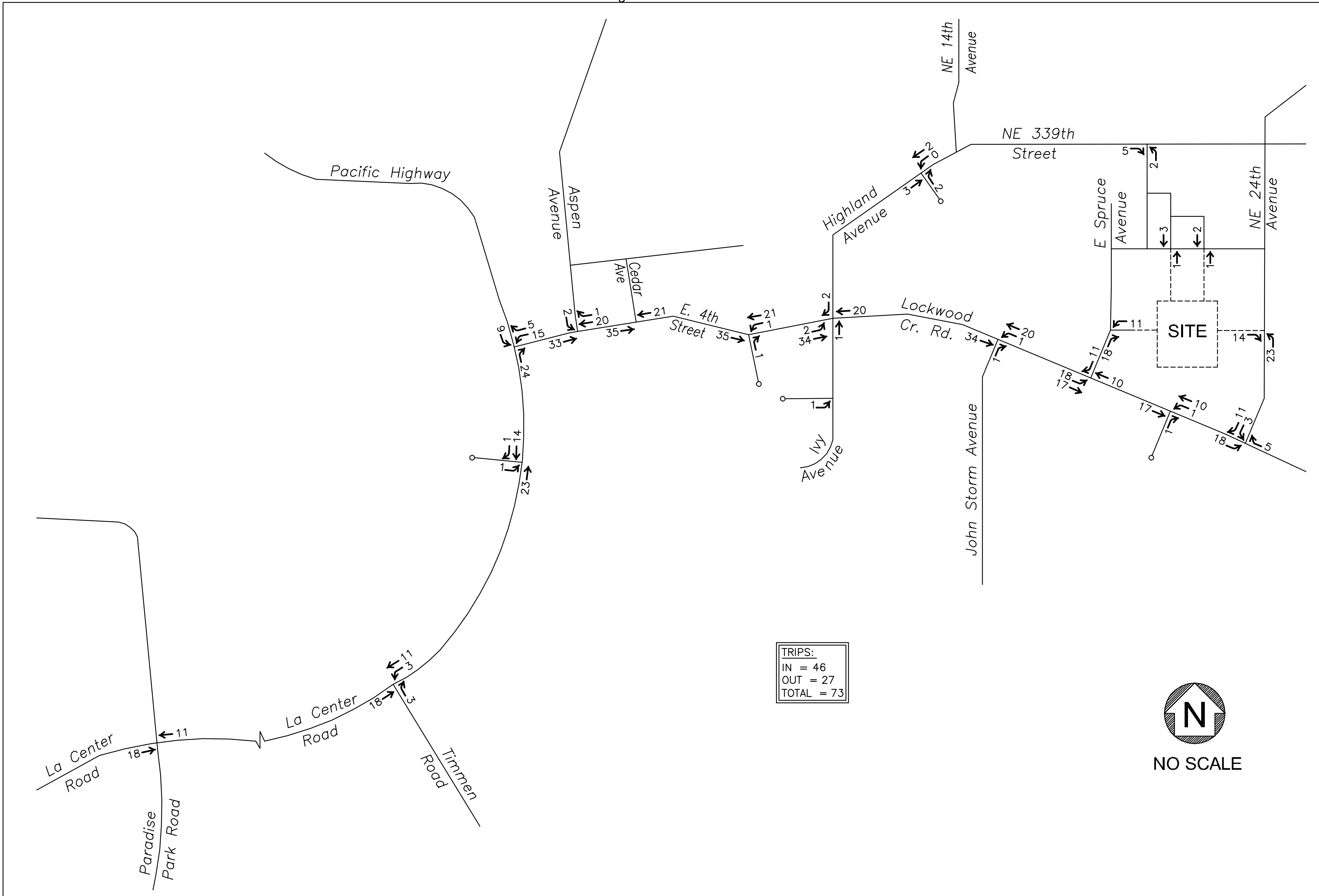
PROJECT: 21-25

NOTES: Trip generation is based on Single-Family Residential (ITE 210) trip rates.

TRIP ASSIGNMENT
AM PEAK HOUR
LOCKWOOD MEADOWS

FIGURE 5a

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

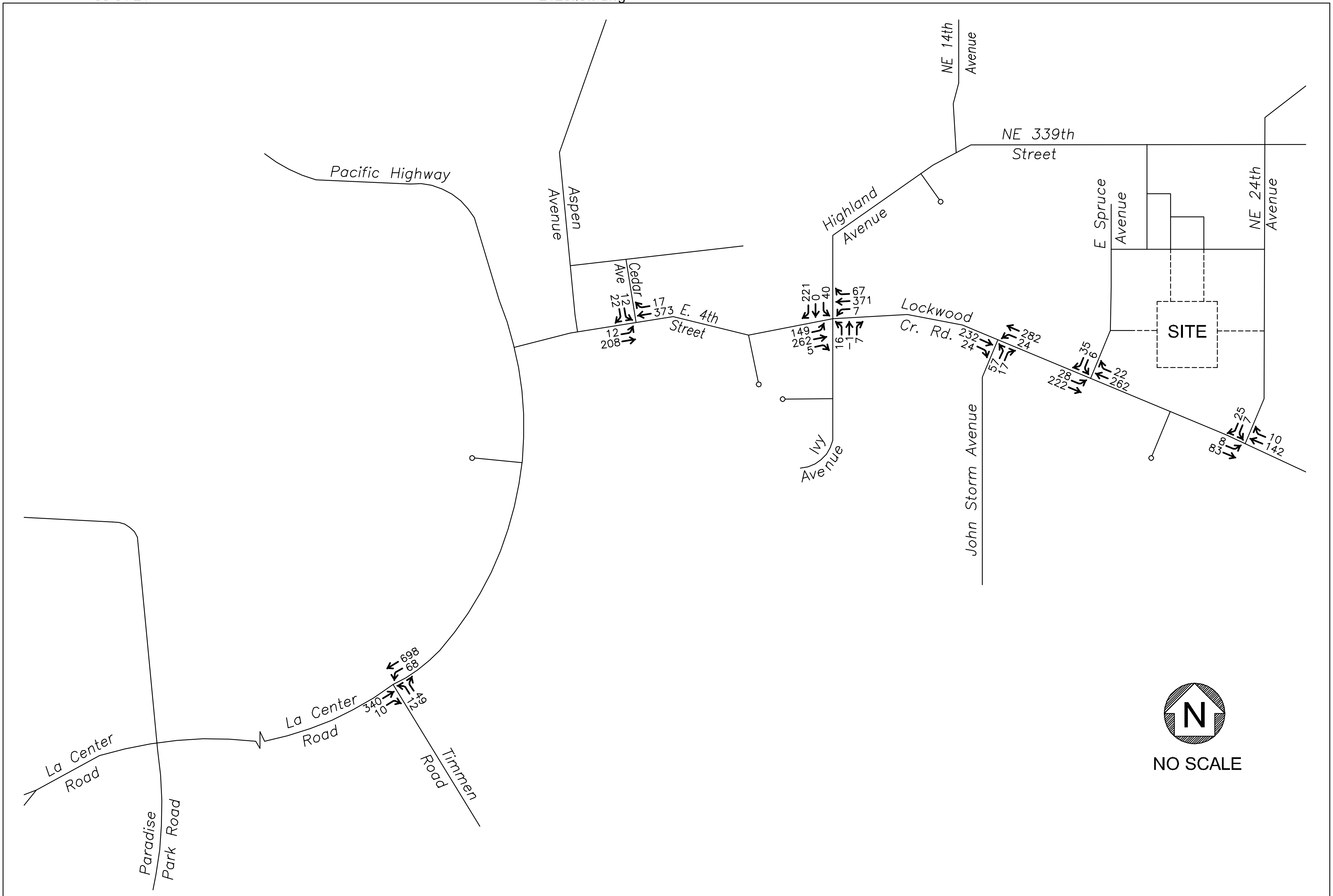
PROJECT: 21-25

NOTES: Trip generation is based on Single-Family Residential (ITE 210) trip rates.

TRIP ASSIGNMENT
PM PEAK HOUR
LOCKWOOD MEADOWS

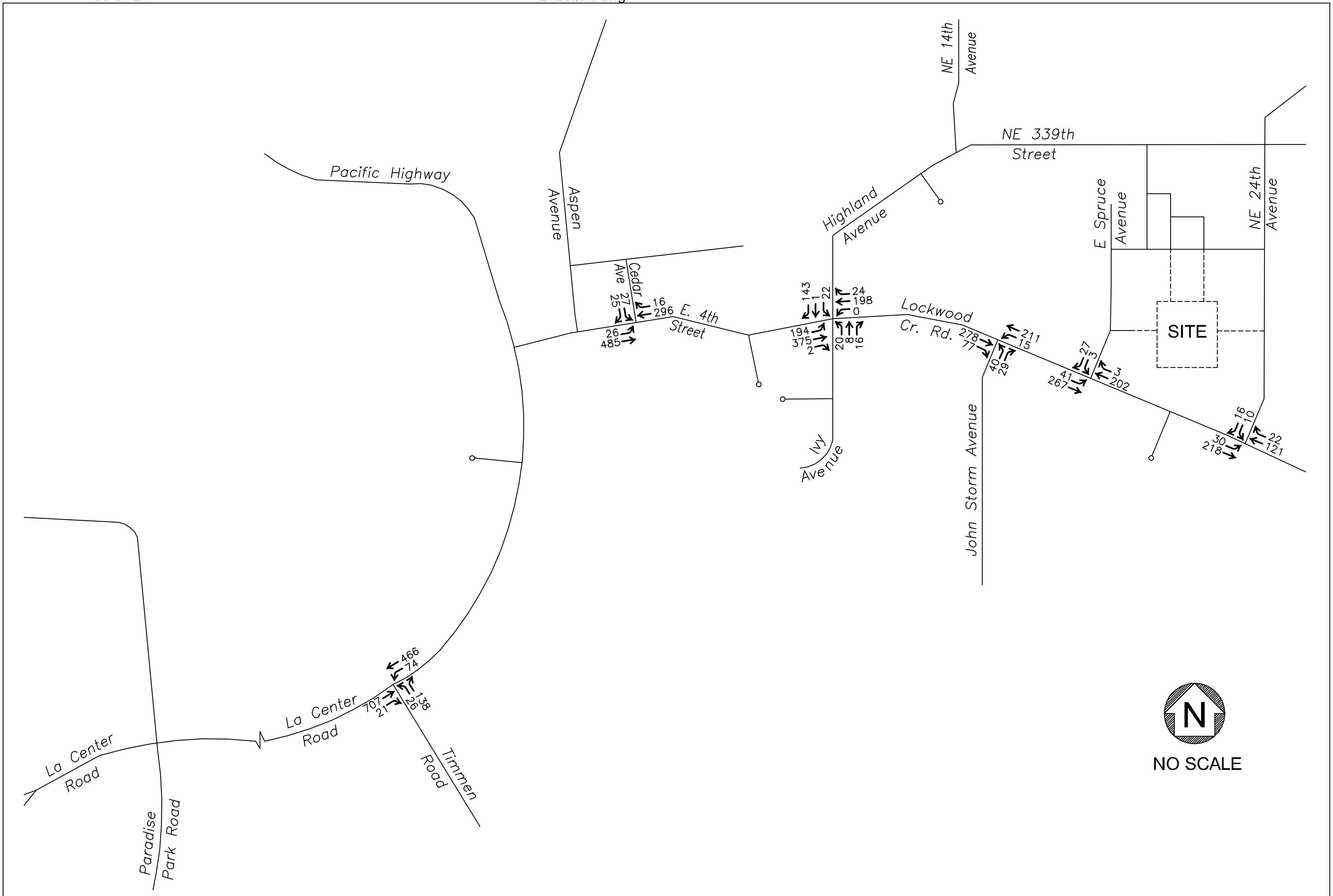
FIGURE 5b

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC PROJECT: 21-25	NOTES: 2024 Total Traffic = 2024 Background Traffic + Trip Assignment.	2024 TOTAL TRAFFIC AM PEAK HOUR LOCKWOOD MEADOWS	FIGURE 6a

PLOT DATE: 08.01.21 FILE: 2125flow.dwg



CHARBONNEAU ENGINEERING LLC

PROJECT: 21-25

NOTES: 2024 Total Traffic = 2024 Background Traffic + Trip Assignment.

2024 TOTAL TRAFFIC
PM PEAK HOUR
LOCKWOOD MEADOWS

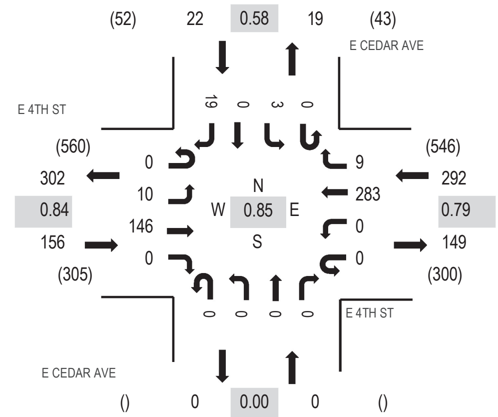
FIGURE 6b

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

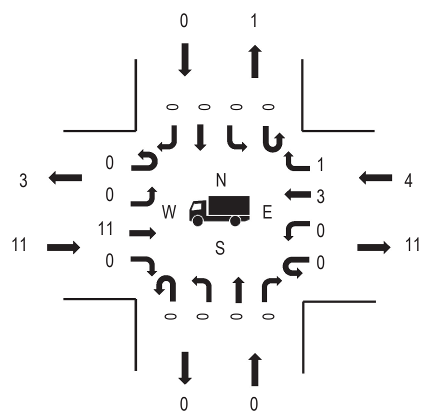
Location: 4 E CEDAR AVE & E 4TH ST AM
Date: Tuesday, July 27, 2021
Peak Hour: 07:25 AM - 08:25 AM
Peak 15-Minutes: 07:25 AM - 07:40 AM

Peak Hour

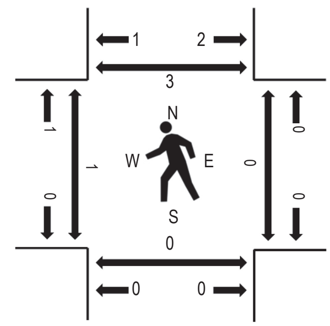
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	7.1%	0.84
WB	1.4%	0.79
NB	0.0%	0.00
SB	0.0%	0.58
All	3.2%	0.85

Traffic Counts - Motorized Vehicles

Interval	E 4TH ST Eastbound				E 4TH ST Westbound				E CEDAR AVE Northbound				E CEDAR AVE Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
7:00 AM	0	0	13	0	0	0	20	1	0	0	0	0	0	0	0	2	36	462
7:05 AM	0	1	14	0	0	0	12	0	0	0	0	0	0	0	0	0	27	458
7:10 AM	0	1	9	0	0	0	19	1	0	0	0	0	0	2	0	2	34	454
7:15 AM	0	0	16	0	0	0	26	1	0	0	0	0	0	1	0	2	46	464
7:20 AM	0	0	6	0	0	0	16	1	0	0	0	0	0	1	0	1	25	450
7:25 AM	0	1	15	0	0	0	28	3	0	0	0	0	0	0	0	1	48	470
7:30 AM	0	1	7	0	0	0	28	1	0	0	0	0	0	0	0	1	38	469
7:35 AM	0	1	22	0	0	0	26	2	0	0	0	0	0	1	0	1	53	466
7:40 AM	0	1	5	0	0	0	34	1	0	0	0	0	0	0	0	2	43	446
7:45 AM	0	1	13	0	0	0	23	0	0	0	0	0	0	0	0	0	37	433
7:50 AM	0	0	12	0	0	0	18	1	0	0	0	0	0	0	0	2	33	428
7:55 AM	0	2	20	0	0	0	15	0	0	0	0	0	0	0	0	5	42	439
8:00 AM	0	1	9	0	0	0	19	0	0	0	0	0	0	1	0	2	32	441
8:05 AM	0	0	10	0	0	0	12	0	0	0	0	0	0	0	0	1	23	
8:10 AM	0	1	14	0	0	0	25	1	0	0	0	0	0	1	0	2	44	
8:15 AM	0	1	4	0	0	0	26	0	0	0	0	0	0	0	0	1	32	
8:20 AM	0	0	15	0	0	0	29	0	0	0	0	0	0	0	0	1	45	
8:25 AM	0	1	12	0	0	0	31	0	0	0	0	0	0	1	0	2	47	
8:30 AM	0	1	11	0	0	0	22	0	0	0	0	0	0	1	0	0	35	
8:35 AM	0	1	15	0	0	0	16	0	0	0	0	0	0	0	0	1	33	
8:40 AM	0	1	6	0	0	0	22	0	0	0	0	0	0	0	0	1	30	
8:45 AM	0	1	5	0	0	0	23	1	0	0	0	0	0	1	0	1	32	
8:50 AM	0	1	15	0	0	0	17	3	0	0	0	0	0	3	0	5	44	
8:55 AM	0	2	17	0	0	0	16	6	0	0	0	0	0	2	0	1	44	
Count Total	0	20	285	0	0	0	523	23	0	0	0	0	0	15	0	37	903	
Peak Hour	0	10	146	0	0	0	283	9	0	0	0	0	0	3	0	19	470	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
7:00 AM	2	0	0	0	2	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:05 AM	1	0	1	0	2	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	0	1	0	1	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	0	0	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	1	0	1	0	2	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	0	1	0	2	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	2	0	0	0	2	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	1	1
7:50 AM	2	0	0	0	2	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	1	1
7:55 AM	1	0	1	0	2	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	1	0	0	0	1	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	2	0	0	0	2	8:10 AM	0	0	0	0	0	8:10 AM	1	0	0	1	2
8:15 AM	0	0	1	0	1	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	1	0	0	0	1	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	1	0	0	0	1	8:25 AM	0	0	0	0	0	8:25 AM	2	0	0	0	2
8:30 AM	0	0	2	0	2	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	3	0	1	0	4	8:35 AM	1	0	0	0	1	8:35 AM	0	0	0	0	0
8:40 AM	0	0	1	0	1	8:40 AM	0	0	0	0	0	8:40 AM	1	0	0	0	1
8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	0	1	0	2	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	1	0	0	0	1	8:55 AM	0	0	0	0	0	8:55 AM	1	0	0	0	1
Count Total	21	0	11	0	32	Count Total	1	0	0	0	1	Count Total	5	0	0	3	8
Peak Hour	11	0	4	0	15	Peak Hour	0	0	0	0	0	Peak Hour	1	0	0	3	4

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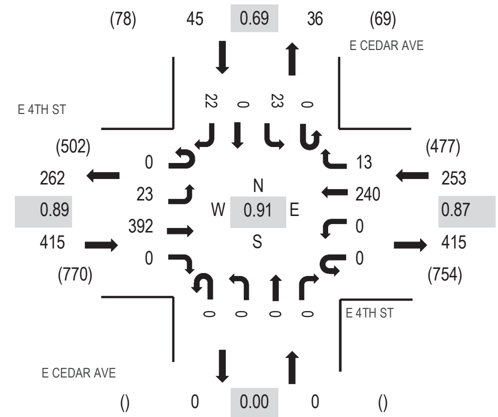
Location: 4 E CEDAR AVE & E 4TH ST PM
Date: Tuesday, July 27, 2021
Peak Hour: 04:25 PM - 05:25 PM
Peak 15-Minutes: 04:35 PM - 04:50 PM

Peak Hour

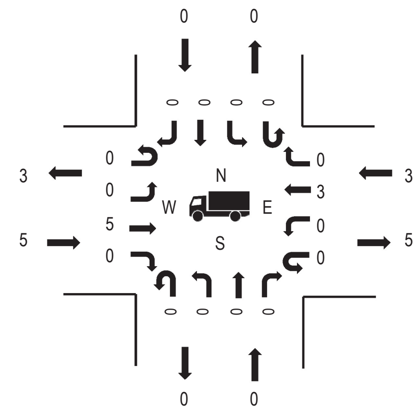
Motorized Vehicles



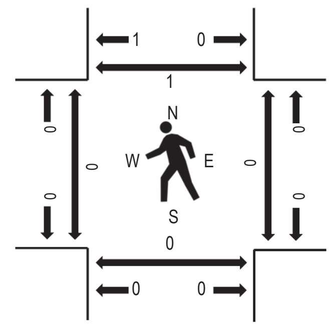
Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.2%	0.89
WB	1.2%	0.87
NB	0.0%	0.00
SB	0.0%	0.69
All	1.1%	0.91

Heavy Vehicles



Pedestrians



Traffic Counts - Motorized Vehicles

Interval Start Time	E 4TH ST Eastbound U-Turn	Left	Thru	Right	E 4TH ST Westbound U-Turn	Left	Thru	Right	E CEDAR AVE Northbound U-Turn	Left	Thru	Right	E CEDAR AVE Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour
4:00 PM	0	0	23	0	0	0	14	0	0	0	0	0	0	0	0	3	40	688
4:05 PM	0	1	23	0	0	0	21	1	0	0	0	0	0	1	0	1	48	698
4:10 PM	0	7	29	0	0	0	21	1	0	0	0	0	0	1	0	1	60	700
4:15 PM	0	2	28	0	0	0	24	0	0	0	0	0	0	2	0	4	60	699
4:20 PM	0	4	30	0	0	0	15	1	0	0	0	0	0	0	0	1	51	703
4:25 PM	0	2	35	0	0	0	17	1	0	0	0	0	0	5	0	3	63	713
4:30 PM	0	3	26	0	0	0	20	1	0	0	0	0	0	1	0	2	53	709
4:35 PM	0	5	35	0	0	0	29	1	0	0	0	0	0	4	0	2	76	713
4:40 PM	0	1	29	0	0	0	21	1	0	0	0	0	0	0	0	4	56	676
4:45 PM	0	2	35	0	0	0	21	1	0	0	0	0	0	3	0	2	64	675
4:50 PM	0	5	35	0	0	0	20	1	0	0	0	0	0	2	0	2	65	664
4:55 PM	0	0	28	0	0	0	18	3	0	0	0	0	0	1	0	2	52	649
5:00 PM	0	2	28	0	0	0	16	1	0	0	0	0	0	3	0	0	50	637
5:05 PM	0	0	28	0	0	0	20	0	0	0	0	0	0	1	0	1	50	
5:10 PM	0	0	34	0	0	0	22	2	0	0	0	0	0	0	0	1	59	
5:15 PM	0	2	37	0	0	0	19	1	0	0	0	0	0	3	0	2	64	
5:20 PM	0	1	42	0	0	0	17	0	0	0	0	0	0	0	0	1	61	
5:25 PM	0	3	30	0	0	0	22	0	0	0	0	0	0	2	0	2	59	
5:30 PM	0	2	30	0	0	0	21	0	0	0	0	0	0	2	0	2	57	
5:35 PM	0	1	24	0	0	0	11	1	0	0	0	0	0	0	0	2	39	
5:40 PM	0	2	27	0	0	0	22	0	0	0	0	0	0	3	0	1	55	
5:45 PM	0	0	30	0	0	0	20	1	0	0	0	0	0	0	0	2	53	
5:50 PM	0	0	36	0	0	0	12	0	0	0	0	0	0	0	0	2	50	
5:55 PM	0	6	17	0	0	0	16	0	0	0	0	0	0	1	0	0	40	
Count Total	0	51	719	0	0	0	459	18	0	0	0	0	0	35	0	43	1,325	
Peak Hour	0	23	392	0	0	0	240	13	0	0	0	0	0	23	0	22	713	

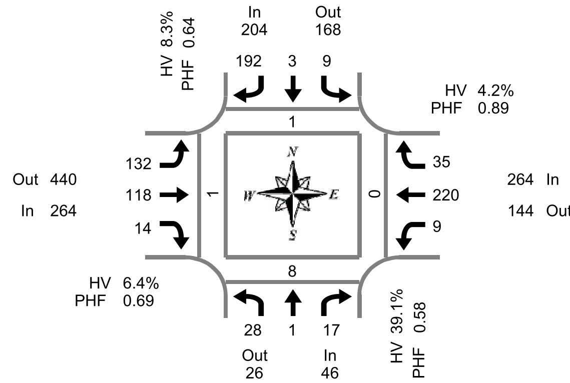
Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	1	0	1	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	1	0	0	0	1	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0	4:10 PM	1	0	0	1	2
4:15 PM	0	0	1	1	2	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	1	0	1	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	0	0	0	1	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	2	0	0	0	2	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	1	0	1	5:00 PM	0	0	0	0	0
5:05 PM	1	0	1	0	2	5:05 PM	1	0	0	0	1	5:05 PM	0	0	0	0	0
5:10 PM	1	0	0	0	1	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	1	1
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	1	0	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	1	0	1	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0	5:30 PM	1	0	0	1	2
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	1	0	0	0	1
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	6	0	6	1	13	Count Total	1	0	1	0	2	Count Total	3	0	0	3	6
Peak Hour	5	0	3	0	8	Peak Hour	1	0	1	0	2	Peak Hour	0	0	0	1	1

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
7:30 AM to 8:30 AM

E Ivy St & E 4th St

Thursday, September 13, 2018
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	0	0	0	0	0	0	33	0	8	21	2	1	0	45	0	0	109	0	0	0	0
7:15 AM	1	1	0	0	1	0	27	0	21	23	0	0	1	48	4	0	127	0	4	0	0
7:30 AM	0	0	0	0	0	0	36	0	23	20	0	0	0	55	2	0	136	0	2	0	1
7:45 AM	2	1	3	0	1	0	47	0	41	23	2	0	3	52	12	0	187	0	4	0	0
8:00 AM	13	0	7	0	8	3	69	0	51	36	9	0	4	53	17	0	270	1	2	0	0
8:15 AM	13	0	7	0	0	0	40	0	17	39	3	0	2	60	4	0	185	0	0	0	0
8:30 AM	3	0	2	0	1	0	23	0	10	20	2	0	0	32	2	0	95	0	3	0	0
8:45 AM	1	1	1	0	0	0	18	0	12	27	0	0	1	34	0	0	95	0	0	0	0
Total Survey	33	3	20	0	11	3	293	0	183	209	18	1	11	379	41	0	1,204	1	15	0	1

Peak Hour Summary
7:30 AM to 8:30 AM

By Approach	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	46	26	72	0	204	168	372	0	264	440	704	0	264	144	408	0	778	1	8	0	1
%HV	39.1%				8.3%				6.4%				4.2%				8.1%				
PHF	0.58				0.64				0.69				0.89				0.72				

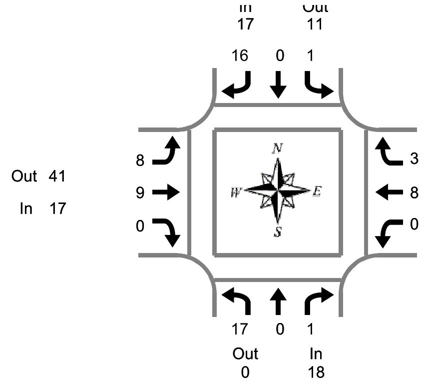
By Movement	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	28	1	17	46	9	3	192	204	132	118	14	264	9	220	35	264	778
%HV	60.7%	0.0%	5.9%	39.1%	11.1%	0.0%	8.3%	8.3%	6.1%	7.6%	0.0%	6.4%	0.0%	3.6%	8.6%	4.2%	8.1%
PHF	0.54	0.25	0.61	0.58	0.28	0.25	0.70	0.64	0.65	0.76	0.39	0.69	0.56	0.92	0.51	0.89	0.72

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
7:00 AM	3	2	3	0	2	0	143	0	93	87	4	1	4	200	18	0	559	0	10	0	1
7:15 AM	16	2	10	0	10	3	179	0	136	102	11	0	8	208	35	0	720	1	12	0	1
7:30 AM	28	1	17	0	9	3	192	0	132	118	14	0	9	220	35	0	778	1	8	0	1
7:45 AM	31	1	19	0	10	3	179	0	119	118	16	0	9	197	35	0	737	1	9	0	0
8:00 AM	30	1	17	0	9	3	150	0	90	122	14	0	7	179	23	0	645	1	5	0	0

Heavy Vehicle Summary

Clay Carney
(503) 833-2740



E Ivy St & E 4th St

Thursday, September 13, 2018
7:00 AM to 9:00 AM

Peak Hour Summary
7:30 AM to 8:30 AM

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	0	0	0	0	1	1	1	8	0	9	0	1	0	1	11
7:15 AM	0	0	0	0	0	0	0	0	1	6	0	7	0	0	0	0	7
7:30 AM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
7:45 AM	0	0	1	1	0	0	2	2	3	2	0	5	0	4	0	4	12
8:00 AM	12	0	0	12	1	0	14	15	4	3	0	7	0	2	2	4	38
8:15 AM	5	0	0	5	0	0	0	0	1	3	0	4	0	1	1	2	11
8:30 AM	0	0	0	0	0	0	0	0	1	2	0	3	0	2	0	2	5
8:45 AM	0	0	0	0	0	0	1	1	0	1	0	1	0	4	0	4	6
Total Survey	17	0	1	18	1	0	18	19	11	26	0	37	0	15	3	18	92

Heavy Vehicle Peak Hour Summary
7:30 AM to 8:30 AM

By Approach	Northbound E Ivy St			Southbound E Ivy St			Eastbound E 4th St			Westbound E 4th St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	18	0	18	17	11	28	17	41	58	11	11	22	63
PHF	0.25			0.25			0.25			0.28			0.26

By Movement	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	17	0	1	18	1	0	16	17	8	9	0	17	0	8	3	11	63
PHF	0.25	0.00	0.25	0.25	0.25	0.00	0.25	0.25	0.25	0.15	0.00	0.25	0.00	0.29	0.25	0.28	0.26

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
7:00 AM	0	0	1	1	0	0	3	3	5	17	0	22	0	6	0	6	32
7:15 AM	12	0	1	13	1	0	16	17	8	12	0	20	0	7	2	9	59
7:30 AM	17	0	1	18	1	0	16	17	8	9	0	17	0	8	3	11	63
7:45 AM	17	0	1	18	1	0	16	17	9	10	0	19	0	9	3	12	66
8:00 AM	17	0	0	17	1	0	15	16	6	9	0	15	0	9	3	12	60

Peak Hour Summary

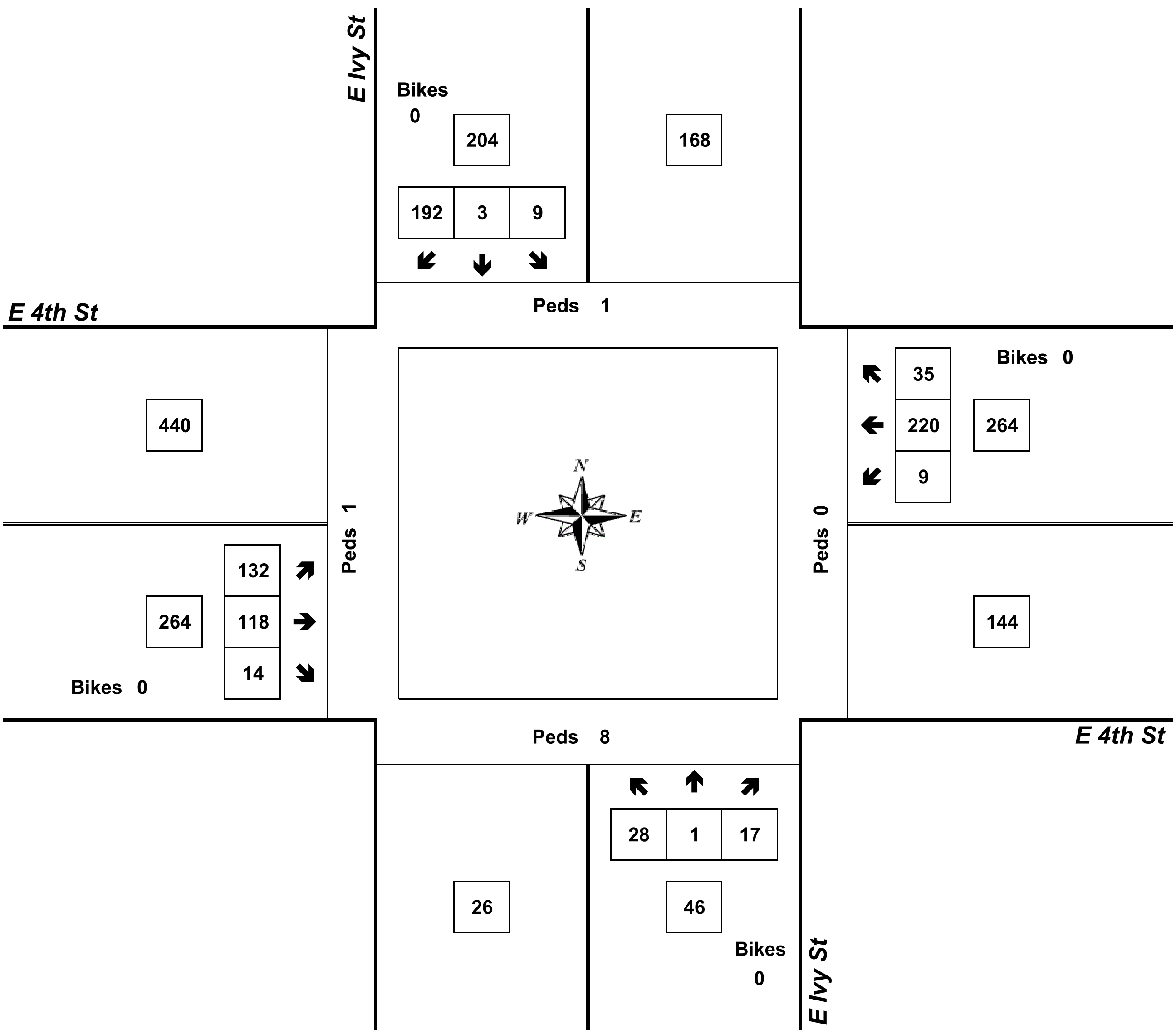
All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

E Ivy St & E 4th St

7:30 AM to 8:30 AM

Thursday, September 13, 2018



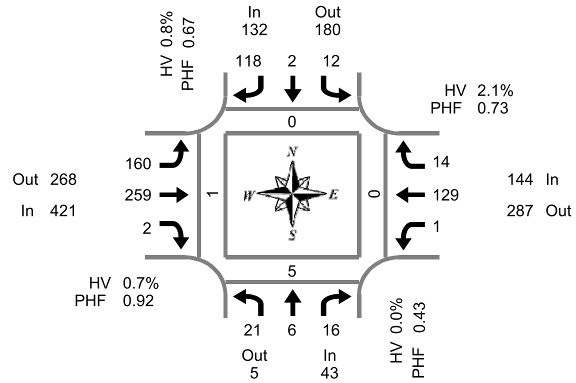
Approach	PHF	HV%	Volume
EB	0.69	6.4%	264
WB	0.89	4.2%	264
NB	0.58	39.1%	46
SB	0.64	8.3%	204
Intersection	0.72	8.1%	778

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

E Ivy St & E 4th St

Thursday, September 13, 2018
4:00 PM to 6:00 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	2	0	1	0	2	0	31	0	24	46	2	0	0	39	1	0	148	0	21	0	0
4:15 PM	5	0	3	0	2	1	20	0	39	64	4	0	0	46	1	0	185	0	20	0	0
4:30 PM	6	1	4	0	0	0	17	0	39	57	1	0	0	44	3	0	172	0	32	0	0
4:45 PM	0	0	0	0	3	1	18	0	49	76	2	0	1	45	5	0	200	0	11	0	0
5:00 PM	1	0	0	0	5	1	22	0	46	59	0	0	0	28	7	0	169	0	1	0	0
5:15 PM	1	1	0	0	1	0	22	0	30	61	0	0	0	46	3	0	165	0	0	0	0
5:30 PM	14	4	7	0	0	0	32	0	45	68	2	0	0	30	3	0	205	0	1	0	0
5:45 PM	5	1	9	0	6	1	42	0	39	71	0	0	1	25	1	0	201	0	3	0	1
Total Survey	34	7	24	0	19	4	204	0	311	502	11	0	2	303	24	0	1,445	0	89	0	1

Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total	Pedestrians Crosswalk			
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes		North	South	East	West
Volume	43	5	48	0	132	180	312	0	421	268	689	0	144	287	431	0	740	0	5	0	1
%HV	0.0%				0.8%				0.7%				2.1%				0.9%				
PHF	0.43				0.67				0.92				0.73				0.90				

By Movement	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	21	6	16	43	12	2	118	132	160	259	2	421	1	129	14	144	740
%HV	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.8%	0.6%	0.8%	0.0%	0.7%	0.0%	2.3%	0.0%	2.1%	0.9%
PHF	0.38	0.38	0.44	0.43	0.50	0.50	0.70	0.67	0.87	0.91	0.25	0.92	0.25	0.70	0.50	0.73	0.90

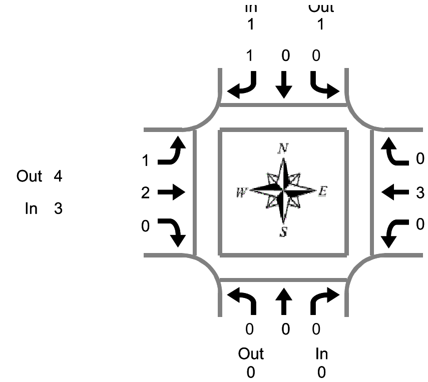
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes	L	T	R	Bikes		North	South	East	West
4:00 PM	13	1	8	0	7	2	86	0	151	243	9	0	1	174	10	0	705	0	84	0	0
4:15 PM	12	1	7	0	10	3	77	0	173	256	7	0	1	163	16	0	726	0	64	0	0
4:30 PM	8	2	4	0	9	2	79	0	164	253	3	0	1	163	18	0	706	0	44	0	0
4:45 PM	16	5	7	0	9	2	94	0	170	264	4	0	1	149	18	0	739	0	13	0	0
5:00 PM	21	6	16	0	12	2	118	0	160	259	2	0	1	129	14	0	740	0	5	0	1

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
5:00 PM to 6:00 PM

E Ivy St & E 4th St

Thursday, September 13, 2018
4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	1	1	0	2	0	2	0	4	0	4	7
4:15 PM	0	0	0	0	0	0	1	1	0	2	0	2	0	2	0	2	5
4:30 PM	0	0	0	0	0	0	1	1	0	1	0	1	0	1	0	1	3
4:45 PM	0	0	0	0	0	0	2	2	0	2	0	2	0	1	0	1	5
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
5:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	2
5:45 PM	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	2
Total Survey	0	0	0	0	0	0	6	6	1	9	0	10	0	11	0	11	27

Heavy Vehicle Peak Hour Summary
5:00 PM to 6:00 PM

By Approach	Northbound E Ivy St			Southbound E Ivy St			Eastbound E 4th St			Westbound E 4th St			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	0	0	0	1	1	2	3	4	7	3	2	5	7
PHF	0.00			0.06			0.15			0.11			0.12

By Movement	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	0	0	1	1	1	2	0	3	0	3	0	3	7
PHF	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.06	0.25	0.10	0.00	0.15	0.00	0.11	0.00	0.11	0.12

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound E Ivy St				Southbound E Ivy St				Eastbound E 4th St				Westbound E 4th St				Interval Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
4:00 PM	0	0	0	0	0	0	5	5	0	7	0	7	0	8	0	8	20
4:15 PM	0	0	0	0	0	0	4	4	0	5	0	5	0	4	0	4	13
4:30 PM	0	0	0	0	0	0	3	3	0	4	0	4	0	4	0	4	11
4:45 PM	0	0	0	0	0	0	2	2	0	4	0	4	0	4	0	4	10
5:00 PM	0	0	0	0	0	0	1	1	1	2	0	3	0	3	0	3	7

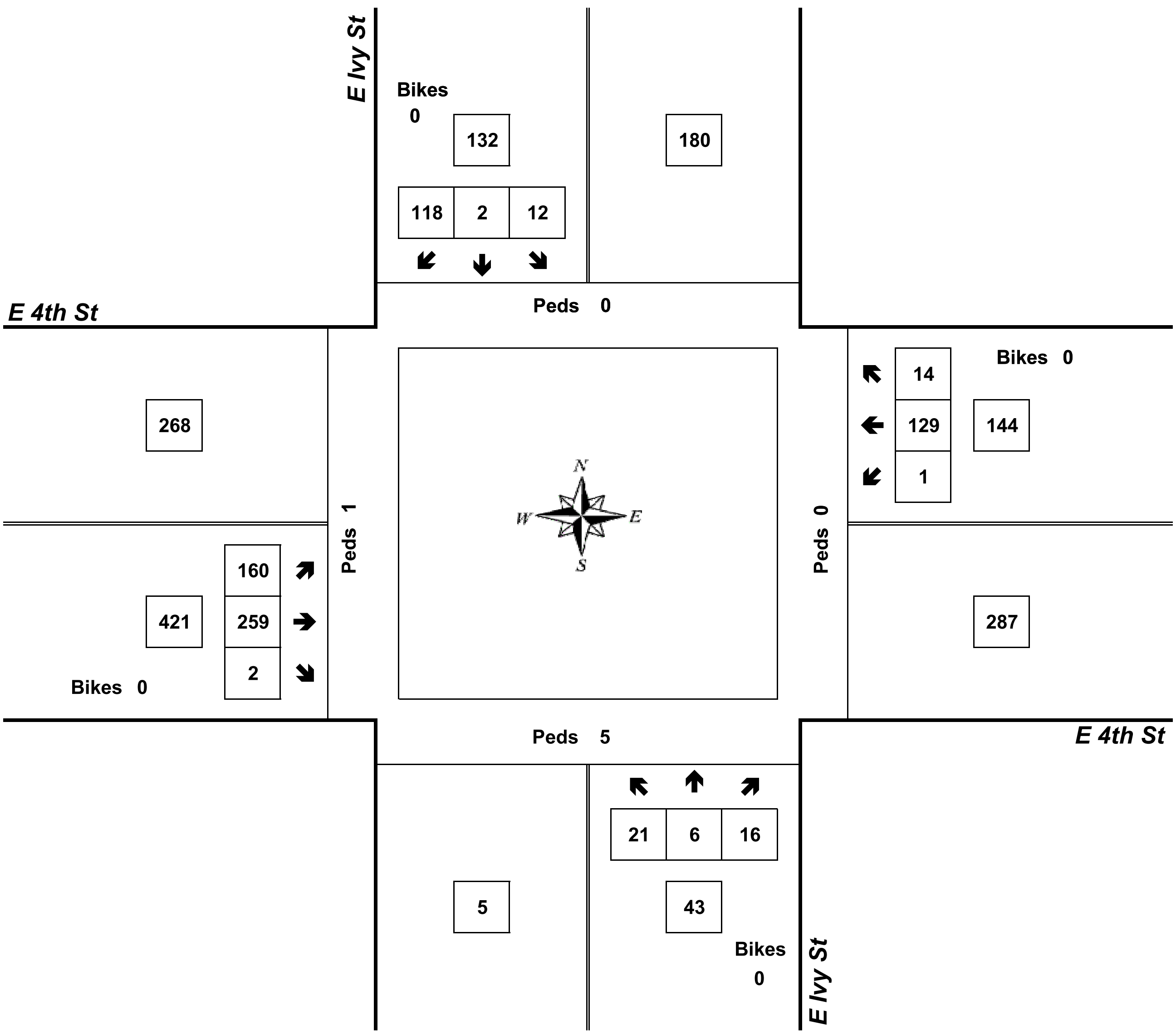
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

E Ivy St & E 4th St

5:00 PM to 6:00 PM
Thursday, September 13, 2018



Approach	PHF	HV%	Volume
EB	0.92	0.7%	421
WB	0.73	2.1%	144
NB	0.43	0.0%	43
SB	0.67	0.8%	132
Intersection	0.90	0.9%	740

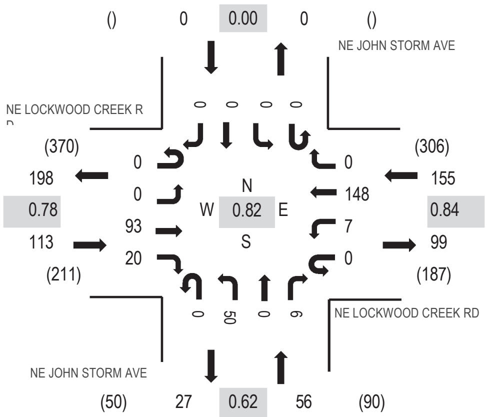
Count Period: 4:00 PM to 6:00 PM

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

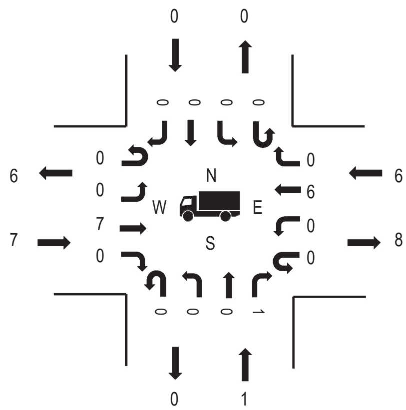
Location: 1 NE JOHN STORM AVE & NE LOCKWOOD CREEK RD AM
Date: Tuesday, July 27, 2021
Peak Hour: 07:10 AM - 08:10 AM
Peak 15-Minutes: 07:25 AM - 07:40 AM

Peak Hour

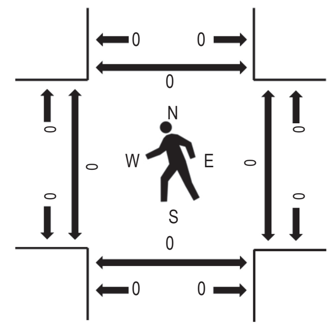
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	6.2%	0.78
WB	3.9%	0.84
NB	1.8%	0.62
SB	0.0%	0.00
All	4.3%	0.82

Traffic Counts - Motorized Vehicles

Interval Start Time	NE LOCKWOOD CREEK RD Eastbound				NE LOCKWOOD CREEK RD Westbound				NE JOHN STORM AVE Northbound				NE JOHN STORM AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	0	12	4	0	0	8	0	0	1	0	1	0	0	0	0	26	319
7:05 AM	0	0	6	0	0	0	8	0	0	2	0	0	0	0	0	0	16	314
7:10 AM	0	0	6	2	0	1	12	0	0	1	0	0	0	0	0	0	22	324
7:15 AM	0	0	8	5	0	0	10	0	0	3	0	0	0	0	0	0	26	324
7:20 AM	0	0	4	0	0	0	21	0	0	3	0	1	0	0	0	0	29	315
7:25 AM	0	0	7	3	0	0	11	0	0	4	0	1	0	0	0	0	26	314
7:30 AM	0	0	8	1	0	1	17	0	0	6	0	0	0	0	0	0	33	319
7:35 AM	0	0	15	4	0	1	13	0	0	7	0	0	0	0	0	0	40	304
7:40 AM	0	0	3	0	0	1	10	0	0	10	0	0	0	0	0	0	24	290
7:45 AM	0	0	10	0	0	1	10	0	0	3	0	2	0	0	0	0	26	290
7:50 AM	0	0	9	1	0	0	10	0	0	2	0	0	0	0	0	0	22	289
7:55 AM	0	0	8	2	0	0	14	0	0	3	0	2	0	0	0	0	29	288
8:00 AM	0	0	7	0	0	2	8	0	0	4	0	0	0	0	0	0	21	288
8:05 AM	0	0	8	2	0	0	12	0	0	4	0	0	0	0	0	0	26	
8:10 AM	0	0	5	2	0	0	13	0	0	2	0	0	0	0	0	0	22	
8:15 AM	0	0	2	0	0	0	12	0	0	3	0	0	0	0	0	0	17	
8:20 AM	0	0	8	1	0	0	17	0	0	1	0	1	0	0	0	0	28	
8:25 AM	0	0	7	1	0	1	18	0	0	4	0	0	0	0	0	0	31	
8:30 AM	0	0	6	2	0	0	8	0	0	2	0	0	0	0	0	0	18	
8:35 AM	0	0	13	0	0	2	10	0	0	0	0	1	0	0	0	0	26	
8:40 AM	0	0	2	0	0	0	14	0	0	5	0	3	0	0	0	0	24	
8:45 AM	0	0	5	2	0	1	15	0	0	2	0	0	0	0	0	0	25	
8:50 AM	0	0	8	2	0	0	10	0	0	0	0	1	0	0	0	0	21	
8:55 AM	0	0	6	4	0	1	13	0	0	4	0	1	0	0	0	0	29	
Count Total	0	0	173	38	0	12	294	0	0	76	0	14	0	0	0	0	607	
Peak Hour	0	0	93	20	0	7	148	0	0	50	0	6	0	0	0	0	324	

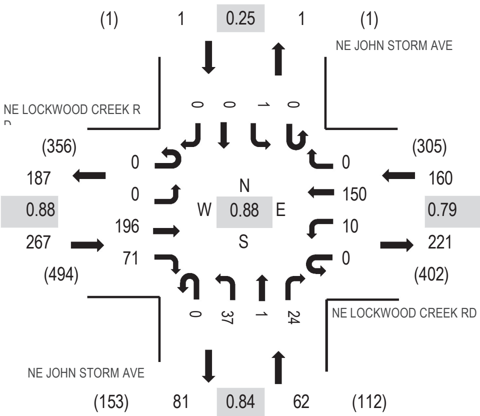
Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

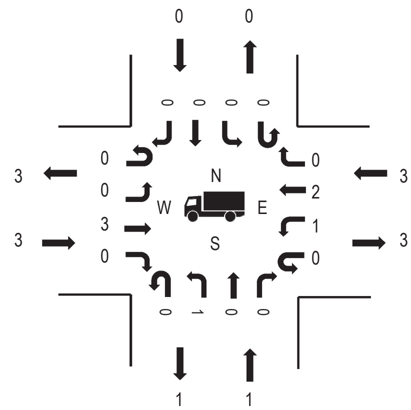
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	1	0	0	0	1	7:00 AM	0	0	0	0	0	7:00 AM	0	1	0	0	1
7:05 AM	1	0	2	0	3	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	1	0	2	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	0	1	0	2	7:30 AM	0	0	0	0	0	7:30 AM	0	1	0	0	1
7:35 AM	2	0	1	0	3	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	1	0	0	1
7:45 AM	0	1	0	0	1	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	2	0	0	0	2	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	0	0	1	0	1	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	0	0
8:00 AM	1	0	1	0	2	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	0	1	0	1	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	1	0	1	0	2	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	1	0	0	0	1	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	0	2	0	2	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	2	1	1	0	4	8:35 AM	1	0	0	0	1	8:35 AM	0	2	0	0	2
8:40 AM	0	0	1	0	1	8:40 AM	0	0	0	0	0	8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	0	0	0	1	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0	8:55 AM	0	1	0	0	1
Count Total	14	2	13	0	29	Count Total	1	0	0	0	1	Count Total	0	6	0	0	6
Peak Hour	7	1	6	0	14	Peak Hour	0	0	0	0	0	Peak Hour	0	2	0	0	2

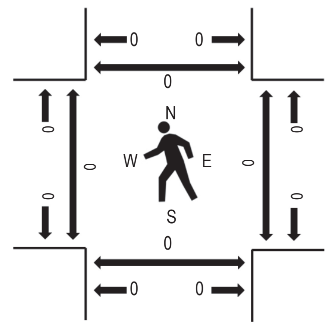
ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 NE JOHN STORM AVE & NE LOCKWOOD CREEK RD PM
Date: Tuesday, July 27, 2021
Peak Hour: 04:25 PM - 05:25 PM
Peak 15-Minutes: 04:25 PM - 04:40 PM

Peak Hour







Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.1%	0.88
WB	1.9%	0.79
NB	1.6%	0.84
SB	0.0%	0.25
All	1.4%	0.88

Traffic Counts - Motorized Vehicles

Interval Start Time	NE LOCKWOOD CREEK RD Eastbound				NE LOCKWOOD CREEK RD Westbound				NE JOHN STORM AVE Northbound				NE JOHN STORM AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	13	5	0	0	9	0	0	5	0	2	0	0	0	0	34	474
4:05 PM	0	0	11	4	0	1	16	0	0	2	0	2	0	0	0	0	36	474
4:10 PM	0	0	14	10	0	2	15	0	0	4	0	1	0	0	0	0	46	477
4:15 PM	0	0	13	5	0	0	7	0	0	4	0	1	0	0	0	0	30	467
4:20 PM	0	0	10	7	0	0	12	0	0	3	0	0	0	0	0	0	32	480
4:25 PM	0	0	12	9	0	1	11	0	0	5	0	4	0	0	0	0	42	490
4:30 PM	0	0	19	5	0	0	16	0	0	4	0	1	0	0	0	0	45	485
4:35 PM	0	0	18	6	0	3	18	0	0	3	0	4	0	0	0	0	52	474
4:40 PM	0	0	13	5	0	1	13	0	0	8	0	2	0	0	0	0	42	458
4:45 PM	0	0	19	5	0	2	13	0	0	1	0	2	0	0	0	0	42	456
4:50 PM	0	0	16	7	0	0	8	0	0	3	0	1	0	0	0	0	35	452
4:55 PM	0	0	12	6	0	0	8	0	0	6	0	6	0	0	0	0	38	448
5:00 PM	0	0	17	5	0	2	10	0	0	0	0	0	0	0	0	0	34	438
5:05 PM	0	0	12	5	0	1	18	0	0	1	0	2	0	0	0	0	39	
5:10 PM	0	0	18	6	0	0	8	0	0	2	1	1	0	0	0	0	36	
5:15 PM	0	0	23	6	0	0	9	0	0	3	0	1	0	1	0	0	43	
5:20 PM	0	0	17	6	0	0	18	0	0	1	0	0	0	0	0	0	42	
5:25 PM	0	0	16	3	0	0	14	0	0	3	0	1	0	0	0	0	37	
5:30 PM	0	0	14	8	0	1	9	0	0	1	0	1	0	0	0	0	34	
5:35 PM	0	0	10	3	0	2	14	0	0	5	0	2	0	0	0	0	36	
5:40 PM	0	0	15	6	0	1	16	0	0	1	0	1	0	0	0	0	40	
5:45 PM	0	0	21	4	0	0	8	0	0	2	0	3	0	0	0	0	38	
5:50 PM	0	0	14	3	0	2	9	0	0	0	0	3	0	0	0	0	31	
5:55 PM	0	0	13	5	0	0	7	0	0	3	0	0	0	0	0	0	28	
Count Total	0	0	360	134	0	19	286	0	0	70	1	41	0	1	0	0	912	
Peak Hour	0	0	196	71	0	10	150	0	0	37	1	24	0	1	0	0	490	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval	Heavy Vehicles					Interval	Bicycles on Roadway					Interval	Pedestrians/Bicycles on Crosswalk				
Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total	Start Time	EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	1	0	0	0	1	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0	4:25 PM	0	1	0	0	1
4:30 PM	0	0	1	0	1	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	1	0	0	0	1	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	0	1	0	1	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	1	0	0	0	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	1	0	0	1	5:05 PM	1	0	0	0	1	5:05 PM	0	0	0	0	0
5:10 PM	1	0	0	0	1	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	1	0	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	1	0	1	5:25 PM	0	0	0	0	0	5:25 PM	0	1	0	0	1
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	4	1	4	0	9	Count Total	1	0	0	0	1	Count Total	0	2	0	0	2
Peak Hour	3	1	3	0	7	Peak Hour	1	0	0	0	1	Peak Hour	0	1	0	0	1

Location: 2 NE SPRUCE AVE & NE LOCKWOOD CREEK RD AM

Date: Tuesday, July 27, 2021

Peak Hour: 07:10 AM - 08:10 AM

Peak 15-Minutes: 07:50 AM - 08:05 AM

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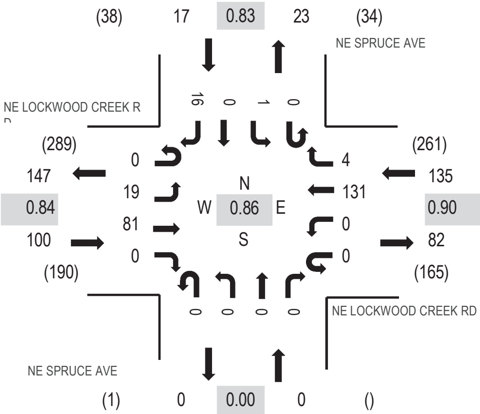
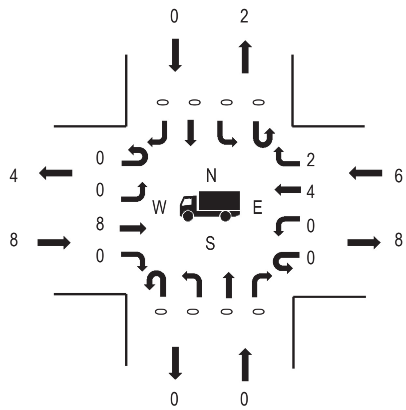
Peak Hour

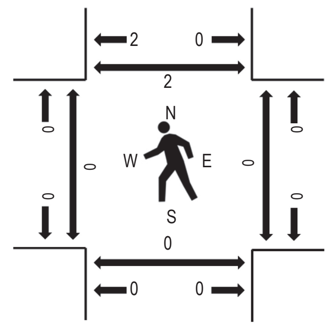
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	8.0%	0.84
WB	4.4%	0.90
NB	0.0%	0.00
SB	0.0%	0.83
All	5.6%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	NE LOCKWOOD CREEK RD Eastbound				NE LOCKWOOD CREEK RD Westbound				NE SPRUCE AVE Northbound				NE SPRUCE AVE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	3	11	0	0	0	7	0	0	0	0	0	0	0	0	3	24	249
7:05 AM	0	1	6	0	0	1	3	0	0	0	0	0	0	0	0	2	13	251
7:10 AM	0	4	4	0	0	0	11	0	0	0	0	0	0	0	0	1	20	252
7:15 AM	0	0	6	0	0	0	10	0	0	0	0	0	0	0	0	2	18	250
7:20 AM	0	2	5	0	0	0	13	0	0	0	0	0	0	0	0	1	21	247
7:25 AM	0	0	4	0	0	0	18	0	0	0	0	0	0	0	0	1	23	244
7:30 AM	0	0	8	0	0	0	7	0	0	0	0	0	0	1	0	2	18	246
7:35 AM	0	2	13	0	0	0	13	0	0	0	0	0	0	0	0	1	29	249
7:40 AM	0	1	6	0	0	0	10	0	0	0	0	0	0	0	0	1	18	238
7:45 AM	0	3	4	0	0	0	9	0	0	0	0	0	0	0	0	2	18	241
7:50 AM	0	2	6	0	0	0	12	2	0	0	0	0	0	0	0	1	23	243
7:55 AM	0	2	11	0	0	0	7	2	0	0	0	0	0	0	0	2	24	241
8:00 AM	0	2	8	0	0	0	15	0	0	0	0	0	0	0	0	1	26	240
8:05 AM	0	1	6	0	0	0	6	0	0	0	0	0	0	0	0	1	14	
8:10 AM	0	2	3	0	0	0	11	0	0	0	0	0	0	0	0	2	18	
8:15 AM	0	1	2	0	0	0	11	1	0	0	0	0	0	0	0	0	15	
8:20 AM	0	0	6	0	0	0	10	0	0	0	0	0	0	0	0	2	18	
8:25 AM	0	0	8	0	0	0	13	0	0	0	0	0	0	1	0	3	25	
8:30 AM	0	0	8	0	0	0	13	0	0	0	0	0	0	0	0	0	21	
8:35 AM	0	1	9	0	0	0	7	0	0	0	0	0	0	0	0	1	18	
8:40 AM	0	0	8	0	0	0	12	0	0	0	0	0	0	0	0	1	21	
8:45 AM	0	0	9	0	0	0	10	0	0	0	0	0	0	0	0	1	20	
8:50 AM	0	0	5	0	0	0	14	0	0	0	0	0	0	0	0	2	21	
8:55 AM	0	0	7	0	0	0	11	2	0	0	0	0	0	0	0	3	23	
Count Total	0	27	163	0	0	1	253	7	0	0	0	0	0	2	0	36	489	
Peak Hour	0	19	81	0	0	0	131	4	0	0	0	0	0	1	0	16	252	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	1	0	0	0	1	7:00 AM	0	0	0	0	0	7:00 AM	0	0	1	0	1
7:05 AM	0	0	1	0	1	7:05 AM	0	0	0	0	0	7:05 AM	0	0	0	0	0
7:10 AM	1	0	1	0	2	7:10 AM	0	0	0	0	0	7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:20 AM	1	0	0	0	1	7:20 AM	0	0	0	0	0	7:20 AM	0	0	0	0	0
7:25 AM	0	0	1	0	1	7:25 AM	0	0	0	0	0	7:25 AM	0	0	0	0	0
7:30 AM	1	0	1	0	2	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:35 AM	2	0	0	0	2	7:35 AM	0	0	0	0	0	7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0	7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
7:50 AM	1	0	1	0	2	7:50 AM	0	0	0	0	0	7:50 AM	0	0	0	0	0
7:55 AM	1	0	1	0	2	7:55 AM	0	0	0	0	0	7:55 AM	0	0	0	2	2
8:00 AM	1	0	1	0	2	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0	8:05 AM	0	0	0	0	0
8:10 AM	0	0	1	0	1	8:10 AM	0	0	0	0	0	8:10 AM	0	0	0	0	0
8:15 AM	0	0	2	0	2	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:20 AM	1	0	0	0	1	8:20 AM	0	0	0	0	0	8:20 AM	0	0	0	0	0
8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0	8:25 AM	0	0	0	0	0
8:30 AM	0	0	1	0	1	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:35 AM	2	0	1	0	3	8:35 AM	0	0	0	0	0	8:35 AM	2	0	0	2	4
8:40 AM	2	0	1	0	3	8:40 AM	1	0	0	0	1	8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
8:50 AM	1	0	0	0	1	8:50 AM	0	0	0	0	0	8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	1	1	8:55 AM	0	0	0	0	0	8:55 AM	0	0	0	0	0
Count Total	15	0	13	1	29	Count Total	1	0	0	0	1	Count Total	2	0	1	4	7
Peak Hour	8	0	6	0	14	Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	2	2

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Location: 2 NE SPRUCE AVE & NE LOCKWOOD CREEK RD PM

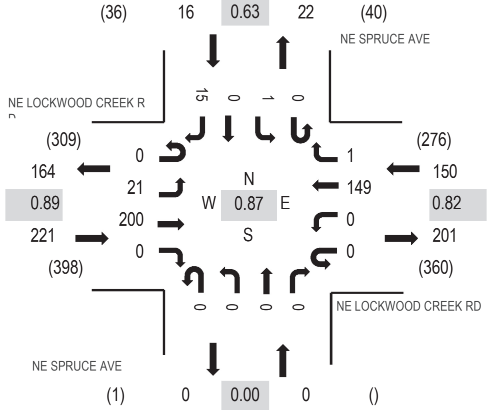
Date: Tuesday, July 27, 2021

Peak Hour: 04:30 PM - 05:30 PM

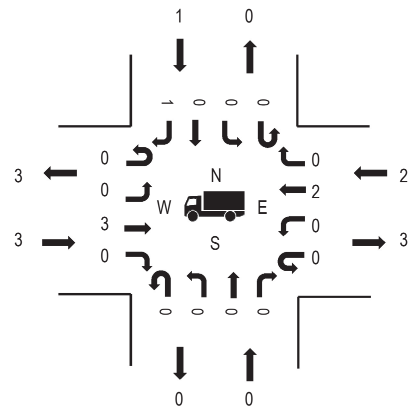
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour

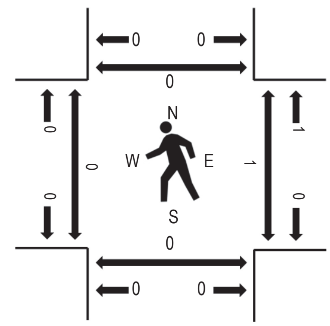
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	1.4%	0.89
WB	1.3%	0.82
NB	0.0%	0.00
SB	6.3%	0.63
All	1.6%	0.87

Traffic Counts - Motorized Vehicles

Interval Start Time	NE LOCKWOOD CREEK RD Eastbound U-Turn	Left	Thru	Right	NE LOCKWOOD CREEK RD Westbound U-Turn	Left	Thru	Right	NE SPRUCE AVE Northbound U-Turn	Left	Thru	Right	NE SPRUCE AVE Southbound U-Turn	Left	Thru	Right	Total	Rolling Hour
4:00 PM	0	3	14	0	0	0	10	0	0	0	0	0	0	0	0	0	27	355
4:05 PM	0	2	10	0	0	0	8	0	0	0	0	0	0	0	0	3	23	361
4:10 PM	0	1	15	0	0	0	18	0	0	0	0	0	0	0	0	0	34	369
4:15 PM	0	0	15	0	0	0	8	0	0	0	0	0	0	0	0	3	26	360
4:20 PM	0	1	13	0	0	0	8	0	0	0	0	0	0	0	0	3	25	367
4:25 PM	0	1	7	0	0	0	11	0	0	0	0	0	0	0	0	4	23	380
4:30 PM	0	2	22	0	0	0	10	0	0	0	0	0	0	0	0	1	35	387
4:35 PM	0	1	18	0	0	0	25	0	0	0	0	0	0	0	0	2	46	380
4:40 PM	0	0	16	0	0	0	10	1	0	0	0	0	0	0	0	3	30	363
4:45 PM	0	3	13	0	0	0	10	0	0	0	0	0	0	0	0	3	29	359
4:50 PM	0	3	21	0	0	0	13	0	0	0	0	0	0	0	0	1	38	360
4:55 PM	0	1	10	0	0	0	8	0	0	0	0	0	0	0	0	0	19	350
5:00 PM	0	3	19	0	0	0	9	0	0	0	0	0	0	0	0	2	33	355
5:05 PM	0	2	11	0	0	0	17	0	0	0	0	0	0	1	0	0	31	
5:10 PM	0	3	11	0	0	0	10	0	0	0	0	0	0	0	0	1	25	
5:15 PM	0	1	21	0	0	0	11	0	0	0	0	0	0	0	0	0	33	
5:20 PM	0	2	24	0	0	0	11	0	0	0	0	0	0	0	0	1	38	
5:25 PM	0	0	14	0	0	0	15	0	0	0	0	0	0	0	0	1	30	
5:30 PM	0	0	18	0	0	0	7	0	0	0	0	0	0	0	0	3	28	
5:35 PM	0	0	16	1	0	0	11	0	0	0	0	0	0	0	0	1	29	
5:40 PM	0	0	10	0	0	0	15	0	0	0	0	0	0	1	0	0	26	
5:45 PM	0	5	11	0	0	0	13	0	0	0	0	0	0	0	0	1	30	
5:50 PM	0	3	15	0	0	0	10	0	0	0	0	0	0	0	0	0	28	
5:55 PM	0	2	14	0	0	0	7	0	0	0	0	0	0	0	0	1	24	
Count Total	0	39	358	1	0	0	275	1	0	0	0	0	0	2	0	34	710	
Peak Hour	0	21	200	0	0	0	149	1	0	0	0	0	0	1	0	15	387	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	1	0	0	0	1	4:10 PM	0	0	0	0	0	4:10 PM	1	0	0	0	1
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	2	2	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0	4:30 PM	0	0	1	0	1
4:35 PM	0	0	1	0	1	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	0	0	0	1	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	1	1	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	1	0	0	0	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0	5:05 PM	0	0	0	0	0
5:10 PM	1	0	0	0	1	5:10 PM	1	0	0	0	1	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	1	0	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	4	0	2	3	9	Count Total	1	0	0	0	1	Count Total	1	0	1	0	2
Peak Hour	3	0	2	1	6	Peak Hour	1	0	0	0	1	Peak Hour	0	0	1	0	1

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Location: 3 NE 24TH AVE & NE LOCKWOOD CREEK RD AM

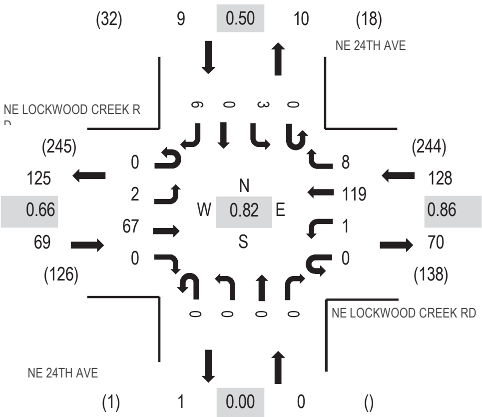
Date: Tuesday, July 27, 2021

Peak Hour: 08:00 AM - 09:00 AM

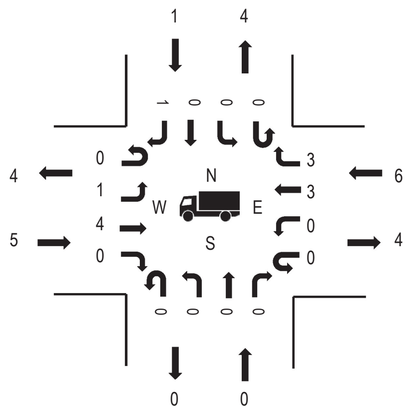
Peak 15-Minutes: 08:35 AM - 08:50 AM

Peak Hour

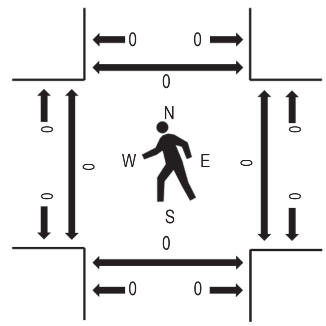
Motorized Vehicles



Heavy Vehicles



Pedestrians



Note: Total study counts contained in parentheses.

	HV%	PHF
EB	7.2%	0.66
WB	4.7%	0.86
NB	0.0%	0.00
SB	11.1%	0.50
All	5.8%	0.82

Traffic Counts - Motorized Vehicles

Interval	NE LOCKWOOD CREEK RD Eastbound				NE LOCKWOOD CREEK RD Westbound				NE 24TH AVE Northbound				NE 24TH AVE Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
7:00 AM	0	0	4	0	0	0	6	0	0	0	0	0	0	1	0	0	11	196
7:05 AM	0	0	3	0	0	0	6	0	0	0	0	0	0	0	0	0	9	200
7:10 AM	0	0	1	0	0	0	13	0	0	0	0	0	0	0	0	0	14	202
7:15 AM	0	1	6	0	0	0	6	0	0	0	0	0	0	0	0	1	14	202
7:20 AM	0	1	4	0	0	0	20	0	0	0	0	0	0	1	0	0	26	199
7:25 AM	0	1	6	0	0	0	7	0	0	0	0	0	0	1	0	1	16	197
7:30 AM	0	0	2	0	0	0	9	1	0	0	0	0	0	3	0	2	17	203
7:35 AM	0	0	12	0	0	0	11	0	0	0	0	0	0	3	0	1	27	197
7:40 AM	0	0	2	0	0	0	8	0	0	0	0	0	0	2	0	1	13	190
7:45 AM	0	1	4	0	0	0	10	1	0	0	0	0	0	3	0	0	19	195
7:50 AM	0	0	3	0	0	0	10	0	0	0	0	0	0	0	0	1	14	201
7:55 AM	0	1	5	0	0	0	7	1	0	0	0	0	0	2	0	0	16	202
8:00 AM	0	0	5	0	0	0	9	0	0	0	0	0	0	0	0	1	15	206
8:05 AM	0	0	3	0	0	0	7	1	0	0	0	0	0	0	0	0	11	
8:10 AM	0	0	3	0	0	0	10	1	0	0	0	0	0	0	0	0	14	
8:15 AM	0	0	2	0	0	1	6	0	0	0	0	0	0	0	0	2	11	
8:20 AM	0	1	6	0	0	0	16	1	0	0	0	0	0	0	0	0	24	
8:25 AM	0	0	7	0	0	0	12	1	0	0	0	0	0	0	0	2	22	
8:30 AM	0	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	11	
8:35 AM	0	0	10	0	0	0	9	1	0	0	0	0	0	0	0	0	20	
8:40 AM	0	1	6	0	0	0	11	0	0	0	0	0	0	0	0	0	18	
8:45 AM	0	0	9	0	0	0	13	1	0	0	0	0	0	2	0	0	25	
8:50 AM	0	0	4	0	0	0	9	1	0	0	0	0	0	1	0	0	15	
8:55 AM	0	0	7	0	0	0	11	1	0	0	0	0	0	0	0	1	20	
Count Total	0	7	119	0	0	1	232	11	0	0	0	0	0	19	0	13	402	
Peak Hour	0	2	67	0	0	1	119	8	0	0	0	0	0	3	0	6	206	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0
7:05 AM	0	0	2	0	2
7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:20 AM	1	0	1	0	2
7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:35 AM	1	0	0	0	1
7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0
8:00 AM	1	0	0	0	1
8:05 AM	0	0	1	0	1
8:10 AM	0	0	1	0	1
8:15 AM	0	0	0	1	1
8:20 AM	1	0	0	0	1
8:25 AM	0	0	2	0	2
8:30 AM	0	0	0	0	0
8:35 AM	1	0	1	0	2
8:40 AM	1	0	0	0	1
8:45 AM	0	0	0	0	0
8:50 AM	1	0	1	0	2
8:55 AM	0	0	0	0	0
Count Total	7	0	9	1	17
Peak Hour	5	0	6	1	12

Interval Start Time	Bicycles on Roadway EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0
7:05 AM	0	0	0	0	0
7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:20 AM	0	0	0	0	0
7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:05 AM	0	0	0	0	0
8:10 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:20 AM	0	0	0	0	0
8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:35 AM	0	0	0	0	0
8:40 AM	1	0	0	0	1
8:45 AM	0	0	0	0	0
8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	0	0
Count Total	1	0	0	0	1
Peak Hour	1	0	0	0	1

Interval Start Time	Pedestrians/Bicycles on Crosswalk EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0
7:05 AM	0	0	0	0	0
7:10 AM	0	0	0	0	0
7:15 AM	0	0	0	0	0
7:20 AM	0	0	0	0	0
7:25 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0
7:35 AM	0	0	0	0	0
7:40 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0
7:50 AM	0	0	0	0	0
7:55 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0
8:05 AM	0	0	0	0	0
8:10 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0
8:20 AM	0	0	0	0	0
8:25 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0
8:35 AM	0	0	0	0	0
8:40 AM	0	0	0	0	0
8:45 AM	0	0	0	0	0
8:50 AM	0	0	0	0	0
8:55 AM	0	0	0	0	0
Count Total	0	0	0	0	0
Peak Hour	0	0	0	0	0

ALL TRAFFIC DATA SERVICES
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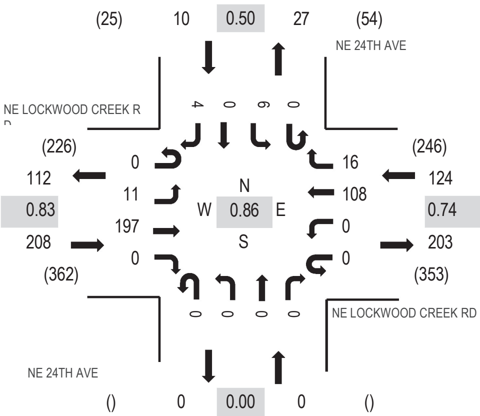
www.alltrafficdata.net

Location: 3 NE 24TH AVE & NE LOCKWOOD CREEK RD PM
Date: Tuesday, July 27, 2021
Peak Hour: 04:30 PM - 05:30 PM
Peak 15-Minutes: 04:35 PM - 04:50 PM

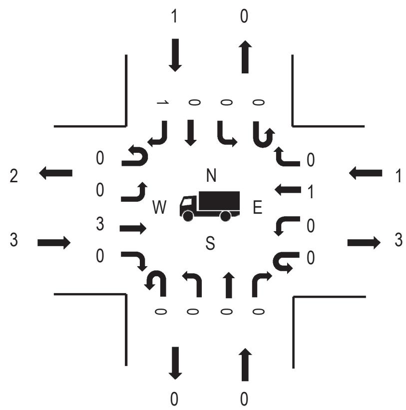
Peak Hour

Motorized Vehicles

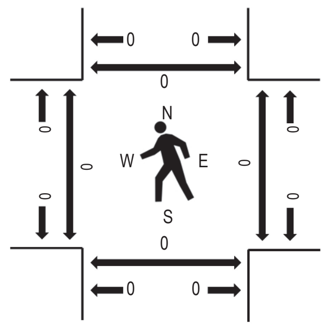


Note: Total study counts contained in parentheses.

Heavy Vehicles



Pedestrians



	HV%	PHF
EB	1.4%	0.83
WB	0.8%	0.74
NB	0.0%	0.00
SB	10.0%	0.50
All	1.5%	0.86

Traffic Counts - Motorized Vehicles

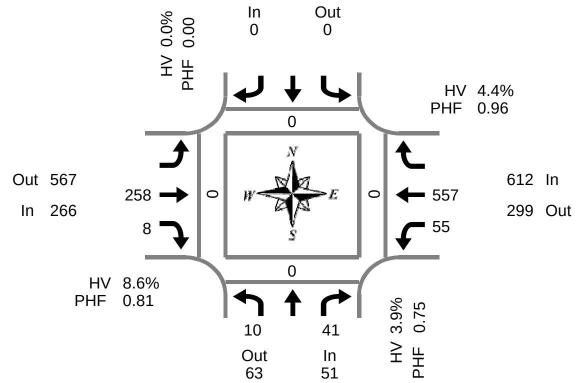
Interval	NE LOCKWOOD CREEK RD Eastbound				NE LOCKWOOD CREEK RD Westbound				NE 24TH AVE Northbound				NE 24TH AVE Southbound					Rolling
Start Time	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	Hour
4:00 PM	0	2	14	0	0	0	11	1	0	0	0	0	0	0	0	0	28	313
4:05 PM	0	2	10	0	0	0	10	1	0	0	0	0	0	1	0	0	24	316
4:10 PM	0	0	11	0	0	0	15	1	0	0	0	0	0	0	0	0	27	316
4:15 PM	0	0	12	0	0	0	4	0	0	0	0	0	0	1	0	0	17	308
4:20 PM	0	1	11	0	0	0	9	1	0	0	0	0	0	0	0	0	22	322
4:25 PM	0	0	12	0	0	0	6	2	0	0	0	0	0	0	0	0	20	334
4:30 PM	0	0	22	0	0	0	5	1	0	0	0	0	0	0	0	1	29	342
4:35 PM	0	0	19	0	0	0	15	2	0	0	0	0	0	1	0	0	37	335
4:40 PM	0	0	15	0	0	0	12	3	0	0	0	0	0	0	0	1	31	329
4:45 PM	0	0	19	0	0	0	9	2	0	0	0	0	0	0	0	1	31	328
4:50 PM	0	1	17	0	0	0	8	2	0	0	0	0	0	1	0	0	29	319
4:55 PM	0	3	6	0	0	0	6	1	0	0	0	0	0	1	0	1	18	317
5:00 PM	0	0	19	0	0	0	9	2	0	0	0	0	0	1	0	0	31	320
5:05 PM	0	0	12	0	0	0	11	0	0	0	0	0	0	1	0	0	24	
5:10 PM	0	1	11	0	0	0	6	0	0	0	0	0	0	1	0	0	19	
5:15 PM	0	3	20	0	0	0	8	0	0	0	0	0	0	0	0	0	31	
5:20 PM	0	1	20	0	0	0	10	3	0	0	0	0	0	0	0	0	34	
5:25 PM	0	2	17	0	0	0	9	0	0	0	0	0	0	0	0	0	28	
5:30 PM	0	1	11	0	0	0	6	1	0	0	0	0	0	2	0	1	22	
5:35 PM	0	2	15	0	0	0	14	0	0	0	0	0	0	0	0	0	31	
5:40 PM	0	1	12	0	0	0	10	2	0	0	0	0	0	1	0	4	30	
5:45 PM	0	3	9	0	0	0	5	1	0	0	0	0	0	4	0	0	22	
5:50 PM	0	1	13	0	0	0	11	2	0	0	0	0	0	0	0	0	27	
5:55 PM	0	0	11	0	0	0	7	2	0	0	0	0	0	0	0	1	21	
Count Total	0	24	338	0	0	0	216	30	0	0	0	0	0	15	0	10	633	
Peak Hour	0	11	197	0	0	0	108	16	0	0	0	0	0	6	0	4	342	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles on Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0
4:05 PM	1	0	0	0	1	4:05 PM	0	0	0	0	0	4:05 PM	0	0	0	0	0
4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0	4:10 PM	0	0	0	0	0
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0	4:20 PM	0	0	0	0	0
4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0	4:25 PM	0	0	0	0	0
4:30 PM	0	0	0	1	1	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0	4:35 PM	0	0	0	0	0
4:40 PM	1	0	0	0	1	4:40 PM	0	0	0	0	0	4:40 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
4:50 PM	1	0	0	0	1	4:50 PM	0	0	0	0	0	4:50 PM	0	0	0	0	0
4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0	4:55 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:05 PM	0	0	0	0	0	5:05 PM	1	0	0	0	1	5:05 PM	0	0	0	0	0
5:10 PM	1	0	0	0	1	5:10 PM	0	0	0	0	0	5:10 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:20 PM	0	0	1	0	1	5:20 PM	0	0	0	0	0	5:20 PM	0	0	0	0	0
5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0	5:25 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0	5:35 PM	0	0	0	0	0
5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0	5:40 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0	5:50 PM	0	0	0	0	0
5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0	5:55 PM	0	0	0	0	0
Count Total	4	0	1	1	6	Count Total	1	0	0	0	1	Count Total	0	0	0	0	0
Peak Hour	3	0	1	1	5	Peak Hour	1	0	0	0	1	Peak Hour	0	0	0	0	0

Total Vehicle Summary

Clay Carney
(503) 833-2740



Peak Hour Summary
_7:15 AM to 8:15 AM_

NW Timmen Rd & NW La Center Rd

Thursday, May 09, 2019
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound NW Timmen Rd L		R	Bikes	Southbound NW Timmen Rd			Bikes	Eastbound NW La Center Rd	T	R	Bikes	Westbound NW La Center Rd L	T		Bikes	Interval Total	Pedestrians Crosswalk North	South	East	West
7:00 AM	3		7	0				0		44	2	0	13	135		0	204	0	0	1	0
7:15 AM	3		10	0				0		53	2	0	11	148		0	227	0	0	0	0
7:30 AM	3		8	0				0		67	1	0	22	130		0	231	0	0	0	0
7:45 AM	2		15	0				0		79	3	0	13	129		0	241	0	0	0	0
8:00 AM	2		8	0				0		59	2	0	9	150		0	230	0	0	0	0
8:15 AM	2		5	0				0		46	4	0	14	134		0	205	0	0	0	0
8:30 AM	5		9	0				0		59	2	0	17	111		0	203	0	0	0	0
8:45 AM	3		7	0				0		45	3	0	13	100		0	171	0	0	0	0
Total Survey	23		69	0				0		452	19	0	112	1,037		0	1,712	0	0	1	0

Peak Hour Summary
7:15 AM to 8:15 AM

By Approach	Northbound NW Timmen Rd In	Out	Total	Bikes	Southbound NW Timmen Rd In	Out	Total	Bikes	Eastbound NW La Center Rd In	Out	Total	Bikes	Westbound NW La Center Rd In	Out	Total	Bikes	Total	Pedestrians Crosswalk North	South	East	West
Volume	51	63	114	0	0	0	0	0	266	567	833	0	612	299	911	0	929	0	0	0	0
%HV	3.9%				0.0%				8.6%				4.4%				5.6%				
PHF	0.75				0.00				0.81				0.96				0.96				

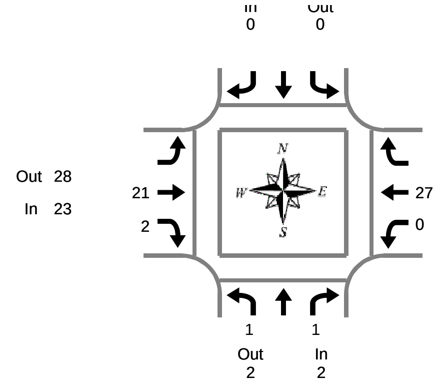
By Movement	Northbound NW Timmen Rd L		R	Total	Southbound NW Timmen Rd			Total	Eastbound NW La Center Rd	T	R	Total	Westbound NW La Center Rd L	T		Total	Total
Volume	10		41	51				0		258	8	266	55	557		612	929
%HV	10.0%	NA	2.4%	3.9%	NA	NA	NA	0.0%	NA	8.1%	25.0%	8.6%	0.0%	4.8%	NA	4.4%	5.6%
PHF	0.83		0.68	0.75				0.00		0.82	0.67	0.81	0.63	0.93		0.96	0.96

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound NW Timmen Rd L		R	Bikes	Southbound NW Timmen Rd			Bikes	Eastbound NW La Center Rd	T	R	Bikes	Westbound NW La Center Rd L	T		Bikes	Interval Total	Pedestrians Crosswalk North	South	East	West
7:00 AM	11		40	0				0		243	8	0	59	542		0	903	0	0	1	0
7:15 AM	10		41	0				0		258	8	0	55	557		0	929	0	0	0	0
7:30 AM	9		36	0				0		251	10	0	58	543		0	907	0	0	0	0
7:45 AM	11		37	0				0		243	11	0	53	524		0	879	0	0	0	0
8:00 AM	12		29	0				0		209	11	0	53	495		0	809	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



NW Timmen Rd & NW La Center Rd

Thursday, May 09, 2019
7:00 AM to 9:00 AM

Peak Hour Summary
7:15 AM to 8:15 AM

Heavy Vehicle 15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
7:00 AM	0		0	0				0		11	2	13	1	6		7	20
7:15 AM	0		0	0				0		7	0	7	0	2		2	9
7:30 AM	0		1	1				0		4	0	4	0	3		3	8
7:45 AM	0		0	0				0		4	1	5	0	1		1	6
8:00 AM	1		0	1				0		6	1	7	0	21		21	29
8:15 AM	1		0	1				0		5	0	5	1	7		8	14
8:30 AM	4		1	5				0		5	0	5	0	3		3	13
8:45 AM	0		0	0				0		2	0	2	1	4		5	7
Total Survey	6		2	8				0		44	4	48	3	47		50	106

Heavy Vehicle Peak Hour Summary
7:15 AM to 8:15 AM

By Approach	Northbound NW Timmen Rd			Southbound NW Timmen Rd			Eastbound NW La Center Rd			Westbound NW La Center Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	2	2	4	0	0	0	23	28	51	27	22	49	52
PHF	0.07			0.00			0.24			0.21			0.23

By Movement	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	1		1	2				0		21	2	23	0	27		27	52
PHF	0.04		0.25	0.07				0.00		0.24	0.25	0.24	0.00	0.22		0.21	0.23

Heavy Vehicle Rolling Hour Summary
7:00 AM to 9:00 AM

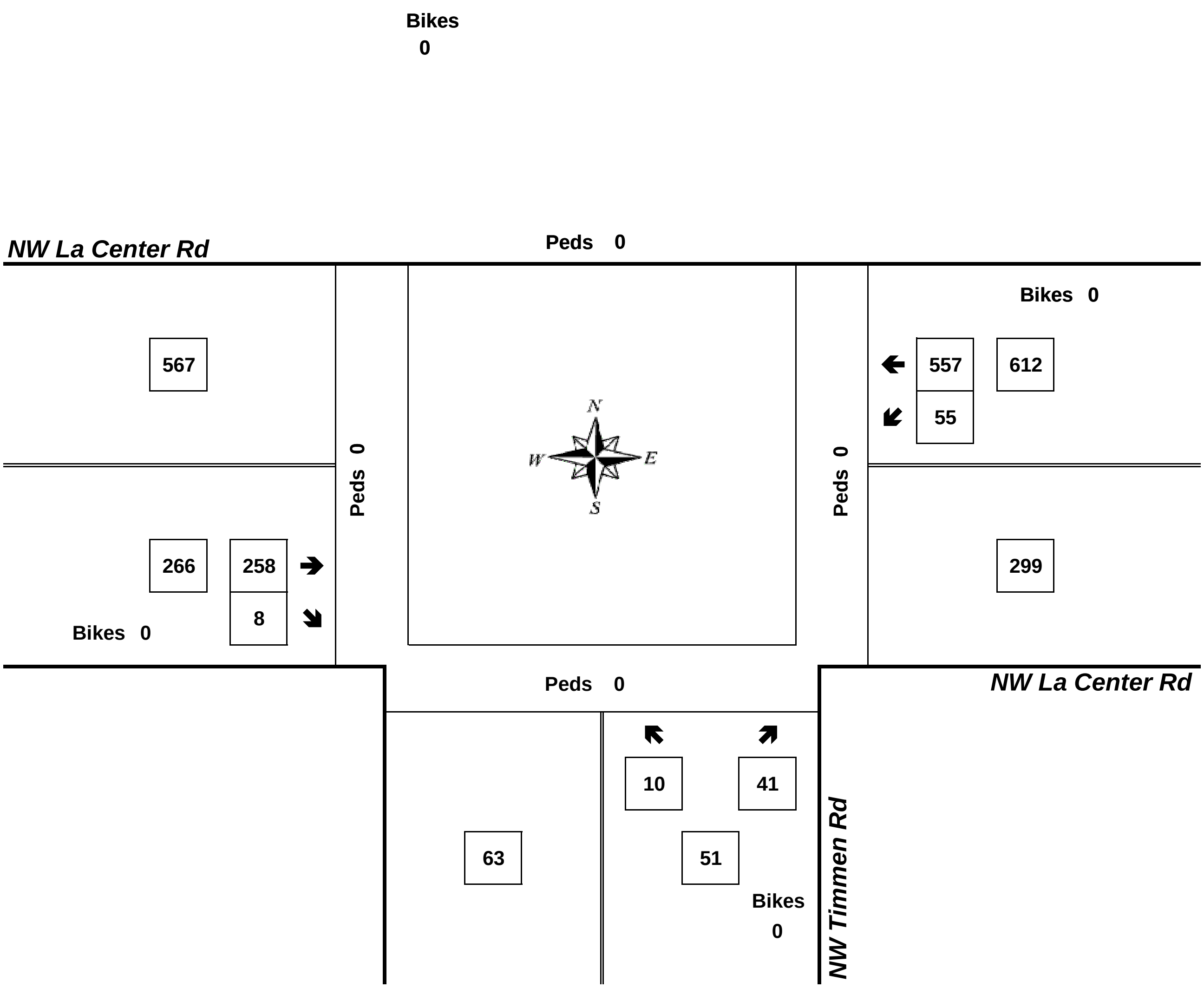
Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
7:00 AM	0		1	1				0		26	3	29	1	12		13	43
7:15 AM	1		1	2				0		21	2	23	0	27		27	52
7:30 AM	2		1	3				0		19	2	21	1	32		33	57
7:45 AM	6		1	7				0		20	2	22	1	32		33	62
8:00 AM	6		1	7				0		18	1	19	2	35		37	63

Peak Hour Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740

NW Timmen Rd & NW La Center Rd

7:15 AM to 8:15 AM
Thursday, May 09, 2019

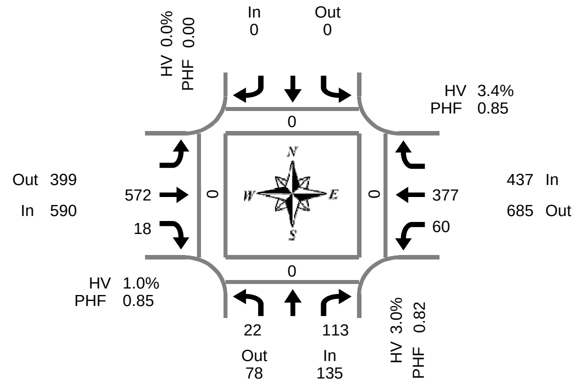


Approach	PHF	HV%	Volume
EB	0.81	8.6%	266
WB	0.96	4.4%	612
NB	0.75	3.9%	51
SB	0.00	0.0%	0
Intersection	0.96	5.6%	929

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

All Traffic Data Services Inc.
Clay Carney
(503) 833-2740



NW Timmen Rd & NW La Center Rd

Wednesday, May 08, 2019
4:00 PM to 6:00 PM

Peak Hour Summary
4:30 PM to 5:30 PM

15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total	Pedestrians Crosswalk			
	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes		North	South	East	West
4:00 PM	4		21	0				0		133	6	0	11	102		0	277	0	0	0	0
4:15 PM	2		36	0				0		138	8	0	9	97		0	290	0	0	0	0
4:30 PM	8		33	0				0		139	5	0	11	84		0	280	0	0	0	0
4:45 PM	4		27	0				0		125	7	0	11	98		0	272	0	0	0	0
5:00 PM	3		23	0				0		138	3	0	18	111		0	296	0	0	0	0
5:15 PM	7		30	0				0		170	3	0	20	84		0	314	0	0	0	0
5:30 PM	5		15	0				0		167	3	0	4	78		0	272	0	0	0	0
5:45 PM	2		25	1				0		126	2	0	11	58		0	224	0	0	0	0
Total Survey	35		210	1				0		1,136	37	0	95	712		0	2,225	0	0	0	0

Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Total
	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	In	Out	Total	Bikes	
Volume	135	78	213	0	0	0	0	0	590	399	989	0	437	685	1,122	0	1,162
%HV	3.0%				0.0%				1.0%				3.4%				2.2%
PHF	0.82				0.00				0.85				0.85				0.93

Pedestrians Crosswalk			
North	South	East	West
0	0	0	0

By Movement	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	22		113	135				0		572	18	590	60	377		437	1,162
%HV	9.1%	NA	1.8%	3.0%	NA	NA	NA	0.0%	NA	1.0%	0.0%	1.0%	0.0%	4.0%	NA	3.4%	2.2%
PHF	0.69		0.86	0.82				0.00		0.84	0.64	0.85	0.75	0.85		0.85	0.93

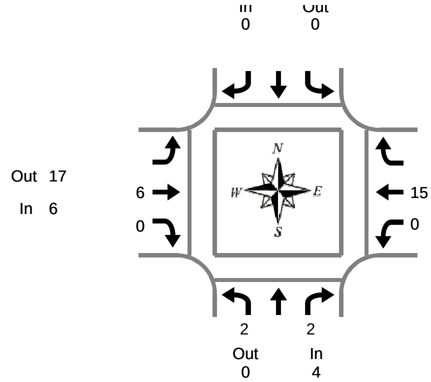
Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total	Pedestrians Crosswalk			
	L		R	Bikes				Bikes		T	R	Bikes	L	T		Bikes		North	South	East	West
4:00 PM	18		117	0				0		535	26	0	42	381		0	1,119	0	0	0	0
4:15 PM	17		119	0				0		540	23	0	49	390		0	1,138	0	0	0	0
4:30 PM	22		113	0				0		572	18	0	60	377		0	1,162	0	0	0	0
4:45 PM	19		95	0				0		600	16	0	53	371		0	1,154	0	0	0	0
5:00 PM	17		93	1				0		601	11	0	53	331		0	1,106	0	0	0	0

Heavy Vehicle Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740



Peak Hour Summary
4:30 PM to 5:30 PM

NW Timmen Rd & NW La Center Rd

Wednesday, May 08, 2019
4:00 PM to 6:00 PM

Heavy Vehicle 15-Minute Interval Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
4:00 PM	1		0	1				0		4	1	5	0	4		4	10
4:15 PM	0		0	0				0		4	0	4	0	6		6	10
4:30 PM	1		1	2				0		4	0	4	0	4		4	10
4:45 PM	0		0	0				0		2	0	2	0	3		3	5
5:00 PM	0		1	1				0		0	0	0	0	6		6	7
5:15 PM	1		0	1				0		0	0	0	0	2		2	3
5:30 PM	1		0	1				0		1	0	1	0	2		2	4
5:45 PM	0		0	0				0		1	1	2	0	1		1	3
Total Survey	4		2	6				0		16	2	18	0	28		28	52

Heavy Vehicle Peak Hour Summary
4:30 PM to 5:30 PM

By Approach	Northbound NW Timmen Rd			Southbound NW Timmen Rd			Eastbound NW La Center Rd			Westbound NW La Center Rd			Total
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Volume	4	0	4	0	0	0	6	17	23	15	8	23	25
PHF	0.33			0.00			0.12			0.27			0.21

By Movement	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	2		2	4				0		6	0	6	0	15		15	25
PHF	0.25		0.25	0.33				0.00		0.13	0.00	0.12	0.00	0.27		0.27	0.21

Heavy Vehicle Rolling Hour Summary
4:00 PM to 6:00 PM

Interval Start Time	Northbound NW Timmen Rd				Southbound NW Timmen Rd				Eastbound NW La Center Rd				Westbound NW La Center Rd				Interval Total
	L		R	Total				Total		T	R	Total	L	T		Total	
4:00 PM	2		1	3				0		14	1	15	0	17		17	35
4:15 PM	1		2	3				0		10	0	10	0	19		19	32
4:30 PM	2		2	4				0		6	0	6	0	15		15	25
4:45 PM	2		1	3				0		3	0	3	0	13		13	19
5:00 PM	2		1	3				0		2	1	3	0	11		11	17

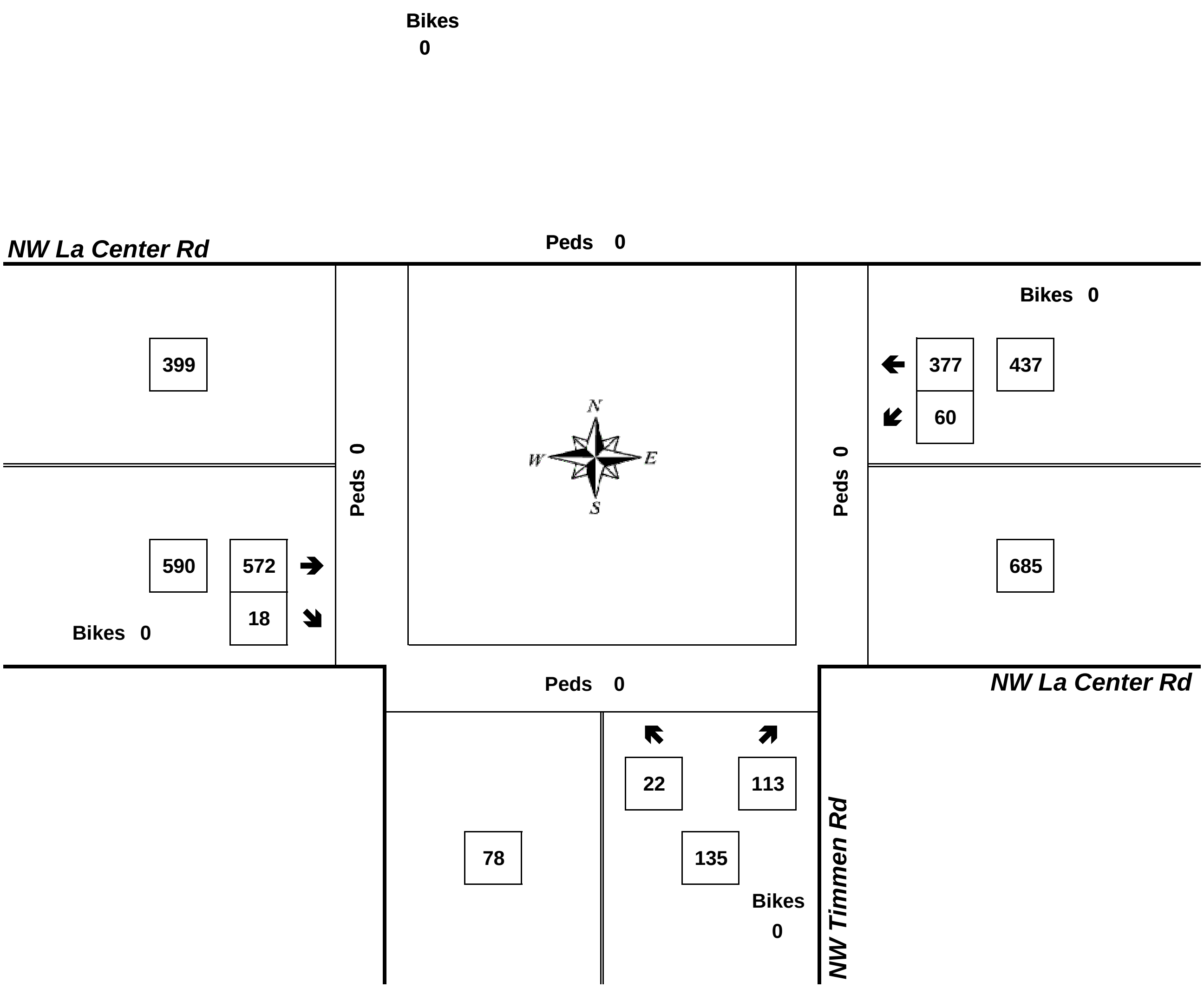
Peak Hour Summary

All Traffic Data Services Inc.

Clay Carney
(503) 833-2740

NW Timmen Rd & NW La Center Rd

4:30 PM to 5:30 PM
Wednesday, May 08, 2019



Approach	PHF	HV%	Volume
EB	0.85	1.0%	590
WB	0.85	3.4%	437
NB	0.82	3.0%	135
SB	0.00	0.0%	0
Intersection	0.93	2.2%	1,162

Count Period: 4:00 PM to 6:00 PM

KELLY ENGINEERING
1805 NE 94th Street No. 19
Vancouver, WA 98665

Phone: 360-433-7530
e-mail: Kellyengineer@comcast.net

February 9, 2021

Roy Heikkala
PO Box 211
Vancouver, WA 98666

Subject: Site Traffic Generation, Teresa's Little School
La Center, Washington

Roy:

This is a site traffic generation estimate for the amount of traffic that could come from the 6,620 sq. ft. GFA private school for tutoring to be known as Teresa's Little School. The site is located in the Heritage Center at 419 Cedar Ave. in La Center. A private school for tutoring would be a conditional use under Chapter 18.150 (14, Services - Educational, h., Public/private educational institutions) of the La Center Municipal Code. The site is in the Downtown Commercial (C-1) District.

I based my calculations on 24 students that would attend the school during the peak hour of school activities. This would be the peak hour of the generator, i.e. the school. I also used a land use of Private School (K-12) and an independent variable of students. Private School (K-12) is land use code 536 in the ITE Trip Generation Manual, 10th edition. Based on my calculations the site could generate 14 trips during the PM peak hour of activities at the school. A trip is a one directional vehicle movement.

In comparison to other permitted land uses for an assumed 6,620 sq. ft. GFA building under the C-1 zoning 14 trips is a minimal impact in regards to traffic. Other permitted land uses under the C-1 zoning for a building of comparable size would be a Quality Restaurant (ITE code 931, *31 PM trips*), Small Office Building (ITE code 712, *25 PM trips*), Athletic Club (ITE code 493, *42 PM trips*) and a Copy, Print and Express Ship Store (ITE code 920, *81 PM trips*).

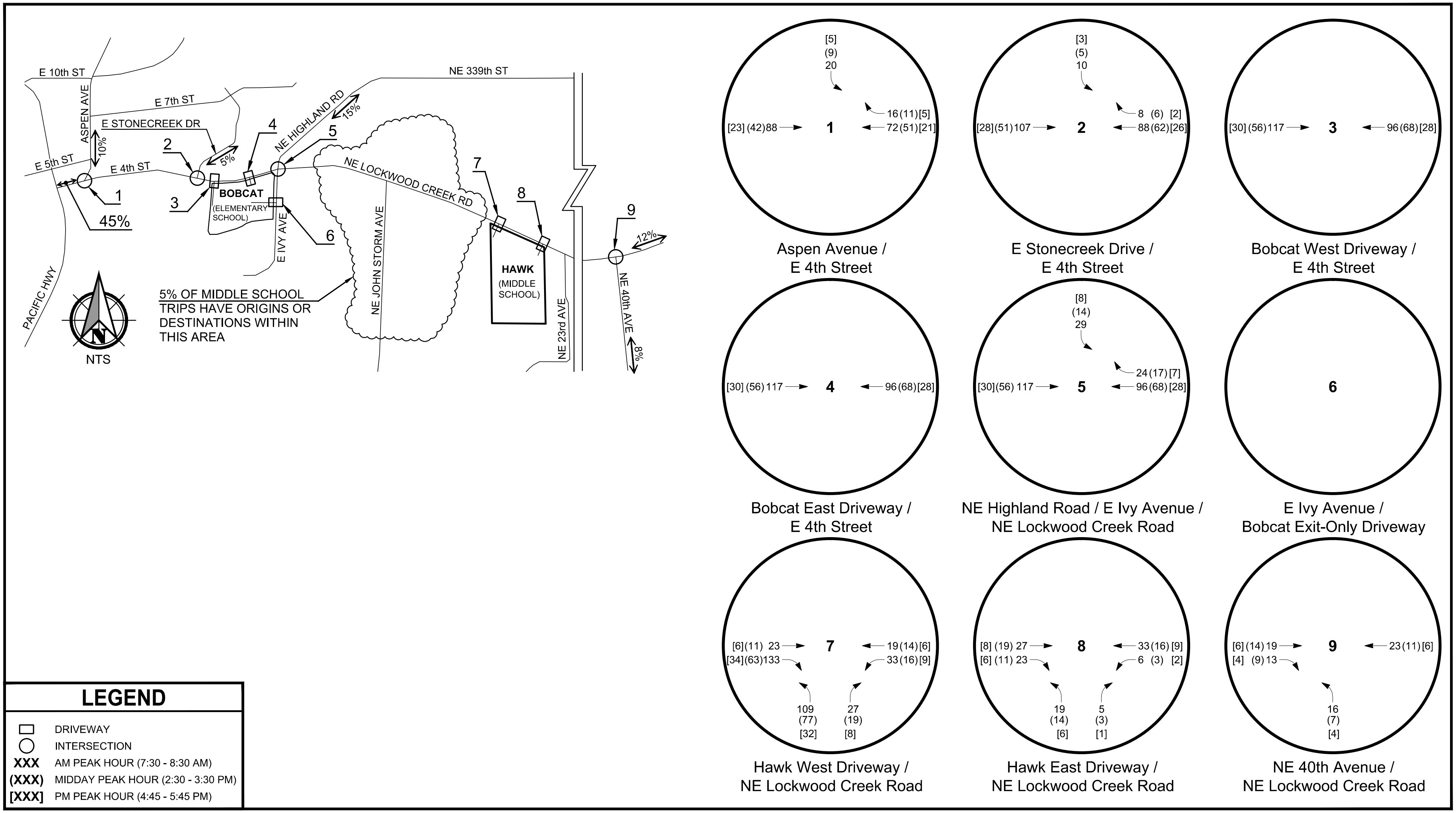
Please contact me if you have any questions regarding the above. I can be reached at 360-433-7530 or e-mail to Kellyengineer@comcast.net.

Sincerely,

David Kelly

David Kelly, P.E.
Transportation Engineer

DAVID S KELLY
STATE OF WASHINGTON
39696
REGISTERED
PROFESSIONAL ENGINEER
David Kelly
2/9/2021



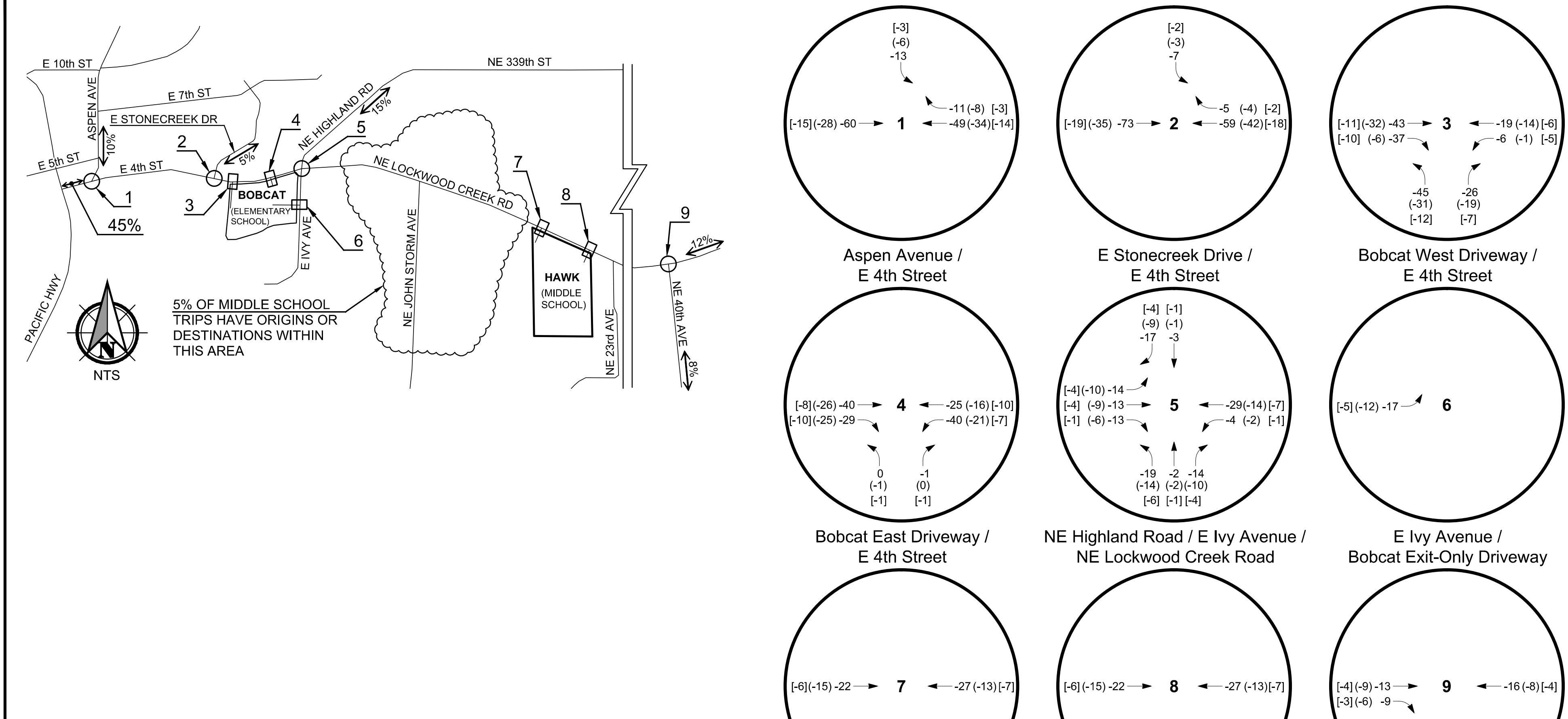
PBS

New Middle School Trip Distribution and Trip Assignments

La Center Middle School

NOV 2018

FIGURE **8**



LEGEND

☐	DRIVEWAY
○	INTERSECTION
XXX	AM PEAK HOUR (7:30 - 8:30 AM)
(XXX)	MIDDAY PEAK HOUR (2:30 - 3:30 PM)
[XXX]	PM PEAK HOUR (4:45 - 5:45 PM)

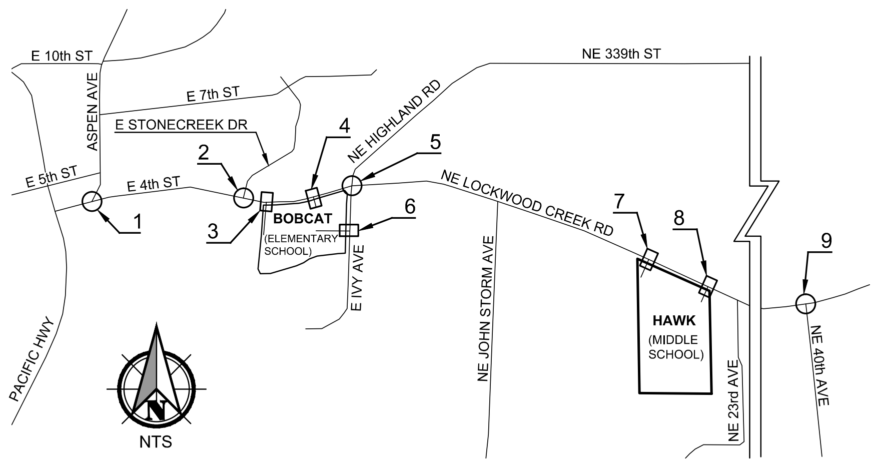
PBS

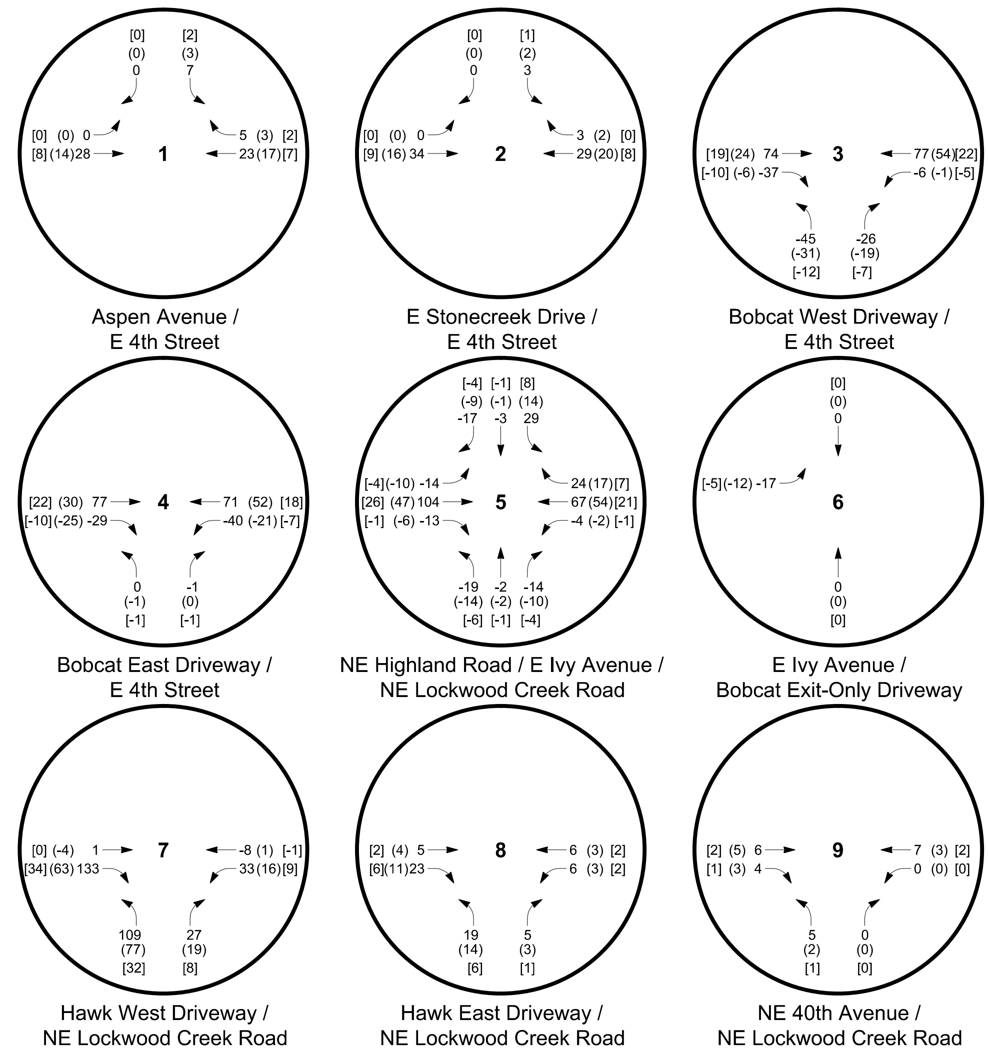
Existing Middle School Trip Distribution and Adjustments

La Center Middle School

NOV 2018

FIGURE **9**





LEGEND

▭	DRIVEWAY
○	INTERSECTION
XXX	AM PEAK HOUR (7:30 - 8:30 AM)
(XXX)	MIDDAY PEAK HOUR (2:30 - 3:30 PM)
[XXX]	PM PEAK HOUR (4:45 - 5:45 PM)

PBS

Net Trip Impacts

La Center Middle School

NOV 2018

FIGURE **10**

CHARBONNEAU
ENGINEERING LLC

MEMORANDUM

Date: March 2, 2020

To: Mike Odren, RLA
Associate Principal
Olson Engineering, Inc.
222 East Evergreen Blvd
Vancouver WA 98660

From: Frank Charbonneau, PE, PTOE

Subject: Trip Generation Assessment FL2024
Minit Management Development
NW Paradise Park Road, La Center

This memo will serve as the trip generation assessment documenting the number of vehicular trips that will be produced by the proposed Minit Management development. The four acre site at address #2814 NW 319th Street is located in the northeast quadrant of NW La Center Road and the I-5 northbound on-ramp.

The development project will demolish the existing convenience store and gas station facilities and construct several new buildings consisting of 11,600 square feet of general retail, fast foot restaurant with drive-through totaling 2,800 square feet, convenience market with coffee drive-through totaling 4,510 square feet, and a 101 unit hotel. Parking on the site for 184 spaces will be provided, including eight ADA parking stalls. A copy of the project's site plan is attached to this memo.

The site we be served by three driveway accesses connecting to the perimeter road (NW Paradise Park Road) on the property's north and east sides. The nearest major intersections include NW La Center Road at the I-5 northbound off-ramp which is configured as a round-about and NW Paradise Park Road at NW La Center Road. This intersection is controlled by stop signing on the northbound Paradise Park Road approach and on the southbound Paradise Road approach.

The City of La Center issued a pre-application conference report (2019-018-PAC) dated June 11, 2019 documenting the application's process and requirements. The staff report detailed that the development agreement between the City and Minit Management LLC dated March 2016 vested a total of 199 PM peak hour trips for the site. As a result it was necessary to submit a trip generation assessment to verify the trip projection.

The number of trips were calculated based on the proposed building uses and sizes. Trip credits were applied for the existing facilities that will be demolished including the convenience market and gas station and a cardlock fueling station. The trip calculations were determined for the weekday average daily traffic (ADT) and the weekday AM and PM peak hours.

The analysis used the ITE Trip Generation manual (10th edition, year 2017).

For the proposed site uses several ITE land use categories were applied including #310 (Hotel), #820 (shopping center), #852 (convenience market), #934 (fast food restaurant with drive-through), and #938 (coffee drive-through). For the existing uses ITE code #853 for convenience market was used and historical rates for Pacific Pride Cardlock were applied for the cardlock fueling station.

A summary of the site's trip generation is provided in the following tables. Table 1 provides the trip generation for the site's existing uses. Table 2 provides the trip generation for the proposed site uses. Table 3 lists the net site trips for the development.

Table 1 Existing Land Uses Trip Generation Summary

ITE Land Use	Units	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Convenience Mkt with Gas (#853)	6 fueling posiitons							
Generation Rate [1]		322.50	20.76	50%	50%	23.04	50%	50%
Total Driveway Trips		**1,935**	**125**	63	62	**138**	69	69
Pass-By Trips [2] (AM Peak=63%; PM Peak=66%)			79	40	39	91	46	45
New Site Trips			**46**	23	23	**47**	23	24
Cardlock Fueling Station	12 fueling positions							
Generation Rate [3]			4.44	50%	50%	2.96	50%	50%
Total Driveway Trips		**1445**	**53**	27	26	**36**	18	18
Pass-By Trips [2] (AM Peak=58%; PM Peak=42%)			31	16	15	15	8	7
New Trips			**22**	11	11	**21**	10	11
Total Site Trips			**178**	90	88	**174**	87	87
Pass-by Trips			**110**	56	54	**106**	54	52
New Trips [4]		**3,380**	**68**	34	34	**68**	33	35

[1] Source: *Trip Generation* , 10th Edition, ITE, 2017, average rates.

[2] Pass-by percentage based on *Trip Generation Handbook, 3nd Edition* , ITE, 2017.

[3] Source: Independent surveys at Tarr Inc. Pacific Pride. AM trip rate = 1.5x calculated PM trip rate, ADT = 70% of ITE #944 Gas Station Rate.

[4] New Trips = Total Trips - Internal Trips - Pass-by Trips.

Table 2 Proposed Land Uses Trip Generation Summary

ITE Land Use	Units	Weekday						
		ADT	AM Peak Hour			PM Peak Hour		
			Total	Enter	Exit	Total	Enter	Exit
Convenience Mkt [Open 15-16 hours] (#852)	4,410 sq. ft.							
Generation Rate [1,2]		345.70	31.02	50%	50%	34.57	49%	51%
Total Driveway Trips		**1,525**	**137**	69	68	**152**	74	78
Internal Trips [3] (AM Peak=16%; PM Peak=36%)			22	11	11	55	27	28
Pass-By Trips [4] (AM Peak=63%; PM Peak=66%)			72	36	36	64	31	33
New Site Trips		**1,525**	**43**	22	21	**33**	16	17
Shopping Center (#820)	11,600 sq. ft.							
Generation Rate [2]		37.75	0.94	62%	38%	3.81	48%	52%
Total Driveway Trips		**438**	**11**	7	4	**44**	21	23
Internal Trips [3] (AM Peak=16%; PM Peak=36%)			2	1	1	16	8	8
Pass-By Trips [4] (AM Peak=N/A; PM Peak=34%)						10	5	5
New Site Trips [4]		**438**	**9**	6	3	**18**	8	10
Hotel (#310)	101 rooms							
Generation Rate [2]		8.36	0.47	59%	41%	0.60	51%	49%
Total Driveway Trips		**844**	**47**	28	19	**61**	31	30
Internal Trips [3] (AM Peak=16%; PM Peak=36%)			8	4	4	22	11	11
New Site Trips			39	24	15	39	20	19
Fast-Food with Drive-Through (#934)	2,800 sq. ft.							
Generation Rate [2]		470.95	40.19	51%	49%	32.67	52%	48%
Total Driveway Trips		**1,319**	**113**	58	55	**91**	48	43
Internal Trips [3] (AM Peak=16%; PM Peak=36%)			19	10	9	33	17	16
Pass-By Trips [4] (AM Peak=49%; PM Peak=50%)			46	24	22	29	15	14
New Trips			**48**	24	24	**29**	16	13
Coffee/Donut Shop with Drive-Through & No Indoor Seating (#938)	100 sq. ft.							
Generation Rate [2]		2000.00	337.04	50%	50%	83.33	50%	50%
Total Driveway Trips		**200**	**34**	17	17	**8**	4	4
Internal Trips [3] (AM Peak=16%; PM Peak=36%)		0	6	3	3	3	2	1
Pass-By Trips [4,5] (AM Peak=83%; PM Peak=83%)		166	23	12	11	4	2	2
New Site Trips		**34**	**5**	2	3	**1**	0	1
Total Site Trips		**4,326**	**342**	179	163	**356**	178	178
Internal Trips			**57**	29	28	**129**	65	64
Pass-by Trips			**141**	72	69	**107**	53	54
New Trips			**144**	78	66	**120**	60	60

1 ADT trip rate estimated as ten times the PM peak hour trip rate.

2 Source: *Trip Generation*, 10th Edition, ITE, 2017, average rates.

3 Internal capture calculated with unconstrained internal capture rates presented in the Center for Urban Transportation Research (CUTR) *Trip Internalization in Multi-Use Developments*, April 2014, FDOT.

4 Pass-by percentage based on Trip Generation Handbook, 3nd Edition, ITE, 2017.

5 The weekday PM peak pass-by rate used to calculate the daily and weekday AM peak pass-by trips.

6 New Trips = Total Trips - Internal Trips - Pass-by Trips.

Table 3 presents the net trip generation results (proposed site trips – existing site trips) for the development project. When the new facility is developed it is projected that the site will generate a net of 76 trips in the AM peak hour 52 trips in the PM peak hour. The ADT is projected to increase by 946 trips per day.

Table 3 Net New Trips

Site Uses	Weekday Peak Hour						Weekday ADT
	AM Peak Hour			PM Peak Hour			
	Total	Enter	Exit	Total	Enter	Exit	
Proposed Site [1]	**144**	78	66	**120**	60	60	4,326
Existing Site [2]	**-68**	-34	-34	**-68**	-33	-35	3,380
Net New Trips [3]	**76**	44	32	**52**	27	25	946

[1] Refer to Table 2.

[2] Refer to Table 1.

[3] Net New Trips = Proposed Site Trips - Existing Site Trips.

It is recommended that the City of La Center support the proposed development without the application of traffic impact fees as the projected number of site trips falls below the vested number of peak hour trips (199 trips) identified in the City's development agreement with Minit Management.

If you should need any additional traffic engineering support on this project or if there are any further questions, please contact Frank Charbonneau, PE, PTOE at 503.293.1118 or email Frank@CharbonneauEngineer.com.

Attachment

- Site Plan

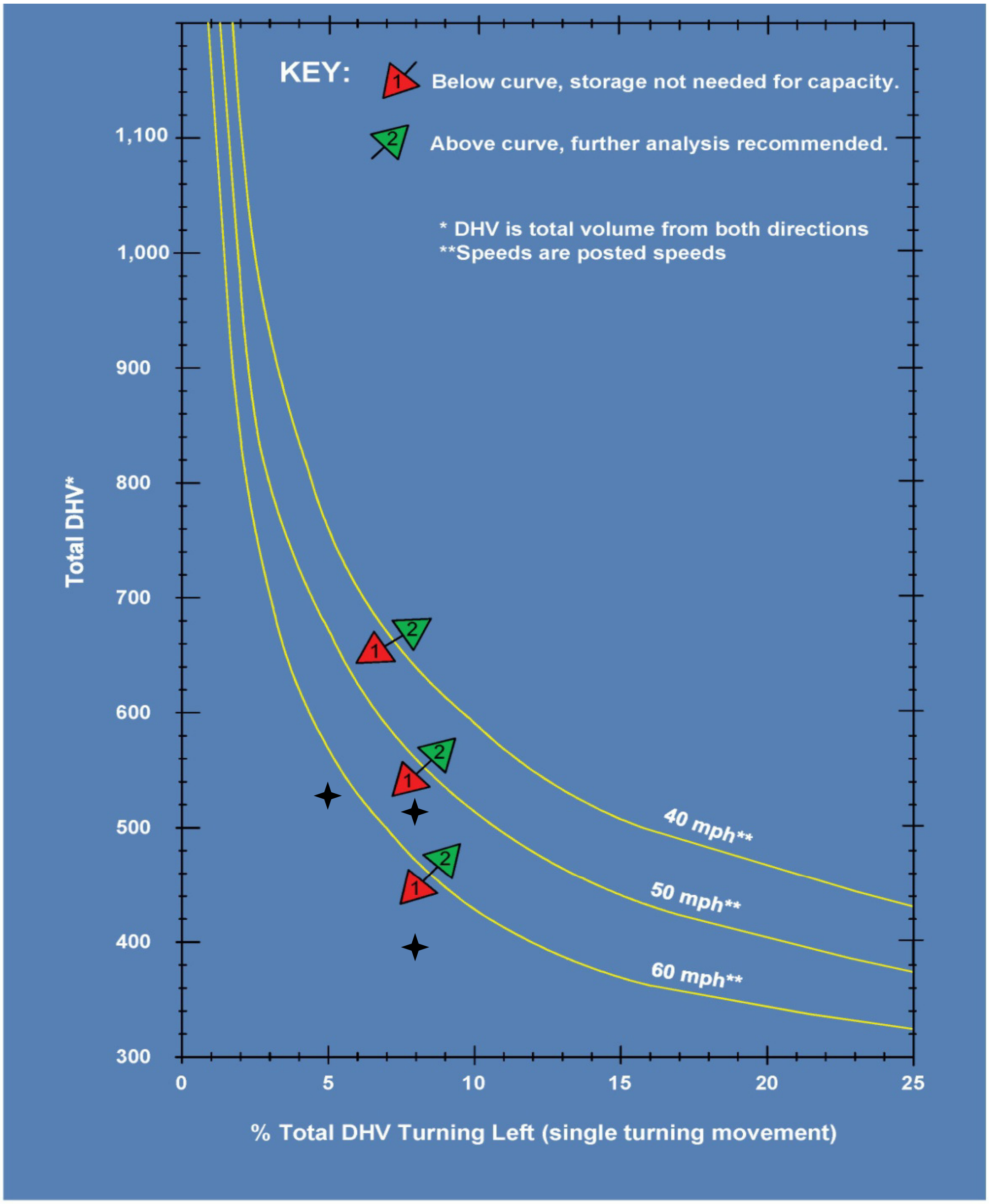


Exhibit 1310-7a. Left-turn Storage Guidelines-: Two-Lane, Unsignalized.

Storage requirements for critical left-turn movements at unsignalized intersections on 2-lane highways.

Intersection	Mov't	Analysis Period	Speed V (mph)	Left Turns in Advancing Volume (vph)	Advancing Volume V_A (vph)	Opposing Volume V_O (vph)	Total DHV	% Left Turns in Advancing Volume L	Storage Req'd (ft)
E Spruce Avenue & Lockwood Cr. Rd.	EB LT	2024 Total Traffic - AM Peak	35	28	250	284	534	5%	None
		2024 Total Traffic - PM Peak		41	308	205	513	8%	None
NE 24th Avenue & Lockwood Cr. Rd.	EB LT	2024 Total Traffic - AM Peak	35	8	91	152	243	3%	None
		2024 Total Traffic - PM Peak		30	248	143	391	8%	None

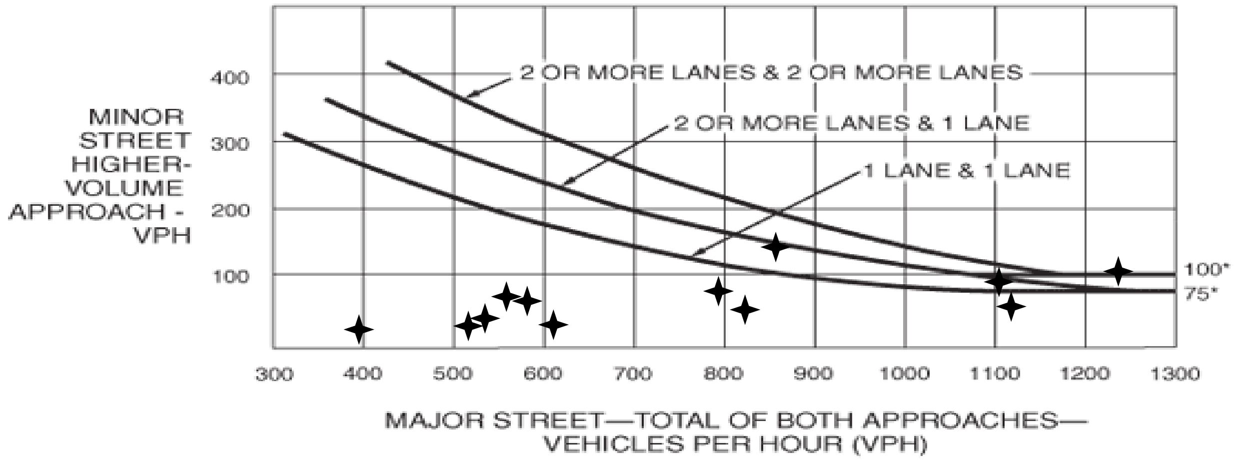
Source: WSDOT Design Guide, February 2019.

Charbonneau
Engineering LLC

PROJECT: #21-25 Lockwood Meadows Subdivision DATE: 08.01.21

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Table for Figure 4C-4

One lane and one lane		Two or more lanes and one lane		Two or more lanes and two or more lanes	
VPH on the major street (Total of both approaches)	**VPH on the minor street (Higher volume approach)**	**VPH on the major street (Total of both approaches)**	**VPH on the minor street (Higher volume approach)**	**VPH on the major street (Total of both approaches)**	**VPH on the minor street (Higher volume approach)**
1300	75	1300	75 or 100*	1300	100
1200	75	1200	80 or 100*	1200	100
1100	75	1100	100	1100	120
1000	80	1000	120	1000	150
900	100	900	140	900	175
800	120	800	160	800	225
700	145	700	200	700	260
600	170	600	245	600	315
500	220	500	280	500	370
400	260	400	340	400	Not available

* Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

Peak hour volume warrant for signalization data.

Intersection	Analysis Period	Major Street Speed (mph)	Major Street		Minor Street High Volume Approach		Signal Warranted?
			Volume (vph)	Lanes (#)	Volume (vph)	Lanes (#)	
Cedar Avenue & E. 4th Street	2024 Total Traffic - AM Peak	35	610	1	34	1	No
	2024 Total Traffic - PM Peak		823		52		No
Highland/ Ivy Avenue & E 4th St/ Lockwood Cr. Rd.	2024 Total Traffic - AM Peak	35	861	2	139[1]	2	No
	2024 Total Traffic - PM Peak		793		80[1]		No
John Storm Road & Lockwood Cr. Rd.	2024 Total Traffic - AM Peak	35	562	1	74	1	No
	2024 Total Traffic - PM Peak		581		69		No
E Spruce Avenue & Lockwood Cr. Rd.	2024 Total Traffic - AM Peak	35	534	1	41	1	No
	2024 Total Traffic - PM Peak		513		30		No
NE 24th Avenue & Lockwood Cr. Rd.	2024 Total Traffic - AM Peak	35	243	1	32	1	No
	2024 Total Traffic - PM Peak		391		26		No
Timmen Road & La Center Road	2024 Total Traffic - AM Peak	50	1,116	2	61	2	No
	2024 Bkgd Traffic - PM Peak		1,236		106[1]		Yes
	Year 2021 Traffic - PM Peak		1,106		91[1]		No

Source: *Manual on Uniform Traffic Control Devices (MUTCD)*, 2003 Edition.

[1] Right-turn volume adjusted using Pagones Theorem.

OFFICER REPORTED CRASHES THAT OCCURRED *at* OR *in the vicinity of* MULTIPLE INTERSECTIONS IN THE CITY OF LA CENTER

01/01/2016 - 12/31/2020

Under 23 U.S. Code § 148 and 23 U.S. Code § 409, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

PRIMARY TRAFFICWAY	BLOCK NUMBER	INTERSECTING TRAFFICWAY	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	REPORT NUMBER	DATE	# INJ	# FAT	# VEH	# PEDS	# BIKES	VEHICLE 1 COMPASS DIRECTION FROM	VEHICLE 1 COMPASS DIRECTION TO	VEHICLE 2 COMPASS DIRECTION FROM	VEHICLE 2 COMPASS DIRECTION TO
E 4TH ST	0	E CEDAR AVE					E760159	01/06/2018	2	0	2	0	0	West	e Stopped	West	East
E 4TH ST	0	NE HIGHLAND RD					E713418	09/18/2017	1	0	1	1	0	West	East		
E 4TH ST	0	NE HIGHLAND RD					E826699	06/14/2018	0	0	2	0	0	North	South	East	West
E 4TH ST	900		163	F	E	NE IVY AVE	E744770	11/29/2017	0	0	2	0	0	North	East	East	West
E 4TH ST	700		379	F	W	NE IVY AVE	E934599	06/13/2019	0	0	1	0	0	North	East		
E 4TH ST	1200		330	F	W	NE JOHN STORM AVE	EA43462	06/22/2020	1	0	2	0	0	South	West	West	East
NE HIGHLAND RD	400		157	F	N	E 4TH ST	E795549	03/22/2018	0	0	2	0	0	North	NE	North	South
NW LACENTER RD	0	NW PARADISE PARK RD					E866954	11/26/2018	0	0	2	0	0	South	North	West	East
NW LACENTER RD	32100		68	F	NE	NW TIMMEN RD	E532641	03/23/2016	0	0	2	0	0	West	East	West	North
NW LACENTER RD	32000		1000	F	SW	NW TIMMEN RD	E603749	10/28/2016	1	0	3	0	0	e Stopped	e Stopped	West	East
NW LACENTER RD	32200		0.25	M	NE	NW TIMMEN RD	E709624	09/07/2017	1	0	2	0	0	East	West	e Stopped	e Stopped
NW LACENTER RD	32100		100	F	NE	NW TIMMEN RD	E837059	09/11/2018	0	0	2	0	0	SW	NE	SE	NW
NW TIMMEN RD	0	NW LACENTER RD					E839247	08/29/2018	1	0	2	0	0	North	West	West	East
NW TIMMEN RD	31600		100	F	NW	NE TIMMEN RD	EA00050	12/12/2019	0	0	1	0	0	North	South		

2036 Mitigated Motor Vehicle Operations

Table 7 shows the p.m. peak hour operations at the study intersections with the recommended improvements. It should be noted that the 2035 Regional Transportation Plan (RTP) for Clark County recommends various improvements without committed funding, including:

- Widening La Center Road to four/five lanes between Timmen Road and 4th Street and reconstruction of the Lewis River Bridge
- Roadway improvements along 4th Street, Lockwood Creek Road, and Highland Avenue-339th Street
- Intersection improvements along 5th Street at Aspen Avenue
- Construction/reconstruction of collector streets between North Fork Avenue and Bolen Street, and Lockwood Creek Road and 339th Street

City staff also suggested constructing a new collector street between La Center Road and Spencer Road. This updated system analysis confirms/re-affirms the need for capacity and safety improvements at these RTP and City identified locations.

Several intersections are not expected to meet mobility targets in 2035 without additional improvements, as shown in Table 7. Further improvement details are provided.

Table 7: 2036 Mitigated Peak Hour Intersection Operations

Intersection (control)	Mobility Standard	PM Peak			Mitigated Intersection Improvement
		Delay	LOS	V/C	
Pacific Highway / 4th Street (roundabout)	LOS E	14.4	B	0.70	None*
4th Street / Aspen Avenue (unsignalized)	LOS E	56.5	**A/F**	0.55	No mitigation, alternate local street connections available
Aspen Avenue / 5th Street (unsignalized)	LOS E	11.5	A/B	0.07	None*
La Center Road / Timmen Road (roundabout)	LOS E	30.7	D	0.89	Install two-lane roundabout (preferred) or traffic signal. Roundabout should be striped with single lane until La Center Road is widened to four lanes.
4th Street / Highland Avenue (unsignalized)	LOS E	84.6	**A/F**	0.37	No mitigation, alternate local street connections available
La Center Road / Paradise Park Road (signalized)	LOS E	34.6	C	0.82	None*
La Center Road / 26th Avenue extension (unsignalized)	LOS E	19.8	B/C	0.21	Restrict turn movements at the intersection to left-in, right-in and right-out.

Bolded red values indicate intersection exceeds LOS mobility target.
Signalized: LOS, V/C and Delay reported for the intersection
Unsignalized: LOS = Level of Service of Major Street / Minor Street; V/C = Volume-to-Capacity Ratio of Worst Movement; Delay = Average Delay of Worst Movement (seconds per vehicle)
Roundabout: LOS = Level of Service of Worst Movement; V/C = Volume-to-Capacity Ratio of Worst Movement; Delay = Average Delay of Worst Movement (seconds per vehicle)
*The intersection operations change slightly from the 2036 Baseline results, despite no intersection improvements, due to network improvements changing motor vehicle travel patterns.

Although the 4th Street / Aspen Avenue and 4th Street / Highland Avenue intersections fail to meet the mobility target (shown in Table 7), the condition was related to high delays experienced by a small number of projected vehicles attempting to turn out of the side street onto 4th Street. It is likely that under such conditions, these drivers will avoid the area and reroute to nearby streets. Street connectivity improvements, including local street extensions in the downtown area, and between Lockwood Creek Road and 339th Street, including the extension of John Storm Avenue to the north and reconstruction of 24th Avenue, will be expected to further alleviate some of the motor vehicle trip demand in these areas. Even a small shift in such trips would be enough to mitigate the impacts to the 4th Street / Aspen Avenue and 4th Street / Highland Avenue intersections. Therefore, no mitigation is recommended for these intersections.

A sensitivity test was conducted to ensure that improvements identified based on p.m. peak hour traffic volumes would accommodate a.m. peak hour commute patterns. The a.m. volumes were estimated at study intersections by using similar growth rates as p.m. peak hour volumes and no additional improvements were identified. The northbound left-turn at the 4th Street / Highland Avenue intersection is expected to operate at LOS F in 2036 during the a.m. peak hour. However, the movement is expected to have a relatively low v/c (0.41), and only 25 vehicles are expected to experience this level of congestion. Therefore, no additional improvements are recommended.

With these improvements in place, all roadway links will be expected to operate with a volume-to-capacity ratio less than 0.90, with the exception of La Center Road between Paradise Park Road and 13th Avenue (as shown in Figure 7). However, this segment of La Center Road is still expected to operate with a volume-to-capacity ratio under 1.0 and has very few accesses. The capacity of this segment will be managed given that future private driveway access is generally prohibited (see access spacing section earlier in this document). Therefore, no improvements are recommended to mitigate this level of congestion.

The following improvements included in the 2035 RTP or identified for evaluation by City staff were not recommended in this updated Transportation CFP:

- Construction of new collector streets, following an alignment between La Center Road and Pacific Highway, including a second bridge over the East Fork Lewis River, and between Pacific Highway and Bolen Street (Source: RTP).
- Creation of a downtown couplet along 4th and 5th Streets (Source: RTP).
- Construction of a new roadway crossing of Brezee Creek, between Stonecreek Drive and Highland Avenue (Source: City Staff).

These projects were considered to have limited utility relative to their cost. A sensitivity test was conducted to determine the potential use of a new Brezee Creek roadway crossing north of 4th Street, however, it is not expected to attract enough motor vehicle traffic to warrant the cost. A trail (pedestrian and bicycle use) creek crossing is recommended as an alternative to a full street connection since it would provide a direct connection between the neighborhoods on the west side of Brezee Creek and the schools and parks on the east side.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	10	146	283	9	3	19
Future Volume (vph)	10	146	283	9	3	19
Confl. Peds. (#/hr)	4			3	3	4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 27.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	146	283	9	3	19
Future Vol, veh/h	10	146	283	9	3	19
Conflicting Peds, #/hr	4	0	0	3	3	4
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	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	172	333	11	4	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	348	0	-	0	542	347
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	199	-
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	1211	-	-	-	501	696
Stage 1	-	-	-	-	719	-
Stage 2	-	-	-	-	835	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1206	-	-	-	491	691
Mov Cap-2 Maneuver	-	-	-	-	491	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	832	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	10.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1206	-	-	-	655
HCM Lane V/C Ratio	0.01	-	-	-	0.04
HCM Control Delay (s)	8	0	-	-	10.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	132	16	10	246	39	31	1	19	10	3	214
Future Volume (vph)	147	132	16	10	246	39	31	1	19	10	3	214
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 53.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	147	132	16	10	246	39	31	1	19	10	3	214
Future Vol, veh/h	147	132	16	10	246	39	31	1	19	10	3	214
Conflicting Peds, #/hr	2	0	9	8	0	1	9	0	8	1	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	6	6	6	4	4	4	39	39	39	8	8	8
Mvmt Flow	204	183	22	14	342	54	43	1	26	14	4	297

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	398	0	0	214	0	0	1168	1037	211	1023	1021	380
Stage 1	-	-	-	-	-	-	611	611	-	399	399	-
Stage 2	-	-	-	-	-	-	557	426	-	624	622	-
Critical Hdwy	4.16	-	-	4.14	-	-	7.49	6.89	6.59	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Follow-up Hdwy	2.254	-	-	2.236	-	-	3.851	4.351	3.651	3.572	4.072	3.372
Pot Cap-1 Maneuver	1139	-	-	1344	-	-	144	199	744	209	231	654
Stage 1	-	-	-	-	-	-	423	431	-	615	592	-
Stage 2	-	-	-	-	-	-	455	527	-	463	470	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1137	-	-	1332	-	-	64	160	732	170	185	647
Mov Cap-2 Maneuver	-	-	-	-	-	-	64	160	-	170	185	-
Stage 1	-	-	-	-	-	-	344	351	-	504	584	-
Stage 2	-	-	-	-	-	-	240	520	-	362	383	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.4	0.3	87.9	16.5
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	64	621	1137	-	-	1332	-	-	170	625
HCM Lane V/C Ratio	0.673	0.045	0.18	-	-	0.01	-	-	0.082	0.482
HCM Control Delay (s)	137.5	11.1	8.9	-	-	7.7	-	-	28.1	16
HCM Lane LOS	F	B	A	-	-	A	-	-	D	C
HCM 95th %tile Q(veh)	2.9	0.1	0.7	-	-	0	-	-	0.3	2.6

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	93	20	7	148	50	6
Future Volume (vph)	93	20	7	148	50	6
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	6%	6%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 23.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	93	20	7	148	50	6
Future Vol, veh/h	93	20	7	148	50	6
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	82	82	82	82	82	82
Heavy Vehicles, %	6	6	4	4	2	2
Mvmt Flow	113	24	9	180	61	7

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	137	0	323	125
Stage 1	-	-	-	-	125	-
Stage 2	-	-	-	-	198	-
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	-	-	1435	-	671	926
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	835	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1435	-	666	926
Mov Cap-2 Maneuver	-	-	-	-	666	-
Stage 1	-	-	-	-	901	-
Stage 2	-	-	-	-	829	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	10.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	687	-	-	1435	-
HCM Lane V/C Ratio	0.099	-	-	0.006	-
HCM Control Delay (s)	10.8	-	-	7.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	19	81	131	14	1	16
Future Volume (vph)	19	81	131	14	1	16
Confl. Peds. (#/hr)	2			2	2	2
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	8%	8%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 27.4% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	19	81	131	14	1	16
Future Vol, veh/h	19	81	131	14	1	16
Conflicting Peds, #/hr	2	0	0	2	2	2
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	86	86	86	86	86	86
Heavy Vehicles, %	8	8	4	4	2	2
Mvmt Flow	22	94	152	16	1	19

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	170	0	-	0	302	164
Stage 1	-	-	-	-	162	-
Stage 2	-	-	-	-	140	-
Critical Hdwy	4.18	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.272	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1372	-	-	-	690	881
Stage 1	-	-	-	-	867	-
Stage 2	-	-	-	-	887	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1369	-	-	-	676	878
Mov Cap-2 Maneuver	-	-	-	-	676	-
Stage 1	-	-	-	-	851	-
Stage 2	-	-	-	-	885	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1369	-	-	-	863
HCM Lane V/C Ratio	0.016	-	-	-	0.023
HCM Control Delay (s)	7.7	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	67	119	8	3	6
Future Volume (vph)	2	67	119	8	3	6
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	7%	5%	5%	11%	11%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 16.7%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	67	119	8	3	6
Future Vol, veh/h	2	67	119	8	3	6
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	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	11	11
Mvmt Flow	2	82	145	10	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	155	0	-	0	236	150
Stage 1	-	-	-	-	150	-
Stage 2	-	-	-	-	86	-
Critical Hdwy	4.17	-	-	-	6.51	6.31
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.263	-	-	-	3.599	3.399
Pot Cap-1 Maneuver	1395	-	-	-	733	873
Stage 1	-	-	-	-	856	-
Stage 2	-	-	-	-	915	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1395	-	-	-	732	873
Mov Cap-2 Maneuver	-	-	-	-	732	-
Stage 1	-	-	-	-	854	-
Stage 2	-	-	-	-	915	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.5
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1395	-	-	-	820
HCM Lane V/C Ratio	0.002	-	-	-	0.013
HCM Control Delay (s)	7.6	0	-	-	9.5
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	278	9	59	600	11	44
Future Volume (vph)	278	9	59	600	11	44
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	9%	4%	4%	4%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 41.6%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	278	9	59	600	11	44
Future Vol, veh/h	278	9	59	600	11	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	9	9	4	4	4	4
Mvmt Flow	290	9	61	625	11	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	299	0	1042	295
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	747	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1251	-	252	740
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	465	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1251	-	240	740
Mov Cap-2 Maneuver	-	-	-	-	240	-
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	442	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	240	740	-	-	1251	-
HCM Lane V/C Ratio	0.048	0.062	-	-	0.049	-
HCM Control Delay (s)	20.8	10.2	-	-	8	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.2	-	-	0.2	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	23	392	240	13	23	22
Future Volume (vph)	23	392	240	13	23	22
Confl. Peds. (#/hr)	1			1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 49.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	392	240	13	23	22
Future Vol, veh/h	23	392	240	13	23	22
Conflicting Peds, #/hr	1	0	0	1	1	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	2	2
Mvmt Flow	25	431	264	14	25	24

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	279	0	-	0	754	273
Stage 1	-	-	-	-	272	-
Stage 2	-	-	-	-	482	-
Critical Hdwy	4.11	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.209	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1289	-	-	-	377	766
Stage 1	-	-	-	-	774	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1288	-	-	-	366	765
Mov Cap-2 Maneuver	-	-	-	-	366	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	620	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	13.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1288	-	-	-	491
HCM Lane V/C Ratio	0.02	-	-	-	0.101
HCM Control Delay (s)	7.9	0	-	-	13.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	289	2	1	144	16	23	7	18	13	2	132
Future Volume (vph)	179	289	2	1	144	16	23	7	18	13	2	132
Confl. Peds. (#/hr)	1		6	5			6		5			1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 43.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	179	289	2	1	144	16	23	7	18	13	2	132
Future Vol, veh/h	179	289	2	1	144	16	23	7	18	13	2	132
Conflicting Peds, #/hr	1	0	6	5	0	0	6	0	5	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	92
Heavy Vehicles, %	1	1	1	2	2	2	2	2	2	1	1	1
Mvmt Flow	199	321	2	1	160	18	26	8	20	14	2	143

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	179	0	0	329	0	0	976	907	333	911	899	176
Stage 1	-	-	-	-	-	-	726	726	-	172	172	-
Stage 2	-	-	-	-	-	-	250	181	-	739	727	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.12	6.52	6.22	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.518	4.018	3.318	3.509	4.009	3.309
Pot Cap-1 Maneuver	1403	-	-	1231	-	-	230	276	709	256	280	870
Stage 1	-	-	-	-	-	-	416	430	-	832	758	-
Stage 2	-	-	-	-	-	-	754	750	-	411	431	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1402	-	-	1224	-	-	168	235	702	215	238	864
Mov Cap-2 Maneuver	-	-	-	-	-	-	168	235	-	215	238	-
Stage 1	-	-	-	-	-	-	355	367	-	713	756	-
Stage 2	-	-	-	-	-	-	623	749	-	334	368	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3	0	21.5	11.4
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	168	451	1402	-	-	1224	-	-	215	831
HCM Lane V/C Ratio	0.152	0.062	0.142	-	-	0.001	-	-	0.067	0.175
HCM Control Delay (s)	30.2	13.5	8	-	-	7.9	-	-	22.9	10.3
HCM Lane LOS	D	B	A	-	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.5	0.2	0.5	-	-	0	-	-	0.2	0.6

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	196	71	10	150	37	24
Future Volume (vph)	196	71	10	150	37	24
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 26.3%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	196	71	10	150	37	24
Future Vol, veh/h	196	71	10	150	37	24
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, %	1	1	2	2	2	2
Mvmt Flow	223	81	11	170	42	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	304	0	456	264
Stage 1	-	-	-	-	264	-
Stage 2	-	-	-	-	192	-
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	-	-	1257	-	562	775
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	841	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1257	-	556	775
Mov Cap-2 Maneuver	-	-	-	-	556	-
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	833	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	626	-	-	1257	-
HCM Lane V/C Ratio	0.111	-	-	0.009	-
HCM Control Delay (s)	11.5	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	21	200	146	1	1	15
Future Volume (vph)	21	200	146	1	1	15
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	6%	6%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 32.9%	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	21	200	146	1	1	15
Future Vol, veh/h	21	200	146	1	1	15
Conflicting Peds, #/hr	0	0	0	1	1	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	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	6	6
Mvmt Flow	22	206	151	1	1	15

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	153	0	-	0	404	153
Stage 1	-	-	-	-	153	-
Stage 2	-	-	-	-	251	-
Critical Hdwy	4.11	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.209	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1434	-	-	-	595	883
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	782	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1433	-	-	-	584	882
Mov Cap-2 Maneuver	-	-	-	-	584	-
Stage 1	-	-	-	-	849	-
Stage 2	-	-	-	-	781	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1433	-	-	-	855
HCM Lane V/C Ratio	0.015	-	-	-	0.019
HCM Control Delay (s)	7.6	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	11	197	108	16	6	4
Future Volume (vph)	11	197	108	16	6	4
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	1%	10%	10%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 29.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	11	197	108	16	6	4
Future Vol, veh/h	11	197	108	16	6	4
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	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	1	10	10
Mvmt Flow	13	229	126	19	7	5

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	145	0	-	0	391	136
Stage 1	-	-	-	-	136	-
Stage 2	-	-	-	-	255	-
Critical Hdwy	4.11	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.209	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1443	-	-	-	598	892
Stage 1	-	-	-	-	871	-
Stage 2	-	-	-	-	769	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1443	-	-	-	592	892
Mov Cap-2 Maneuver	-	-	-	-	592	-
Stage 1	-	-	-	-	862	-
Stage 2	-	-	-	-	769	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1443	-	-	-	684
HCM Lane V/C Ratio	0.009	-	-	-	0.017
HCM Control Delay (s)	7.5	0	-	-	10.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	616	19	65	406	24	122
Future Volume (vph)	616	19	65	406	24	122
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	3%	3%	3%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 50.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	616	19	65	406	24	122
Future Vol, veh/h	616	19	65	406	24	122
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	3	3	3	3
Mvmt Flow	662	20	70	437	26	131

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	682	0	1249	672
Stage 1	-	-	-	-	672	-
Stage 2	-	-	-	-	577	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	906	-	190	454
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	560	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	906	-	175	454
Mov Cap-2 Maneuver	-	-	-	-	175	-
Stage 1	-	-	-	-	506	-
Stage 2	-	-	-	-	517	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	18.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	175	454	-	-	906	-
HCM Lane V/C Ratio	0.147	0.289	-	-	0.077	-
HCM Control Delay (s)	29.1	16.1	-	-	9.3	-
HCM Lane LOS	D	C	-	-	A	-
HCM 95th %tile Q(veh)	0.5	1.2	-	-	0.2	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	12	197	341	17	12	22
Future Volume (vph)	12	197	341	17	12	22
Confl. Peds. (#/hr)	4			3	3	4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 31.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	0.9					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	197	341	17	12	22
Future Vol, veh/h	12	197	341	17	12	22
Conflicting Peds, #/hr	4	0	0	3	3	4
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	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	232	401	20	14	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	425	0	-	0	678	419
Stage 1	-	-	-	-	415	-
Stage 2	-	-	-	-	263	-
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	1134	-	-	-	418	634
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	781	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1130	-	-	-	409	629
Mov Cap-2 Maneuver	-	-	-	-	409	-
Stage 1	-	-	-	-	654	-
Stage 2	-	-	-	-	778	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1130	-	-	-	529
HCM Lane V/C Ratio	0.012	-	-	-	0.076
HCM Control Delay (s)	8.2	0	-	-	12.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Future Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 53.9% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Int Delay, s/veh	11.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	148	251	5	7	340	67	16	0	7	40	0	218
Future Vol, veh/h	148	251	5	7	340	67	16	0	7	40	0	218
Conflicting Peds, #/hr	2	0	9	8	0	1	9	0	8	1	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	6	6	6	4	4	4	39	39	39	8	8	8
Mvmt Flow	206	349	7	10	472	93	22	0	10	56	0	303

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	567	0	0	365	0	0	1473	1361	370	1319	1318	530
Stage 1	-	-	-	-	-	-	774	774	-	541	541	-
Stage 2	-	-	-	-	-	-	699	587	-	778	777	-
Critical Hdwy	4.16	-	-	4.14	-	-	7.49	6.89	6.59	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Follow-up Hdwy	2.254	-	-	2.236	-	-	3.851	4.351	3.651	3.572	4.072	3.372
Pot Cap-1 Maneuver	985	-	-	1183	-	-	87	125	601	130	153	537
Stage 1	-	-	-	-	-	-	341	359	-	515	511	-
Stage 2	-	-	-	-	-	-	376	442	-	380	398	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	983	-	-	1173	-	-	31	97	591	106	118	531
Mov Cap-2 Maneuver	-	-	-	-	-	-	31	97	-	106	118	-
Stage 1	-	-	-	-	-	-	267	281	-	406	505	-
Stage 2	-	-	-	-	-	-	159	437	-	293	312	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0.1	185.1	28.3
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	31	591	983	-	-	1173	-	-	106	531
HCM Lane V/C Ratio	0.717	0.016	0.209	-	-	0.008	-	-	0.524	0.57
HCM Control Delay (s)	261.2	11.2	9.6	-	-	8.1	-	-	71.4	20.4
HCM Lane LOS	F	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	2.4	0.1	0.8	-	-	0	-	-	2.4	3.5

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	221	24	23	251	57	17
Future Volume (vph)	221	24	23	251	57	17
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	6%	6%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 41.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	2.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	221	24	23	251	57	17
Future Vol, veh/h	221	24	23	251	57	17
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	82	82	82	82	82	82
Heavy Vehicles, %	6	6	4	4	2	2
Mvmt Flow	270	29	28	306	70	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	299	0	647	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	362	-
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	-	-	1251	-	436	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1251	-	424	754
Mov Cap-2 Maneuver	-	-	-	-	424	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	685	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	471	-	-	1251	-
HCM Lane V/C Ratio	0.192	-	-	0.022	-
HCM Control Delay (s)	14.4	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.7	-	-	0.1	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	22	217	246	22	6	19
Future Volume (vph)	22	217	246	22	6	19
Confl. Peds. (#/hr)	2			2	2	2
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	8%	8%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 40.4%	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	22	217	246	22	6	19
Future Vol, veh/h	22	217	246	22	6	19
Conflicting Peds, #/hr	2	0	0	2	2	2
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	86	86	86	86	86	86
Heavy Vehicles, %	8	8	4	4	2	2
Mvmt Flow	26	252	286	26	7	22

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	314	0	-	0	607	303
Stage 1	-	-	-	-	301	-
Stage 2	-	-	-	-	306	-
Critical Hdwy	4.18	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.272	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1213	-	-	-	460	737
Stage 1	-	-	-	-	751	-
Stage 2	-	-	-	-	747	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1211	-	-	-	447	734
Mov Cap-2 Maneuver	-	-	-	-	447	-
Stage 1	-	-	-	-	731	-
Stage 2	-	-	-	-	746	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	10.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1211	-	-	-	636
HCM Lane V/C Ratio	0.021	-	-	-	0.046
HCM Control Delay (s)	8	0	-	-	10.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	2	83	142	9	3	8
Future Volume (vph)	2	83	142	9	3	8
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	7%	5%	5%	11%	11%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 18.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	0.5					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	2	83	142	9	3	8
Future Vol, veh/h	2	83	142	9	3	8
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	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	11	11
Mvmt Flow	2	101	173	11	4	10

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	184	0	-	0	284	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	105	-
Critical Hdwy	4.17	-	-	-	6.51	6.31
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.263	-	-	-	3.599	3.399
Pot Cap-1 Maneuver	1361	-	-	-	688	841
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	897	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1361	-	-	-	687	841
Mov Cap-2 Maneuver	-	-	-	-	687	-
Stage 1	-	-	-	-	829	-
Stage 2	-	-	-	-	897	-

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	9.6
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1361	-	-	-	793
HCM Lane V/C Ratio	0.002	-	-	-	0.017
HCM Control Delay (s)	7.7	0	-	-	9.6
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	334	10	64	681	12	48
Future Volume (vph)	334	10	64	681	12	48
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	9%	4%	4%	4%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 45.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	10	64	681	12	48
Future Vol, veh/h	334	10	64	681	12	48
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	9	9	4	4	4	4
Mvmt Flow	348	10	67	709	13	50

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	358	0	1196	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	843	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1190	-	204	686
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	419	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1190	-	193	686
Mov Cap-2 Maneuver	-	-	-	-	193	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	396	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	13.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	193	686	-	-	1190	-
HCM Lane V/C Ratio	0.065	0.073	-	-	0.056	-
HCM Control Delay (s)	24.9	10.7	-	-	8.2	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0.2	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	450	275	16	27	25
Future Volume (vph)	26	450	275	16	27	25
Confl. Peds. (#/hr)	1			1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	1.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	450	275	16	27	25
Future Vol, veh/h	26	450	275	16	27	25
Conflicting Peds, #/hr	1	0	0	1	1	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	2	2
Mvmt Flow	29	495	302	18	30	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	321	0	-	0	866	313
Stage 1	-	-	-	-	312	-
Stage 2	-	-	-	-	554	-
Critical Hdwy	4.11	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.209	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1245	-	-	-	324	727
Stage 1	-	-	-	-	742	-
Stage 2	-	-	-	-	575	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1244	-	-	-	313	726
Mov Cap-2 Maneuver	-	-	-	-	313	-
Stage 1	-	-	-	-	718	-
Stage 2	-	-	-	-	574	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	14.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1244	-	-	-	431
HCM Lane V/C Ratio	0.023	-	-	-	0.133
HCM Control Delay (s)	8	0	-	-	14.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	192	341	2	0	178	24	20	7	16	22	1	141
Future Volume (vph)	192	341	2	0	178	24	20	7	16	22	1	141
Confl. Peds. (#/hr)	1		6	5			6		5			1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 47.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	192	341	2	0	178	24	20	7	16	22	1	141
Future Vol, veh/h	192	341	2	0	178	24	20	7	16	22	1	141
Conflicting Peds, #/hr	1	0	6	5	0	0	6	0	5	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	92
Heavy Vehicles, %	1	1	1	2	2	2	2	2	2	1	1	1
Mvmt Flow	213	379	2	0	198	27	22	8	18	24	1	153

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	226	0	0	387	0	0	1107	1038	391	1037	1026	219
Stage 1	-	-	-	-	-	-	812	812	-	213	213	-
Stage 2	-	-	-	-	-	-	295	226	-	824	813	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.12	6.52	6.22	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.518	4.018	3.318	3.509	4.009	3.309
Pot Cap-1 Maneuver	1348	-	-	1171	-	-	188	231	658	210	236	823
Stage 1	-	-	-	-	-	-	373	392	-	791	728	-
Stage 2	-	-	-	-	-	-	713	717	-	369	393	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1347	-	-	1164	-	-	132	193	651	173	197	818
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	193	-	173	197	-
Stage 1	-	-	-	-	-	-	312	328	-	665	727	-
Stage 2	-	-	-	-	-	-	575	716	-	294	329	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.9	0	25.7	13.1
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	132	378	1347	-	-	1164	-	-	173	800
HCM Lane V/C Ratio	0.168	0.068	0.158	-	-	-	-	-	0.141	0.193
HCM Control Delay (s)	37.7	15.2	8.2	-	-	0	-	-	29.2	10.6
HCM Lane LOS	E	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.6	0.2	0.6	-	-	0	-	-	0.5	0.7

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	244	77	14	191	40	28
Future Volume (vph)	244	77	14	191	40	28
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 32.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	244	77	14	191	40	28
Future Vol, veh/h	244	77	14	191	40	28
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, %	1	1	2	2	2	2
Mvmt Flow	277	88	16	217	45	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	365	0	570	321
Stage 1	-	-	-	-	321	-
Stage 2	-	-	-	-	249	-
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	-	-	1194	-	483	720
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	792	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1194	-	476	720
Mov Cap-2 Maneuver	-	-	-	-	476	-
Stage 1	-	-	-	-	735	-
Stage 2	-	-	-	-	780	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	553	-	-	1194	-
HCM Lane V/C Ratio	0.14	-	-	0.013	-
HCM Control Delay (s)	12.6	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	23	250	192	3	3	16
Future Volume (vph)	23	250	192	3	3	16
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	6%	6%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 38.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.7

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	23	250	192	3	3	16
Future Vol, veh/h	23	250	192	3	3	16
Conflicting Peds, #/hr	0	0	0	1	1	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	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	6	6
Mvmt Flow	24	258	198	3	3	16

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	202	0	-	0	508	201
Stage 1	-	-	-	-	201	-
Stage 2	-	-	-	-	307	-
Critical Hdwy	4.11	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.209	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1376	-	-	-	518	830
Stage 1	-	-	-	-	823	-
Stage 2	-	-	-	-	737	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1375	-	-	-	507	829
Mov Cap-2 Maneuver	-	-	-	-	507	-
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	736	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1375	-	-	-	753
HCM Lane V/C Ratio	0.017	-	-	-	0.026
HCM Control Delay (s)	7.7	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	12	218	121	17	7	5
Future Volume (vph)	12	218	121	17	7	5
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	1%	10%	10%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 31.3%	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	12	218	121	17	7	5
Future Vol, veh/h	12	218	121	17	7	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	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	1	10	10
Mvmt Flow	14	253	141	20	8	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	161	0	-	0	432	151
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	281	-
Critical Hdwy	4.11	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.209	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1424	-	-	-	566	875
Stage 1	-	-	-	-	858	-
Stage 2	-	-	-	-	749	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1424	-	-	-	560	875
Mov Cap-2 Maneuver	-	-	-	-	560	-
Stage 1	-	-	-	-	849	-
Stage 2	-	-	-	-	749	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1424	-	-	-	659
HCM Lane V/C Ratio	0.01	-	-	-	0.021
HCM Control Delay (s)	7.6	0	-	-	10.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	689	21	71	455	26	133
Future Volume (vph)	689	21	71	455	26	133
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	3%	3%	3%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 54.8%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	2.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	689	21	71	455	26	133
Future Vol, veh/h	689	21	71	455	26	133
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	3	3	3	3
Mvmt Flow	741	23	76	489	28	143

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	764	0	1394	753
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	641	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	844	-	155	408
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	523	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	844	-	141	408
Mov Cap-2 Maneuver	-	-	-	-	141	-
Stage 1	-	-	-	-	463	-
Stage 2	-	-	-	-	476	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	21.5
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	141	408	-	-	844	-
HCM Lane V/C Ratio	0.198	0.351	-	-	0.09	-
HCM Control Delay (s)	36.7	18.5	-	-	9.7	-
HCM Lane LOS	E	C	-	-	A	-
HCM 95th %tile Q(veh)	0.7	1.5	-	-	0.3	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	12	208	373	17	12	22
Future Volume (vph)	12	208	373	17	12	22
Confl. Peds. (#/hr)	4			3	3	4
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 32.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	12	208	373	17	12	22
Future Vol, veh/h	12	208	373	17	12	22
Conflicting Peds, #/hr	4	0	0	3	3	4
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	85	85	85	85	85	85
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	14	245	439	20	14	26

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	463	0	-	0	729	457
Stage 1	-	-	-	-	453	-
Stage 2	-	-	-	-	276	-
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	1098	-	-	-	390	604
Stage 1	-	-	-	-	640	-
Stage 2	-	-	-	-	771	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1094	-	-	-	381	599
Mov Cap-2 Maneuver	-	-	-	-	381	-
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	768	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	12.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1094	-	-	-	498
HCM Lane V/C Ratio	0.013	-	-	-	0.08
HCM Control Delay (s)	8.3	0	-	-	12.9
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Future Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.8%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	13.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	149	262	5	7	371	67	16	0	7	40	0	221
Future Vol, veh/h	149	262	5	7	371	67	16	0	7	40	0	221
Conflicting Peds, #/hr	2	0	9	8	0	1	9	0	8	1	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	72	72	72	72	72	72	72	72	72	72	72	72
Heavy Vehicles, %	6	6	6	4	4	4	39	39	39	8	8	8
Mvmt Flow	207	364	7	10	515	93	22	0	10	56	0	307

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	610	0	0	380	0	0	1535	1421	385	1379	1378	573
Stage 1	-	-	-	-	-	-	791	791	-	584	584	-
Stage 2	-	-	-	-	-	-	744	630	-	795	794	-
Critical Hdwy	4.16	-	-	4.14	-	-	7.49	6.89	6.59	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.49	5.89	-	6.18	5.58	-
Follow-up Hdwy	2.254	-	-	2.236	-	-	3.851	4.351	3.651	3.572	4.072	3.372
Pot Cap-1 Maneuver	950	-	-	1168	-	-	78	114	589	118	141	508
Stage 1	-	-	-	-	-	-	333	352	-	487	489	-
Stage 2	-	-	-	-	-	-	355	422	-	372	391	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	948	-	-	1158	-	-	25	87	580	95	108	503
Mov Cap-2 Maneuver	-	-	-	-	-	-	25	87	-	95	108	-
Stage 1	-	-	-	-	-	-	258	273	-	380	484	-
Stage 2	-	-	-	-	-	-	136	417	-	284	303	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.5	0.1	257.6	32.4
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	25	580	948	-	-	1158	-	-	95	503
HCM Lane V/C Ratio	0.889	0.017	0.218	-	-	0.008	-	-	0.585	0.61
HCM Control Delay (s)	$ 365.3	11.3	9.9	-	-	8.1	-	-	86.2	22.7
HCM Lane LOS	F	B	A	-	-	A	-	-	F	C
HCM 95th %tile Q(veh)	2.7	0.1	0.8	-	-	0	-	-	2.7	4

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	232	24	24	282	57	17
Future Volume (vph)	232	24	24	282	57	17
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	6%	6%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 44.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	2.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	232	24	24	282	57	17
Future Vol, veh/h	232	24	24	282	57	17
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	82	82	82	82	82	82
Heavy Vehicles, %	6	6	4	4	2	2
Mvmt Flow	283	29	29	344	70	21

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	312	0	700	298
Stage 1	-	-	-	-	298	-
Stage 2	-	-	-	-	402	-
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	-	-	1237	-	405	741
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	676	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1237	-	393	741
Mov Cap-2 Maneuver	-	-	-	-	393	-
Stage 1	-	-	-	-	753	-
Stage 2	-	-	-	-	656	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	441	-	-	1237	-
HCM Lane V/C Ratio	0.205	-	-	0.024	-
HCM Control Delay (s)	15.3	-	-	8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	28	222	262	22	6	35
Future Volume (vph)	28	222	262	22	6	35
Confl. Peds. (#/hr)	2			2	2	2
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	8%	8%	4%	4%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 42.4%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	1.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	28	222	262	22	6	35
Future Vol, veh/h	28	222	262	22	6	35
Conflicting Peds, #/hr	2	0	0	2	2	2
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	86	86	86	86	86	86
Heavy Vehicles, %	8	8	4	4	2	2
Mvmt Flow	33	258	305	26	7	41

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	333	0	-	0	646	322
Stage 1	-	-	-	-	320	-
Stage 2	-	-	-	-	326	-
Critical Hdwy	4.18	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.272	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1193	-	-	-	436	719
Stage 1	-	-	-	-	736	-
Stage 2	-	-	-	-	731	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1191	-	-	-	420	716
Mov Cap-2 Maneuver	-	-	-	-	420	-
Stage 1	-	-	-	-	711	-
Stage 2	-	-	-	-	730	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	11
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1191	-	-	-	649
HCM Lane V/C Ratio	0.027	-	-	-	0.073
HCM Control Delay (s)	8.1	0	-	-	11
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	8	83	142	10	7	25
Future Volume (vph)	8	83	142	10	7	25
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Heavy Vehicles (%)	7%	7%	5%	5%	11%	11%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 21.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	83	142	10	7	25
Future Vol, veh/h	8	83	142	10	7	25
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	82	82	82	82	82	82
Heavy Vehicles, %	7	7	5	5	11	11
Mvmt Flow	10	101	173	12	9	30

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	185	0	-	0	300	179
Stage 1	-	-	-	-	179	-
Stage 2	-	-	-	-	121	-
Critical Hdwy	4.17	-	-	-	6.51	6.31
Critical Hdwy Stg 1	-	-	-	-	5.51	-
Critical Hdwy Stg 2	-	-	-	-	5.51	-
Follow-up Hdwy	2.263	-	-	-	3.599	3.399
Pot Cap-1 Maneuver	1360	-	-	-	673	841
Stage 1	-	-	-	-	831	-
Stage 2	-	-	-	-	882	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1360	-	-	-	668	841
Mov Cap-2 Maneuver	-	-	-	-	668	-
Stage 1	-	-	-	-	824	-
Stage 2	-	-	-	-	882	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1360	-	-	-	796
HCM Lane V/C Ratio	0.007	-	-	-	0.049
HCM Control Delay (s)	7.7	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	340	10	68	698	12	49
Future Volume (vph)	340	10	68	698	12	49
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	9%	9%	4%	4%	4%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary

Control Type: Unsignalized

Intersection Capacity Utilization 46.7% ICU Level of Service A

Analysis Period (min) 15

Intersection						
Int Delay, s/veh	1.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	340	10	68	698	12	49
Future Vol, veh/h	340	10	68	698	12	49
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	9	9	4	4	4	4
Mvmt Flow	354	10	71	727	13	51

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	364	0	1228	359
Stage 1	-	-	-	-	359	-
Stage 2	-	-	-	-	869	-
Critical Hdwy	-	-	4.14	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	-	-	2.236	-	3.536	3.336
Pot Cap-1 Maneuver	-	-	1184	-	195	681
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	407	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1184	-	183	681
Mov Cap-2 Maneuver	-	-	-	-	183	-
Stage 1	-	-	-	-	702	-
Stage 2	-	-	-	-	383	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	183	681	-	-	1184	-
HCM Lane V/C Ratio	0.068	0.075	-	-	0.06	-
HCM Control Delay (s)	26.1	10.7	-	-	8.2	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	0.2	-	-	0.2	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	26	485	296	16	27	25
Future Volume (vph)	26	485	296	16	27	25
Confl. Peds. (#/hr)	1			1	1	1
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	1%	1%	1%	1%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	485	296	16	27	25
Future Vol, veh/h	26	485	296	16	27	25
Conflicting Peds, #/hr	1	0	0	1	1	1
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	91	91	91	91	91	91
Heavy Vehicles, %	1	1	1	1	2	2
Mvmt Flow	29	533	325	18	30	27

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	344	0	-	0	927	336
Stage 1	-	-	-	-	335	-
Stage 2	-	-	-	-	592	-
Critical Hdwy	4.11	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.209	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1221	-	-	-	298	706
Stage 1	-	-	-	-	725	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1220	-	-	-	287	705
Mov Cap-2 Maneuver	-	-	-	-	287	-
Stage 1	-	-	-	-	700	-
Stage 2	-	-	-	-	552	-

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	15.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1220	-	-	-	401
HCM Lane V/C Ratio	0.023	-	-	-	0.143
HCM Control Delay (s)	8	0	-	-	15.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	194	375	2	0	198	24	20	8	16	22	1	143
Future Volume (vph)	194	375	2	0	198	24	20	8	16	22	1	143
Confl. Peds. (#/hr)	1		6	5			6		5			1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.92
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 49.0%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	5.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	194	375	2	0	198	24	20	8	16	22	1	143
Future Vol, veh/h	194	375	2	0	198	24	20	8	16	22	1	143
Conflicting Peds, #/hr	1	0	6	5	0	0	6	0	5	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	125	-	-	60	-	-	125	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	92
Heavy Vehicles, %	1	1	1	2	2	2	2	2	2	1	1	1
Mvmt Flow	216	417	2	0	220	27	22	9	18	24	1	155

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	248	0	0	425	0	0	1174	1104	429	1104	1092	241
Stage 1	-	-	-	-	-	-	856	856	-	235	235	-
Stage 2	-	-	-	-	-	-	318	248	-	869	857	-
Critical Hdwy	4.11	-	-	4.12	-	-	7.12	6.52	6.22	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.218	-	-	3.518	4.018	3.318	3.509	4.009	3.309
Pot Cap-1 Maneuver	1324	-	-	1134	-	-	169	211	626	189	215	800
Stage 1	-	-	-	-	-	-	352	374	-	770	712	-
Stage 2	-	-	-	-	-	-	693	701	-	348	375	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1323	-	-	1128	-	-	117	175	619	154	179	795
Mov Cap-2 Maneuver	-	-	-	-	-	-	117	175	-	154	179	-
Stage 1	-	-	-	-	-	-	293	311	-	644	711	-
Stage 2	-	-	-	-	-	-	553	700	-	273	312	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.8	0	28.6	13.8
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	117	335	1323	-	-	1128	-	-	154	776
HCM Lane V/C Ratio	0.19	0.08	0.163	-	-	-	-	-	0.159	0.202
HCM Control Delay (s)	42.8	16.7	8.2	-	-	0	-	-	32.7	10.8
HCM Lane LOS	E	C	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.7	0.3	0.6	-	-	0	-	-	0.5	0.8

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	278	77	15	211	40	29
Future Volume (vph)	278	77	15	211	40	29
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.1%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	278	77	15	211	40	29
Future Vol, veh/h	278	77	15	211	40	29
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, %	1	1	2	2	2	2
Mvmt Flow	316	88	17	240	45	33

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	404	0	634	360
Stage 1	-	-	-	-	360	-
Stage 2	-	-	-	-	274	-
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	-	-	1155	-	443	684
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	772	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1155	-	435	684
Mov Cap-2 Maneuver	-	-	-	-	435	-
Stage 1	-	-	-	-	706	-
Stage 2	-	-	-	-	759	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	13.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	514	-	-	1155	-
HCM Lane V/C Ratio	0.153	-	-	0.015	-
HCM Control Delay (s)	13.3	-	-	8.2	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0	-

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	41	267	202	3	3	27
Future Volume (vph)	41	267	202	3	3	27
Confl. Peds. (#/hr)				1	1	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	1%	1%	1%	6%	6%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 40.5%	ICU Level of Service A
Analysis Period (min) 15	

Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	41	267	202	3	3	27
Future Vol, veh/h	41	267	202	3	3	27
Conflicting Peds, #/hr	0	0	0	1	1	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	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	6	6
Mvmt Flow	42	275	208	3	3	28

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	212	0	-	0	571	211
Stage 1	-	-	-	-	211	-
Stage 2	-	-	-	-	360	-
Critical Hdwy	4.11	-	-	-	6.46	6.26
Critical Hdwy Stg 1	-	-	-	-	5.46	-
Critical Hdwy Stg 2	-	-	-	-	5.46	-
Follow-up Hdwy	2.209	-	-	-	3.554	3.354
Pot Cap-1 Maneuver	1364	-	-	-	476	819
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	697	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1363	-	-	-	458	818
Mov Cap-2 Maneuver	-	-	-	-	458	-
Stage 1	-	-	-	-	785	-
Stage 2	-	-	-	-	696	-

Approach	EB	WB	SB
HCM Control Delay, s	1	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1363	-	-	-	758
HCM Lane V/C Ratio	0.031	-	-	-	0.041
HCM Control Delay (s)	7.7	0	-	-	10
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	30	218	121	22	10	16
Future Volume (vph)	30	218	121	22	10	16
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	1%	1%	1%	1%	10%	10%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 34.2%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	1.2					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	30	218	121	22	10	16
Future Vol, veh/h	30	218	121	22	10	16
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	86	86	86	86	86	86
Heavy Vehicles, %	1	1	1	1	10	10
Mvmt Flow	35	253	141	26	12	19

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	167	0	-	0	477	154
Stage 1	-	-	-	-	154	-
Stage 2	-	-	-	-	323	-
Critical Hdwy	4.11	-	-	-	6.5	6.3
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	2.209	-	-	-	3.59	3.39
Pot Cap-1 Maneuver	1417	-	-	-	533	871
Stage 1	-	-	-	-	855	-
Stage 2	-	-	-	-	716	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1417	-	-	-	518	871
Mov Cap-2 Maneuver	-	-	-	-	518	-
Stage 1	-	-	-	-	830	-
Stage 2	-	-	-	-	716	-

Approach	EB	WB	SB
HCM Control Delay, s	0.9	0	10.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1417	-	-	-	690
HCM Lane V/C Ratio	0.025	-	-	-	0.044
HCM Control Delay (s)	7.6	0	-	-	10.5
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	707	21	74	466	26	138
Future Volume (vph)	707	21	74	466	26	138
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	1%	1%	3%	3%	3%	3%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 55.9%	ICU Level of Service B
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	3.1					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	707	21	74	466	26	138
Future Vol, veh/h	707	21	74	466	26	138
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	105	-	-	90
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	1	1	3	3	3	3
Mvmt Flow	760	23	80	501	28	148

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	783	0	1433	772
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	661	-
Critical Hdwy	-	-	4.13	-	6.43	6.23
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	-	-	2.227	-	3.527	3.327
Pot Cap-1 Maneuver	-	-	831	-	147	398
Stage 1	-	-	-	-	454	-
Stage 2	-	-	-	-	512	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	831	-	133	398
Mov Cap-2 Maneuver	-	-	-	-	133	-
Stage 1	-	-	-	-	454	-
Stage 2	-	-	-	-	463	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	22.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	133	398	-	-	831	-
HCM Lane V/C Ratio	0.21	0.373	-	-	0.096	-
HCM Control Delay (s)	39.1	19.3	-	-	9.8	-
HCM Lane LOS	E	C	-	-	A	-
HCM 95th %tile Q(veh)	0.8	1.7	-	-	0.3	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Future Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary

Control Type: Roundabout

Intersection Capacity Utilization 53.9% ICU Level of Service A

Analysis Period (min) 15

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	562	575	32	359
Demand Flow Rate, veh/h	595	598	45	387
Vehicles Circulating, veh/h	70	249	648	532
Vehicles Exiting, veh/h	849	444	17	315
Ped Vol Crossing Leg, #/h	9	8	9	2
Ped Cap Adj	0.990	0.993	0.996	0.999
Approach Delay, s/veh	5.0	9.4	6.8	8.3
Approach LOS	A	A	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	L	TR	L	TR	L	TR
Assumed Moves	L	TR	L	TR	L	TR	L	TR
RT Channelized								
Lane Util	0.366	0.634	0.017	0.983	0.689	0.311	0.155	0.845
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	218	377	10	588	31	14	60	327
Cap Entry Lane, veh/h	1332	1332	1132	1132	787	787	875	875
Entry HV Adj Factor	0.945	0.944	1.000	0.961	0.710	0.714	0.933	0.927
Flow Entry, veh/h	206	356	10	565	22	10	56	303
Cap Entry, veh/h	1247	1246	1124	1080	557	560	816	810
V/C Ratio	0.165	0.286	0.009	0.523	0.040	0.018	0.069	0.374
Control Delay, s/veh	4.3	5.5	3.3	9.5	6.9	6.6	5.1	8.9
LOS	A	A	A	A	A	A	A	A
95th %tile Queue, veh	1	1	0	3	0	0	0	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Future Volume (vph)	148	251	5	7	340	67	16	0	7	40	0	218
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Detector Phase	2	2		6	6		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	37.4	37.4		37.4	37.4		22.6	22.6		22.6	22.6	
Total Split (%)	62.3%	62.3%		62.3%	62.3%		37.7%	37.7%		37.7%	37.7%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min		Min	Min		Min	Min	
Act Effct Green (s)	17.7	17.7		17.7	17.7		7.8	7.8		7.8	7.8	
Actuated g/C Ratio	0.50	0.50		0.50	0.50		0.22	0.22		0.22	0.22	
v/c Ratio	0.62	0.40		0.02	0.63		0.14	0.02		0.19	0.51	
Control Delay	15.3	6.5		4.1	9.2		17.4	0.0		16.1	4.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	15.3	6.5		4.1	9.2		17.4	0.0		16.1	4.9	
LOS	B	A		A	A		B	A		B	A	
Approach Delay		9.7			9.1			11.9			6.7	
Approach LOS		A			A			B			A	

Intersection Summary

Cycle Length: 60
Actuated Cycle Length: 35.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 8.8 Intersection LOS: A
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: Ivy Avenue/Highland Avenue & E. 4th Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	148	251	5	7	340	67	16	0	7	40	0	218
Future Volume (veh/h)	148	251	5	7	340	67	16	0	7	40	0	218
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	0.98		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1841	1841	1841	1322	1322	1322	1781	1781	1781
Adj Flow Rate, veh/h	206	349	7	10	472	93	22	0	10	56	0	303
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Percent Heavy Veh, %	6	6	6	4	4	4	39	39	39	8	8	8
Cap, veh/h	422	954	19	584	804	158	217	0	293	497	0	400
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.27	0.00	0.27	0.27	0.00	0.27
Sat Flow, veh/h	817	1769	35	1005	1491	294	760	0	1101	1316	0	1504
Grp Volume(v), veh/h	206	0	356	10	0	565	22	0	10	56	0	303
Grp Sat Flow(s),veh/h/ln	817	0	1804	1005	0	1785	760	0	1101	1316	0	1504
Q Serve(g_s), s	10.5	0.0	5.2	0.3	0.0	9.9	1.3	0.0	0.3	1.5	0.0	8.6
Cycle Q Clear(g_c), s	20.4	0.0	5.2	5.5	0.0	9.9	9.8	0.0	0.3	1.8	0.0	8.6
Prop In Lane	1.00		0.02	1.00		0.16	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	422	0	973	584	0	963	217	0	293	497	0	400
V/C Ratio(X)	0.49	0.00	0.37	0.02	0.00	0.59	0.10	0.00	0.03	0.11	0.00	0.76
Avail Cap(c_a), veh/h	564	0	1285	758	0	1271	313	0	432	663	0	589
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.0	0.0	6.1	7.7	0.0	7.2	20.1	0.0	12.6	13.2	0.0	15.6
Incr Delay (d2), s/veh	0.9	0.0	0.2	0.0	0.0	0.6	0.2	0.0	0.0	0.1	0.0	3.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.6	0.0	1.3	0.0	0.0	2.5	0.2	0.0	0.1	0.4	0.0	2.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.9	0.0	6.3	7.7	0.0	7.7	20.3	0.0	12.6	13.3	0.0	18.8
LnGrp LOS	B	A	A	A	A	A	C	A	B	B	A	B
Approach Vol, veh/h		562			575			32			359	
Approach Delay, s/veh		9.5			7.7			17.9			18.0	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		29.4		16.8		29.4		16.8				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		32.9		18.1		32.9		18.1				
Max Q Clear Time (g_c+I1), s		22.4		11.8		11.9		10.6				
Green Ext Time (p_c), s		2.6		0.0		3.7		1.2				

Intersection Summary			
HCM 6th Ctrl Delay			11.0
HCM 6th LOS			B

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Future Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Control Type: Roundabout	
Intersection Capacity Utilization 55.8%	ICU Level of Service B
Analysis Period (min) 15	

Intersection	
Intersection Delay, s/veh	8.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	578	618	32	363
Demand Flow Rate, veh/h	612	643	45	392
Vehicles Circulating, veh/h	70	250	665	577
Vehicles Exiting, veh/h	899	460	17	316
Ped Vol Crossing Leg, #/h	9	8	9	2
Ped Cap Adj	0.990	0.993	0.996	0.999
Approach Delay, s/veh	5.1	10.3	6.9	9.0
Approach LOS	A	B	A	A

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	L	TR	L	TR	L	TR	L	TR
Assumed Moves	L	TR	L	TR	L	TR	L	TR
RT Channelized								
Lane Util	0.358	0.642	0.016	0.984	0.689	0.311	0.153	0.847
Follow-Up Headway, s	2.535	2.535	2.535	2.535	2.535	2.535	2.535	2.535
Critical Headway, s	4.544	4.544	4.544	4.544	4.544	4.544	4.544	4.544
Entry Flow, veh/h	219	393	10	633	31	14	60	332
Cap Entry Lane, veh/h	1332	1332	1131	1131	775	775	840	840
Entry HV Adj Factor	0.945	0.944	1.000	0.961	0.710	0.714	0.933	0.925
Flow Entry, veh/h	207	371	10	608	22	10	56	307
Cap Entry, veh/h	1247	1246	1123	1079	548	552	783	776
V/C Ratio	0.166	0.298	0.009	0.564	0.040	0.018	0.072	0.396
Control Delay, s/veh	4.3	5.6	3.3	10.4	7.0	6.7	5.3	9.6
LOS	A	A	A	B	A	A	A	A
95th %tile Queue, veh	1	1	0	4	0	0	0	2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Future Volume (vph)	149	262	5	7	371	67	16	0	7	40	0	221
Confl. Peds. (#/hr)	2		9	8		1	9		8	1		2
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	6%	6%	6%	4%	4%	4%	39%	39%	39%	8%	8%	8%
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Detector Phase	6	6		2	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	22.5	22.5		22.5	22.5		22.5	22.5		22.5	22.5	
Total Split (s)	37.5	37.5		37.5	37.5		22.5	22.5		22.5	22.5	
Total Split (%)	62.5%	62.5%		62.5%	62.5%		37.5%	37.5%		37.5%	37.5%	
Yellow Time (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Act Effct Green (s)	21.7	21.7		21.7	21.7		8.0	8.0		8.0	8.0	
Actuated g/C Ratio	0.55	0.55		0.55	0.55		0.20	0.20		0.20	0.20	
v/c Ratio	0.60	0.38		0.02	0.61		0.16	0.02		0.21	0.55	
Control Delay	14.8	6.3		4.3	8.9		18.6	0.0		17.2	6.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	14.8	6.3		4.3	8.9		18.6	0.0		17.2	6.7	
LOS	B	A		A	A		B	A		B	A	
Approach Delay		9.3			8.8			12.8			8.3	
Approach LOS		A			A			B			A	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 39.3	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 9.0	Intersection LOS: A
Intersection Capacity Utilization 57.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 2: Ivy Avenue/Highland Avenue & E. 4th Street

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	149	262	5	7	371	67	16	0	7	40	0	221
Future Volume (veh/h)	149	262	5	7	371	67	16	0	7	40	0	221
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.98	0.98		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1841	1841	1841	1322	1322	1322	1781	1781	1781
Adj Flow Rate, veh/h	207	364	7	10	515	93	22	0	10	56	0	307
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Percent Heavy Veh, %	6	6	6	4	4	4	39	39	39	8	8	8
Cap, veh/h	401	982	19	581	841	152	202	0	291	484	0	397
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.26	0.00	0.26	0.26	0.00	0.26
Sat Flow, veh/h	786	1771	34	992	1515	274	757	0	1101	1316	0	1504
Grp Volume(v), veh/h	207	0	371	10	0	608	22	0	10	56	0	307
Grp Sat Flow(s),veh/h/ln	786	0	1805	992	0	1789	757	0	1101	1316	0	1504
Q Serve(g_s), s	12.0	0.0	5.7	0.3	0.0	11.4	1.4	0.0	0.3	1.6	0.0	9.4
Cycle Q Clear(g_c), s	23.4	0.0	5.7	6.0	0.0	11.4	10.8	0.0	0.3	2.0	0.0	9.4
Prop In Lane	1.00		0.02	1.00		0.15	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	401	0	1001	581	0	992	202	0	291	484	0	397
V/C Ratio(X)	0.52	0.00	0.37	0.02	0.00	0.61	0.11	0.00	0.03	0.12	0.00	0.77
Avail Cap(c_a), veh/h	487	0	1198	689	0	1188	276	0	399	613	0	545
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.3	0.0	6.2	7.9	0.0	7.5	21.9	0.0	13.6	14.3	0.0	16.9
Incr Delay (d2), s/veh	1.0	0.0	0.2	0.0	0.0	0.7	0.2	0.0	0.0	0.1	0.0	4.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	0.0	1.5	0.0	0.0	3.0	0.2	0.0	0.1	0.4	0.0	3.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.4	0.0	6.4	7.9	0.0	8.1	22.1	0.0	13.6	14.4	0.0	21.6
LnGrp LOS	B	A	A	A	A	A	C	A	B	B	A	C
Approach Vol, veh/h		578			618			32			363	
Approach Delay, s/veh		10.0			8.1			19.5			20.5	
Approach LOS		A			A			B			C	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		32.1		17.6		32.1		17.6				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		33.0		18.0		33.0		18.0				
Max Q Clear Time (g_c+I1), s		13.4		12.8		25.4		11.4				
Green Ext Time (p_c), s		4.0		0.0		2.2		1.1				

Intersection Summary		
HCM 6th Ctrl Delay		11.8
HCM 6th LOS		B

Exhibit A.17

Exhibit A.18

BANK USE PLAN

November 2, 2021

Lockwood Meadows Subdivision

La Center, Washington

Prepared for

Susanna S. Hung

701 Columbia St. #414

Vancouver, Washington 98660

Prepared by

Ecological Land Services

1157 3rd Avenue, Suite 220A • Longview, WA 98632

(360) 578-1371 • Project Number 2245.14

NWS-2020-1015

SIGNATURE PAGE

The information and data in this report was compiled and prepared under the supervision and direction of the undersigned.

Annie Jean Rendleman
Biologist

TABLE OF CONTENTS

Tables:

Sheet Set:

Appendix A

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INTRODUCTION

Ecological Land Services, Inc. (ELS) has prepared this bank use plan for the applicant, Susanna Hung, for proposed wetland impacts resulting from a residential subdivision in La Center, Washington. Construction is anticipated to begin in spring 2022 or upon permit approval.

The project will involve directly impacting 0.05 acres of a Category IV wetland. The applicant proposes purchasing 0.04 wetland credits at East Fork Lewis Mitigation Bank (EFLMB). This mitigation approach is meant to:

1) Compensate for direct Category IV wetland impacts and
2) Ensure no net loss of ecological wetland functions

This bank use plan was prepared according to:

- *La Center Municipal Code (LCMC) Title 18.300 Critical Areas* (2021),
- The Interagency Review Team (IRT) for Washington State's Guidance Paper, *Using Credits from Wetland Mitigation Banks: Guidance to Applicants on Submittal Contents for Bank Use Plans* (2009),
- The Washington State Department of Ecology (Ecology) *Wetland Mitigation in Washington State* (2006), and
- The U.S. Army Corps of Engineers' (Corps) *Compensatory Mitigation for Losses of Aquatic Resources* (33 C.F.R. §332 (2008)).

PROJECT DESCRIPTION

Project Location

The site consists of Clark County Tax Parcel 209113-000 located at 2000 NE Lockwood Creek Road in La Center, Washington. NE Lockwood Creek Road abuts the southeastern portion of the site and NE 24th Avenue abuts the site to the east. The site is located in the southeast portion of Section 10, Township 3 North, Range 2 East of the Willamette Meridian (Sheet 1).

Project History

- ELS conducted a broad-scope assessment of the site March of 2020.
- ELS delineated wetlands and mapped critical areas September 8, 2020.
- During a site visit with Miranda Adams (Department of Ecology) on November 10, 2020, the Wetland A boundary was confirmed. Five additional test plots were taken near Wetland A to further support the delineation (TPs AA – AE). The pond area was also re-delineated (Wetland B), encompassing a larger area than what was originally outlined. Three additional test plots were taken to support the Wetland B delineation.
- ELS collected additional data from test plots made during the November site visit with Ecology, as well as TP-6, on February 24, 2021.
- A wetland boundary verification was issued by the Corps on March 31, 2021 (Appendix A).

Proposed Development

The proposed project is for construction of the Lockwood Meadows Subdivision, consisting of 71 residential lots. Construction of the residential development will include grading, lot preparation, utility installation, construction of interior streets, and a stormwater detention facility. Existing buildings within the site will be demolished prior to work. Impacts to critical areas have been avoided where feasible; however, 0.05 acres of Category IV wetland will be unavoidably impacted for site construction. The onsite priority habitat Oregon white oak (*Quercus garryana*) will be retained and no grading will occur within the oak's dripline (Sheet 3 shows proposed grading lines).

Stormwater

Stormwater onsite will be collected and conveyed through a storm main that will run through the proposed public roads onsite. Stormwater from impervious surfaces will be treated with media filters. The stormwater facility was designed to release stormwater at pre-development rates. A portion of the site's runoff will be released to Wetland B to ensure that it continues recharging.

Prior to construction, the clearing limits will be demarcated with orange construction fencing or silt fencing; following construction, any areas of exposed soils will be reseeded with native seed mix. Staging areas will be located within uplands outside of critical areas. Mitigation for project impacts will be satisfied by purchasing 0.04 credits at EFLMB.

EXISTING CONDITIONS

Existing and Surrounding Land Uses

The 20-acre site is zoned Single Family Residential (R1-7.5) with an Urban Holding (UH-10) zoning overlay. The site currently contains a single-family residence, barn, and well. The site is surrounded by high-density subdivision lots to the north and west, and low-density single-family parcels to the south (Sheet 2). The majority of the site consists of mowed field grasses with scattered trees, including Oregon white oaks (*Quercus garryana*). The eastern portion of the site is a decommissioned Christmas tree farm. The site contains two Category IV wetlands and one priority habitat Oregon white oak (Sheet 2). The property has been used as both a hobby and commercial farm operation for several decades which included agricultural activities such as livestock, hay, and Christmas tree production, as well as rental pasture and barn stalls for horses. The Christmas trees were grown on a third-party lease arrangement and the last selective tree harvest occurred during the winter of 2020/2021. The *Critical Areas Report for Lockwood Meadows Subdivision* (ELS 2021) discusses the site history and maintenance activity in further detail.

Landscape Position

The project site is located north of East Fork Lewis River, in the western portion of the 12-digit Hydrologic Unit Code (HUC) 170800020507 Lockwood Creek-East Fork Lewis River. The Washington State Department of Ecology's Water Quality Atlas maps the project site within the Watershed Resource Inventory Area (WRIA) 27 Lewis. A Type Ns stream is mapped onsite by the Washington Department of Natural Resources Stream Type Map. However, ELS has determined that the mapped stream does not meet stream criteria (ELS 2021).

Existing Critical Areas and Buffers

Two wetlands and one priority habitat Oregon white oak (*Quercus garryana*) were mapped onsite. The priority habitat Oregon white oak will be avoided and retained onsite. This bank use plan discusses the proposed wetland impacts and mitigation.

Wetlands

Two wetlands were delineated onsite, identified as Wetlands A and B. All onsite wetlands were rated according to the *Washington State Wetlands Rating System for Western Washington – 2014 Update* (Rating System) (Hruby 2014). The wetland ratings in the Critical Areas Report (ELS 2021) have been reviewed and confirmed by the Department of Ecology. Appendix A contains a wetland boundary verification from the Corps.

Wetland A

Wetland A is a Category IV forested, slope wetland located near the center of the decommissioned tree farm, totaling 0.05 acres (Sheet 2). Wetland A receives most of its hydrology from a seasonally high groundwater table, precipitation, and surface runoff from surrounding uplands. The wetland is saturated only and functions to recharge groundwater. According to the Rating System), Wetland A is a Category IV wetland scoring 5 points for water quality functions, 5 points for hydrologic functions, and 4 points for habitat functions with a total of 14 points. According to *LCMC 18.300.090(5)(d) Exempted Wetlands*, Wetland A is exempted from La Center buffer regulations.

Wetland B

Wetland B is a Category IV emergent and forested, depressional wetland located in the central southern portion of the site, totaling 0.08 acres (Sheet 2). The wetland receives it hydrology from groundwater and precipitation. Wetland B is permanently flooded and saturated only and functions to recharge groundwater. According to the Rating System, Wetland B is a Category IV wetland scoring 5 points for water quality functions, 6 points for hydrologic functions, and 4 points for habitat functions with a total of 15 points. The designated buffer width for a Category IV wetland with a habitat score of 4 is 50 feet, as listed in *LCMC Table 18.300.090(5)(i)(i)-1*.

Buffers

Wetland A is exempted from City of La Center buffer regulations. However, the landscape surrounding Wetland A consists of decommissioned Christmas tree farmland. This area is gently sloping and is dominated by black cottonwood (*Populus balsamifera*) and planted Nordmann fir (*Abies nordmanniana*) as well as sweet vernal grass (*Anthoxanthum odoratum*), velvet grass (*Holcus lanatus*), and Himalayan blackberry (*Rubus armeniacus*). The buffer functions of this area are reduced due to regular mowing and tree removal. Wetland B's buffer slopes more dramatically, especially toward the south. Wetland B's buffer is dominated by black cottonwood, Scouler's willow (*Salix scouleriana*), Himalayan blackberry, orchard grass (*Dactylis glomerata*), marsh cudweed (*Gnaphalium uliginosum*), chickweed (*stellaria media*), garden vetch (*Vicia sativa*), and bluegrass (*Poa* sp.). The functions of Wetland B's buffer are somewhat reduced due to regular mowing; however, some trees and shrubs are established.

Table 1. Summary of Onsite Wetlands.

Critical Area	Category[1]	HGM Class[2]	Cowardin Class[3]	Habitat Score	Area (ac.)	Buffer[4] (ft.)
A	IV	Slope	Forested	4	0.05	Exempted[5]
B	IV	Depressional	Emergent, Forested	4	0.08	50

[1] *Hruby 2014*
[2] *NRCS 2008*
[3] *Cowardin et al. 1979*
[4] *LCMC Table 18.300.090(5)(i)(i)-1*
[5] *LCMC 18.300.090(5)(d)*

AVOIDANCE AND MINIMIZATION OF IMPACTS

The preferred mitigation sequencing of first avoidance, then minimization, and finally compensation for unavoidable impacts were taken into consideration. Other than Wetland A, all onsite critical areas will not be impacted. The following avoidance and minimization measures were applied for the project:

- The site design was modified to completely avoid impacts to Wetland B and the onsite priority Oregon white oak.
- Per *LCMC 18.300.090(5)(d) Exempted Wetlands*, Wetland A is exempt from the requirement to avoid impacts.
- The stormwater facility was placed outside of the wetlands and wetland buffers.
- The priority habitat Oregon white oak will not be impacted.
- Prior to construction, silt fencing will be installed to protect Wetland B from disturbance.
- During construction dust and/or erosion control best management practices (BMPs) will be implemented.
- Following construction, any exposed soils will be seeded with native seed mix.
- Permanent signs will be installed on metal or wood posts around the Wetland B buffer onsite. Habitat signs will be posted at 100-foot intervals reading, "*Wetland and Buffer – Please Retain in a Natural State.*"

UNAVOIDABLE WETLAND IMPACT ACREAGE

Per *LCMC 18.300.090(5)(d) Exempted Wetlands*, Wetland A is exempt from the requirement to avoid impacts. This wetland may be filled as long as the impacts are fully mitigated. Wetland A is proposed to be filled due to the topography of the site. Significant grading will be required to provide the required cross circulation to adjacent parcels and roads, as well as to provide reasonable building pads for the future construction of homes, which will necessitate the filling of Wetland A. Construction activities will involve directly impacting 0.05 acres of wetland from grading and fill for lot construction. The types of equipment used for the construction will include dump trucks, backhoes, graders, bulldozers, and rollers. Table 2 below summarizes the proposed wetland impacts.

Table 2. Summary of Wetland Impacts to be Mitigated at EFLMB.

Wetland	Category	Impact Type	Impact Area (acres)
Wetland A	IV	Direct, Fill	0.05

IMPACTED WETLAND FUNCTIONS

A wetland function assessment was performed for Wetlands A and B based on the functions identified in the rating system (Hruby 2014). Wetland A provides moderate water quality functions due to its average slope and sediment-trapping plant community, low potential to support the water quality function of the site, and high water quality improvement provided by the site valuable to society. Wetland A provides moderate hydrologic functions due to a low potential for reducing flood erosion, low potential to support hydrologic functions of the site, and high hydrologic functions valuable to society (flooding problems down-gradient of sub-basin). Wetland A provides low habitat functions due to its lack of habitat interspersion and variety of hydroperiods, as well as a lack of nearby habitat features valuable to society. The wetland is in a somewhat disturbed condition, as much of its vegetation is non-native from the decommissioned tree farm. Wetland A will be completely filled, resulting in 0.05 acres of Category IV direct wetland impacts.

Wetland B will not be permanently impacted. However, approximately 14,795 square feet of its buffer will be temporarily impacted from grading (See grading lines on Sheet 3). This grading area is in the outermost portion of the buffer and currently contain mowed grasses. No tree removal will occur in this area as a result of the grading plan. The proposed grading activities will result in a temporary change in buffer conditions from placement of soil. The graded areas will be reseeded with a native grass mix. Soil placement will not result in negative hydrologic changes in the buffer area or adjacent wetland, as the areas will remain permeable and will not consist of any permanent structures. Additionally, placement of soil can improve hydrological flow through the buffer by the addition of organic topsoil, increasing infiltration at the soil surface and increasing water holding capacity within the soils below the soil surface. Grading through the placement of soil in the buffer will not result in a reduction of wetland acreage or function. Grading will take place in the wetland buffer only and outside of the wetland boundary. Wetland boundary/limits of grading will be marked in the field with silt fencing prior to any grading work. The surveyed wetland boundary will be offset 1 to 2 feet to provide an additional measure of protection against sedimentation encroaching into the wetland boundary. Wetland functions will not be altered as the activity will take place entirely outside of the boundaries of the wetland, and buffer vegetation will be restored to pre-project conditions. The wetland buffer functions will not be permanently altered as a result of the grading in the buffer as outlined above.

MITIGATION SITE SELECTION RATIONALE

The wetland proposed for impact is located within the EFLMB service area (Sheet 4). The impact site is approximately 6.5 miles southwest of the bank site within the central western portion of the service area. Wetland science from Ecology, the Corps, and the U.S. Environmental Protection Agency states that they promote mitigation that is:

> "…located appropriately on the landscape, addresses restoration of watershed processes, is sustainable, and has a high likelihood of ecological success. Onsite mitigation may achieve these goals in many circumstances. However, we should not risk mitigation success or bypass opportunities for improving ecological processes in a watershed by unnecessarily prioritizing onsite mitigation over more effective and sustainable offsite options (Hruby *et al.* 2009)."

Impacts to Wetland A will be mitigated at the EFLMB, which is owned by the East Fork Lewis Mitigation Partners, LLC. The general goal of the bank is to re-establish 108.20 acres of wetland, enhance 0.29 acres of wetland, and preserve 4.77 acres of associated wetland and upland forest as detailed in the *East Fork Lewis Mitigation Bank Mitigation Banking Instrument* (MBI). Post-construction, the bank site will consist of a forested, scrub-shrub, and emergent depressional flow-through wetland system that will contain a seasonal stream and a fish-bearing, perennial stream. The re-established wetlands at the bank will increase flood storage, improve water quality, help prevent downstream erosion, and recharge groundwater to supplement low summer flows in the stream. Furthermore, trees and shrubs planted along the tributary to Rock Creek (perennial, fish bearing stream) and buffer will help keep the stream temperature cooler during the hot summer months as well as establish a corridor to adjacent upland areas.

The Service Area of the bank extends to the limits of the rain-dominated mountainous hydrogeologic unit, as determined in developing the *Watershed Characterization of Clark County* (Ecology 2009). This covers the southwest portion of the Lewis River Water Resources Inventory Area (WRIA 27). This Hydrogeologic Unit was classified due to its regional climate, surficial geology, topography (landform), groundwater, and surface flow patterns in relationship to aquatic ecosystems (Stanley *et al*. 2005). Gee Creek and Allen Canyon Creek Watersheds, and the north portion of Mill Creek Sub-watershed are included in the East Fork Lewis River Service Area, and are areas of special consideration. Gee Creek and Allen Canyon Creek Watersheds are located in the Lewis River WRIA (WRIA 27), but they have similar topography and geology to other watersheds in the Salmon/Washougal WRIA (WRIA 28). Conversely, the northern portion of Mill Creek Sub-watershed is located in WRIA 28 but actually drains to the north into WRIA 27. For these reasons, these watersheds are included in the East Fork Lewis River Service Area (as described in *Watershed Characterization of Clark County*, Ecology 2009).

The bank is located in the southeast quarter of Section 23, Township 5 North, Range 2 East of the Willamette Meridian, near La Center, Washington (Sheet 4). All real property to be included within the bank site area (Clark County Tax Parcels 264409000, 264355000, 264413000, 264402000, 264412000, 264411000 and 264352000), as more completely described in the legal description attached in Exhibit A within the MBI, is owned in fee simple by three parties: Perry and Cheryl Gilmour, John Deleganes, and Warren and Sara Sarkinen.

The interagency Mitigation Bank Review Team approved the MBI in the spring of 2011. The MBI was executed by the following agencies on the following dates: Clark County (May 17, 2011), the Washington State Department of Ecology (May 9, 2011) and by the U.S. Army Corps of Engineers (June 6, 2011) that serves as the underlying agreement for the mitigation bank. The MBI defines the terms and conditions relating to the establishment, construction, maintenance and monitoring, and operation of the bank. The MBI contains provisions relating to credit establishment, release, and use upon the bank sponsor meeting specific objective performance standards. The MBI also contains other requirements intended to secure banker's obligations to perform under the MBI. All terms and conditions must be adhered to, for the bank to generate and offer mitigation credits for use.

The East Fork Lewis Mitigation Bank has re-established approximately 100 acres of wetland area and function within the project site. The bank was recently awarded 31.50 mitigation credits for the achievement of performance standards relating to wetland hydrology re-establishment and native wetland habitat community re-establishment (emergent, shrub and forested wetlands) during monitoring Years 1, 3 and 5. The bank has been highly successful in re-establishing both forested and scrub-shrub wetland habitat communities, as well as a diverse native mixture of wet meadow and native emergent wetland habitat communities that are largely free of invasive species. The bank has completed Year 5 of its monitoring program and wetland hydrology and plant communities have been fully established, eliminating the risk of temporal loss or mitigation failure associated with many permittee-responsible mitigation projects. Additionally, because the majority of the bank is primarily wetland re-establishment, the net-loss of wetland area that might occur through permittee responsible mitigation actions such as wetland enhancement, preservation or rehabilitation is eliminated.

Additionally, the 2008 *Compensatory Mitigation for Losses of Aquatic Resources*, *Final Rule* recommends purchasing mitigation bank credits for ecological considerations (lower risk of failure and lower temporal loss of resources and services) and to avoid the maintenance and contingency issues and outright failures that often accompany permittee-responsible mitigation sites. Use of the Bank substantially lowers the risk of failure and temporal loss of resource. Mitigating the impacts offsite at EFLMB will be more meaningful and beneficial to the overall watershed as the goals and objectives for the establishment and success of EFLMB directly address watershed concerns and priorities and correspond in-kind with the mitigation needs of the proposed project. ELS therefore selected to mitigate offsite at EFLMB. As described below, the functional lift anticipated by the Bank will adequately compensate for wetland functions impacted by the proposed project.

WETLAND FUNCTIONS PROVIDED AT MITIGATION BANK

The following is excerpted or paraphrased from the East Fork Lewis Mitigation Banking Instrument (MBI):

> Prior to establishment of the bank, the site consisted of intensely farmed agricultural fields bisected by a series of ditches with groundwater was controlled by an extensive ditch and drain tile system. A Type F stream (tributary to Rock Creek) was historically diverted across (east) the northern portion of the bank site, then turns to flow south along the eastern boundary. The onsite ditches and stream were considered Category IV, riverine flow-through wetlands. A Category III, slope/depressional forested wetland is also located within the narrow strip of land along the western bank boundary that continues offsite to the west.
>
> The primary ecological goals of the East Fork Lewis Wetland Mitigation Bank are as follows:

- Restore wetland hydrology by disabling the extensive ditch and drain tile system currently used to convey water off of the site.
- Establish a variety of native wetland habitat types, comparable to pre-agricultural conditions and in accordance with targeted hydrologic regimes and elevations across the site.
- Control invasive species, including but not limited to, reed canarygrass (*Phalaris arundinacea*) and Himalayan blackberry (*Rubus armeniacus*) across the site.
- Create and enhance wildlife habitat, structure and function of the site.

Grading activities and installation of large woody material and other habitat features at the bank were completed in 2013 and 2014, and plant installation was completed in March 2014.

Water Quality (Removing nutrients, sediment, metals, and toxic organic compounds)

The bank's contributing basin includes rural residences and paved roads that contribute untreated stormwater runoff to the bank site. Because the contributing basin is largely undeveloped, it is expected that future land use in the surrounding area will only increase the level of sediments, nutrients, and toxics that could potentially enter the site. Post-construction wetland functions related to water quality, such as removing sediments, nutrients, metals, and toxic organic substances will significantly increase as vegetation establishes. Specifically, the wetland will store water seasonally and during flood events, slowing and reducing sediment transport, and multiple vegetative classes will filter metals and toxic organic substances and remove nutrients in the increased aerobic conditions. Furthermore, trees and shrubs planted along the tributary to Rock Creek will help keep the stream temperature cooler during the hot summer months.

Hydrology (Reducing peak flows, downstream erosion, and recharging groundwater)

Prior to bank construction, groundwater, runoff, and flood water from the tributary to Rock Creek entering the bank site was quickly and effectively conveyed downstream through the extensive drain tile and ditch system. Disabling drain tiles and plugging ditches allow the site to saturate, creating new wetland area (108+ acres), which significantly increase flood water storage within the watershed. This reduces peak flows downstream of the bank, decreases downstream erosion, and provides groundwater recharge that helps to alleviate low flows downstream of the bank site during the dry season.

Wildlife Habitat (General, invertebrates, amphibians, fish, birds, mammals)

Overall habitat suitability for invertebrates, amphibians, wetland-associated birds, and wetland-associated mammals have improved tremendously over existing conditions of the bank site, specifically because of the increase in wetland area containing a variety of hydroperiods (permanent, seasonal, and occasional inundation and/or saturation), vegetative species richness, habitat interspersion, the habitat features (large woody debris and bird nesting boxes), eventual canopy closure of forested wetland areas, and corridors to adjacent upland areas. Although the site has been designed to exclude resident and anadromous fish to prevent stranding, fish habitat in the onsite ditches and downstream is enhanced because plantings along the tributary to Rock Creek provide temperature regulation and leaf litter. The wetlands also increase groundwater recharge that will supplement low flows during the dry season, and the wetland vegetation improves water quality entering the stream.

ANTICIPATED FUNCTIONAL LIFT

The goal of the bank site is to re-establish high quality wetland and associated wildlife habitat providing for significant overall functional lift. The bank site location within the landscape and its overall design will provide a significant ecological benefit to not only the immediate surrounding area, but throughout a large portion of the watershed. The bank is currently in the establishment period having been planted in spring of 2014. The post-construction bank site will consist of a forested, scrub-shrub, and emergent depressional flow-through wetland system that will contain a seasonal stream and a fish-bearing, perennial stream. A variety of water regimes, vegetation interspersion, and habitat features will provide diverse habitat opportunity for wildlife. The re-established wetlands will also increase flood storage, improve water quality, help prevent downstream erosion, recharge groundwater to supplement low summer flows and keep summer water temperatures cooler, similar to pre-agricultural conditions. The anticipated functional lift post-construction of the bank consists of an overall increase in functions related to habitat, water quality and water quantity.

WETLAND FUNCTIONS NOT MITIGATED AT MITIGATION BANK

Onsite stormwater detention and treatment will mitigate Wetland A's impacted water quality and water quantity functions. Runoff generated from the new imperious surfaces will be collected and conveyed to stormwater facilities for detention and treatment, which will help to recharge groundwater and will provide water quality treatment. All other impacted functions will be compensated at the mitigation bank.

PROPOSED MITIGATION CREDITS

Table 3 below is taken from the East Fork Lewis MBI and lists the recommended credit ratios for purchasing credits based on the impacted resource category.

Table 3. Credits Recommended for Wetland and Buffer Impacts at EFMB

Resource Impact	Bank Credits:Impact Area
Category I Wetland	Case-by-case
Category II Wetland	1.2:1
Category III Wetland	1:1
Category IV Wetland	0.85:1
Critical Area Buffer	Case-by-case

Construction activities will involve directly impacting 0.05 acres of Category IV wetland. Bank credits will be purchased from EFLMB at a 0.85:1 ratio, per Table 3 above. The purchasing of 0.04 credits at the bank will fully compensate for the quality of habitat lost and ensure there is no net loss of ecological function. Table 4 below details the mitigation ratios used to calculate the total number of bank credits needed to compensate for the project impacts.

Table 4. Mitigation Bank Credits Proposed for Project Impacts.

Impact Area	Wetland Category	Impact Amount (ac.)	Mitigation Ratio	Proposed Credit Purchase
Wetland A	IV	0.05	0.85:1	0.0425
Total				**0.04 (rounded)**

CREDIT PURCHASE AND TRANSFER TIMING

The applicant will enter into a Buy/Sell Agreement with East Fork Lewis Mitigation Partners for purchasing mitigation credits as specified in Table 4 above to appropriately mitigate for the proposed project impacts. The actual purchase of credits will occur following permit issuance, and prior to project impacts from the development. In no case shall credits be applied (e.g. debited from the bank) to a receiving (impact) project unless and until permits have been issued for the underlying activity by the agencies with jurisdiction. Nothing in the mitigation credit Purchase Agreement shall be interpreted or construed to permit any activity that otherwise requires a federal, state, and/or local permit.

CONFIRMATION OF MITIGATION CREDIT AVAILABILITY

East Fork Lewis Mitigation Partners, LLC, the Bank Sponsor, has met all the required terms and conditions for the release of mitigation credits from the East Fork Lewis Mitigation Bank. Proof of the current number of available mitigation credits at the East Fork Lewis Mitigation Bank site can be confirmed by approving agency(s) through the Interagency Review Team.

Interagency Review Team contact information:

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Washington Department of Ecology
Shorelands and Environmental Assistance Program
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Olympia, WA 98504
(360) 407-6749
kate.thompson@ecy.wa.gov

Suzanne Anderson
US Army Corps of Engineers
Regulatory Branch, Seattle District
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Seattle, WA 98124
206-764-3708
Suzanne.L.Anderson@usace.army.mil

REFERENCES

Castelle, A.J., C. Conolkly, M. Emers, E.D. Metz, S. Meyer, M. Witter, S. Mauermann, T. Erickson, and S.S. Cooke. 1992. *Wetland Buffers: Use and Effectiveness*. Publ. 92-10. Adolfson Assoc., for Shorelands and Coastal Zone Manage. Program, Washington Department of Ecology, Olympia, WA.

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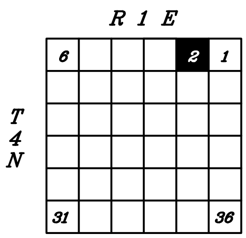
SHEET SET

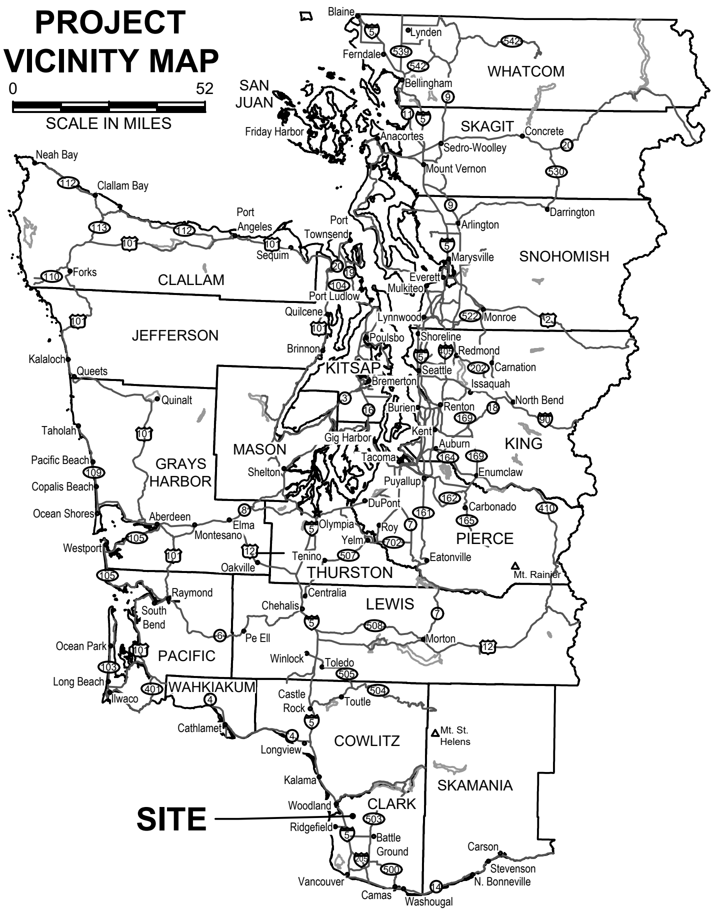
WASHINGTON

Latitude: 45.8620°
Longitude: -122.6487°

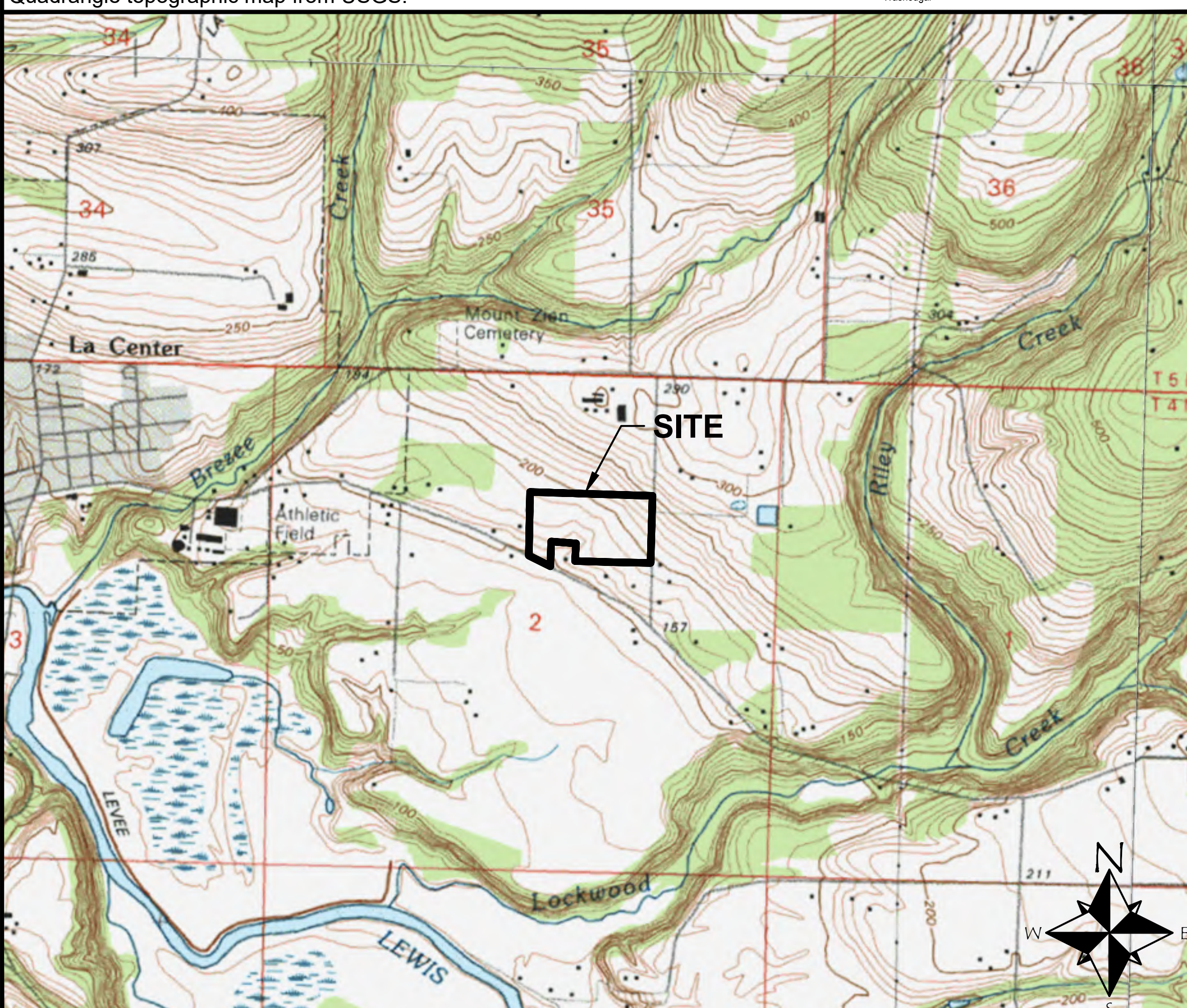
LOCATION MAP



PROJECT VICINITY MAP



NOTE:
Quadrangle topographic map from USGS.



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SCALE IN FEET

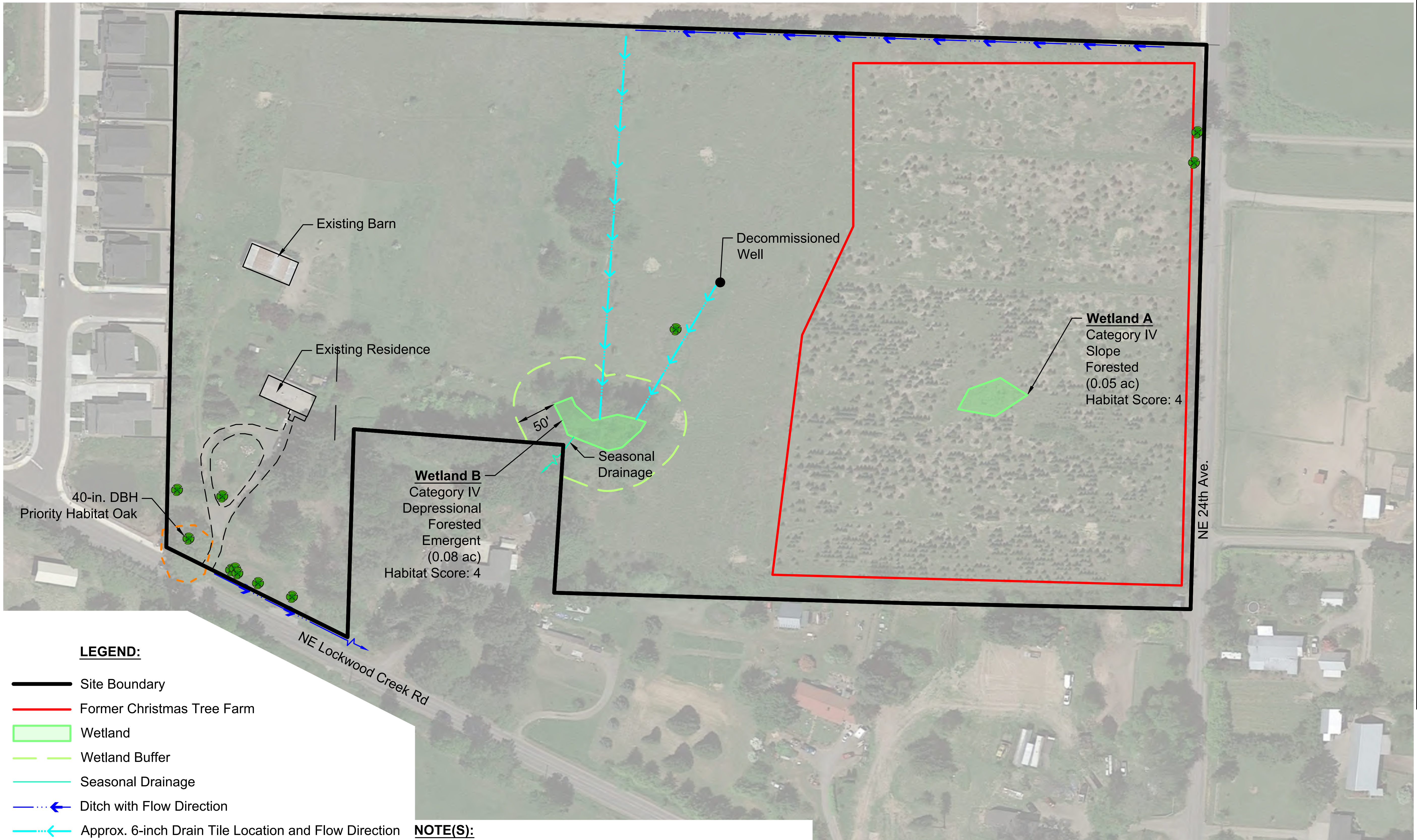
PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 1 **OF** 5
DATE: 11/2/21

VICINITY MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



LEGEND:

- Site Boundary
- Former Christmas Tree Farm
- Wetland
- Wetland Buffer
- Seasonal Drainage
- Ditch with Flow Direction
- Approx. 6-inch Drain Tile Location and Flow Direction
- Pavement/Gravel
- Oak Tree
- Oak Tree Dripline (0.10 ac)
- TP-1 ● Test Plot Location
- Continues Offsite

NOTE(S):

1. Aerial from May 2019 Google Earth™.
2. Wetlands, test plots, and oak trees were mapped by an ELS Biologist using a hand-held GPS unit with submeter accuracy.
3. Wetland A is exempted from La Center buffers per LCMC 18.300.090(5)(d) Exempted Wetlands.

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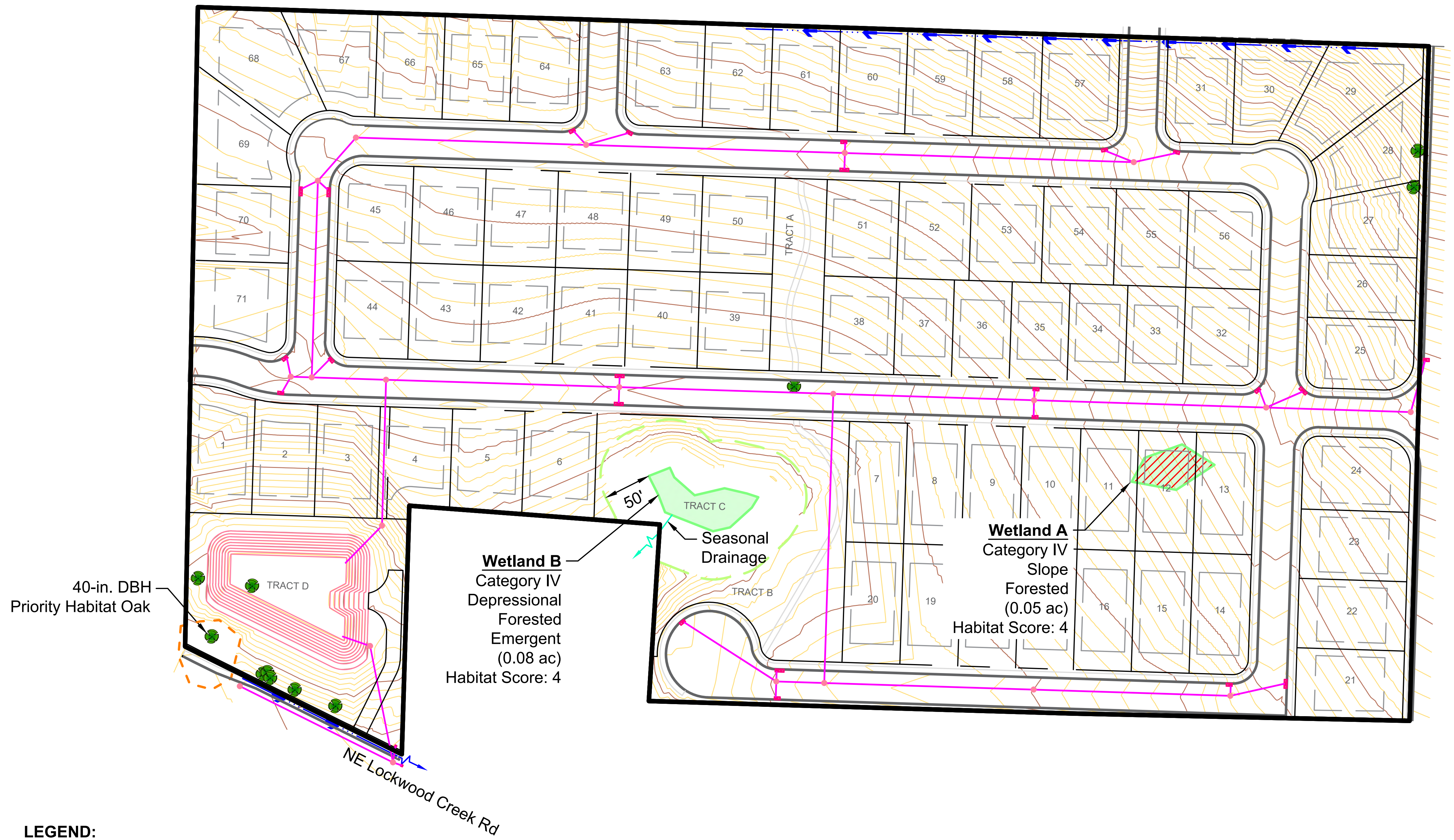
SCALE IN FEET

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 2 **OF** 5
DATE: 11/2/21

EXISTING CONDITIONS
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



LEGEND:

Site Boundary	Proposed Edge of Asphalt
Wetland	Proposed Property Boundary
Wetland Buffer	Proposed Building Envelope
Seasonal Drainage	Proposed Stormwater Pond
Ditch with Flow Direction	Proposed Storm Pipe
Oak Tree	Proposed Wetland Impacts (0.05 ac.)
Oak Tree Dripline (0.10 ac)	Proposed 1' Contours
Continues Offsite	Proposed 5' Contours

NOTE(S):

1. Wetlands, test plots, and oak trees were mapped by an ELS Biologist using a hand-held GPS unit with submeter accuracy.
2. Wetland A is exempted from La Center buffers per LCMC 18.300.090(5)(d) Exempted Wetlands.
3. Site plan provided by PLS Engineering.

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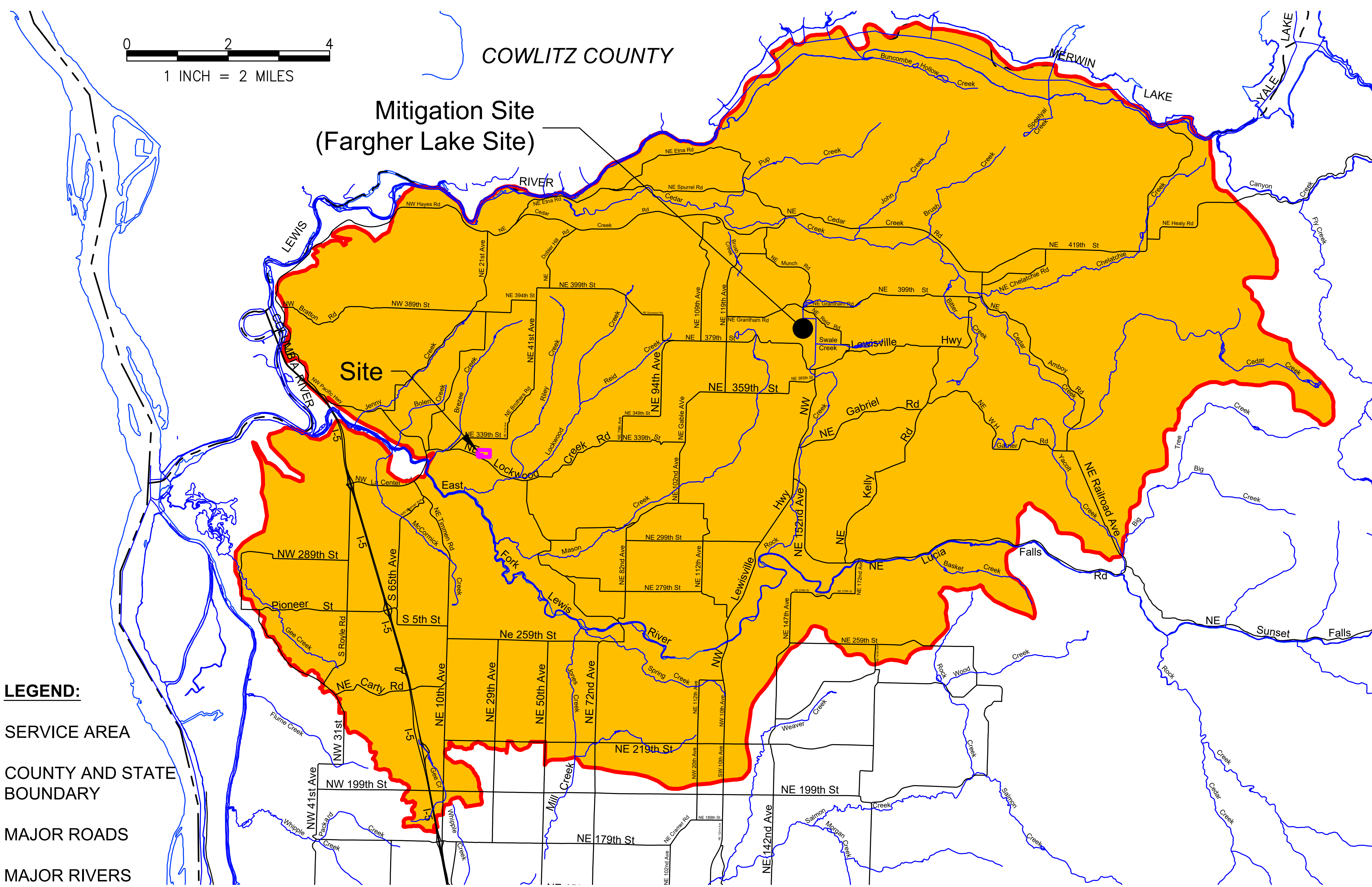
SCALE IN FEET

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 3 **OF** 5
DATE: 11/2/21

PROPOSED CONDITIONS
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371



LEGEND:

SERVICE AREA

COUNTY AND STATE BOUNDARY

MAJOR ROADS

MAJOR RIVERS AND STREAMS

NOTES:

1. STATE, COUNTY, ROADS, RIVERS AND STREAM BOUNDARIES FROM ECOLOGY WEBSITE: http://www.wsdot.wa.gov/mapsdata/geodatacatalog/default.htm
2. SERVICE AREA BOUNDARY BASED ON MAP PREPARED BY STEPHEN STANLEY WETLAND RESTORATION BIOLOGIST WASHINGTON DEPARTMENT OF ECOLOGY SEA PROGRAM.
3. MAP PREPARED BY ECOLOGICAL LAND SERVICES, INC., DECEMBER, 2007 AND JANUARY, 2010.

PURPOSE: Wetland Fill

DATUM: NAD83

ADJACENT PROPERTY OWNERS: See JARPA

East Fork Lewis River Mitigation Bank Service Area

APPLICANT: PLS Engineering

PROJECT NAME: Lockwood Meadows Subdivision

REFERENCE #: NWS-2020-1015

SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PROPOSED: Residential subdivision

IN Wetland

NEAR: La Center

COUNTY: Clark **STATE:** WA

SHEET 4 **OF** 5

DATE: 11/2/21

ECOLOGICAL LAND SERVICES, INC.
1157 3rd Avenue, Suite 220
Longview, WA 98632

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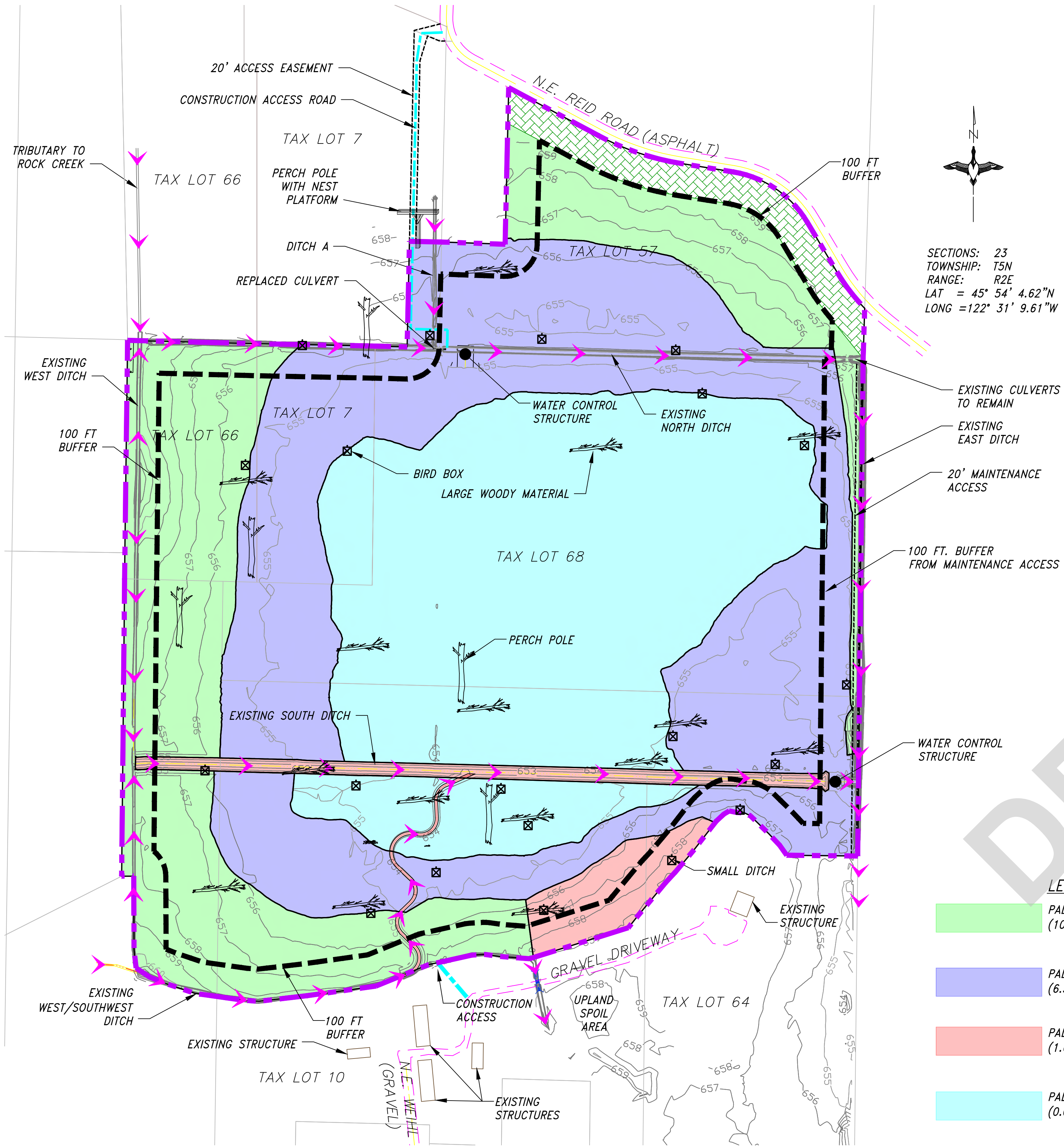

Habitat Features	
Type	*Amount*
Large woody material assemblage/root wad/downed log/perch pole	15
Standard nest box/nest platform/wood duck nest box/purple martin next house/bat box	21

Existing Conditions	Mitigation Bank Site Total (acres)	Area in Bank Buffer (acres)	Creditable Area (acres)
Upland Ag	107.96	16.65	--
Forested Upland	3.63	3.63	--
Palustrine Forested Wetland	0.39	0.39	--
Palustrine Emergent Wetland (includes all existing ditches on site)	1.28	0.28	--
Total Existing Conditions	**113.26**	**20.95**	--

Proposed Conditions	Mitigation Bank Site Total (acres)	Area in Bank Buffer (acres)	Creditable Area (acres)
Palustrine Forested Wetland (reestablishment)	27.80	10.09	17.71
Palustrine Scrub-Shrub Wetland (reestablishment)	17.86	2.70	15.16
Palustrine Scrub Shrub/Emergent Transition Wetland (reestablishment)	22.55	1.89	20.66
Palustrine Emergent Wetland Variant (reestablishment)	3.09	1.57	1.52
Palustrine Emergent Wetland (reestablishment)	36.90	0.81	36.09
South Ditch Palustrine Emergent Wetland (enhancement)	0.29	0	0.29
North Ditch Non-Creditable Area	0.43	0.26	0
East Ditch/Maintenance Access Non-Creditable Area	0.71	0	0
Upland Forest	3.63	3.63	0
Total Bank Site Area 113.26	**113.26**	**20.95***	**91.43****

*Does not include 0.71 acres of East Ditch/maintenance access which is considered non-creditable and not part of the buffer.

**Does not include 0.17 acres of the North Ditch which is considered non-creditable.

LEGEND

- PALUSTRINE FORESTED WETLAND (27.93 AC) (10.15 AC IN BANK BUFFER)
- PALUSTRINE SCRUB-SHRUB WETLAND (39.23 AC) (6.59 AC IN BANK BUFFER)
- PALUSTRINE EMERGENT WETLAND VARIANT (4.61 AC) (1.66 AC IN BANK BUFFER)
- PALUSTRINE EMERGENT WETLAND REESTABLISHMENT (38.32 AC) (0.00 AC IN BANK BUFFER)
- FORESTED UPLAND (3.63 AC) (3.63 AC IN BANK BUFFER)
- SITE BOUNDARY (113.26 AC)
- LOT BOUNDARY
- BUFFER (20.95 AC)
- EXISTING CULVERTS
- DESIGN WATER SURFACE ELEVATION = 654.8
- MAJOR CONTOURS
- MINOR CONTOURS
- FLOW ARROWS
- SWALE

NOTES:

1. Base map prepared by Ducks Unlimited.
2. Planting area boundaries mapped with a hand-held GPS unit with ≥ 3-foot accuracy.
3. Plants were installed in Spring 2014 by Tree Management Plus.

EAST FORK LEWIS MITIGATION BANK SITE DESIGN

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark
STATE: WA
SHEET 5 **OF** 5
DATE: 11/2/21

APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

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SCALE IN FEET

Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371

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APPENDIX A: US ARMY CORPS OF ENGINEERS WETLAND BOUNDARY VERIFICATION (MARCH 31, 2021)

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, SEATTLE DISTRICT
P.O. BOX 3755
SEATTLE, WASHINGTON 98124-3755

Regulatory Branch March 31, 2021

Ms. Susanna Hung
701 Columbia Street, Unit 414
Vancouver, Washington 98660

Reference: NWS-2020-1015
Hung, Susanna
(Wetland Boundary
Verification)

Dear Ms. Hung:

On November 10, 2020, Ms. Miranda Adams of Washington Department of Ecology (Ecology) inspected the property at 2000 Northeast Lockwood Creek Road, La Center, Clark County, Washington, in response to your request for verification of wetland boundaries in the review area. The U.S. Army Corps of Engineers (Corps) has reviewed the findings by Ecology and have determined the wetland boundaries shown on the enclosed drawings dated March 24, 2021, accurately identify the extent of wetlands in the review area. This verification of wetland boundaries only applies to the wetland boundary and does not apply jurisdiction status of the wetland. Other waters and wetlands that may occur on this property outside the review area are not the subject of this review. This confirmation of wetland boundaries is valid for a period of five years from the date of this letter unless new information warrants revisions of the determination.

To document the extent of the Corps jurisdiction over the project and if you request, we can proceed with an approved jurisdictional determination (AJD), which is an official determination regarding the presence or absence of waters of the U.S. If one is requested, please be aware that I may require the submittal of additional information. Depending on our determination, we may have to coordinate with the U.S. Environmental Protection Agency on our findings before making an official determination. An AJD is appealable and is most often requested when a project proponent questions the Corps' jurisdiction or the extent (boundaries) of jurisdictional waters. I will <u>not</u> be able to process a permit request until the AJD determination is final.

You can request a preliminary jurisdictional determination (PJD), which is a written indication that waters on the property may be waters of the United States. Such waters will be treated as jurisdictional waters of the U.S. for purposes of evaluating a permit request. While a preliminary JD is not appealable, the property owner can, at any time, request an approved JD for the site. The PJD is most often used in instances where a project proponent just wants to move ahead with the permit process without further delay.

A copy of this letter with drawings will be furnished to Ms. Annie Jean Rendleman, Ecological Land Services, Incorporated at anniejean@eco-land.com. If you propose to do any work in the areas identified to be wetlands, you should contact our office prior to commencing work to determine permit requirements. If you have any questions, please contact me at james.h.carsner@usace.army.mil or (206) 316-3047.

Sincerely,

James H. Carsner

James H. Carsner.
Senior Project Manager
Regulatory Branch

Enclosures

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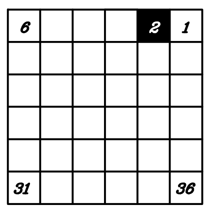
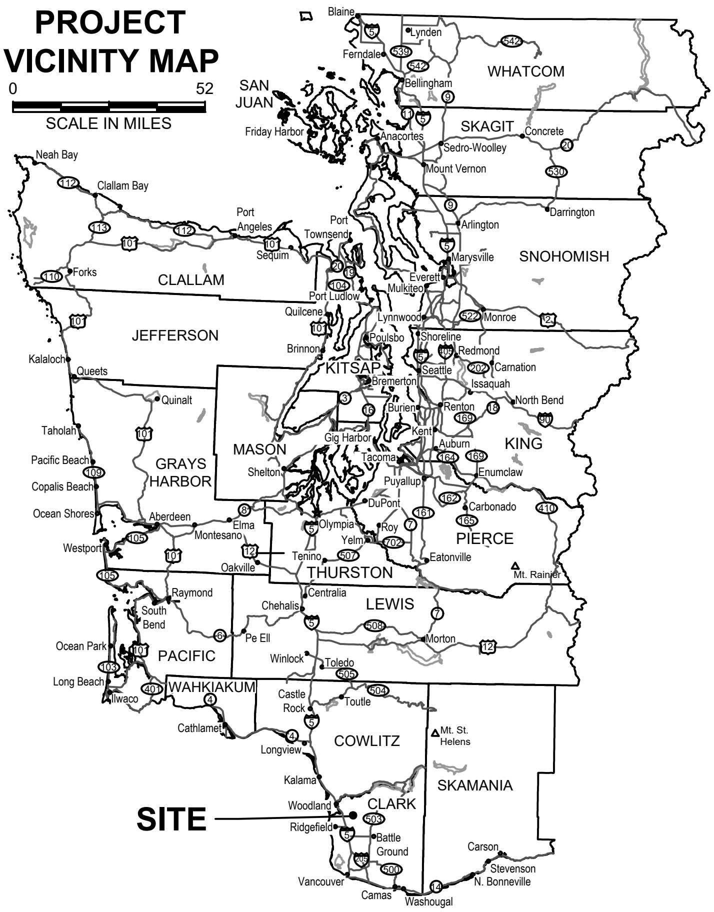
WASHINGTON

Latitude: 45.8620°
Longitude: -122.6487°

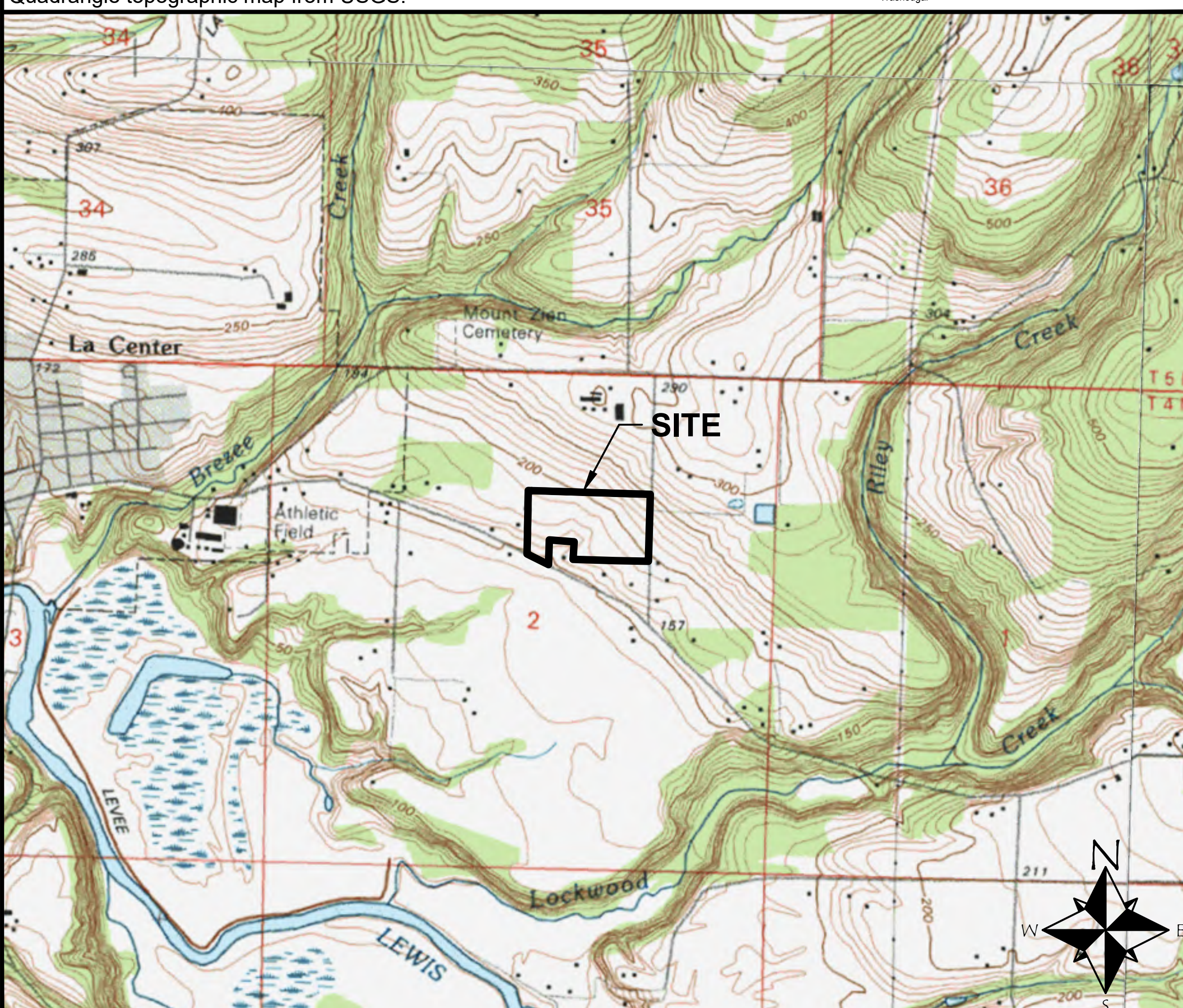
LOCATION MAP



PROJECT VICINITY MAP



NOTE:
Quadrangle topographic map from USGS.



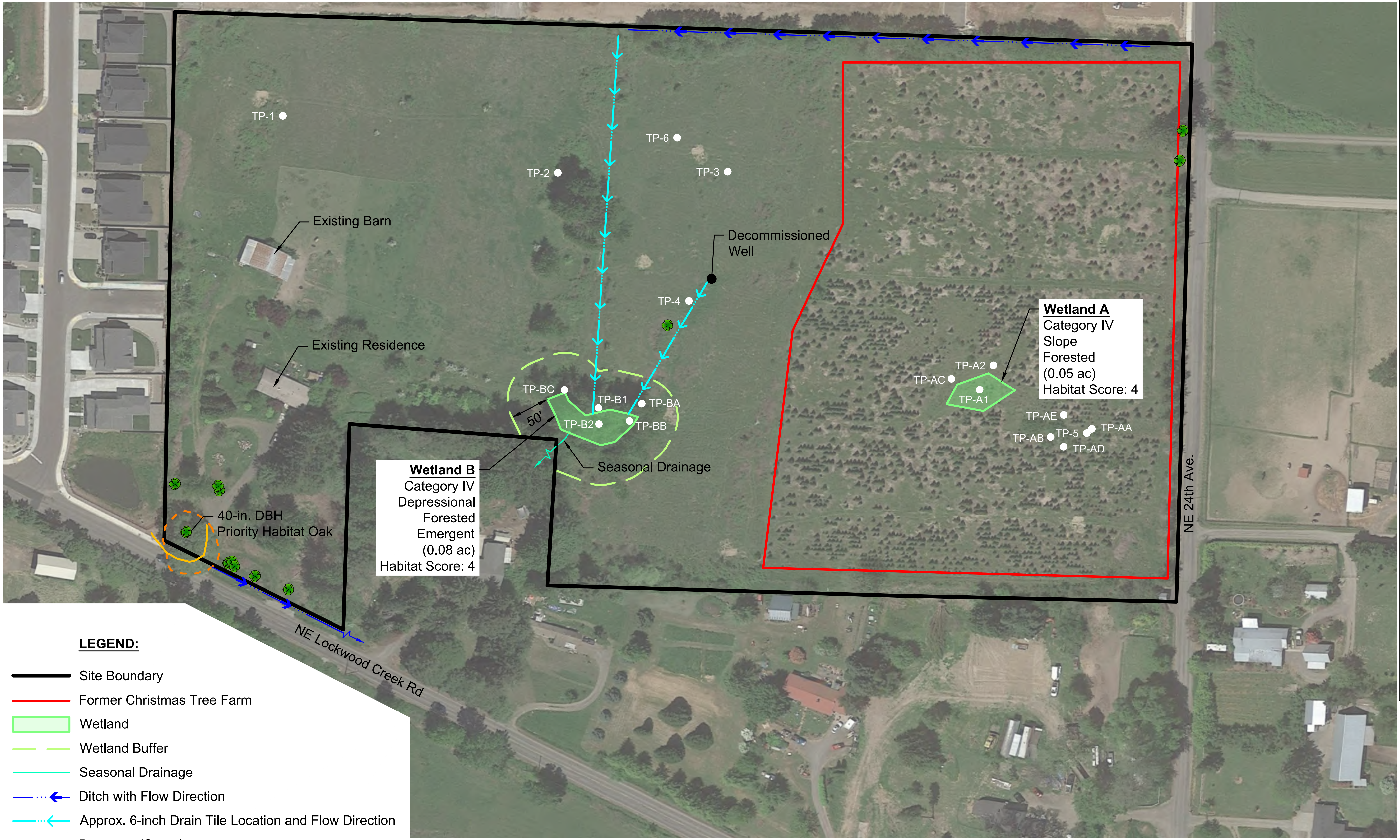
PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 1 **OF** 2
DATE: 3/24/21

VICINITY MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

0 2000 4000
SCALE IN FEET

1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371
Ecological Land Services



LEGEND:

- Site Boundary
- Former Christmas Tree Farm
- Wetland
- Wetland Buffer
- Seasonal Drainage
- Ditch with Flow Direction
- Approx. 6-inch Drain Tile Location and Flow Direction
- Pavement/Gravel
- Oak Tree
- Oak Tree Dripline (0.10 ac)
- TP-1 ● Test Plot Location
- Continues Offsite

NOTE(S):

1. Aerial from May 2019 Google Earth™.
2. Wetlands, test plots, and oak trees were mapped by an ELS Biologist using a hand-held GPS unit with submeter accuracy.
3. Wetland A is exempted from La Center buffers per LCMC 18.300.090(5)(d) Exempted Wetlands.

0 120 240
SCALE IN FEET

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark
STATE: WA
SHEET 2 OF 2
DATE: 3/24/21

SITE MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

Ecological Land Services
1157 3rd Ave., Suite 220A
Longview, WA 98632
Phone: (360) 578-1371

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Exhibit A.19

CRITICAL AREAS REPORT

March 24, 2021



Lockwood Meadows Subdivision

La Center, Washington

Prepared for

PLS Engineering

604 W. Evergreen Blvd.

Vancouver, Washington 98660

(360) 944-6519

Prepared by

Ecological Land Services

1157 3rd Avenue, Suite 220A • Longview, WA 98632

(360) 578-1371 • Project Number 2245.14

NWS-2020-1015

SIGNATURE PAGE

The information and data in this report was compiled and prepared under the supervision and direction of the undersigned.

Annie Jean Rendleman
Biologist

TABLE OF CONTENTS

INTRODUCTION

Ecological Land Services, Inc. (ELS) has completed this critical areas report on behalf of PLS Engineering for the purpose of constructing a residential subdivision. The project site consists of Clark County Parcel 209113-000 located at 2000 NE Lockwood Creek Road in La Center, Washington. The site is located within the southeast portion of Section 10, Township 3 North, and Range 2 East of the Willamette Meridian (Sheet 1). This report discusses onsite critical areas in accordance with *La Center Municipal Code (LCMC) Title 18 Development Code* (December 2020).

Project History

- ELS conducted a broad-scope assessment of the site March of 2020.
- ELS delineated wetlands and mapped critical areas September 8, 2020.
- During a site visit with Miranda Adams (Department of Ecology) on November 10, 2020, the Wetland A boundary was confirmed. Five additional test plots were taken near Wetland A to further support the delineation (TPs AA – AE). The pond area was also re-delineated (Wetland B), encompassing a larger area than what was originally outlined. Three additional test plots were taken to support the Wetland B delineation.
- ELS collected additional data from test plots made during the November site visit with Ecology, as well as TP-6, on February 24, 2021.

SITE DESCRIPTION

The project site can be accessed from the southwest via NE Lockwood Creek Road. The 20-acre site is zoned Urban Holding (UH-10) and currently has a single-family residence, barn, and existing well. NE Lockwood Creek Road abuts the southeastern portion of the site and NE 24th Avenue abuts the site to the east. The site is surrounded by high-density subdivision lots to the north and west, and low-density single-family parcels to the south (Sheet 2).

The majority of the site consists of mowed field grasses with scattered trees, including Oregon white oaks (*Quercus garryana*). The eastern portion of the site is a decommissioned Christmas tree farm. The site contains two Category IV wetlands and one priority habitat Oregon white oak (Sheet 2).

Site History

General

The property has been used as both a hobby and commercial farm operation for several decades that included agricultural activities such as livestock, hay, and Christmas tree production, as well as rental pasture and barn stalls for horses. The Christmas trees were grown on a third-party lease arrangement and the last selective tree harvest occurred during the winter of 2020/2021. Site feature and recent maintenance activities performed in the past two years are discussed below.

Ditch Maintenance

The ditch along the north property boundary appears to have been installed circa 2005, according to aerial imagery (Clark County GIS). The owner at that time was concerned about future development activities upslope releasing uncontrolled stormwater onto the property. The ditch funneled seasonal flow (only in winter) to a swale underlaid by a 4-inch perforated flex pipe (drain tile shown on Sheet 2). The tile drains south to Wetland B, which was excavated to serve as a livestock water pond between 2000 and 2002. In the past two years, the property line ditch was cleaned to original depth and the swale had minor maintenance performed by cleaning deposited silt. As the 4-inch pipe below the swale was plugged in places, it was replaced with a 6-inch flex pipe. The increased pipe size was intended to account for stormwater discharge volumes from upslope developments. Care was taken to daylight the downstream end of the pipe in the Wetland B area (pond) in a flat spot to avoid erosive flows during high rainfall events.

Well Maintenance

An existing hand-dug well, approximately three feet in diameter with a partial brick well casing, is located northeast of Wetland B. The well was a potential falling hazard, as it was previously unmarked. The well perked water to the surface during high ground water events and saturated the immediate downslope area making it further hazardous, as the well casing could slough. As part of the recent maintenance work, the farm contractor filled the well and collapsed the vertical sides to prevent cave-ins and for the site's overall safety. A 4-inch drainpipe was installed downslope of the well to ensure that water no longer saturated the surface area during high groundwater events. The pipe also drains to Wetland B.

Blackberry Removal on Dam

The old pond (Wetland B) was originally constructed by building an earthen dam across the swale before it exited the property toward the south. The dam was overgrown with Himalayan blackberries (*Rubus armeniacus*) and there was evidence of erosion on the downstream side of the dam where the old pond drainpipe went through the dam. This risked a complete dam failure and subsequent downstream damage to a neighboring home and property. The farm contractor removed the blackberries on the dam, removed the pipe, and cut an overflow swale that is open and has gradual grades, to allow water to exit the pond. This prevents high water events from flooding the pond and threatening downstream properties with a dam blow-out.

Noxious Weed Removal

The western portion of the site previously had internal fences. Recent maintenance in this area included removal the internal fences as well as some tree removal, in order to aid in annual mowing, either for hay production or, at minimum, for weed mowing. After horses were removed, there was an infestation of County-listed noxious weeds Canada thistle (*Cirsium arvense*) and tansy ragwort (*Jacobaea vulgari*s) that has since and is currently being routinely maintained with mowing and spraying.

METHODOLOGY

Wetlands

The wetland delineation followed the Routine Determination Method according to the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)* (Corps 2010).

The Routine Determination Method examines three parameters—vegetation, soils, and hydrology—to determine if wetlands exist in a given area. Hydrology is critical in determining what is wetland, but is often difficult to assess because hydrologic conditions can change periodically (hourly, daily, or seasonally). Consequently, it is necessary to determine if hydrophytic vegetation and hydric soils are present, which would indicate that water is present for a long enough duration to support a wetland plant community. By definition, wetlands are those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are regulated as "Waters of the United States" by the Corps, as "Waters of the State" by the Washington Department of Ecology (Ecology), and locally by the City of La Center.

ELS biologists completed fieldwork on September 8, 2020 and February 24, 2021 to determine the presence or absence of critical areas and if present, to map their approximate locations. Prior to conducting the initial fieldwork, an ELS biologist reviewed current and historic aerial photographs dating back to 1955 and reviewed the Clark County GIS database (2020) for information regarding soils, topography, wetlands, and habitat conservation areas. ELS biologists collected vegetation, soil, and hydrology information from 18 test plots to determine the presence or absence of wetlands onsite (Sheet 2). Test plot locations were determined based on changes in elevation, vegetation, the presence of hydrology, and according to potential wetland signatures based on an interpretation of aerial imagery. ELS biologists flagged the test plots and wetland boundaries in the field and recorded the locations with a hand-held GPS unit with sub meter accuracy under ideal conditions.

Wetland signatures were observed on aerial imagery within the tree farm area. Wetland A was delineated within a wet signature area in September, and the delineation was supported with several additional test plots in the vicinity during the site visit with Ecology. Wetland A was delineated primarily using vegetation: Pennyroyal (*Mentha pulegium*, OBL), creeping St. John's wort (*Hypericum anagalloides*, OBL), and soft rush (*Juncus effusus*, FACW) were observed within the wetland boundary. Additionally, oxeye daisy (*Leucanthemum vulgare*, FACU) and Himalayan blackberry (FAC) were observed outside of the wetland. Black cottonwood (*Populus balsamifera*, FAC) trees and shrubs are established within Wetland A as well as the area southeast of the wetland. Several test plots were taken in the signature southeast of the wetland (Sheet 2). These test plots contained similar vegetation as Wetland A, but soils were not hydric. Additionally, during the February site visit, standing water was not observed in these areas, but was observed within the wetland.

Wetland B was delineated with Ecology based on changes in vegetation, soils, and hydrology. The permanently ponded portion of the wetland is dominated by black cottonwood and Scouler's willow (*Salix scouleriana*, FAC) and the remainder of the wetland is dominated by creeping buttercup (*Ranunculus repens*, FAC) and mowed grass with some Himalayan blackberry. Hydric soils were observed within Wetland B, including the hydric soil indicator Hydrogen Sulfide (A4). Soils in the wetland buffer contained depleted matrices relatively deeper in the soil with little to no redoximorphic features (1 percent or less). During the follow-up fieldwork in February, less than an inch of standing water was observed at TP-BB, but not outside the wetland boundary.

VEGETATION

The indicator status, following the scientific names indicate the likelihood of a plant species to be established in wetlands. Listed from most likely to least likely, the indicator status categories are:

- **OBL** (obligate wetland) - occur almost always under natural conditions in wetlands.
- **FACW** (facultative wetland) - usually occur in wetlands, but occasionally found in non-wetlands.
- **FAC** (facultative) - equally likely to occur in wetlands or non-wetlands.
- **FACU** (facultative upland) - usually occur in non-wetlands, but occasionally found in wetlands.
- **UPL** (obligate upland) - occur almost always under natural conditions in non-wetlands.
- **NI** (no indicator) - insufficient data to assign to an indicator category.

Wetlands

Wetland A is a forested slope located within the decommissioned tree farm in the eastern portion of the site. Wetland B is forested depressional wetland located in the central southern portion of the site. Wetland A is dominated by **grasses**: sweet vernal grass (*Anthoxanthum odoratum*, FACU), velvet grass (*Holcus lanatus*, FAC), and soft rush (FACW); and **trees**: black cottonwood (FAC) and planted Nordmann fir (*Abies nordmanniana*, assumed to be FACU).

Wetland B is dominated by **herbs**: chickweed (*Stellaria media*, FACU), marsh cudweed (*Gnaphalium uliginosum*, FAC), marsh willowherb (*Epilobium palustre*, OBL), and creeping buttercup (FAC); and **trees**: black cottonwood and Scouler's willow (FAC).

Uplands

Onsite uplands within the field areas were dominated by **herbs and grasses**: sweet vernal grass, colonial bentgrass (*Agrostis capillaris*, FAC), tall fescue (*Schedonorus arundinaceus*, FAC), orchard grass (*Dactylis glomerata*, FACU), and English plantain (*Plantago lanceolata*, FACU); with scattered **shrubs**: Himalayan blackberry and **trees**: Oregon white oak and black cottonwood. The tree farm portion of the site is dominated by **grasses**: sweet vernal grass and colonial bentgrass; and **trees**: Nordmann fir and black cottonwood (Wetland A vicinity only). Regularly mowed Himalayan blackberry is also scattered throughout the tree farm area.

SOILS

Soil onsite is mapped as:

- Gee silt loam, 0 to 8 percent slopes (GeB),
- Gee silt loam, 8 to 20 percent slopes (GeD),
- Hillsboro silt loam, 0 to 3 percent slopes (HoA),
- Hillsboro silt loam, 8 to 15 percent slopes (HoC), and
- Odne silty clay loam, 0 to 3 percent slopes (OdB),

as referenced on the Natural Resources Conservation Service (NRCS) website (2020; Sheet 4).

Gee silt loam, 0 to 8 percent slopes and Gee silt loam, 8 to 20 percent slopes are characterized as moderately well-drained soils with an approximate depth to water table of about 24 to 48 inches below ground surface (BGS). These soils are generally found on terraces. A typical profile consists of silt loam from 0 to 22 and silty clay loam from 22 to 60 inches BGS.

Hillsboro silt loam, 0 to 3 percent slopes and Hillsboro silt loam, 8 to 15 percent slopes are characterized as well-drained soils with an approximate depth to water table of more than 80 inches BGS. These soils are generally found on terraces. A typical profile consists of silt loam from 0 to 60 inches BGS.

Odne silty clay loam, 0 to 3 percent slopes is characterized as a poorly-drained soil with an approximate depth to water table of about 0 to 18 inches BGS. This soil is generally found on terraces and drainageways. A typical profile consists of ashy silt loam from 0 to 5, silt loam from 5 to 33, and loam from 33 to 60 inches BGS. Odne silty clay loam, 0 to 3 percent slopes is listed as a hydric soil on the *Washington State Hydric Soils List* (NRCS 2019).

Wetland test plots met primary hydric soil indicators Hydrogen Sulfide (A4), Depleted Below Dark Surface (A11), and Depleted Matrix (F3). Soil data from the test plots can be found in Appendix A.

HYDROLOGY

Precipitation data were gathered from the Battle Ground WETS Station and are summarized in the table below from data in Appendix C. Rainfall was below the 30-year monthly average in July and October and was above the 30-year monthly average in June, September, January, and February. In August, November, and December, rainfall did not deviate from the 30-year monthly average. February received 88 percent of its normal rainfall by the day of the site visit on February 24th.

Table 1. Precipitation Data.

Field-work Dates	Precipitation (inches)						
	Prior 14 Day Total	3 Months Prior		30 Year Monthly Average	Deviation from 30 Year Monthly Average	30% Below	30% Above
		Month	Monthly Total				
2/24/21	3.19	02/2021	6.69	5.36	+1.33	3.65	6.40
		01/2021	9.70	7.31	+2.39	5.70	8.45
		12/2020	7.10	7.98	-0.88	6.33	9.18
11/10/20	2.19	11/2020	8.51	7.67	+0.84	5.50	9.06
		10/2020	2.59	4.81	-2.22	3.29	5.74
		09/2020	2.69	2.20	+0.49	1.12	2.65
9/8/2020	0.00	08/2020	0.44	0.80	-0.36	0.37	0.94

Field-work Dates	Precipitation (inches)						
	Prior 14 Day Total	3 Months Prior		30 Year Monthly Average	Deviation from 30 Year Monthly Average	30% Below	30% Above
		Month	Monthly Total				
		07/2020	0.18	0.63	-0.45	0.23	0.70
		06/2019	3.88	2.31	+1.57	1.61	2.75

Oxidized Rhizospheres on Livings Roots (C3) were observed within Wetland A test plots in September and November, and Surface Water (A1), High Water Table (A2), and Saturation (A3) were observed within Wetland A in February. The secondary hydrology indicator Saturation Visible on Aerial Imagery (C9) was also noted during September fieldwork, due to the wet signatures discussed in the *Methodology* section above.

Oxidized Rhizospheres on Livings Roots (C3) were observed within Wetland B test plots during each site visit, and Surface Water (A1), High Water Table (A2), Saturation (A3), and Hydrogen Sulfide Odor (C1) were observed within Wetland B in February. The recorded hydrological data from test plots are in Appendix A.

According to the Washington Department of Natural Resources Stream Type Map (WDNR 2020), a Type Ns stream is mapped onsite, flowing south through the center of the site (Sheets 5 and 6). The Type Ns stream is mapped originating approximately 700 feet offsite to the north, through the center of the site, and continuing offsite southwesterly for another 975 feet before a water type break (Sheet 6). From there, the Type F stream continues southwest for approximately 0.5 miles before reaching a wetland adjacent to East Fork Lewis River. The site lies within Water Resource Inventory Area (WRIA) 27 Lewis and Hydrologic Unit Code (HUC) 170800020507 Lockwood Creek – East Fork Lewis River.

ELS biologists did not observed flowing water, nor any signs of a waterbody in the onsite mapped area onsite. According to *LCMC 18.300.030 Definitions*, “streams” are defined as “those areas where surface waters produce a defined channel or bed excluding streams and lakes regulated under the State Shorelines Management Act.” The presence of a stream can be indicated by either hydraulically sorted sediments or by the removal of vegetation from the action of moving water. Photos 7 and 8 show the onsite mapped area, which does not feature a channel, bed, bank, or signs of regular water flow, seasonal or otherwise. An ordinary high water mark (OHWM) could not be delineated because, although slight changes in topography were present, the area does not exhibit changes in vegetation or sediment. Test plots located along the mapped riparian area (TPs 3, 4, and 6) did not contain hydric soils, nor hydrologic indicators. Therefore, ELS has determined that the mapped stream does not meet stream criteria.

WETLAND INVENTORY

The National Wetlands Inventory (NWI 2020) shows a palustrine wetland in the vicinity of Wetland A, and Wetland B is not mapped (Sheet 7). The NWI and Clark County Inventory (Clark

County GIS 2020) show an offsite wetland north of the site, aligned with the Type Ns stream mapping. ELS findings differ somewhat from the mapped critical areas, as an additional wetland was delineated in the southern portion of the site (Wetland B). Wetland inventory maps should be used with discretion, as they are typically used to gather wetland information about a region and, because of the large scale necessary for regional mapping, are limited in accuracy for localized analyses.

CRITICAL AREAS SUMMARY

Wetlands

Two wetlands (Wetlands A and B) were delineated onsite based on topography and soil, vegetative, and hydrologic indicators. The wetland determination data forms are in Appendix A and the wetland rating forms are in Appendix B. Table 2 summarizes the onsite wetlands. All wetland buffers were designated assuming high land use intensity.

Wetland A

Wetland A is a Category IV forested, slope wetland located near the center of the decommissioned tree farm, totaling 0.05 acres (Sheet 2). Wetland A receives most of its hydrology from a seasonally high groundwater table, precipitation, and surface runoff from surrounding uplands. The wetland is saturated only and functions to recharge groundwater. According to the *Washington State Wetland Rating System for Western Washington: 2014 Update* (rating system), Wetland A is a Category IV wetland scoring 5 points for water quality functions, 5 points for hydrologic functions, and 4 points for habitat functions with a total of 14 points. According to *LCMC 18.300.090(5)(d) Exempted Wetlands*, Wetland A is exempted from La Center buffer regulations.

Wetland B

Wetland B is a Category IV emergent and forested, depressional wetland located in the central southern portion of the site, totaling 0.08 acres (Sheet 2). The wetland receives it hydrology from groundwater and precipitation. Wetland B is permanently flooded and saturated only and functions to recharge groundwater. According to the rating system, Wetland B is a Category IV wetland scoring 5 points for water quality functions, 6 points for hydrologic functions, and 4 points for habitat functions with a total of 15 points. The designated buffer width for a Category IV wetland with a habitat score of 4 is 50 feet, as listed in *LCMC Table 18.300.090(5)(i)(i)-1*.

Table 2. Wetland Summary.

Wetland	Category[1]	HGM Class[2]	Cowardin Class[3]	Habitat Score	Wetland Area (ac.)	Buffer[4] (ft.)
A	IV	Slope	Forested	4	0.05	Exempted[5]
B	IV	Depressional	Emergent, Forested	4	0.08	50

[1] *Hruby 2014*
[2] *NRCS 2008*
[3] *Cowardin et al. 1979*
[4] *LCMC Table 18.300.090(5)(i)(i)-1*
[5] *LCMC 18.300.090(5)(d)*

Oregon White Oaks

According to *LCMC 18.300.090(2) Fish and Wildlife Conservation Areas*, oaks are considered a priority habitat by the Washington Department of Fish and Wildlife (WDFW) and locally by the City of La Center. In urban or urbanizing areas west of the Cascades, WDFW defines priority oak habitat as single oaks, or stands of pure oak, or oak/conifer associations, 1 acre or greater in size (2008). WDFW may also consider individual Oregon white oak trees a priority habitat when found to be particularly valuable to wildlife (i.e., contains many cavities, has a large diameter at breast height (DBH), is used by priority species, or has a large canopy) (Larsen and Morgan, 1998). WDFW recommendation is that in urban and urbanizing areas, single trees should be maintained if they are deemed important to species highly associated with Oregon white oak. Oaks and their associated floras comprise distinct woodland ecosystems with various plant communities providing valuable habitat that contributes to wildlife diversity; Oak woodlands provide a mix of feeding, resting, and breeding habitat for many wildlife species (Larsen and Morgan, 1998). WDFW considers oak trees with a DBH of greater than 20 inches to be large and greater than 12 inches to be medium.

Fifteen small oaks were observed onsite with DBHs ranging from 2 to 8 inches (Photo 12). An additional oak in the southwestern corner of the site has a DBH of 40 inches and is considered priority habitat. The priority oak canopy is approximately 0.10 acres (Sheet 2). *LCMC Table 18.300.090(2)(a)* states that nonriparian priority habitats and species require a buffer of 300 feet or a threshold based upon consultation with WDFW. Appendix D shows email correspondence with WDFW Habitat Specialist, Isaac Holowatz, stating that the dripline is adequate to protect the priority oak tree (February 17, 2021).

CONCLUSION

One depressional wetland and one slope wetland were delineated onsite. The wetland boundaries were confirmed by Ecology on November 10, 2020. One priority habitat Oregon white oak is located in the southwestern corner of the site. The mapped Type Ns stream was not observed onsite, as no channel, bed, bank, or signs of regular water flow were observed onsite. Upon the forthcoming site plan design for a residential subdivision development, a mitigation plan will be submitted to satisfy any necessary critical areas impacts.

LIMITATIONS

ELS bases this report's determinations on standard scientific methodology and best professional judgment. In our opinion, local, state, and federal regulatory agencies should agree with our determinations. However, the information contained in this report should be considered preliminary and used at your own risk until it has been approved in writing by the appropriate regulatory agencies. ELS is not responsible for the impacts of any changes in environmental standards, practices, or regulations after the date of this report.

REFERENCES

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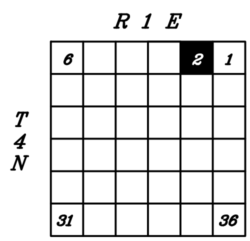
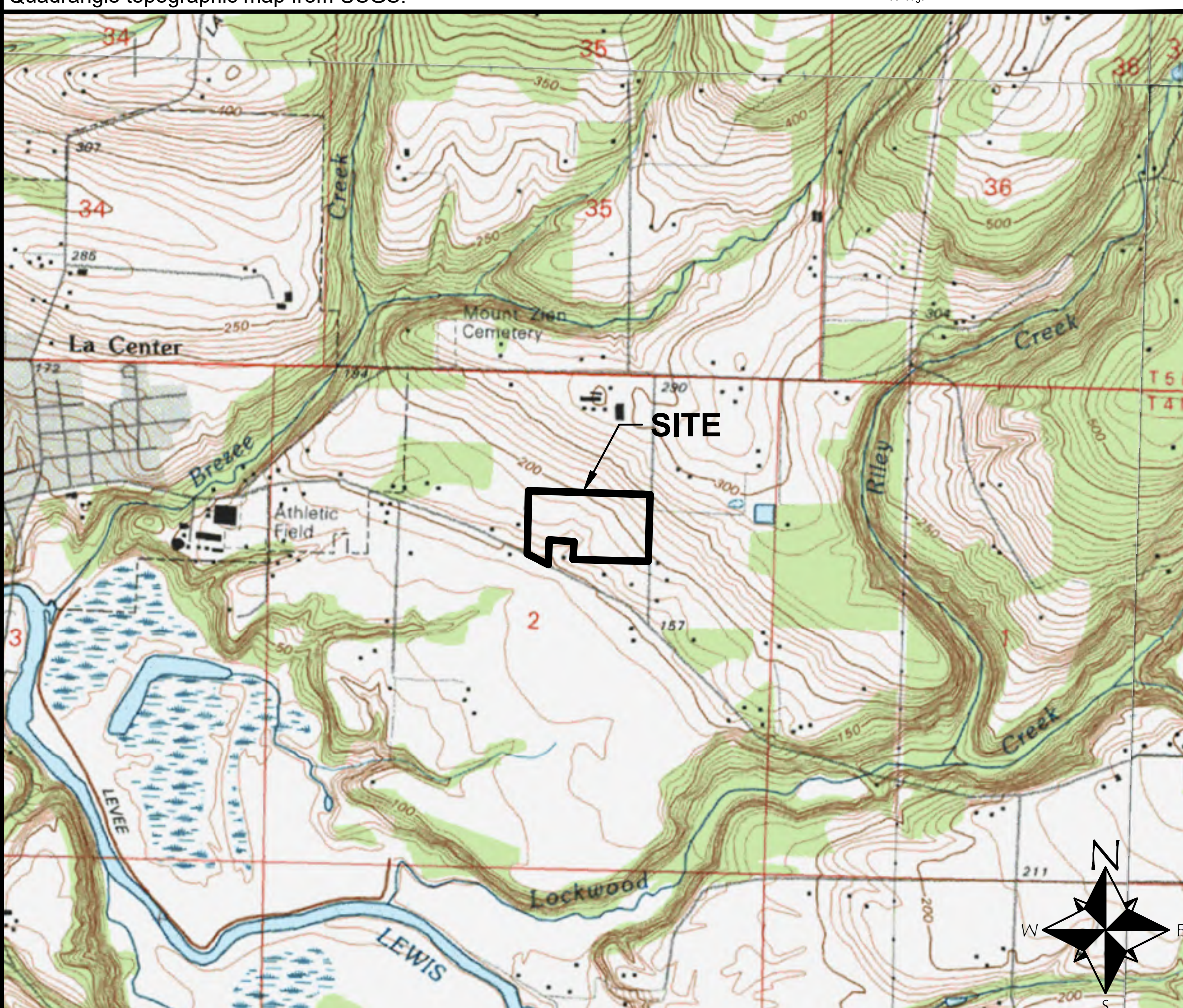
SHEET SET & PHOTOPLATES

Latitude: 45.8620°
Longitude: -122.6487°

LOCATION MAP



NOTE:
Quadrangle topographic map from USGS.



PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 1 **OF** 10
DATE: 3/24/21

VICINITY MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

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SCALE IN FEET

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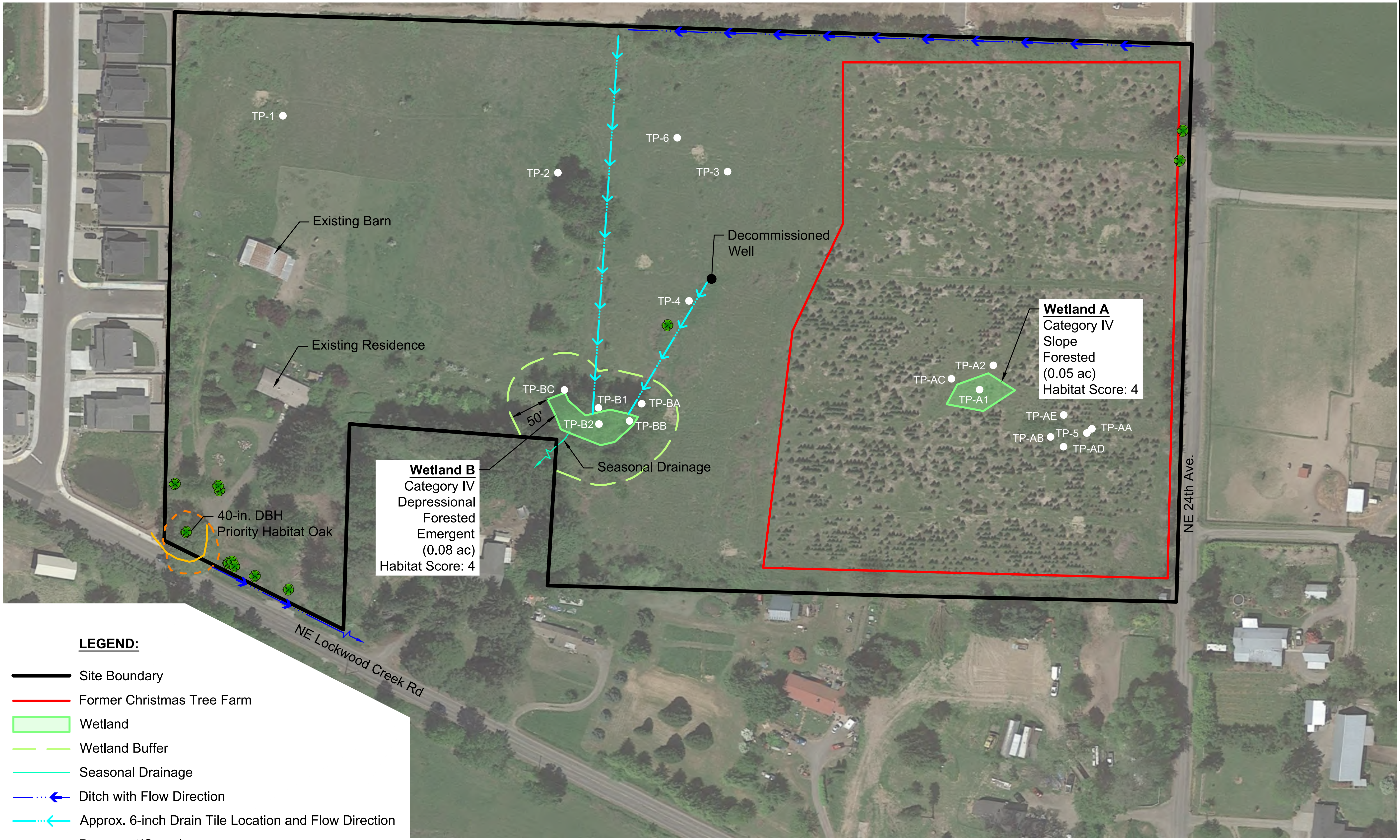

LEGEND:

- Site Boundary
- Former Christmas Tree Farm
- Wetland
- Wetland Buffer
- Seasonal Drainage
- Ditch with Flow Direction
- Approx. 6-inch Drain Tile Location and Flow Direction
- Pavement/Gravel
- Oak Tree
- Oak Tree Dripline (0.10 ac)
- TP-1 ● Test Plot Location
- Continues Offsite

NOTE(S):

1. Aerial from May 2019 Google Earth™.
2. Wetlands, test plots, and oak trees were mapped by an ELS Biologist using a hand-held GPS unit with submeter accuracy.
3. Wetland A is exempted from La Center buffers per LCMC 18.300.090(5)(d) Exempted Wetlands.

N W E S

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 2 **OF** 10
DATE: 3/24/21

SITE MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

0 120 240
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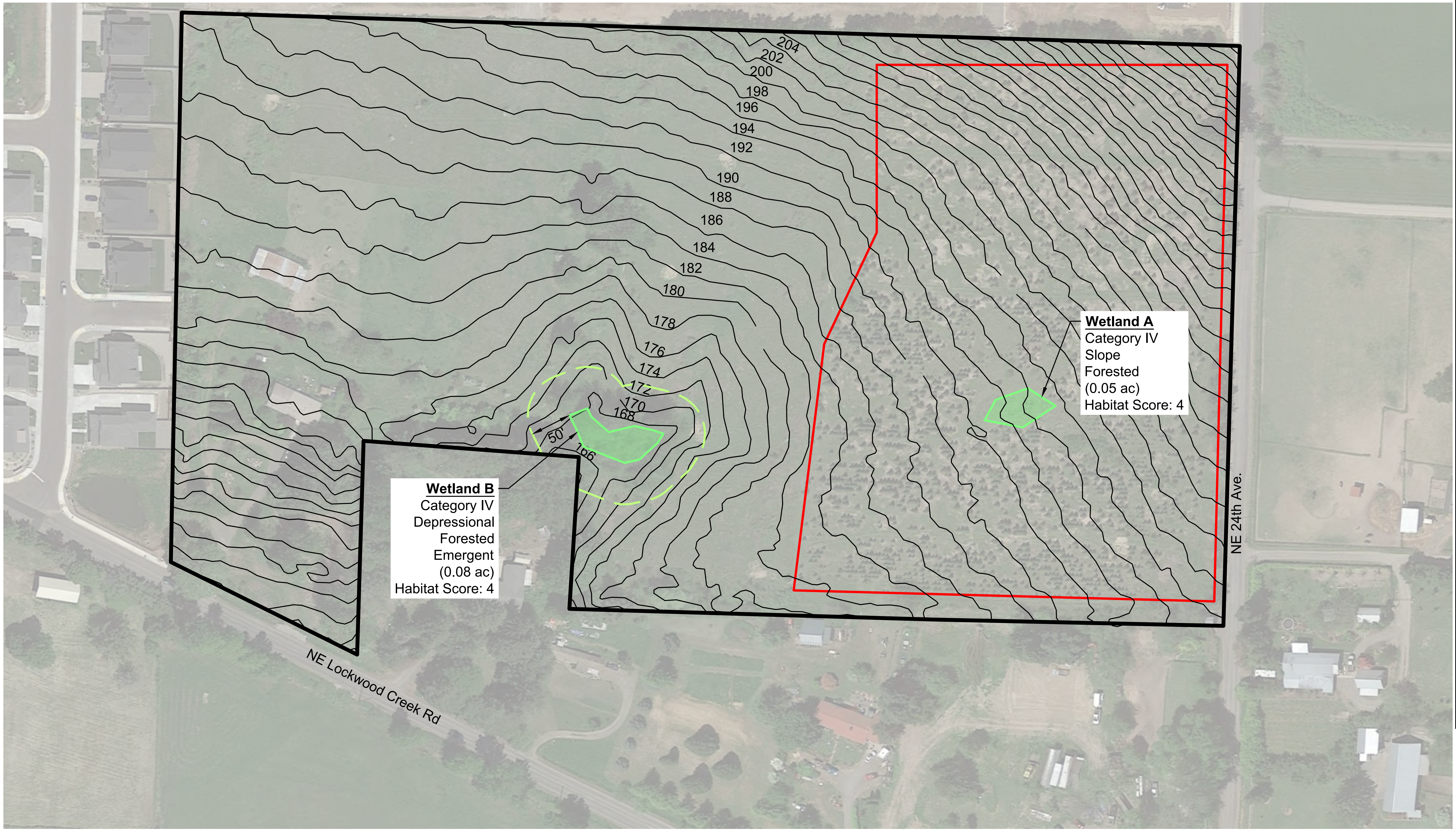

LEGEND:

- Site Boundary
- Former Christmas Tree Farm
- Wetland
- Wetland Buffer

NOTE(S):

1. Aerial from May 2019 Google Earth™.
2. Wetlands, test plots, and oak trees were mapped by an ELS Biologist using a hand-held GPS unit with submeter accuracy.
3. Wetland A is exempted from La Center buffers per LCMC 18.300.090(5)(d) Exempted Wetlands.

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark
STATE: WA
SHEET 3 **OF** 10
DATE: 3/24/21

AERIAL WITH TOPO
APPLICANT: PLS Engeneering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

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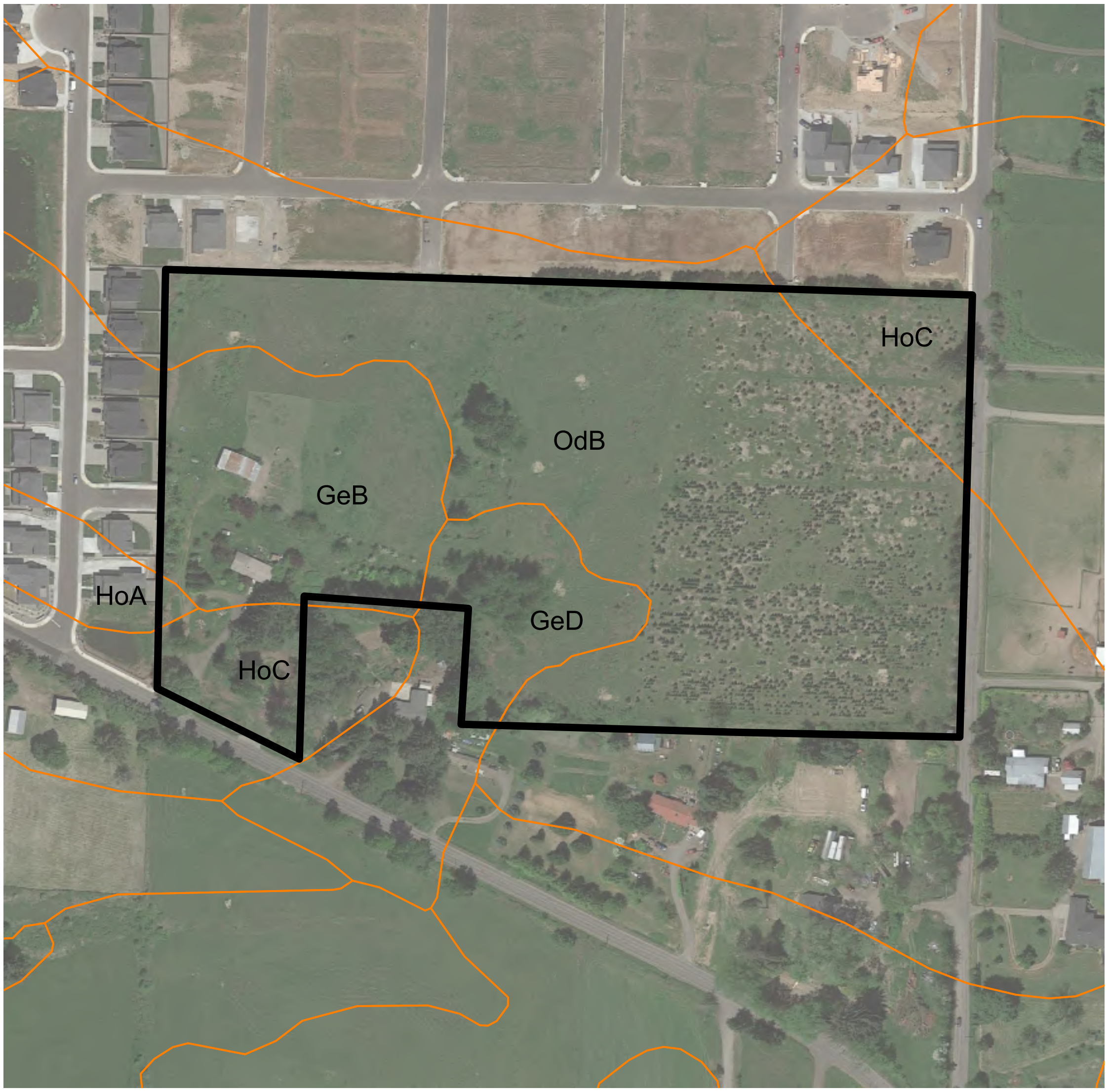

LEGEND:

▬	Site Boundary
GeB	Gee silt loam, 0 to 8 percent slopes. Not hydric.
GeD	Gee silt loam, 8 to 20 percent slopes. Not hydric.
HoA	Hillsboro silt loam, 0 to 3 percent slopes. Not hydric.
HoC	Hillsboro silt loam, 8 to 15 percent slopes. Not hydric.
OdB	Odne silty clay loam, 0 to 3 percent slopes. **Hydric.**

NOTE(S):

1. Map provided online by NRCS at web address: *https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey*

N W E S

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 4 **OF** 10
DATE: 3/24/21

NRCS SOIL SURVEY MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill
DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

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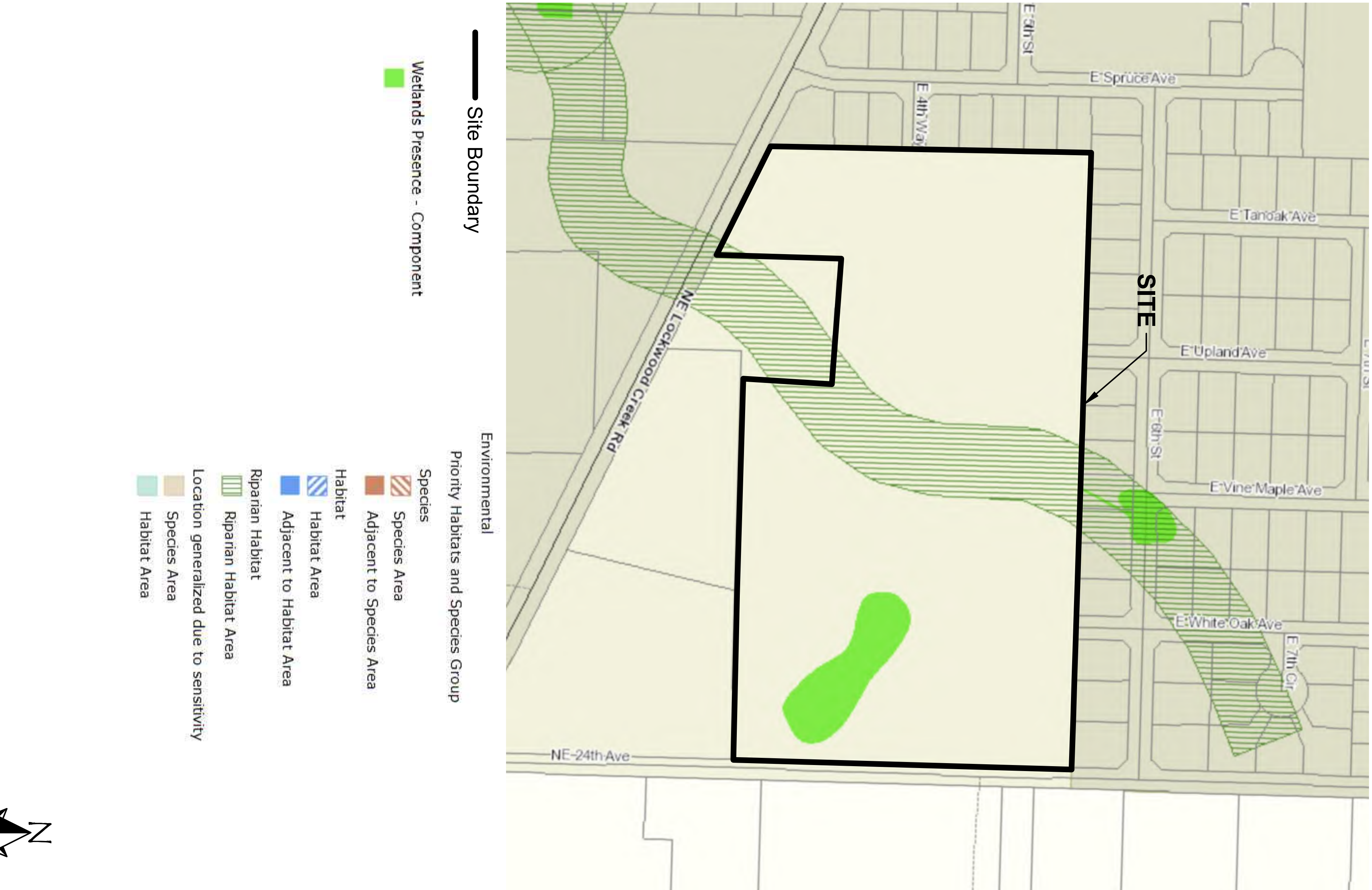
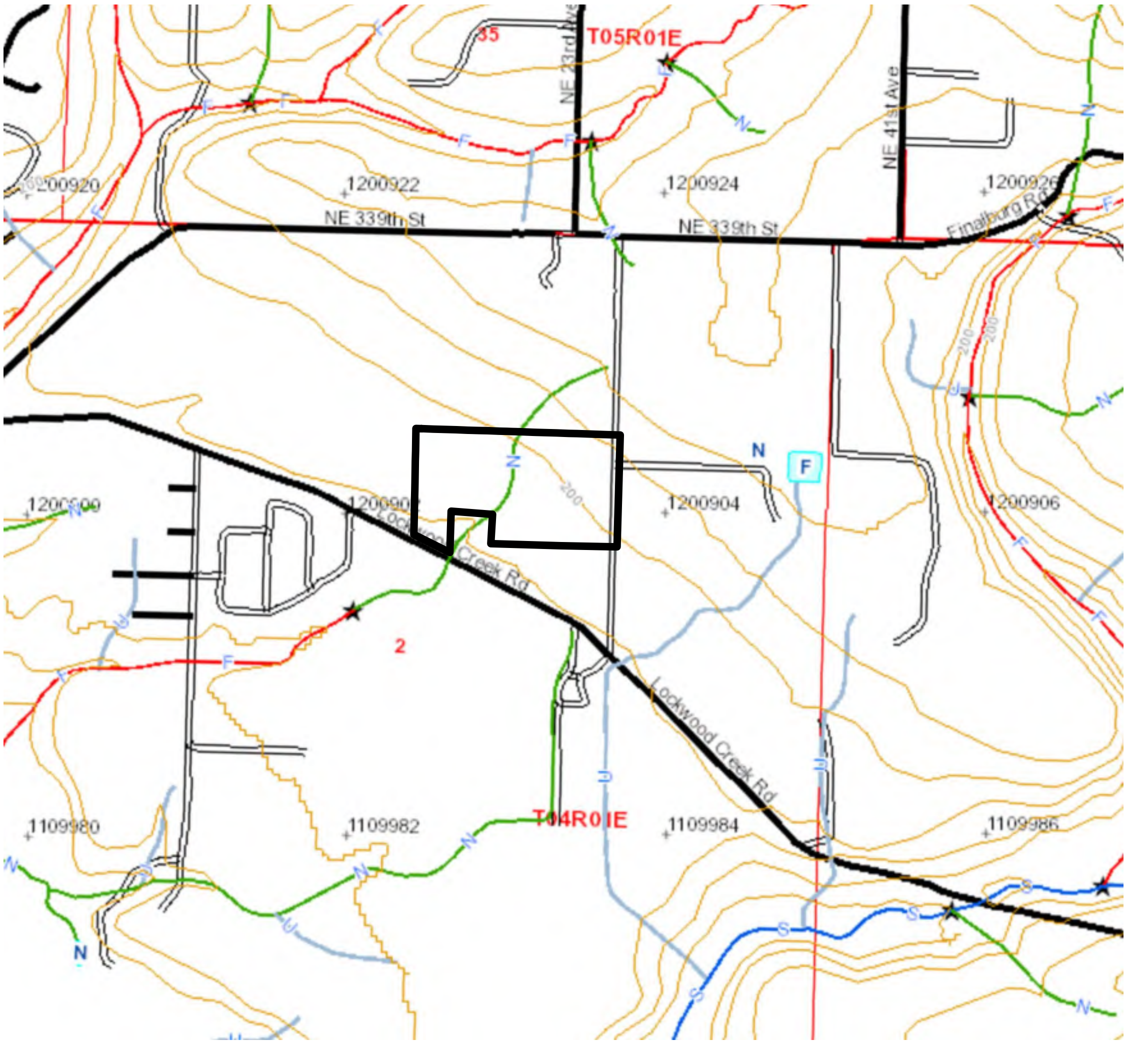


NOTE: Map provided online by Clark County, Washington at web address: *https://gis.clark.wa.gov/mapsonline/*

0 300 600 SCALE IN FEET Ecological Land Services 1157 3rd Ave., Suite 220A Longview, WA 98632 Phone: (360) 578-1371	**PURPOSE:** Wetland Fill **DATUM:** NAD83 **ADJACENT PROPERTY OWNERS:** See JARPA	CLARK COUNTY ENVIROMENTAL CONSTRAINTS **APPLICANT:** PLS Engeneering **PROJECT NAME:** Lockwood Meadows Subdivision **REFERENCE #:** NWS-2020-1015 **SITE LOCATION ADDRESS:** 2000 NE Lockwood Creek Road, La Center WA 98629	**PROPOSED:** Residential subdivision **IN** Wetland **NEAR:** La Center **COUNTY:** Clark **STATE:** WA **SHEET** 5 **OF** 10 **DATE:** 3/24/21



Mapped streams indicated onsite by the Washington State Department of Natural Resources (DNR).

LEGEND:

Site Boundary

Water Bodies (FP)

Water Bodies (FP)

- Other Impoundments
- Open Freshwater
- Subject to Inundation
- Glacier / Snowfield
- Wet Area
- Open Saltwater
- Artificial Feature

Water Courses (FP)

Water Courses (FP)

- Type S
- Type F
- Type N, Np, Ns
- U, unknown
- X, non-typed per WAC 222-16

NOTE: Map provided online by Washington State Department of Natural Resources at web address: *https://fortress.wa.gov/dnr/protectiongis/fpamt/index.html*

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PURPOSE: Wetland Fill

DATUM: NAD83

ADJACENT PROPERTY OWNERS:

See JARPA

DNR WATER TYPE MAP

APPLICANT: PLS Engeneering

PROJECT NAME: Lockwood Meadows Subdivision

REFERENCE #: NWS-2020-1015

SITE LOCATION ADDRESS:

2000 NE Lockwood Creek Road,
La Center WA 98629

PROPOSED: Residential subdivision

IN Wetland

NEAR: La Center

COUNTY: Clark **STATE:** WA

SHEET 6 **OF** 10

DATE: 3/24/21

Mapped wetlands indicated onsite by US Fish & Wildlife Service.

LEGEND:

Site Boundary

Freshwater Emergent Wetland

PEM1A Palustrine, emergent, persistent, temporarily flooded.

PEM1Ad Palustrine, emergent, persistent, temporarily flooded, partially drained/ditched.

NOTE(S):

1. Map provided online by US Fish & Wildlife Service at web address: *https://www.fws.gov/wetlands/data/Mapper.html*

PROPOSED: Residential subdivision

IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 7 **OF** 10
DATE: 3/24/21

NATIONAL WETLAND INVENTORY MAP
APPLICANT: PLS Engineering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

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LEGEND:

- Site Boundary
- Wetland Unit Boundary
- 150' Wetland Offset

NOTE: Aerial photo provided by Google Earth™.

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PURPOSE: Wetland Fill **DATUM:** NAD83 **ADJACENT PROPERTY OWNERS:** See JARPA	150' OFFSET WETLAND A RATING FIGURE **APPLICANT:** PLS Engeneering **PROJECT NAME:** Lockwood Meadows Subdivision **REFERENCE #:** NWS-2020-1015 **SITE LOCATION ADDRESS:** 2000 NE Lockwood Creek Road, La Center WA 98629	**PROPOSED:** Residential subdivision **IN** Wetland **NEAR:** La Center **COUNTY:** Clark **STATE:** WA **SHEET** 8A **OF** 10 **DATE:** 3/24/21	

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LEGEND:

- Site Boundary
- Wetland Unit Boundary
- Vegetation Class Division
- Hydroperiod Division
- 150' Wetland Offset
- Seasonal Flow

NOTE: Aerial photo provided by Google Earth™.

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Phone: (360) 578-1371

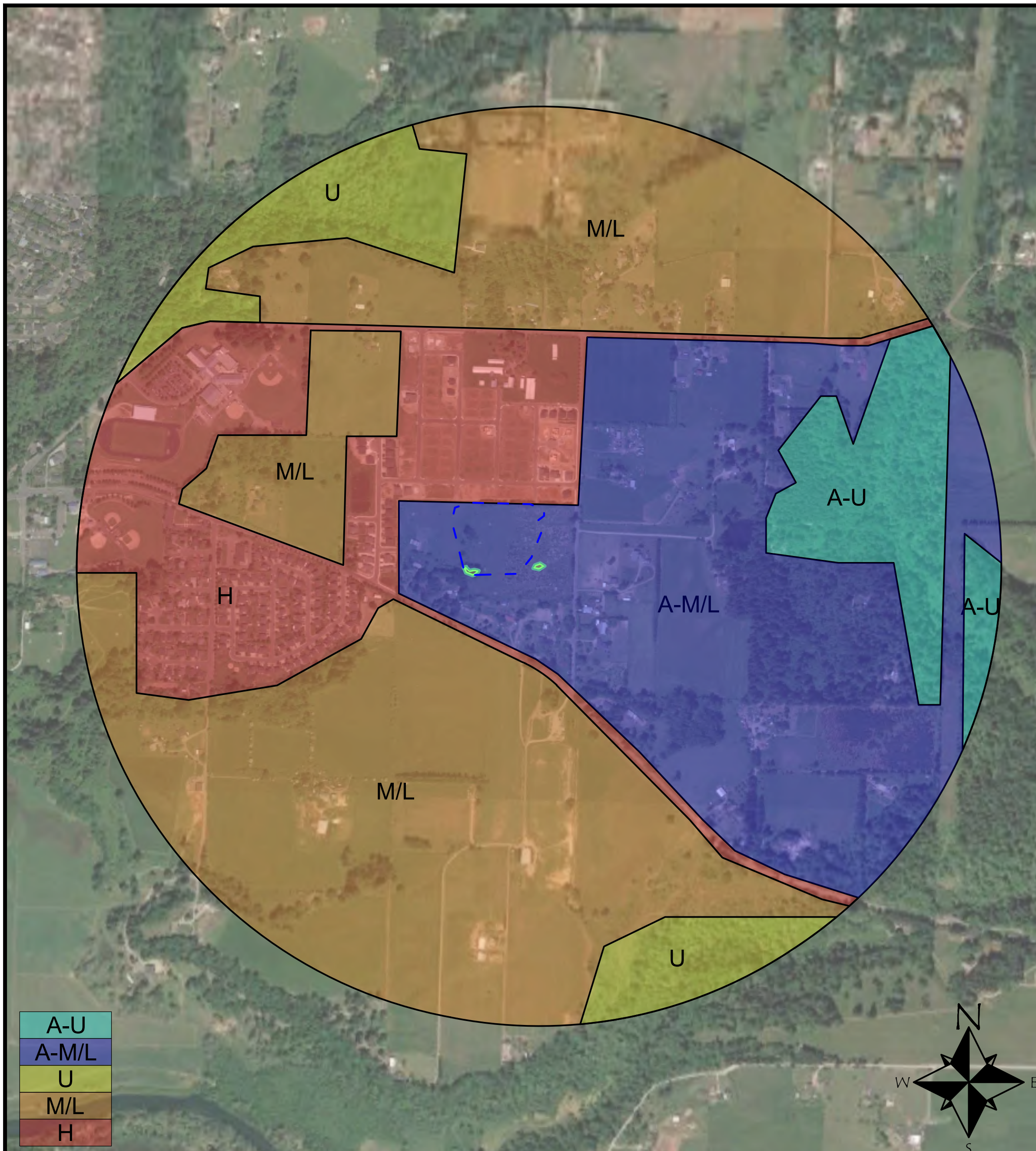
PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

150' OFFSET WETLAND B RATING FIGURE
APPLICANT: PLS Engeneering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PROPOSED: Residential subdivision

IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 8B **OF** 10
DATE: 3/24/21



NOTE: Aerial photo provided by Google Earth™

LEGEND:

Wetland Unit Boundary

Contributing Basin (10-100x area of Wetland B)

H2.1 Accessible Habitat		**H2.2 Undisturbed Habitat**	
A-U	A-U (6%)	U	U (6%)
A-M/L	A-M/L (26%)	M/L	M/L (44%)
		H2.3 Land Use Intensity	
		H	H (18%)

H 2.1. Accessible Habitat Equation

6% A-U habitat + [(26% A-M/L intensity land uses)/2] 13% = 19%

H 2.2. Total Undisturbed Habitat Equation

6% A-U + 6% U habitat + [(26% A-M/L + 44% M/L land uses)/2] 35% = 47%

PROPOSED: Residential subdivision

IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 9 **OF** 10
DATE: 3/24/21

1KM OFFSET WETLAND RATING FIGURE
APPLICANT: PLS Engeneering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS: 2000 NE Lockwood Creek Road, La Center WA 98629

PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS: See JARPA

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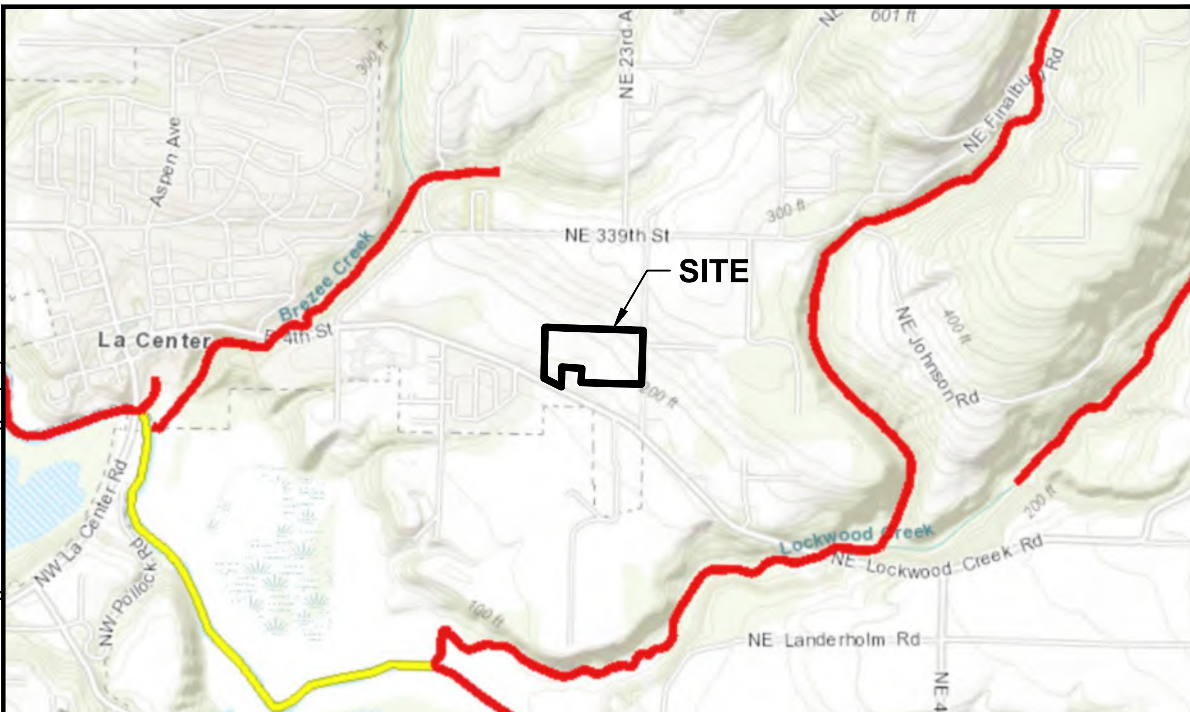
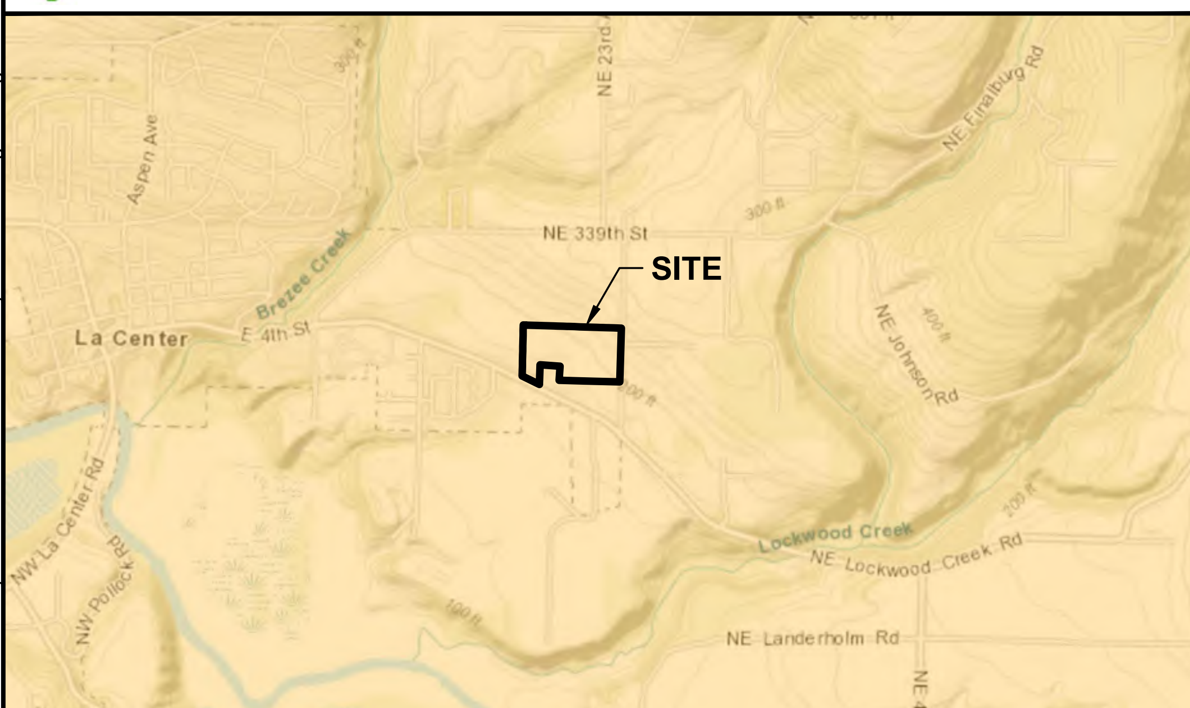


Assessed Waters/Sediment

Water	Sediment
Category 5 - 303d	Category 5 - 303d
Category 4C	Category 4C
Category 4B	Category 4B
Category 4A	Category 4A
Category 2	Category 2
Category 1	Category 1



WQ Improvement Projects

Approved
In Development

NOTE(S):
1. Map provided on-line by Washington State Department of Ecology at web address: *https://fortress.wa.gov/ecy/waterqualityatlas/map.aspx?*

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Phone: (360) 578-1371

PURPOSE: Wetland Fill

DATUM: NAD83
ADJACENT PROPERTY OWNERS:
See JARPA

303(D) LISTED WATERS AND TMDLS
APPLICANT: PLS Engeneering
PROJECT NAME: Lockwood Meadows Subdivision
REFERENCE #: NWS-2020-1015
SITE LOCATION ADDRESS:
2000 NE Lockwood Creek Road,
La Center WA 98629

PROPOSED: Residential subdivision
IN Wetland
NEAR: La Center
COUNTY: Clark **STATE:** WA
SHEET 10 **OF** 10
DATE: 3/24/21

Photo 1. Mowed grass portion of the site that was previously used for livestock, facing south. Photo taken September 2020.

Photo 2. View facing south from TP-2. Photo taken September 2020.

Photo 3. View facing SW from the NE corner of the site. Nordmann firs from the tree farm can be seen. Photo taken September 2020.

Photo 4. Cottonwood trees growing in the decommissioned tree farm area, near Wetland A. Photo taken September 2020.

Ecological Land Services

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Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305

DATE: 3/24/2021
DWN: AJR
PRJ. MGR: AJR
PROJ #: 2245.14
NWS-2020-1015

Photoplate 1
Site Photos
Lockwood Meadows Subdivision
PLS Engineering
La Center, Washington
Section 2, Township 4N, Range 1E, W.M.

Photo 5. View facing southwest near TP-A1, within Wetland A. Nordmann firs can be seen outside the wetland boundary in background. Photo taken February 2021.

Photo 6. Cottonwood patch southeast of Wetland A. Photo taken February 2021.

Photo 7. View facing north of tile location where Type Ns stream is mapped. Photo taken September 2020.

Photo 8. View facing south of tile location where Type Ns stream is mapped. Photo taken February 2021.

Ecological Land Services

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Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305

DATE: 3/24/2021
DWN: AJR
PRJ. MGR: AJR
PROJ #: 2245.14
NWS-2020-1015

Photoplate 2
Site Photos
Lockwood Meadows Subdivision
PLS Engineering
La Center, Washington
Section 2, Township 4N, Range 1E, W.M.

Photo 9. View of Wetland B facing south. Photo taken September 2020.

Photo 10. Vegetation within the ponded portion of Wetland B. Photo taken September 2020.

Photo 11. Seasonal drainage south of Wetland B. Arrow shows drainage path through blackberry bushes offsite. Photo taken September 2020.

Photo 12. Small, non-priority oaks located in the southwestern portion of the site. Photo taken February 2021.

Ecological Land Services

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Longview, WA 98632
Phone: (360) 578-1371
Fax: (360) 414-9305

DATE: 3/24/2021
DWN: AJR
PRJ. MGR: AJR
PROJ #: 2245.14
NWS-2020-1015

Photoplate 3
Site Photos
Lockwood Meadows Subdivision
PLS Engineering
La Center, Washington
Section 2, Township 4N, Range 1E, W.M.

APPENDIX A: WETLAND DETERMINATION DATA FORMS

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP1
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): None Slope (%): 0-8%
Subregion (LRR): A Lat: 45.862444 Long: -122.650711 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 0 to 8 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soils Present? Yes ☐ No ☒		
Wetland Hydrology Present? Yes ☐ No ☒		

Remarks: This test plot is located in the northwest portion of Clark County Tax Parcel 209113000. TP1 only met one of the three wetland parameters; therefore, it is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
3.	%		
4.	%		
50% = ___ 20% = ___	%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	30%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 15 20% = 6	30%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Anthoxanthum odoratum*	25%	yes	FACU
2. *Agrostis capillaris*	25%	yes	FAC
3. *Leucanthemum vulgare*	10%	no	FACU
4. *Asclepias syriaca*	5%	no	FACU
5. *Lotus corniculatus*	5%	no	FAC
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 35 20% = 14	70%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 30%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (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)	____ (B)

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 ☐

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

Sampling Point: TP1

SOIL

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	10YR 3/3	100%		%			Silt loam	
7-16	10YR 4/3	99%	10YR 4/6	1%	C	M	Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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** ☒

Remarks: Soil was very dry and compact. No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP2
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): None Slope (%): 0-3%
Subregion (LRR): A Lat: 45.862269 Long: -122.649359 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located within the north-central portion of Clark County Tax Parcel 209113000, near a DNR mapped Type N stream. This test plot only met one of the three wetland parameters; therefore, TP2 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	45%	yes	FAC
2.	%		
3.	%		
4.	%		
50% = 22 20% = 9	45%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	20%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 10 20% = 5	20%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Agrostis capillaris*	25%	yes	FAC
2. *Ranunculus repens*	25%	yes	FAC
3. *Holcus lanatus*	5%	no	FAC
4. *Cirsium arvense*	5%	no	FAC
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 30 20% = 12	60%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 40%			

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (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)		____ (B)

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☐**

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TP2

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
0-16	10YR 3/2	100%		%			silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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 ☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP3
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): None Slope (%): 0-3%
Subregion (LRR): A Lat: 45.862305 Long: -122.648575 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located within the north-central portion of Clark County Tax Parcel 209113000, east of a DNR mapped Type N stream. This test plot only met one of the three wetland parameters; therefore, TP3 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
3.	%		
4.	%		
50% = ___ 20% = ___	%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	5%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 2 20% = 1	5%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Agrostis capillaris*	40%	yes	FAC
2. *Dactylis glomerata*	40%	yes	FACU
3. *Leucanthemum vulgare*	10%	no	FACU
4. *Cirsium arvense*	10%	no	FAC
5. *Rumex crispus*	5%	no	FAC
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 52 20% = 21	105%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (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)		____ (B)

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 ☐**

Remarks:The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TP3

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/3	100%		%			Silt loam	
10-16	10YR 3/2	100%		%			Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP4
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): None Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861826 Long: -122.648692 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☐ No ☒		

Remarks: This test plot is located in the central portion of Clark County Tax Parcel 209113000, south of the existing well. This test plot only met one of the three wetland parameters; therefore, TP4 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1.	%		
2.	%		
3.	%		
4.	%		
50% = ___ 20% = ___	%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	5%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 2 20% = 1	5%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Schedonorus arundinaceus*	20%	yes	FAC
2. *Agrostis capillaris*	20%	yes	FAC
3. *Plantago lanceolata*	20%	yes	FACU
4. *Asclepias syriaca*	15%	no	FACU
5. *Cirsium arvense*	10%	no	FAC
6. *Leucanthemum vulgare*	10%	no	FACU
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 47 20% = 19	95%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 5%

Dominance Test Worksheet

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (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)		____ (B)

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 ☐**

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TP4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100%		%			Silt loam	
9-16	10YR 4/3	100%		%			Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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** ☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP5
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): None Slope (%): 0-3%
Subregion (LRR): A Lat: 45.862305 Long: -122.648575 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located within the southeast portion of Clark County Tax Parcel 209113000, southeast of Wetland A. This test plot only met one of the three wetland parameters; therefore, TP5 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	15%	yes	FAC
2. **Abies nordmanniana*	5%	yes	FACU
3.	%		
4.	%		
50% = 10 20% = 4	20%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	10%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 5 20% = 2	10%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Anthoxanthum odoratum*	40%	yes	FACU
2. *Agrostis capillaris*	30%	yes	FAC
3. *Holcus lanatus*	20%	yes	FAC
4. *Cirsium arvense*	5%	no	FAC
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 47 20% = 19	95%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 5%			

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: 66 (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)		_____ (B)

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 ☐

Remarks: *Abies nordmanniana is assumed to be FACU. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TP5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	100%		%			Silt loam	
8-16	10YR 3/2	100%		%			Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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**☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TP6
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.8624002 Long: -122.6487743 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located in the northern central portion of the site, along the DNR mapped Type N stream. Because all three wetland indicators were not met, TP-6 was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.	%		
2.	%		
3.	%		
4.	%		
50% = ___ 20% = ___	%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
50% = ___ 20% = ___	%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. **Poa sp.*	90%	yes	FAC
2. *Rumex acetosella*	10%	no	FACU
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (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)		____ (B)

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☐**

Remarks:*Poa sp. assumed to be FAC. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TP6

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100%		%			Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPA1
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Concave Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861598 Long: -122.647313 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes** ☒ **No** ☐
Hydric Soils Present?	Yes ☒	No ☐	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: This test plot is located within the southeast portion of Clark County Tax Parcel 209113000, within Wetland A. This test plot met all three wetland parameters; therefore, TPA1 is considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	30%	yes	FAC
2.	%		
3.	%		
4.	%		
50% = 15 20% = 6	30%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
50% = ___ 20% = ___	%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	60%	yes	FAC
2. *Anthoxanthum odoratum*	20%	yes	FACU
3. *Juncus effusus*	20%	yes	FACW
4. *Mentha pulegium*	15%	no	OBL
5. *Hypericum anagalloides*	10%	no	OBL
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 62 20% = 25	125%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC 75 (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)		___ (B)

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** ☐

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPA1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/2	100%		%			Silt loam	
4-16	10YR 4/1	85%	10YR 4/6	15%	C	M	Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☐

Remarks: The hydric soil indicator Depleted Matrix (F3) was met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:Wetland hydrology indicator Oxidized Rhizospheres along Living Roots (C3) and secondary indicator Saturation Visible on Aerial Imagery (C9) were met.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPA2
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): None Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861677 Long: -122.647211 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located within the southeast portion of Clark County Tax Parcel 209113000, just north of Wetland A. This test plot only met one of the three wetland parameters; therefore, TPA2 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	20%	yes	FAC
2. **Abies nordmanniana*	10%	yes	FACU
3.	%		
4.	%		
50% = 15 20% = 6	30%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	10%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 5 20% = 2	10%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	30%	yes	FAC
2. *Anthoxanthum odoratum*	30%	yes	FACU
3. *Cirsium arvense*	20%	no	FAC
4. *Mentha pulegium*	10%	no	OBL
5. *Leucanthemum vulgare*	10%	no	FAC
6. *Hypochaeris radicata*	5%	no	FACU
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 52 20% = 21	105%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)
Total Number of Dominant Species Across All Strata: 5 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (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)		(B)

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☐**

Remarks: *Abies nordmanniana is assumed to be FACU. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TPA2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-11	10YR 4/2	99%	10YR 4/6	1%	C	M	Silt loam	
11-16	10YR 4/2	95%	10YR 4/6	5%	C	M	Silt loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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**☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒ Depth (Inches):
Water Table Present? Yes ☐ No ☒ Depth (Inches): _____
Saturation Present? Yes ☐ No ☒ Depth (Inches): _____
(Includes Capillary fringe)

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Wetland hydrology secondary indicator Saturation Visible on Aerial Imagery (C9) was met; however wetland hydrology criteria was not met due to only one secondary indicator being met and there were no other indicators of wetland hydrology observed.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPAA
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861438 Long: -122.646694 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☐ No ☒		

Remarks: This test plot is located southeast of Wetland A in an area where Cottonwood saplings are established. Because all three wetland indicators were not met, TP-AA was considered to be in uplands.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. **Abies nordmanniana*	25%	yes	FACU
2.	%		
3.	%		
4.	%		
50% = 13 20% = 5	25%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	10%	yes	FAC
2. *Populus balsamifera*	8%	yes	FAC
3.	%		
4.	%		
5.	%		
50% = 9 20% = 4	18%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	70%	yes	FAC
2. *Anthoxanthum odoratum*	30%	yes	FACU
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (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)		____ (B)

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 ☐

Remarks:*Abies nordmanniana assumed to be FACU. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPAA

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	100%		%			Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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** ☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒ Depth (Inches):
Water Table Present? Yes ☐ No ☒ Depth (Inches): _____
Saturation Present? Yes ☐ No ☒ Depth (Inches): _____
(Includes Capillary fringe)

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit. The soil was moist from recent rainfall, but not saturated. Standing water was not observed at this test plot, but was observed within Wetland A.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPAB
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861406 Long: -122.646896 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☒	Is the Sampled Area within a Wetland?	Yes ☐ No ☒
Hydric Soils Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☐ No ☒		

Remarks: This test plot is located southeast of Wetland A in an area where Cottonwood saplings are established. Because all three wetland indicators were not met, TP-AB was considered to be in uplands.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Abies grandis*	10%	yes	FACU
2. **Abies nordmanniana*	10%	yes	FACU
3.	%		
4.	%		
50% = 10 20% = 4	20%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Populus balsamifera*	60%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 30 20% = 12	60%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	80%	yes	FAC
2. *Anthoxanthum odoratum*	20%	yes	FACU
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 0%

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)		_____ (B)

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** ☒

Remarks:*Abies nordmanniana assumed to be FACU. The hydrophytic vegetation criterion is not met due to less than 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPAB

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 3/2	100%		%			Clay loam	
9-16	10YR 3/2	99%	10YR 4/6	1%	C	M	Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒ Depth (Inches):
Water Table Present? Yes ☐ No ☒ Depth (Inches): _____
Saturation Present? Yes ☐ No ☒ Depth (Inches): _____
(Includes Capillary fringe)

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit. The soil was moist from recent rainfall, but not saturated. Standing water was not observed at this test plot, but was observed within Wetland A.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPAC
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861597 Long: -122.647392 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☒	**Is the Sampled Area within a Wetland?** **Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located northwest of Wetland A. Because all three wetland indicators were not met, TP-AC was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. **Abies nordmanniana*	10%	yes	FACU
2. *Abies grandis*	10%	yes	FACU
3.	%		
4.	%		
50% = 10 20% = 4	20%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Populus balsamifera*	25%	yes	FAC
2. *Rubus armeniacus*	15%	yes	FAC
3.	%		
4.	%		
5.	%		
50% = 20 20% = 8	40%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	70%	yes	FAC
2. *Anthoxanthum odoratum*	20%	yes	FACU
3. *Leucanthemum vulgare*	10%	no	FACU
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (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)		____ (B)

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 ☒**

Remarks: *Abies nordmanniana assumed to be FACU. The hydrophytic vegetation criterion is not met due to 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPAC

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	100%		%			Clay loam	
10-16	10YR 3/2	93%	10YR 4/6	7%	C	M	Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒ Depth (Inches):
Water Table Present? Yes ☐ No ☒ Depth (Inches): _____
Saturation Present? Yes ☐ No ☒ Depth (Inches): _____
(Includes Capillary fringe)

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit. The soil was moist from recent rainfall, but not saturated. Standing water was not observed at this test plot, but was observed within Wetland A.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPAD
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861438 Long: -122.646694 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☒	**Is the Sampled Area within a Wetland?** **Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located southeast of Wetland A in an area where Cottonwood saplings are established. Because all three wetland indicators were not met, TP-AD was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. **Abies nordmanniana*	30%	yes	FACU
2. *Abies grandis*	5%	no	FACU
3.	%		
4.	%		
50% = 18 20% = 7	35%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Populus balsamifera*	15%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 8 20% = 3	15%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	80%	yes	FAC
2. *Anthoxanthum odoratum*	20%	yes	FACU
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

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	_____	x 1=	_____
FACW species	_____	x 2=	_____
FAC species	_____	x 3=	_____
FACU species	_____	x 4=	_____
UPL species	_____	x 5=	_____
Column Totals:	_____ (A)		_____ (B)

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 ☒**

Remarks: *Abies nordmanniana assumed to be FACU. The hydrophytic vegetation criterion is not met due to 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPAD

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/2	100%		%			Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☐ Hydrogen Sulfide (A4)
☐ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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**☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒ Depth (Inches):
Water Table Present? Yes ☐ No ☒ Depth (Inches): _____
Saturation Present? Yes ☐ No ☒ Depth (Inches): _____
(Includes Capillary fringe)

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit. The soil was moist from recent rainfall, but not saturated. Standing water was not observed at this test plot, but was observed within Wetland A.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPAE
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Drainageways, Terraces Local relief: (concave, convex, none): Convex Slope (%): 0-3%
Subregion (LRR): A Lat: 45.861483 Long: -122.646834 Datum: NAD83
Soil Map Unit Name: Odne silty clay loam, 0 to 3 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?**	**Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐ No ☒		
Wetland Hydrology Present?	Yes ☐ No ☒		

Remarks: This test plot is located southeast of Wetland A in an area where Cottonwood saplings are established. Because all three wetland indicators were not met, TP-AE was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. **Abies nordmanniana*	25%	yes	FACU
2. *Abies grandis*	5%	no	FACU
3.	%		
4.	%		
50% = 15 20% = 6	30%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	10%	yes	FAC
2. *Populus balsamifera*	5%	yes	FAC
3.	%		
4.	%		
5.	%		
50% = 8 20% = 3	15%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Holcus lanatus*	80%	yes	FAC
2. *Anthoxanthum odoratum*	20%	yes	FACU
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 0%			

Dominance Test Worksheet

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

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60 (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)		(B)

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 ☐**

Remarks:*Abies nordmanniana assumed to be FACU. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either OBL, FACW, or FAC indicator statuses.

SOIL

Sampling Point: TPAE

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 3/2	100%		%			Clay loam	
10-16	10YR 3/1	100%		%			Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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** ☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:No indicators of hydrology were observed in the test plot during the site visit. The soil was moist from recent rainfall, but not saturated. Standing water was not observed at this test plot, but was observed within Wetland A.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPB1
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): None Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861468 Long: -122.649143 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes ☐ No ☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located in the south-central portion of Clark County Tax Parcel 209113000, north of Wetland B. This test plot only met one of the three wetland parameters; therefore, TP-B1 is not considered to be within a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	60%	yes	FAC
2.	%		
3.	%		
4.	%		
50% = 30 20% = 12	60%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Salix scouleriana*	20%	yes	FAC
2. *Rubus armeniacus*	5%	yes	FAC
3.	%		
4.	%		
5.	%		
50% = 12 20% = 5	25%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Dactylis glomerata*	15%	yes	FACU
2. *Gnaphalium uliginosum*	10%	yes	FAC
3. *Vicia sativa*	10%	yes	UPL
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 17 20% = 7	35%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 65%

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: 66 (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)		____ (B)

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 ☐**

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having FAC indicator statuses.

SOIL

Sampling Point: TPB1

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	10YR 4/4	100%		%			Silty clay loam	
10-16	10YR 4/3	100%		%			Silty clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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** ☒

Remarks: No hydric soil indicators were observed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:Hydrology was not present and there were no indicators of wetland hydrology.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 9/8/2020
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPB2
Investigator(s): Naglich, Francis; Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): Concave Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861385 Long: -122.649159 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain Remarks.)
Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ 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 ☐	**Is the Sampled Area within a Wetland?**	**Yes ☒ No ☐**
Hydric Soils Present?	Yes ☒ No ☐		
Wetland Hydrology Present?	Yes ☒ No ☐		

Remarks: This test plot is located in the south-central portion of Clark County Tax Parcel 209113000, within Wetland B. Because all three wetland parameters were met, TP-B2 is considered a wetland.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	90%	yes	FAC
2. *Salix scouleriana*	10%	no	FAC
3.	%		
4.	%		
50% = 50 20% = 20	100%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
50% = ___ 20% = ___	%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. *Stellaria media*	20%	yes	FACU
2. *Gnaphalium uliginosum*	20%	yes	FAC
3. *Epilobium palustre*	10%	yes	OBL
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 25 20% = 10	50%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	
% Bare Ground in Herb Stratum 50%			

Dominance Test Worksheet

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

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 75 (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)		___ (B)

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 ☐**

Remarks: The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either FAC and OBL indicator statuses.

SOIL

Sampling Point: TPB2

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	100%		%			Silty clay loam	
4-16	10YR 4/1	60%	10YR 4/6	40%	C	M	Silty clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☒ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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** ☐

Remarks: The hydric soil indicators Depleted Below Dark Surface (A11) and Depleted Matrix (F3) were met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches):
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:Wetland hydrology indicator Oxidized Rhizospheres along Living Roots (C3) was met.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPBA
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): Convex Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861482 Long: -122.648913 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☐	No ☒	

Remarks: This test plot is located northeast of Wetland B. Because all three wetland indicators were not met, TP-BA was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	10%	yes	FAC
2.	%		
3.	%		
4.	%		
50% = 5 20% = 2	10%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
50% = ___ 20% = ___	%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. **Poa sp.*	80%	yes	FAC
2. *Ranunculus repens*	20%	yes	FAC
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (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)		_____ (B)

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☐**

Remarks:*Poa sp. assumed to be FAC. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either FAC and OBL indicator statuses.

SOIL

Sampling Point: TPBA

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/2	100%		%			Clay loam	
8-16	10YR 4/2	99%	10YR 4/6	1%	C	M	Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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**☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches): _____
Water Table Present?	Yes ☐	No ☒	Depth (Inches): _____
Saturation Present? (Includes Capillary fringe)	Yes ☐	No ☒	Depth (Inches): _____

Wetland Hydrology Present? **Yes** ☐ **No** ☒

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

Remarks:The soil was moist from recent rainfall, but not saturated. No indicators of hydrology were observed in the test plot during the site visit.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPBB
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): Concave Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861437 Long: -122.648925 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	Is the Sampled Area within a Wetland?	Yes☒ No☐
Hydric Soils Present?	Yes ☒ No ☐		
Wetland Hydrology Present?	Yes ☒ No ☐		

Remarks: This test plot is located in the easternmost portion of Wetland B. Because all three wetland parameters were met, TP-BB is considered a wetland.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft radius)			
1. *Populus balsamifera*	50%	yes	FAC
2. *Salix scouleriana*	5%	no	FAC
3.	%		
4.	%		
50% = 28 20% = 11	55%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1.	%		
2.	%		
3.	%		
4.	%		
5.	%		
50% = ___ 20% = ___	%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. **Poa sp.*	60%	yes	FAC
2. *Stellaria media*	20%	yes	FACU
3. *Gnaphalium uliginosum*	10%	no	FAC
4. *Epilobium palustre*	5%	no	OBL
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 48 20% = 19	95%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 5%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

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

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☐**

Remarks:*Poa sp. assumed to be FAC. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either FAC and OBL indicator statuses.

SOIL

Sampling Point: TPBB

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100%		%			Clay loam	
5-16	10YR 4/1	80%	10YR 4/6	20%	C	M	Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

☐ Histosal (A1)
☐ Histic Epipedon (A2)
☐ Black Histic (A3)
☒ Hydrogen Sulfide (A4)
☒ Depleted Below Dark Surface (A11)
☐ Thick Dark Surface (A12)
☐ Sandy Mucky Minerals (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

☐ 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**☐

Remarks: The hydric soil indicators Depleted Below Dark Surface (A11), Depleted Matrix (F3), and Hydrogen Sulfide (A4) were met due to a matrix value of 4, chroma of 1, and redoximorphic features from 5-16 inches below the surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☐	Depth (Inches): 0.5
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 8
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): 0

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:The wetland hydrology indicators Surface Water (A1), High Water Table (A2), Saturation (A3), and Hydrogen Sulfide Odor (C1) were met.

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

Project/Site: Lockwood Meadows Subdivision City/County: La Center/Clark Sampling Date: 2/24/2021
Applicant/Owner: PLS Engeneering State: WA Sampling Point: TPBC
Investigator(s): Rendleman, Annie Jean Section, Township, Range: S2, T4N, R1E
Landform (hillslope, terrace, etc.): Terraces Local relief: (concave, convex, none): Convex Slope (%): 8-20%
Subregion (LRR): A Lat: 45.861519 Long: -122.649297 Datum: NAD83
Soil Map Unit Name: Gee silt loam, 8 to 20 percent slopes NWI classification: None
Are climatic / hydrologic conditions on the site typical for this time of year? Yes☒ No☐ (If no, explain Remarks.)
Are Vegetation☐, Soil☐, or Hydrology☐ significantly disturbed? Are "Normal Circumstances" present? Yes☒ 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 ☐	**Is the Sampled Area within a Wetland?** **Yes☐ No☒**
Hydric Soils Present?	Yes ☐	No ☒	
Wetland Hydrology Present?	Yes ☒	No ☐	

Remarks: This test plot is located north of Wetland B. Because all three wetland indicators were not met, TP-BC was considered to be in uplands.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Populus balsamifera*	15%	yes	FAC
2.	%		
3.	%		
4.	%		
50% = 8 20% = 3	15%	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft. radius)			
1. *Rubus armeniacus*	15%	yes	FAC
2.	%		
3.	%		
4.	%		
5.	%		
50% = 8 20% = 3	15%	=Total Cover	
Herb Stratum (Plot size: 5 ft radius)			
1. **Poa sp.*	50%	yes	FAC
2. *Ranunculus repens*	50%	yes	FAC
3.	%		
4.	%		
5.	%		
6.	%		
7.	%		
8.	%		
9.	%		
10.	%		
11.	%		
50% = 50 20% = 20	100%	=Total Cover	
Woody Vine Stratum (Plot size: 15 ft radius)			
1.	%		
2.	%		
50% = ___ 20% = ___	%	=Total Cover	

% Bare Ground in Herb Stratum 0%

Dominance Test Worksheet

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (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)	(B)

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☐**

Remarks:*Poa sp. assumed to be FAC. The hydrophytic vegetation criterion is met due to greater than 50% of the dominant vegetation within the test plot having either FAC and OBL indicator statuses.

SOIL

Sampling Point: TPBC

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

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/2	100%		%			Clay loam	
5-16	10YR 4/1	100%		%			Clay loam	
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				
		%		%				

[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.)

- ☐ Histosal (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Minerals (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

- ☐ 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** ☒

Remarks: No indicators of hydric soil were observed in the test plot during the site visit.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (min. 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 ☒	Depth (Inches): ____
Water Table Present?	Yes ☒	No ☐	Depth (Inches): 8
Saturation Present? (Includes Capillary fringe)	Yes ☒	No ☐	Depth (Inches): 5

Wetland Hydrology Present? **Yes** ☒ **No** ☐

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

Remarks:The hydrology indicators High Water Table (A2) and Saturation (A3) were met within the test plot.

APPENDIX B: WETLAND RATING FORMS

RATING SUMMARY – Western Washington

Name of wetland (or ID #): Wetland A Date of site visit: 9/8/2020

Rated by AJ Rendleman Trained by Ecology? Yes X No___ Date of training 11/2020

HGM Class used for rating Slope Wetland has multiple HGM classes?___Y X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map Google Earth

OVERALL WETLAND CATEGORY __IV__ (based on functions X or special characteristics___)

1. Category of wetland based on FUNCTIONS

_______**Category I** – Total score = 23 – 27

_______**Category II** – Total score = 20 – 22

_______**Category III** – Total score = 16 – 19

___x___**Category IV** – Total score = 9 – 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
			Circle the appropriate ratings	
Site Potential	H M L	H M L	H M L	
Landscape Potential	H M L	H M L	H M L	
Value	H M L	H M L	H M L	**TOTAL**
Score Based on Ratings	5	5	4	14

Score for each function based on three ratings
(order of ratings is not important)

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number _A___

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	
Hydroperiods	D 1.4, H 1.2	
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	
Map of the contributing basin	D 4.3, D 5.3	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	8A
Hydroperiods	H 1.2	8A
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	8A
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	8A
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	8A
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	9
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	10
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	10

Wetland name or number _A___

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**
*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3 **YES** – The wetland class is **Flats**
*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
___At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
_x___The wetland is on a slope (*slope can be very gradual*),
_x_The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
_x___The water leaves the wetland **without being impounded**.

NO – go to 5 **YES** – The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
____The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
____The overbank flooding occurs at least once every 2 years.

Wetland name or number A

NO – go to 6 **YES** – The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

NO – go to 7 **YES** – The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

NO – go to 8 **YES** – The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

   NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number _A___

SLOPE WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

S 1.0. Does the site have the potential to improve water quality?	
S 1.1. Characteristics of the average slope of the wetland: *(a 1% slope has a 1 ft vertical drop in elevation for every 100 ft of horizontal distance)* 4 / 88 = 4.5% (See 2-ft contours on Sheet 3). Slope is 1% or less points = 3 Slope is > 1%-2% points = 2 Slope is > 2%-5% points = 1 Slope is greater than 5% points = 0	1
S 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*: Yes = 3 No = 0	0
S 1.3. Characteristics of the plants in the wetland that trap sediments and pollutants: Choose the points appropriate for the description that best fits the plants in the wetland. *Dense means you have trouble seeing the soil surface (>75% cover), and uncut means not grazed or mowed and plants are higher than 6 in.* Dense, uncut, herbaceous plants > 90% of the wetland area points = 6 Dense, uncut, herbaceous plants > ½ of area points = 3 Dense, woody, plants > ½ of area points = 2 Dense, uncut, herbaceous plants > ¼ of area points = 1 Does not meet any of the criteria above for plants points = 0	3
Total for S 1 Add the points in the boxes above	4

Rating of Site Potential If score is:___**12 = H** ___**6-11 = M** _x__**0-5 = L** *Record the rating on the first page*

S 2.0. Does the landscape have the potential to support the water quality function of the site?	
S 2.1. Is > 10% of the area within 150 ft on the uphill side of the wetland in land uses that generate pollutants? The tree farm is no longer in use (not sprayed or mowed). Yes = 1 No = 0	0
S 2.2. Are there other sources of pollutants coming into the wetland that are not listed in question S 2.1? Other sources Yes = 1 No = 0	0
Total for S 2 Add the points in the boxes above	0

Rating of Landscape Potential If score is:___**1-2 = M** _x_**0 = L** *Record the rating on the first page*

S 3.0. Is the water quality improvement provided by the site valuable to society?	
S 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
S 3.2. Is the wetland in a basin or sub-basin where water quality is an issue? *At least one aquatic resource in the basin is on the 303(d) list*. Yes = 1 No = 0	1
S 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality? *Answer YES if there is a TMDL for the basin in which unit is found.* Yes = 2 No = 0	2
Total for S 3 Add the points in the boxes above	3

Rating of Value If score is:_x__**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number _A___

SLOPE WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream erosion

S 4.0. Does the site have the potential to reduce flooding and stream erosion?	
S 4.1. Characteristics of plants that reduce the velocity of surface flows during storms: Choose the points appropriate for the description that best fits conditions in the wetland. *Stems of plants should be thick enough (usually > 1/8 in), or dense enough, to remain erect during surface flows.* Dense, uncut, **rigid** plants cover > 90% of the area of the wetland — points = 1 All other conditions — points = 0	0

Rating of Site Potential If score is:**____1 = M __x__0 = L** *Record the rating on the first page*

S 5.0. Does the landscape have the potential to support the hydrologic functions of the site?	
S 5.1. Is more than 25% of the area within 150 ft upslope of wetland in land uses or cover that generate excess surface runoff? — Yes = 1 No = 0	0

Rating of Landscape Potential If score is:**____1 = M __x__0 = L** *Record the rating on the first page*

S 6.0. Are the hydrologic functions provided by the site valuable to society?	
S 6.1. Distance to the nearest areas downstream that have flooding problems: The sub-basin immediately down-gradient of site has flooding problems that result in damage to human or natural resources (e.g., houses or salmon redds) — points = 2 Surface flooding problems are in a sub-basin farther down-gradient — points = 1 No flooding problems anywhere downstream — points = 0	2
S 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan? — Yes = 2 No = 0	0
Total for S 6 — Add the points in the boxes above	2

Rating of Value If score is:**__x__2-4 = H ____1 = M ____0 = L** *Record the rating on the first page*

NOTES and FIELD OBSERVATIONS:

Wetland name or number A

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* — 0

____Aquatic bed — 4 structures or more: points = 4
____Emergent — 3 structures: points = 2
____Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1
__x__Forested (areas where trees have > 30% cover) — 1 structure: points = 0

If the unit has a Forested class, check if:

____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon

H 1.2. Hydroperiods — 0

Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*).

____Permanently flooded or inundated — 4 or more types present: points = 3
____Seasonally flooded or inundated — 3 types present: points = 2
____Occasionally flooded or inundated — 2 types present: points = 1
__x__Saturated only — 1 type present: points = 0
____Permanently flowing stream or river in, or adjacent to, the wetland
____Seasonally flowing stream in, or adjacent to, the wetland
____**Lake Fringe wetland** — **2 points**
____**Freshwater tidal wetland** — **2 points**

H 1.3. Richness of plant species — 1

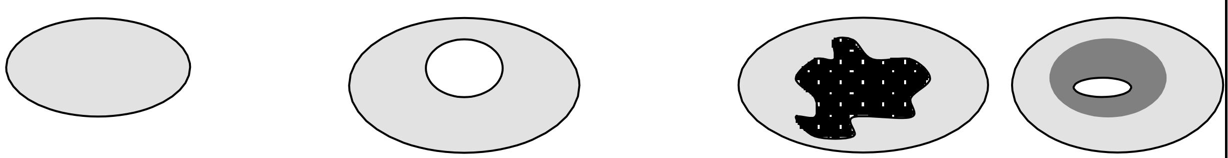
Count the number of plant species in the wetland that cover at least 10 ft^2.

Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species — points = 2
5 - 19 species — points = 1
< 5 species — points = 0

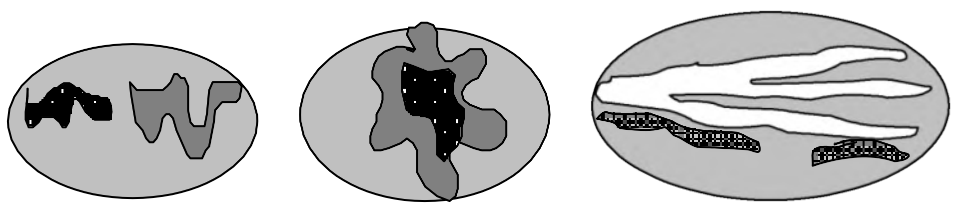
H 1.4. Interspersion of habitats — 0

Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points   **Low** = 1 point   **Moderate** = 2 points

All three diagrams in this row are **HIGH** = 3points



H 1.5. Special habitat features:	1
Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* _x__Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	
Total for H 1 — Add the points in the boxes above	2

Rating of Site Potential If score is:___**15-18 = H** ___**7-14 = M** __**x**__**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat_6_ **+** [(% moderate and low intensity land uses)/2]_13_ **=** _**19**_% If total accessible habitat is: > $^{1}/_{3}$ (33.3%) of 1 km Polygon — points = 3 20-33% of 1 km Polygon — points = 2 10-19% of 1 km Polygon — points = 1 < 10% of 1 km Polygon — points = 0	1
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat_12_ **+** [(% moderate and low intensity land uses)/2]_44_ **=** _**47**_% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10-50% and in 1-3 patches — points = 2 Undisturbed habitat 10-50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (- 2) ≤ 50% of 1 km Polygon is high intensity — points = 0	0
Total for H 2 — Add the points in the boxes above	2

Rating of Landscape Potential If score is:___**4-6 = H** __**x**__**1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m — points = 1 Site does not meet any of the criteria above — points = 0	0
Total for H 3 — Add the points in the boxes above	0

Rating of Value If score is:___**2 = H** ___**1 = M** __**x**__**0 = L** *Record the rating on the first page*

Wetland name or number _A___

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number A

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	**Category**
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes **–** Go to **SC 2.2** No **–** Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes **= Category I** No **= Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 2.4** No **= Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes **= Category I** No **= Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below. **If you answer YES you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No **= Is not a bog**	**Cat. I**

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** — **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. — **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** No = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** No = **Not a wetland in a coastal lagoon**	**Cat. I**
SC 5.1. Does the wetland meet all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: — Long Beach Peninsula: Lands west of SR 103 — Grayland-Westport: Lands west of SR 105 — Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** No = **not an interdunal wetland for rating**	**Cat I**
SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2**	**Cat. II**
SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3**	**Cat. III**
SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

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RATING SUMMARY – Western Washington

Name of wetland (or ID #): _Wetland B_________________________Date of site visit: 9/8/2020

Rated by__AJ Rendleman_____Trained by Ecology? Yes__X__No____ Date of training 11/2020______

HGM Class used for rating__Depressional____ Wetland has multiple HGM classes?___Y __X N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.
Source of base aerial photo/map _Google Earth_________________________

OVERALL WETLAND CATEGORY _IV_ (based on functions_X_ or special characteristics___)

1. Category of wetland based on FUNCTIONS

_______**Category I** – Total score = 23 – 27

_______**Category II** – Total score = 20 – 22

_______**Category III** – Total score = 16 – 19

___X___**Category IV** – Total score = 9 – 15

FUNCTION	Improving Water Quality	Hydrologic	Habitat	
			Circle the appropriate ratings	
Site Potential	H M L	H M L	H M L	
Landscape Potential	H M L	H M L	H M L	
Value	H M L	H M L	H M L	**TOTAL**
Score Based on Ratings	5	6	4	15

Score for each function based on three ratings
(order of ratings is not important)

9 = H,H,H
8 = H,H,M
7 = H,H,L
7 = H,M,M
6 = H,M,L
6 = M,M,M
5 = H,L,L
5 = M,M,L
4 = M,L,L
3 = L,L,L

2. Category based on SPECIAL CHARACTERISTICS of wetland

CHARACTERISTIC	CATEGORY
Estuarine	I II
Wetland of High Conservation Value	I
Bog	I
Mature Forest	I
Old Growth Forest	I
Coastal Lagoon	I II
Interdunal	I II III IV
None of the above	N/A

Wetland name or number B

Maps and figures required to answer questions correctly for Western Washington

Depressional Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	D 1.3, H 1.1, H 1.4	8B
Hydroperiods	D 1.4, H 1.2	8B
Location of outlet (*can be added to map of hydroperiods)*	D 1.1, D 4.1	8B
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	D 2.2, D 5.2	8B
Map of the contributing basin	D 4.3, D 5.3	9
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	9
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	D 3.1, D 3.2	10
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	D 3.3	10

Riverine Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Ponded depressions	R 1.1	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	R 2.4	
Plant cover of trees, shrubs, and herbaceous plants	R 1.2, R 4.2	
Width of unit vs. width of stream *(can be added to another figure)*	R 4.1	
Map of the contributing basin	R 2.2, R 2.3, R 5.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	R 3.1	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	R 3.2, R 3.3	

Lake Fringe Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	L 1.1, L 4.1, H 1.1, H 1.4	
Plant cover of trees, shrubs, and herbaceous plants	L 1.2	
Boundary of area within 150 ft of the wetland *(can be added to another figure)*	L 2.2	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	L 3.1, L 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	L 3.3	

Slope Wetlands

Map of:	To answer questions:	Figure #
Cowardin plant classes	H 1.1, H 1.4	
Hydroperiods	H 1.2	
Plant cover of **dense** trees, shrubs, and herbaceous plants	S 1.3	
Plant cover of **dense, rigid** trees, shrubs, and herbaceous plants (*can be added to figure above)*	S 4.1	
Boundary of 150 ft buffer (can be added to another figure)	S 2.1, S 5.1	
1 km Polygon: Area that extends 1 km from entire wetland edge - including polygons for accessible habitat and undisturbed habitat	H 2.1, H 2.2, H 2.3	
Screen capture of map of 303(d) listed waters in basin (from Ecology website)	S 3.1, S 3.2	
Screen capture of list of TMDLs for WRIA in which unit is found (from web)	S 3.3	

HGM Classification of Wetlands in Western Washington

For questions 1-7, the criteria described must apply to the entire unit being rated.

If the hydrologic criteria listed in each question do not apply to the entire unit being rated, you probably have a unit with multiple HGM classes. In this case, identify which hydrologic criteria in questions 1-7 apply, and go to Question 8.

1. Are the water levels in the entire unit usually controlled by tides except during floods?

NO – go to 2 **YES** – the wetland class is **Tidal Fringe** – go to 1.1

1.1 Is the salinity of the water during periods of annual low flow below 0.5 ppt (parts per thousand)?

NO – Saltwater Tidal Fringe (Estuarine) **YES – Freshwater Tidal Fringe**

*If your wetland can be classified as a Freshwater Tidal Fringe use the forms for **Riverine** wetlands. If it is Saltwater Tidal Fringe it is an **Estuarine** wetland and is not scored. This method **cannot** be used to score functions for estuarine wetlands.*

2. The entire wetland unit is flat and precipitation is the only source (>90%) of water to it. Groundwater and surface water runoff are NOT sources of water to the unit.

NO – go to 3 **YES** – The wetland class is **Flats**

*If your wetland can be classified as a Flats wetland, use the form for **Depressional** wetlands.*

3. Does the entire wetland unit **meet all** of the following criteria?
___The vegetated part of the wetland is on the shores of a body of permanent open water (without any plants on the surface at any time of the year) at least 20 ac (8 ha) in size;
___At least 30% of the open water area is deeper than 6.6 ft (2 m).

NO – go to 4 **YES –** The wetland class is **Lake Fringe** (Lacustrine Fringe)

4. Does the entire wetland unit **meet all** of the following criteria?
____The wetland is on a slope (*slope can be very gradual*),
____The water flows through the wetland in one direction (unidirectional) and usually comes from seeps. It may flow subsurface, as sheetflow, or in a swale without distinct banks,
____The water leaves the wetland **without being impounded**.

NO – go to 5 **YES –** The wetland class is **Slope**

NOTE: Surface water does not pond in these type of wetlands except occasionally in very small and shallow depressions or behind hummocks (depressions are usually <3 ft diameter and less than 1 ft deep).

5. Does the entire wetland unit **meet all** of the following criteria?
____The unit is in a valley, or stream channel, where it gets inundated by overbank flooding from that stream or river,
____The overbank flooding occurs at least once every 2 years.

Wetland name or number B

NO – go to 6 **YES –** The wetland class is **Riverine**

NOTE: The Riverine unit can contain depressions that are filled with water when the river is not flooding

6. Is the entire wetland unit in a topographic depression in which water ponds, or is saturated to the surface, at some time during the year? *This means that any outlet, if present, is higher than the interior of the wetland.*

   NO – go to 7 **YES –** The wetland class is **Depressional**

7. Is the entire wetland unit located in a very flat area with no obvious depression and no overbank flooding? The unit does not pond surface water more than a few inches. The unit seems to be maintained by high groundwater in the area. The wetland may be ditched, but has no obvious natural outlet.

   NO – go to 8 **YES –** The wetland class is **Depressional**

8. Your wetland unit seems to be difficult to classify and probably contains several different HGM classes. For example, seeps at the base of a slope may grade into a riverine floodplain, or a small stream within a Depressional wetland has a zone of flooding along its sides. GO BACK AND IDENTIFY WHICH OF THE HYDROLOGIC REGIMES DESCRIBED IN QUESTIONS 1-7 APPLY TO DIFFERENT AREAS IN THE UNIT (make a rough sketch to help you decide). Use the following table to identify the appropriate class to use for the rating system if you have several HGM classes present within the wetland unit being scored.

   NOTE: Use this table only if the class that is recommended in the second column represents 10% or more of the total area of the wetland unit being rated. If the area of the HGM class listed in column 2 is less than 10% of the unit; classify the wetland using the class that represents more than 90% of the total area.

HGM classes within the wetland unit being rated	HGM class to use in rating
Slope + Riverine	Riverine
Slope + Depressional	Depressional
Slope + Lake Fringe	Lake Fringe
Depressional + Riverine along stream within boundary of depression	Depressional
Depressional + Lake Fringe	Depressional
Riverine + Lake Fringe	Riverine
Salt Water Tidal Fringe and any other class of freshwater wetland	Treat as ESTUARINE

If you are still unable to determine which of the above criteria apply to your wetland, or if you have ***more than 2 HGM classes*** *within a wetland boundary, classify the wetland as Depressional for the rating.*

Wetland name or number _B___

DEPRESSIONAL AND FLATS WETLANDS

Water Quality Functions - Indicators that the site functions to improve water quality

D 1.0. Does the site have the potential to improve water quality?	
D 1.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression (QUESTION 7 on key) with no surface water leaving it (no outlet). points = 3 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet. points = 2 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing points = 1 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch. points = 1	2
D 1.2. The soil 2 in below the surface (or duff layer) is true clay or true organic *(use NRCS definitions)*. Yes = 4 No = 0	0
D 1.3. Characteristics and distribution of persistent plants (Emergent, Scrub-shrub, and/or Forested Cowardin classes): Wetland has persistent, ungrazed, plants > 95% of area points = 5 Wetland has persistent, ungrazed, plants > ½ of area points = 3 Wetland has persistent, ungrazed plants > $^1/_{10}$ of area points = 1 Wetland has persistent, ungrazed plants < $^1/_{10}$ of area points = 0	3
D 1.4. Characteristics of seasonal ponding or inundation: *This is the area that is ponded for at least 2 months. See description in manual.* Area seasonally ponded is > ½ total area of wetland points = 4 Area seasonally ponded is > ¼ total area of wetland points = 2 Area seasonally ponded is < ¼ total area of wetland points = 0	0
Total for D 1 Add the points in the boxes above	5

Rating of Site Potential If score is:___**12-16 = H** ___**6-11 = M** _x_**0-5 = L** *Record the rating on the first page*

D 2.0. Does the landscape have the potential to support the water quality function of the site?	
D 2.1. Does the wetland unit receive stormwater discharges? Yes = 1 No = 0	0
D 2.2. Is > 10% of the area within 150 ft of the wetland in land uses that generate pollutants? Yes = 1 No = 0	0
D 2.3. Are there septic systems within 250 ft of the wetland? Yes = 1 No = 0	0
D 2.4. Are there other sources of pollutants coming into the wetland that are not listed in questions D 2.1-D 2.3? Source Yes = 1 No = 0	0
Total for D 2 Add the points in the boxes above	0

Rating of Landscape Potential If score is:___**3 or 4 = H** ___**1 or 2 = M** _x__**0 = L** *Record the rating on the first page*

D 3.0. Is the water quality improvement provided by the site valuable to society?	
D 3.1. Does the wetland discharge directly (i.e., within 1 mi) to a stream, river, lake, or marine water that is on the 303(d) list? Yes = 1 No = 0	0
D 3.2. Is the wetland in a basin or sub-basin where an aquatic resource is on the 303(d) list? Yes = 1 No = 0	1
D 3.3. Has the site been identified in a watershed or local plan as important for maintaining water quality (*answer YES if there is a TMDL for the basin in which the unit is found*)? Yes = 2 No = 0	2
Total for D 3 Add the points in the boxes above	3

Rating of Value If score is:_x__**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number _B___

DEPRESSIONAL AND FLATS WETLANDS

Hydrologic Functions - Indicators that the site functions to reduce flooding and stream degradation

D 4.0. Does the site have the potential to reduce flooding and erosion?		
D 4.1. Characteristics of surface water outflows from the wetland: Wetland is a depression or flat depression with no surface water leaving it (no outlet) Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing	 points = 4 points = 2 points = 1 points = 0	2
D 4.2. Depth of storage during wet periods: *Estimate the height of ponding above the bottom of the outlet. For wetlands with no outlet, measure from the surface of permanent water or if dry, the deepest part.* Marks of ponding are 3 ft or more above the surface or bottom of outlet Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet The wetland is a "headwater" wetland Wetland is flat but has small depressions on the surface that trap water Marks of ponding less than 0.5 ft (6 in)	 points = 7 points = 5 points = 3 points = 3 points = 1 points = 0	3
D 4.3. Contribution of the wetland to storage in the watershed: *Estimate the ratio of the area of upstream basin contributing surface water to the wetland to the area of the wetland unit itself.* The area of the basin is less than 10 times the area of the unit The area of the basin is 10 to 100 times the area of the unit The area of the basin is more than 100 times the area of the unit Entire wetland is in the Flats class	 points = 5 points = 3 points = 0 points = 5	3
Total for D 4	Add the points in the boxes above	8

Rating of Site Potential If score is:___**12-16 = H** __x_**6-11 = M** ___**0-5 = L** *Record the rating on the first page*

D 5.0. Does the landscape have the potential to support hydrologic functions of the site?		
D 5.1. Does the wetland receive stormwater discharges?	Yes = 1 No = 0	0
D 5.2. Is >10% of the area within 150 ft of the wetland in land uses that generate excess runoff?	Yes = 1 No = 0	0
D 5.3. Is more than 25% of the contributing basin of the wetland covered with intensive human land uses (residential at >1 residence/ac, urban, commercial, agriculture, etc.)?	Yes = 1 No = 0	0
Total for D 5	Add the points in the boxes above	0

Rating of Landscape Potential If score is:___**3 = H** ___**1 or 2 = M** __x_**0 = L** *Record the rating on the first page*

D 6.0. Are the hydrologic functions provided by the site valuable to society?		
D 6.1. The unit is in a landscape that has flooding problems. *Choose the description that best matches conditions around the wetland unit being rated. Do not add points. Choose the highest score if more than one condition is met.* The wetland captures surface water that would otherwise flow down-gradient into areas where flooding has damaged human or natural resources (e.g., houses or salmon redds): • Flooding occurs in a sub-basin that is immediately down-gradient of unit. • Surface flooding problems are in a sub-basin farther down-gradient. Flooding from groundwater is an issue in the sub-basin. The existing or potential outflow from the wetland is so constrained by human or natural conditions that the water stored by the wetland cannot reach areas that flood. *Explain why* ______________ There are no problems with flooding downstream of the wetland.	 points = 2 points = 1 points = 1 points = 0 points = 0	2
D 6.2. Has the site been identified as important for flood storage or flood conveyance in a regional flood control plan?	Yes = 2 No = 0	0
Total for D 6	Add the points in the boxes above	2

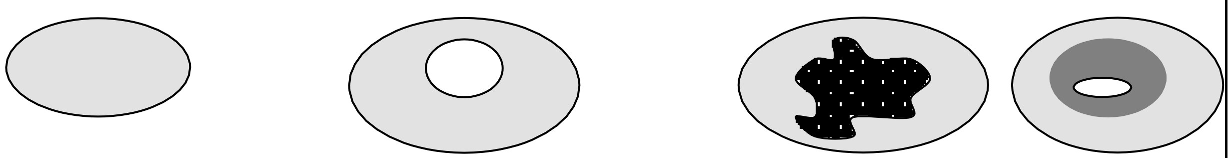
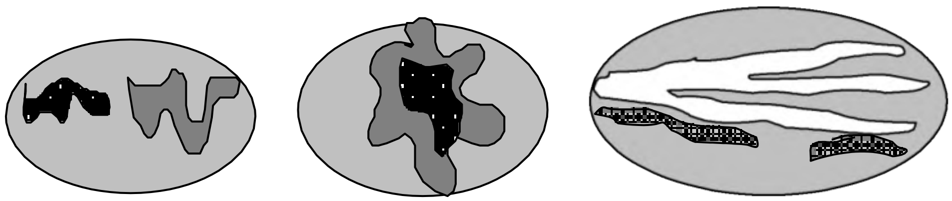
Rating of Value If score is:__x__**2-4 = H** ___**1 = M** ___**0 = L** *Record the rating on the first page*

Wetland name or number _B___

These questions apply to wetlands of all HGM classes.

HABITAT FUNCTIONS - Indicators that site functions to provide important habitat

H 1.0. Does the site have the potential to provide habitat?

H 1.1. Structure of plant community: *Indicators are Cowardin classes and strata within the Forested class.* Check the Cowardin plant classes in the wetland. *Up to 10 patches may be combined for each class to meet the threshold of ¼ ac or more than 10% of the unit if it is smaller than 2.5 ac. Add the number of structures checked.* ____Aquatic bed — 4 structures or more: points = 4 _x__Emergent — 3 structures: points = 2 ____Scrub-shrub (areas where shrubs have > 30% cover) — 2 structures: points = 1 _x_Forested (areas where trees have > 30% cover) — 1 structure: points = 0 *If the unit has a Forested class, check if:* ____The Forested class has 3 out of 5 strata (canopy, sub-canopy, shrubs, herbaceous, moss/ground-cover) that each cover 20% within the Forested polygon	2
H 1.2. Hydroperiods Check the types of water regimes (hydroperiods) present within the wetland. The water regime has to cover more than 10% of the wetland or ¼ ac to count (*see text for descriptions of hydroperiods*). _x_Permanently flooded or inundated — 4 or more types present: points = 3 ____Seasonally flooded or inundated — 3 types present: points = 2 ____Occasionally flooded or inundated — 2 types present: points = 1 _x_Saturated only — 1 type present: points = 0 ____Permanently flowing stream or river in, or adjacent to, the wetland ____Seasonally flowing stream in, or adjacent to, the wetland ____**Lake Fringe wetland** — **2 points** ____**Freshwater tidal wetland** — **2 points**	1
H 1.3. Richness of plant species Count the number of plant species in the wetland that cover at least 10 ft^2. *Different patches of the same species can be combined to meet the size threshold and you do not have to name the species.* ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle*** If you counted: > 19 species — points = 2 5 - 19 species — points = 1 < 5 species — points = 0	1
H 1.4. Interspersion of habitats Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*  **None** = 0 points — **Low** = 1 point — **Moderate** = 2 points All three diagrams in this row are **HIGH** = 3points 	1

Wetland name or number _B___

H 1.5. Special habitat features: Check the habitat features that are present in the wetland. *The number of checks is the number of points.* ____Large, downed, woody debris within the wetland (> 4 in diameter and 6 ft long). ____Standing snags (dbh > 4 in) within the wetland ____Undercut banks are present for at least 6.6 ft (2 m) **and/or** overhanging plants extends at least 3.3 ft (1 m) over a stream (or ditch) in, or contiguous with the wetland, for at least 33 ft (10 m) ____Stable steep banks of fine material that might be used by beaver or muskrat for denning (> 30 degree slope) OR signs of recent beaver activity are present *(cut shrubs or trees that have not yet weathered where wood is exposed)* ____At least ¼ ac of thin-stemmed persistent plants or woody branches are present in areas that are permanently or seasonally inundated *(structures for egg-laying by amphibians)* _x__Invasive plants cover less than 25% of the wetland area in every stratum of plants (*see H 1.1 for list of strata*)	1
Total for H 1 — Add the points in the boxes above	6

Rating of Site Potential If score is:___**15-18 = H** ___**7-14 = M** __x_**0-6 = L** *Record the rating on the first page*

H 2.0. Does the landscape have the potential to support the habitat functions of the site?	
H 2.1. Accessible habitat (include *only habitat that directly abuts wetland unit*). *Calculate:* % undisturbed habitat_6_ **+** [(% moderate and low intensity land uses)/2]_13_ **=** _**19**_% If total accessible habitat is: > $^1/_3$ (33.3%) of 1 km Polygon — points = 3 20-33% of 1 km Polygon — points = 2 10-19% of 1 km Polygon — points = 1 < 10% of 1 km Polygon — points = 0	1
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* % undisturbed habitat_12_ **+** [(% moderate and low intensity land uses)/2]_44_ **=** _**47**_% Undisturbed habitat > 50% of Polygon — points = 3 Undisturbed habitat 10-50% and in 1-3 patches — points = 2 Undisturbed habitat 10-50% and > 3 patches — points = 1 Undisturbed habitat < 10% of 1 km Polygon — points = 0	1
H 2.3. Land use intensity in 1 km Polygon: If > 50% of 1 km Polygon is high intensity land use — points = (- 2) ≤ 50% of 1 km Polygon is high intensity — points = 0	0
Total for H 2 — Add the points in the boxes above	2

Rating of Landscape Potential If score is:___**4-6 = H** __x__**1-3 = M** ___**< 1 = L** *Record the rating on the first page*

H 3.0. Is the habitat provided by the site valuable to society?	
H 3.1. Does the site provide habitat for species valued in laws, regulations, or policies? *Choose only the highest score that applies to the wetland being rated.* Site meets ANY of the following criteria: — points = 2 — It has 3 or more priority habitats within 100 m (see next page) — It provides habitat for Threatened or Endangered species (any plant or animal on the state or federal lists) — It is mapped as a location for an individual WDFW priority species — It is a Wetland of High Conservation Value as determined by the Department of Natural Resources — It has been categorized as an important habitat site in a local or regional comprehensive plan, in a Shoreline Master Plan, or in a watershed plan Site has 1 or 2 priority habitats (listed on next page) within 100 m — points = 1 Site does not meet any of the criteria above — points = 0	0
Total for H 3 — Add the points in the boxes above	0

Rating of Value If score is:___**2 = H** ___**1 = M** __x__**0 = L** *Record the rating on the first page*

Wetland name or number _B___

WDFW Priority Habitats

Priority habitats listed by WDFW (see complete descriptions of WDFW priority habitats, and the counties in which they can be found, in: Washington Department of Fish and Wildlife. 2008. Priority Habitat and Species List. Olympia, Washington. 177 pp. http://wdfw.wa.gov/publications/00165/wdfw00165.pdf or access the list from here: http://wdfw.wa.gov/conservation/phs/list/)

Count how many of the following priority habitats are within 330 ft (100 m) of the wetland unit: ***NOTE:*** *This question is independent of the land use between the wetland unit and the priority habitat.*

— **Aspen Stands:** Pure or mixed stands of aspen greater than 1 ac (0.4 ha).

— **Biodiversity Areas and Corridors**: Areas of habitat that are relatively important to various species of native fish and wildlife (*full descriptions in WDFW PHS report*).

— **Herbaceous Balds:** Variable size patches of grass and forbs on shallow soils over bedrock.

— **Old-growth/Mature forests:** Old-growth west of Cascade crest – Stands of at least 2 tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) > 32 in (81 cm) dbh or > 200 years of age. Mature forests – Stands with average diameters exceeding 21 in (53 cm) dbh; crown cover may be less than 100%; decay, decadence, numbers of snags, and quantity of large downed material is generally less than that found in old-growth; 80-200 years old west of the Cascade crest.

— **Oregon White Oak:** Woodland stands of pure oak or oak/conifer associations where canopy coverage of the oak component is important (*full descriptions in WDFW PHS report p. 158 – see web link above*).

— **Riparian**: The area adjacent to aquatic systems with flowing water that contains elements of both aquatic and terrestrial ecosystems which mutually influence each other.

— **Westside Prairies:** Herbaceous, non-forested plant communities that can either take the form of a dry prairie or a wet prairie (*full descriptions in WDFW PHS report p. 161 – see web link above*).

— **Instream:** The combination of physical, biological, and chemical processes and conditions that interact to provide functional life history requirements for instream fish and wildlife resources.

— **Nearshore**: Relatively undisturbed nearshore habitats. These include Coastal Nearshore, Open Coast Nearshore, and Puget Sound Nearshore. (*full descriptions of habitats and the definition of relatively undisturbed are in WDFW report – see web link on previous page).*

— **Caves:** A naturally occurring cavity, recess, void, or system of interconnected passages under the earth in soils, rock, ice, or other geological formations and is large enough to contain a human.

— **Cliffs:** Greater than 25 ft (7.6 m) high and occurring below 5000 ft elevation.

— **Talus:** Homogenous areas of rock rubble ranging in average size 0.5 - 6.5 ft (0.15 - 2.0 m), composed of basalt, andesite, and/or sedimentary rock, including riprap slides and mine tailings. May be associated with cliffs.

— **Snags and Logs:** Trees are considered snags if they are dead or dying and exhibit sufficient decay characteristics to enable cavity excavation/use by wildlife. Priority snags have a diameter at breast height of > 20 in (51 cm) in western Washington and are > 6.5 ft (2 m) in height. Priority logs are > 12 in (30 cm) in diameter at the largest end, and > 20 ft (6 m) long.

Note: All vegetated wetlands are by definition a priority habitat but are not included in this list because they are addressed elsewhere.

Wetland name or number B

CATEGORIZATION BASED ON SPECIAL CHARACTERISTICS

Wetland Type *Check off any criteria that apply to the wetland. Circle the category when the appropriate criteria are met.*	Category
SC 1.0. Estuarine wetlands Does the wetland meet the following criteria for Estuarine wetlands? — The dominant water regime is tidal, — Vegetated, and — With a salinity greater than 0.5 ppt Yes –Go to **SC 1.1** No= **Not an estuarine wetland**	
SC 1.1. Is the wetland within a National Wildlife Refuge, National Park, National Estuary Reserve, Natural Area Preserve, State Park or Educational, Environmental, or Scientific Reserve designated under WAC 332-30-151? Yes = **Category I** No - Go to **SC 1.2**	**Cat. I**
SC 1.2. Is the wetland unit at least 1 ac in size and meets at least two of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing, and has less than 10% cover of non-native plant species. (If non-native species are *Spartina*, see page 25) — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland has at least two of the following features: tidal channels, depressions with open water, or contiguous freshwater wetlands. Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 2.0. Wetlands of High Conservation Value (WHCV) SC 2.1. Has the WA Department of Natural Resources updated their website to include the list of Wetlands of High Conservation Value? Yes **–** Go to **SC 2.2** No **–** Go to **SC 2.3** SC 2.2. Is the wetland listed on the WDNR database as a Wetland of High Conservation Value? Yes **= Category I** No **= Not a WHCV** SC 2.3. Is the wetland in a Section/Township/Range that contains a Natural Heritage wetland? http://www1.dnr.wa.gov/nhp/refdesk/datasearch/wnhpwetlands.pdf Yes **– Contact WNHP/WDNR and go to SC 2.4** No **= Not a WHCV** SC 2.4. Has WDNR identified the wetland within the S/T/R as a Wetland of High Conservation Value and listed it on their website? Yes **= Category I** No **= Not a WHCV**	**Cat. I**
SC 3.0. Bogs Does the wetland (or any part of the unit) meet both the criteria for soils and vegetation in bogs? *Use the key below.* ***If you answer YES you will still need to rate the wetland based on its functions.*** SC 3.1. Does an area within the wetland unit have organic soil horizons, either peats or mucks, that compose 16 in or more of the first 32 in of the soil profile? Yes – Go to **SC 3.3** No – Go to **SC 3.2** SC 3.2. Does an area within the wetland unit have organic soils, either peats or mucks, that are less than 16 in deep over bedrock, or an impermeable hardpan such as clay or volcanic ash, or that are floating on top of a lake or pond? Yes – Go to **SC 3.3** No = **Is not a bog** SC 3.3. Does an area with peats or mucks have more than 70% cover of mosses at ground level, AND at least a 30% cover of plant species listed in Table 4? Yes = **Is a Category I bog** No – Go to **SC 3.4** **NOTE:** If you are uncertain about the extent of mosses in the understory, you may substitute that criterion by measuring the pH of the water that seeps into a hole dug at least 16 in deep. If the pH is less than 5.0 and the plant species in Table 4 are present, the wetland is a bog. SC 3.4. Is an area with peats or mucks forested (> 30% cover) with Sitka spruce, subalpine fir, western red cedar, western hemlock, lodgepole pine, quaking aspen, Engelmann spruce, or western white pine, AND any of the species (or combination of species) listed in Table 4 provide more than 30% of the cover under the canopy? Yes = **Is a Category I bog** No **= Is not a bog**	**Cat. I**

Wetland name or number B

SC 4.0. Forested Wetlands Does the wetland have at least 1 contiguous acre of forest that meets one of these criteria for the WA Department of Fish and Wildlife's forests as priority habitats? ***If you answer YES you will still need to rate the wetland based on its functions.*** — **Old-growth forests** (west of Cascade crest): Stands of at least two tree species, forming a multi-layered canopy with occasional small openings; with at least 8 trees/ac (20 trees/ha) that are at least 200 years of age OR have a diameter at breast height (dbh) of 32 in (81 cm) or more. — **Mature forests** (west of the Cascade Crest): Stands where the largest trees are 80- 200 years old OR the species that make up the canopy have an average diameter (dbh) exceeding 21 in (53 cm). Yes = **Category I** No = **Not a forested wetland for this section**	**Cat. I**
SC 5.0. Wetlands in Coastal Lagoons Does the wetland meet all of the following criteria of a wetland in a coastal lagoon? — The wetland lies in a depression adjacent to marine waters that is wholly or partially separated from marine waters by sandbanks, gravel banks, shingle, or, less frequently, rocks — The lagoon in which the wetland is located contains ponded water that is saline or brackish (> 0.5 ppt) during most of the year in at least a portion of the lagoon *(needs to be measured near the bottom)* Yes – Go to **SC 5.1** No = **Not a wetland in a coastal lagoon** SC 5.1. Does the wetland meet all of the following three conditions? — The wetland is relatively undisturbed (has no diking, ditching, filling, cultivation, grazing), and has less than 20% cover of aggressive, opportunistic plant species (see list of species on p. 100). — At least ¾ of the landward edge of the wetland has a 100 ft buffer of shrub, forest, or un-grazed or un-mowed grassland. — The wetland is larger than $^{1}/_{10}$ ac (4350 ft^2) Yes = **Category I** No = **Category II**	**Cat. I** **Cat. II**
SC 6.0. Interdunal Wetlands Is the wetland west of the 1889 line (also called the Western Boundary of Upland Ownership or WBUO)? ***If you answer yes you will still need to rate the wetland based on its habitat functions.*** In practical terms that means the following geographic areas: — Long Beach Peninsula: Lands west of SR 103 — Grayland-Westport: Lands west of SR 105 — Ocean Shores-Copalis: Lands west of SR 115 and SR 109 Yes – Go to **SC 6.1** No = **not an interdunal wetland for rating** SC 6.1. Is the wetland 1 ac or larger and scores an 8 or 9 for the habitat functions on the form (rates H,H,H or H,H,M for the three aspects of function)? Yes = **Category I** No – Go to **SC 6.2** SC 6.2. Is the wetland 1 ac or larger, or is it in a mosaic of wetlands that is 1 ac or larger? Yes = **Category II** No – Go to **SC 6.3** SC 6.3. Is the unit between 0.1 and 1 ac, or is it in a mosaic of wetlands that is between 0.1 and 1 ac? Yes = **Category III** No = **Category IV**	**Cat I** **Cat. II** **Cat. III** **Cat. IV**
Category of wetland based on Special Characteristics If you answered No for all types, enter "Not Applicable" on Summary Form	

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APPENDIX C: PRECIPITATION DATA

WETS Station: BATTLE GROUND, WA

Requested years: 1991 - 2021

Month	Temperature (°F)			Precipitation (inches)				
	Avg daily max	Avg daily min	Avg daily mean	Avg	30% chance will have		Avg number of days with 0.10 inch or more	Average total snowfall
					less than	more than		
Jan	46.4	33.0	39.7	7.31	5.70	8.45	15	1.2
Feb	50.4	32.8	41.6	5.36	3.65	6.40	13	1.1
Mar	55.0	35.6	45.3	5.59	4.26	6.50	14	0.4
Apr	59.9	38.9	49.4	4.54	3.32	5.34	12	0.0
May	66.7	44.4	55.6	3.31	2.00	4.01	9	0.0
Jun	71.4	48.4	59.9	2.31	1.61	2.75	6	0.0
Jul	78.9	51.7	65.3	0.63	0.23	0.70	2	0.0
Aug	79.9	51.2	65.6	0.80	0.37	0.94	2	0.0
Sep	74.7	46.7	60.7	2.20	1.12	2.65	5	0.0
Oct	62.7	40.9	51.8	4.81	3.29	5.74	10	0.0
Nov	51.9	36.6	44.2	7.67	5.50	9.06	14	0.1
Dec	45.3	32.8	39.1	7.98	6.33	9.18	15	0.4
Annual:					47.35	56.14		
Average	61.9	41.1	51.5	-	-	-	-	-
Total	-	-	-	52.51			118	3.3

Climatological Data for BATTLE GROUND, WA - February 2021

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2021-02-01	54	45	49.5	10	0	0.27	M	M
2021-02-02	49	43	46.0	6	0	0.46	M	M
2021-02-03	48	37	42.5	3	0	0.57	M	M
2021-02-04	42	35	38.5	0	0	0.05	M	M
2021-02-05	42	37	39.5	0	0	0.53	M	M
2021-02-06	49	37	43.0	3	0	0.18	M	M
2021-02-07	44	37	40.5	1	0	0.45	M	M
2021-02-08	46	34	40.0	0	0	0.02	M	M
2021-02-09	43	25	34.0	0	0	0.00	M	M
2021-02-10	45	25	35.0	0	0	0.00	M	M
2021-02-11	44	31	37.5	0	0	0.03	M	M
2021-02-12	36	26	31.0	0	0	0.15	M	M
2021-02-13	28	22	25.0	0	0	0.90	11.0	M
2021-02-14	31	25	28.0	0	0	0.21	1.0	M
2021-02-15	32	31	31.5	0	0	0.55	M	M
2021-02-16	43	31	37.0	0	0	0.10	M	M
2021-02-17	45	34	39.5	0	0	0.04	M	M
2021-02-18	46	31	38.5	0	0	0.03	M	M
2021-02-19	40	32	36.0	0	0	0.23	M	M
2021-02-20	47	35	41.0	1	0	0.05	M	M
2021-02-21	47	38	42.5	3	0	0.17	M	M
2021-02-22	47	40	43.5	4	0	0.22	M	M
2021-02-23	48	35	41.5	2	0	0.51	M	M
2021-02-24	46	32	39.0	0	0	0.15	M	M
2021-02-25	48	32	40.0	0	0	0.13	M	M
2021-02-26	45	37	41.0	1	0	0.54	M	M
2021-02-27	47	37	42.0	2	0	0.15	M	M
2021-02-28	49	36	42.5	3	0	0.00	M	M
Average|Sum	44.0	33.6	38.8	39	0	6.69	12.0	M

Climatological Data for BATTLE GROUND, WA - January 2021

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2021-01-01	51	44	47.5	8	0	0.15	0.0	0
2021-01-02	55	45	50.0	10	0	0.46	0.0	0
2021-01-03	49	40	44.5	5	0	1.73	0.0	0
2021-01-04	52	40	46.0	6	0	0.48	0.0	0
2021-01-05	50	41	45.5	6	0	0.54	0.0	0
2021-01-06	51	41	46.0	6	0	0.37	0.0	0
2021-01-07	47	43	45.0	5	0	0.40	0.0	0
2021-01-08	54	40	47.0	7	0	0.15	0.0	0
2021-01-09	48	30	39.0	0	0	0.19	0.0	0
2021-01-10	44	31	37.5	0	0	0.10	0.0	0
2021-01-11	45	38	41.5	2	0	0.03	0.0	0
2021-01-12	52	39	45.5	6	0	1.39	0.0	0
2021-01-13	57	44	50.5	11	1	1.50	0.0	0
2021-01-14	53	34	43.5	4	0	0.40	0.0	0
2021-01-15	54	35	44.5	5	0	0.25	0.0	0
2021-01-16	48	38	43.0	3	0	0.05	0.0	0
2021-01-17	45	38	41.5	2	0	0.10	0.0	0
2021-01-18	50	34	42.0	2	0	0.00	0.0	0
2021-01-19	51	28	39.5	0	0	0.00	0.0	0
2021-01-20	53	27	40.0	0	0	0.00	0.0	0
2021-01-21	45	27	36.0	0	0	0.19	0.0	0
2021-01-22	44	36	40.0	0	0	0.00	0.0	0
2021-01-23	51	25	38.0	0	0	0.00	0.0	0
2021-01-24	45	24	34.5	0	0	0.00	0.0	0
2021-01-25	38	34	36.0	0	0	0.42	0.0	0
2021-01-26	39	34	36.5	0	0	0.04	0.0	0
2021-01-27	41	33	37.0	0	0	0.17	0.0	0
2021-01-28	43	35	39.0	0	0	0.15	0.0	0
2021-01-29	45	39	42.0	2	0	0.04	0.0	0
2021-01-30	44	39	41.5	2	0	0.28	0.0	0
2021-01-31	51	41	46.0	6	0	0.12	0.0	0
Average|Sum	48.2	36.0	42.1	98	1	9.70	0.0	0.0

Climatological Data for BATTLE GROUND, WA - December 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-12-01	48	28	38.0	0	0	0.27	0.0	0
2020-12-02	50	27	38.5	0	0	0.05	0.0	0
2020-12-03	56	29	42.5	3	0	0.00	0.0	0
2020-12-04	47	27	37.0	0	0	0.00	0.0	0
2020-12-05	53	26	39.5	0	0	0.00	0.0	0
2020-12-06	52	27	39.5	0	0	0.16	0.0	0
2020-12-07	46	37	41.5	2	0	0.00	0.0	0
2020-12-08	48	33	40.5	1	0	0.00	0.0	0
2020-12-09	54	33	43.5	4	0	0.34	0.0	0
2020-12-10	51	32	41.5	2	0	0.04	0.0	0
2020-12-11	41	35	38.0	0	0	0.20	0.0	0
2020-12-12	41	32	36.5	0	0	0.42	0.0	0
2020-12-13	43	32	37.5	0	0	0.15	0.0	0
2020-12-14	41	37	39.0	0	0	0.21	0.0	0
2020-12-15	45	39	42.0	2	0	0.05	0.0	0
2020-12-16	47	40	43.5	4	0	0.20	0.0	0
2020-12-17	51	39	45.0	5	0	0.47	0.0	0
2020-12-18	48	40	44.0	4	0	0.06	0.0	0
2020-12-19	51	43	47.0	7	0	0.31	0.0	0
2020-12-20	50	49	49.5	10	0	1.91	0.0	0
2020-12-21	50	44	47.0	7	0	0.51	0.0	0
2020-12-22	57	38	47.5	8	0	0.30	0.0	0
2020-12-23	46	29	37.5	0	0	0.00	0.0	0
2020-12-24	41	25	33.0	0	0	0.00	0.0	0
2020-12-25	46	23	34.5	0	0	0.08	0.0	0
2020-12-26	45	31	38.0	0	0	0.55	0.0	0
2020-12-27	49	40	44.5	5	0	0.18	0.0	0
2020-12-28	50	26	38.0	0	0	0.00	0.0	0
2020-12-29	45	25	35.0	0	0	0.00	0.0	0
2020-12-30	37	29	33.0	0	0	0.13	0.0	0
2020-12-31	45	37	41.0	1	0	0.51	0.0	0
Average|Sum	47.5	33.3	40.4	65	0	7.10	0.0	0.0

Climatological Data for BATTLE GROUND, WA - November 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-11-01	59	30	44.5	5	0	0.00	0.0	0
2020-11-02	68	30	49.0	9	0	0.00	0.0	0
2020-11-03	65	31	48.0	8	0	0.00	0.0	0
2020-11-04	59	36	47.5	8	0	0.40	0.0	0
2020-11-05	64	57	60.5	21	11	0.01	0.0	0
2020-11-06	57	47	52.0	12	2	1.28	0.0	0
2020-11-07	48	34	41.0	1	0	0.39	0.0	0
2020-11-08	44	28	36.0	0	0	0.09	0.0	0
2020-11-09	46	25	35.5	0	0	0.00	0.0	0
2020-11-10	41	28	34.5	0	0	0.33	0.0	0
2020-11-11	47	36	41.5	2	0	0.17	0.0	0
2020-11-12	50	28	39.0	0	0	0.01	0.0	0
2020-11-13	47	30	38.5	0	0	1.30	0.0	0
2020-11-14	49	38	43.5	4	0	0.31	0.0	0
2020-11-15	47	39	43.0	3	0	1.06	0.0	0
2020-11-16	53	42	47.5	8	0	0.14	0.0	0
2020-11-17	52	40	46.0	6	0	0.20	0.0	0
2020-11-18	56	40	48.0	8	0	0.54	0.0	0
2020-11-19	46	41	43.5	4	0	0.55	0.0	0
2020-11-20	49	37	43.0	3	0	0.02	0.0	0
2020-11-21	43	31	37.0	0	0	0.01	0.0	0
2020-11-22	39	37	38.0	0	0	0.00	0.0	0
2020-11-23	42	28	35.0	0	0	0.36	0.0	0
2020-11-24	50	35	42.5	3	0	0.20	0.0	0
2020-11-25	48	38	43.0	3	0	0.60	0.0	0
2020-11-26	46	40	43.0	3	0	0.12	0.0	0
2020-11-27	47	37	42.0	2	0	0.01	0.0	0
2020-11-28	44	34	39.0	0	0	0.11	0.0	0
2020-11-29	43	35	39.0	0	0	0.04	0.0	0
2020-11-30	50	31	40.5	1	0	0.26	0.0	0
Average|Sum	50.0	35.4	42.7	114	13	8.51	0.0	0.0

Climatological Data for BATTLE GROUND, WA - October 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-10-01	81	48	64.5	25	15	0.00	0.0	0
2020-10-02	76	52	64.0	24	14	0.01	0.0	0
2020-10-03	79	52	65.5	26	16	0.01	0.0	0
2020-10-04	76	51	63.5	24	14	0.00	0.0	0
2020-10-05	66	47	56.5	17	7	0.00	0.0	0
2020-10-06	72	47	59.5	20	10	0.00	0.0	0
2020-10-07	77	47	62.0	22	12	0.00	0.0	0
2020-10-08	73	48	60.5	21	11	0.00	0.0	0
2020-10-09	60	53	56.5	17	7	0.00	0.0	0
2020-10-10	73	53	63.0	23	13	0.84	0.0	0
2020-10-11	61	49	55.0	15	5	0.40	0.0	0
2020-10-12	56	50	53.0	13	3	0.61	0.0	0
2020-10-13	61	49	55.0	15	5	0.10	0.0	0
2020-10-14	61	45	53.0	13	3	0.39	0.0	0
2020-10-15	61	36	48.5	9	0	0.01	0.0	0
2020-10-16	63	35	49.0	9	0	0.00	0.0	0
2020-10-17	61	44	52.5	13	3	0.02	0.0	0
2020-10-18	63	49	56.0	16	6	0.00	0.0	0
2020-10-19	63	52	57.5	18	8	0.01	0.0	0
2020-10-20	61	44	52.5	13	3	0.00	0.0	0
2020-10-21	62	43	52.5	13	3	0.00	0.0	0
2020-10-22	58	30	44.0	4	0	0.00	0.0	0
2020-10-23	56	29	42.5	3	0	0.00	0.0	0
2020-10-24	51	30	40.5	1	0	0.02	0.0	0
2020-10-25	48	36	42.0	2	0	0.00	0.0	0
2020-10-26	46	25	35.5	0	0	0.00	0.0	0
2020-10-27	53	26	39.5	0	0	0.00	0.0	0
2020-10-28	57	26	41.5	2	0	0.00	0.0	0
2020-10-29	65	31	48.0	8	0	0.00	0.0	0
2020-10-30	58	36	47.0	7	0	0.00	0.0	0
2020-10-31	60	31	45.5	6	0	0.17	0.0	0
Average|Sum	63.2	41.7	52.5	399	158	2.59	0.0	0.0

Climatological Data for BATTLE GROUND, WA - September 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-09-01	73	49	61.0	21	11	0.00	0.0	0
2020-09-02	86	48	67.0	27	17	0.00	0.0	0
2020-09-03	88	52	70.0	30	20	0.00	0.0	0
2020-09-04	93	53	73.0	33	23	0.00	0.0	0
2020-09-05	84	55	69.5	30	20	0.00	0.0	0
2020-09-06	73	49	61.0	21	11	0.00	0.0	0
2020-09-07	87	48	67.5	28	18	0.00	0.0	0
2020-09-08	89	52	70.5	31	21	0.00	0.0	0
2020-09-09	80	50	65.0	25	15	0.00	0.0	0
2020-09-10	88	49	68.5	29	19	0.00	0.0	0
2020-09-11	87	50	68.5	29	19	0.00	0.0	0
2020-09-12	62	45	53.5	14	4	0.00	0.0	0
2020-09-13	63	44	53.5	14	4	0.00	0.0	0
2020-09-14	62	43	52.5	13	3	0.00	0.0	0
2020-09-15	70	51	60.5	21	11	0.00	0.0	0
2020-09-16	74	50	62.0	22	12	0.00	0.0	0
2020-09-17	68	49	58.5	19	9	0.00	0.0	0
2020-09-18	71	49	60.0	20	10	0.21	0.0	0
2020-09-19	64	56	60.0	20	10	0.34	0.0	0
2020-09-20	68	53	60.5	21	11	0.15	0.0	0
2020-09-21	74	50	62.0	22	12	0.00	0.0	0
2020-09-22	73	49	61.0	21	11	0.04	0.0	0
2020-09-23	72	57	64.5	25	15	0.16	0.0	0
2020-09-24	63	56	59.5	20	10	1.22	0.0	0
2020-09-25	69	56	62.5	23	13	0.12	0.0	0
2020-09-26	61	48	54.5	15	5	0.44	0.0	0
2020-09-27	67	49	58.0	18	8	0.01	0.0	0
2020-09-28	72	44	58.0	18	8	0.00	0.0	0
2020-09-29	87	43	65.0	25	15	0.00	0.0	0
2020-09-30	87	45	66.0	26	16	0.00	0.0	0
Average|Sum	75.2	49.7	62.5	681	381	2.69	0.0	0.0

Climatological Data for BATTLE GROUND, WA - August 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-08-01	86	55	70.5	31	21	0.00	0.0	0
2020-08-02	78	54	66.0	26	16	0.00	0.0	0
2020-08-03	82	54	68.0	28	18	0.00	0.0	0
2020-08-04	82	53	67.5	28	18	0.00	0.0	0
2020-08-05	84	53	68.5	29	19	0.00	0.0	0
2020-08-06	81	54	67.5	28	18	0.00	0.0	0
2020-08-07	70	47	58.5	19	9	0.20	0.0	0
2020-08-08	75	46	60.5	21	11	0.00	0.0	0
2020-08-09	75	48	61.5	22	12	0.00	0.0	0
2020-08-10	82	47	64.5	25	15	0.00	0.0	0
2020-08-11	86	46	66.0	26	16	0.00	0.0	0
2020-08-12	76	46	61.0	21	11	0.00	0.0	0
2020-08-13	70	42	56.0	16	6	0.00	0.0	0
2020-08-14	75	42	58.5	19	9	0.00	0.0	0
2020-08-15	85	46	65.5	26	16	0.00	0.0	0
2020-08-16	96	52	74.0	34	24	0.00	0.0	0
2020-08-17	93	59	76.0	36	26	0.00	0.0	0
2020-08-18	90	59	74.5	35	25	0.00	0.0	0
2020-08-19	82	53	67.5	28	18	0.00	0.0	0
2020-08-20	83	53	68.0	28	18	0.00	0.0	0
2020-08-21	81	58	69.5	30	20	0.15	0.0	0
2020-08-22	74	56	65.0	25	15	0.09	0.0	0
2020-08-23	78	51	64.5	25	15	0.00	0.0	0
2020-08-24	80	49	64.5	25	15	0.00	0.0	0
2020-08-25	77	48	62.5	23	13	0.00	0.0	0
2020-08-26	78	48	63.0	23	13	0.00	0.0	0
2020-08-27	80	47	63.5	24	14	0.00	0.0	0
2020-08-28	81	47	64.0	24	14	0.00	0.0	0
2020-08-29	81	49	65.0	25	15	0.00	0.0	0
2020-08-30	73	43	58.0	18	8	0.00	0.0	0
2020-08-31	74	42	58.0	18	8	0.00	0.0	0
Average|Sum	80.3	49.9	65.1	786	476	0.44	0.0	0.0

Climatological Data for BATTLE GROUND, WA - July 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-07-01	68	51	59.5	20	10	0.04	0.0	0
2020-07-02	62	51	56.5	17	7	0.06	0.0	0
2020-07-03	68	48	58.0	18	8	0.01	0.0	0
2020-07-04	68	49	58.5	19	9	0.00	0.0	0
2020-07-05	71	49	60.0	20	10	0.00	0.0	0
2020-07-06	72	49	60.5	21	11	0.00	0.0	0
2020-07-07	66	50	58.0	18	8	0.00	0.0	0
2020-07-08	64	53	58.5	19	9	0.07	0.0	0
2020-07-09	71	49	60.0	20	10	0.00	0.0	0
2020-07-10	73	50	61.5	22	12	0.00	0.0	0
2020-07-11	77	49	63.0	23	13	0.00	0.0	0
2020-07-12	73	49	61.0	21	11	0.00	0.0	0
2020-07-13	74	46	60.0	20	10	0.00	0.0	0
2020-07-14	78	46	62.0	22	12	0.00	0.0	0
2020-07-15	83	47	65.0	25	15	0.00	0.0	0
2020-07-16	83	50	66.5	27	17	0.00	0.0	0
2020-07-17	80	55	67.5	28	18	0.00	0.0	0
2020-07-18	70	46	58.0	18	8	0.00	0.0	0
2020-07-19	84	46	65.0	25	15	0.00	0.0	0
2020-07-20	87	52	69.5	30	20	0.00	0.0	0
2020-07-21	90	56	73.0	33	23	0.00	0.0	0
2020-07-22	84	57	70.5	31	21	0.00	0.0	0
2020-07-23	77	57	67.0	27	17	0.00	0.0	0
2020-07-24	72	51	61.5	22	12	0.00	0.0	0
2020-07-25	69	45	57.0	17	7	0.00	0.0	0
2020-07-26	80	45	62.5	23	13	0.00	0.0	0
2020-07-27	98	49	73.5	34	24	0.00	0.0	0
2020-07-28	96	56	76.0	36	26	0.00	0.0	0
2020-07-29	85	54	69.5	30	20	0.00	0.0	0
2020-07-30	88	53	70.5	31	21	0.00	0.0	0
2020-07-31	91	56	73.5	34	24	0.00	0.0	0
Average|Sum	77.5	50.5	64.0	751	441	0.18	0.0	0.0

Climatological Data for BATTLE GROUND, WA - June 2020

Date	Max Temperature	Min Temperature	Avg Temperature	GDD Base 40	GDD Base 50	Precipitation	Snowfall	Snow Depth
2020-06-01	62	39	50.5	11	1	0.02	0.0	0
2020-06-02	69	39	54.0	14	4	0.00	0.0	0
2020-06-03	75	42	58.5	19	9	0.00	0.0	0
2020-06-04	71	46	58.5	19	9	0.00	0.0	0
2020-06-05	70	47	58.5	19	9	0.00	0.0	0
2020-06-06	67	48	57.5	18	8	0.01	0.0	0
2020-06-07	59	46	52.5	13	3	0.61	0.0	0
2020-06-08	57	46	51.5	12	2	0.16	0.0	0
2020-06-09	62	48	55.0	15	5	0.80	0.0	0
2020-06-10	62	49	55.5	16	6	0.21	0.0	0
2020-06-11	77	55	66.0	26	16	0.00	0.0	0
2020-06-12	73	55	64.0	24	14	0.00	0.0	0
2020-06-13	57	50	53.5	14	4	0.17	0.0	0
2020-06-14	58	46	52.0	12	2	0.42	0.0	0
2020-06-15	65	46	55.5	16	6	0.45	0.0	0
2020-06-16	62	49	55.5	16	6	0.30	0.0	0
2020-06-17	63	46	54.5	15	5	0.47	0.0	0
2020-06-18	71	46	58.5	19	9	0.00	0.0	0
2020-06-19	79	50	64.5	25	15	0.00	0.0	0
2020-06-20	84	50	67.0	27	17	0.00	0.0	0
2020-06-21	68	57	62.5	23	13	0.21	0.0	0
2020-06-22	72	48	60.0	20	10	0.00	0.0	0
2020-06-23	83	48	65.5	26	16	0.00	0.0	0
2020-06-24	90	56	73.0	33	23	0.00	0.0	0
2020-06-25	76	53	64.5	25	15	0.00	0.0	0
2020-06-26	82	55	68.5	29	19	0.00	0.0	0
2020-06-27	83	55	69.0	29	19	0.00	0.0	0
2020-06-28	66	52	59.0	19	9	0.01	0.0	0
2020-06-29	66	51	58.5	19	9	0.00	0.0	0
2020-06-30	70	53	61.5	22	12	0.04	0.0	0
Average|Sum	70.0	49.0	59.5	595	295	3.88	0.0	0.0

APPENDIX D: EMAIL COMMUNICATION WITH WDFW

Annie Jean Rendleman

From:	Holowatz, Isaac T (DFW) <Isaac.Holowatz@dfw.wa.gov>
Sent:	Wednesday, February 17, 2021 5:03 PM
To:	Annie Jean Rendleman
Subject:	RE: Oregon white oak protection- La Center

Annie Jean,
It was great talking with you earlier today. Thank you for the Picture … what a beautiful Oak tree.
Yes, I think that dripline would cover the adequate amount of space to protect the Oak Tree.
If you have any further questions please let me know.
Thank you,

Isaac Holowatz
Habitat Biologist
Washington Department of Fish and Wildlife
Cell: 360.773.8943

From: Annie Jean Rendleman <AnnieJean@eco-land.com>
Sent: Tuesday, February 16, 2021 5:00 PM
To: Holowatz, Isaac T (DFW) <Isaac.Holowatz@dfw.wa.gov>
Subject: Oregon white oak protection- La Center

Hi Isaac,

I'm working on a project in the City of La Center on Clark County parcel 209113000 with a large white oak tree (40-inch DBH). The City code says to consult with WDFW on an appropriate buffer for priority oaks. I have never dealt with a buffer off of an oak, other than the dripline. Is this something you would need to make a site visit for? I plan to go out next week and could take more photos for you, if that's preferable.

Feel free to forward this on if I should be reaching out to someone else!

Thanks,

Please note: I am no longer working on Fridays. Please call our office at the number below if you need immediate assistance.

Annie-Jean Rendleman | Biologist
Port of Camas/Washougal Satellite Office
3805 Truman Road, Suite 2, Washougal, WA 98671
P: 360-835-9082 ext 1104
Longview Office
1157 3rd Avenue, Suite 220A Longview, WA 98632
P: 360-578-1371 ext 1104 | F: 360-414-9305
www.eco-land.com | AnnieJean@eco-land.com

From: Spoo, Ethan <ethan.spoo@wsp.com>
Sent: Tuesday, February 16, 2021 11:21 AM
To: Annie Jean Rendleman <AnnieJean@eco-land.com>; Sarah Dollar <sdollar@ci.lacenter.wa.us>
Cc: Anthony Cooper <acooper@ci.lacenter.wa.us>; Matt Jenkins <mjenkins@ci.lacenter.wa.us>
Subject: RE: Hung Annexation - ELS - Wetland Boundary

Hi Annie,

Please take a look at Table 18.300.090(2)(a) which requires a standard buffer of 300 feet around non-riparian PHS point sites *or as recommended in consultation with WDFW.* Assuming this is priority oak habitat we are talking about, please reach out to WDFW and come to concurrence with them about what buffer would protect the oak since I'm assuming you won't want to use 300 feet. In the past WDFW requires priority oak habitat be protected to the driplines. Once you come to an agreement with WDFW, please submit a letter or email from them stating what they require the buffer to be.

Let me know if you have any other questions.

Thanks,
Ethan

From: Annie Jean Rendleman <AnnieJean@eco-land.com>
Sent: Tuesday, February 16, 2021 9:27 AM
To: Sarah Dollar <sdollar@ci.lacenter.wa.us>
Cc: Anthony Cooper <acooper@ci.lacenter.wa.us>; Matt Jenkins <mjenkins@ci.lacenter.wa.us>; Spoo, Ethan <ethan.spoo@wsp.com>
Subject: RE: Hung Annexation - ELS - Wetland Boundary

Good morning,

I'm working on the critical areas report for the Hung parcel. In looking at the La Center code (18.300.090(2) Fish and Wildlife Conservation Areas), I noticed it mentions a buffer non-riparian priority habitat and species. I've completed many permitting projects with priority oaks, but never seen a buffer for them. I looked through the WDFW Management

Recommendations and didn't see anything regarding setbacks or buffers. Could you clarify what the City requires for oak buffers?

Thanks so much,
Annie Jean

Please note: I am no longer working on Fridays. Please call our office at the number below if you need immediate assistance.

Ecological Land Services

Annie-Jean Rendleman | Biologist

Port of Camas/Washougal Satellite Office
3805 Truman Road, Suite 2, Washougal, WA 98671
P: 360-835-9082 ext 1104

Longview Office
1157 3rd Avenue, Suite 220A Longview, WA 98632
P: 360-578-1371 ext 1104 | F: 360-414-9305
www.eco-land.com | AnnieJean@eco-land.com

Exhibit A.20

Lockwood Meadows Subdivision

Located in the SW ¼ of the NE ¼ of Section 2, T4N, R1E, W.M.
La Center, Washington

PROPOSAL:
The applicant is proposing a 71 lot subdivision in the LDR-7.5 zone. Density transfer is proposed for the wetland on the south end of the site. 90 percent of the proposed parcels average to 7,740 sqft. The other 10 percent of the lots have been reduced to approximately 6,000 sqft. 0.5 acres of usable park area is proposed. The proposed net density is 5du./ac. The minimum allowable net density is 4du./ac. 5 acres of public ROW is proposed to be dedicated to the City of La Center. Street lighting and landscaping will be provided with this preliminary submittal.

Total site area = 871,028 SF (20.00 AC)
ROW Dedication = 215,972 SF (4.96 AC)
Total Acreage = 655,056 SF (15.03 AC)

Tract A,B,C & D to be owned and maintained by home owners association. A blanket easement on Tract D will be provided to the City of La Center for inspection.

Tract B will contain the proposed park area
20,134 SF of proposed park area
16,353 SF of improved park area

SETBACKS:
Front = 20', Side = 7.5', Side Street = 10', Back = 20'

LOT COVERAGE:
Maximum Building Lot Coverage = 35%
Maximum Impervious Surface Area = 50%

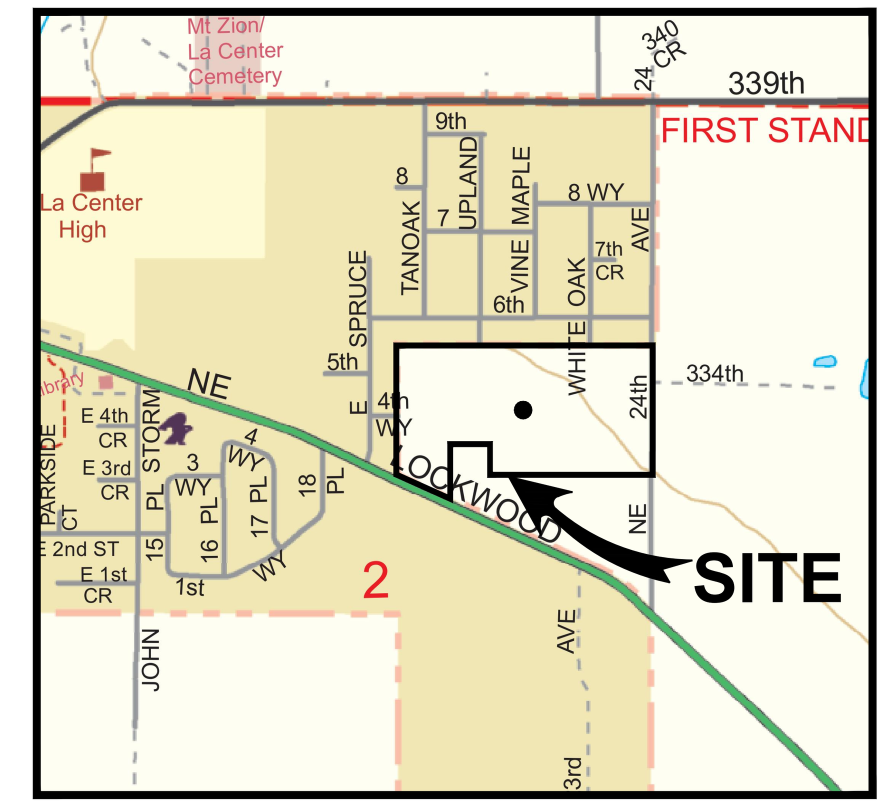
Average Building per Lot = 2,666 SF
Average Driveway per Lot = 1,602 SF

Utilities:
Public water and sewer service is available at the site. The public water and sewer purveyors are Clark Public Utilities and the City of La Center respectively.

Stormwater runoff from the site will be treated and routed to a proposed storm facility in the southwest corner of the development.

CRITICAL AREAS:
There are 2 delineated category IV wetlands on site. The slope wetland on the eastern end of the site is proposed to be filled. The other wetland at the low point of the site is proposed to be retained and be included as open space adjacent to the proposed park area in Tract B. There is an Oregon White Oak located on Lockwood Creek Road that may need to be impacted due to the proposed frontage improvements. There are no onsite areas within the designated 100 year floodplain, landslide hazards, or known significant historic resources on site.

Sheet Index



VICINITY MAP
NOT TO SCALE

GENERAL NOTES

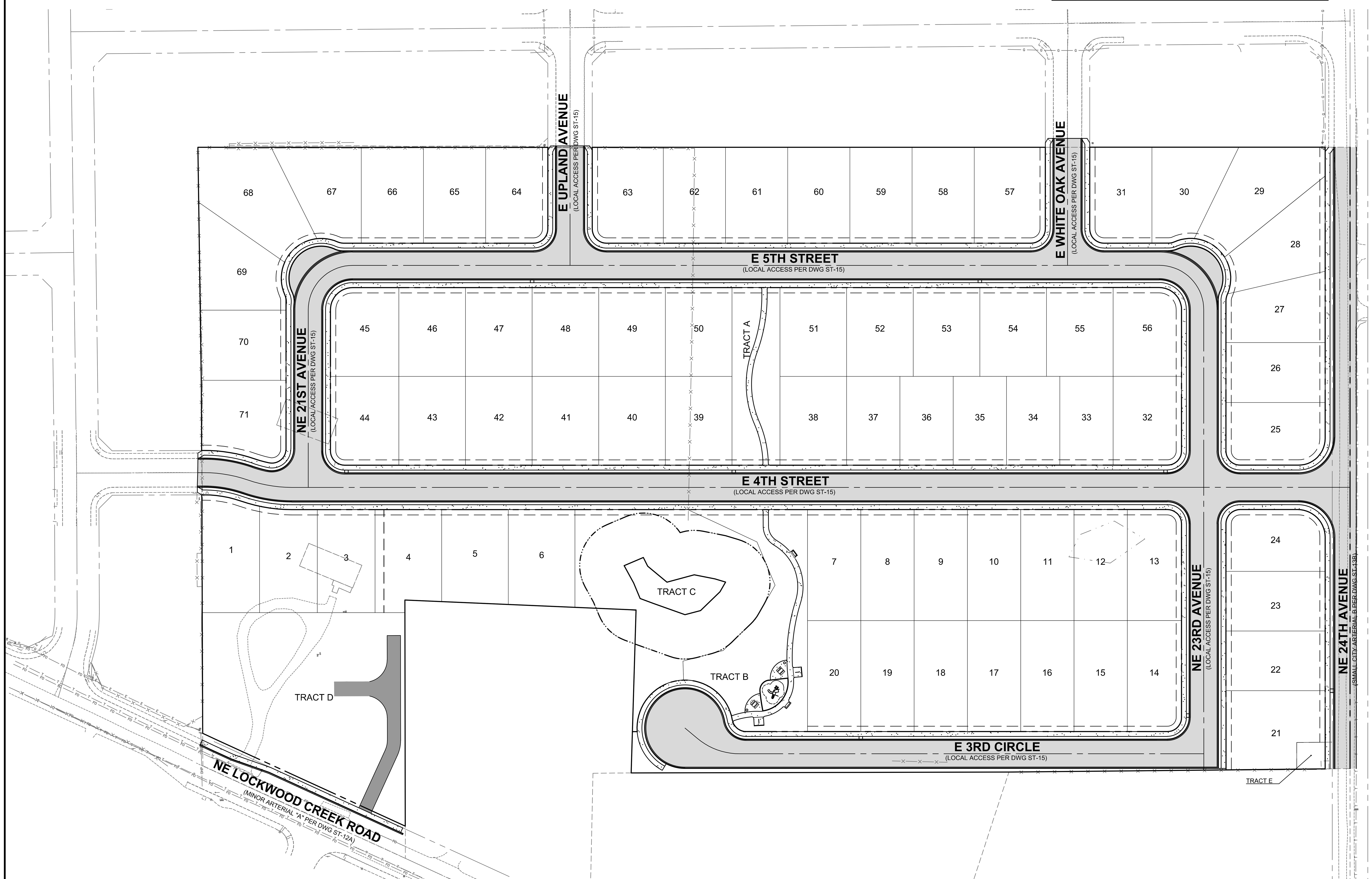
OWNER/APPLICANT:
Susanna S Hung Trust
710 Columbia St #414
Vancouver, WA 98660
(360) 450-8154
sshung_2000@yahoo.com

CIVIL ENGINEER:
PLS Engineering
Contact: Travis Johnson, PE
604 W Evergreen Blvd
Vancouver, WA 98660
PH: (360) 944-6519
pm@plsengineering.com

SITE ADDRESS:
2000 NW Lockwood Creek Rd
La Center, WA 98629

Parcel #: 209113000

Lot Size: 20.0 acres



Hatching Legend

- Proposed Asphalt Concrete
- Proposed Cement Concrete
- Proposed Gravel

Scale 1" = 60'
60 30 0 60

Cover Sheet For:
Lockwood Meadows Subdivision
A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING
Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions

Project No. 3094	
SCALE:	H: 1" = 60' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ

GENERAL NOTES

OWNER/APPLICANT:
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710 Columbia St #414
Vancouver, WA 98660
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SITE ADDRESS:
2000 NW Lockwood Creek Rd
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Parcel #: 209113000

Lot Size: 20.0 acres

EXISTING CONDITIONS LEGEND

LINETYPES

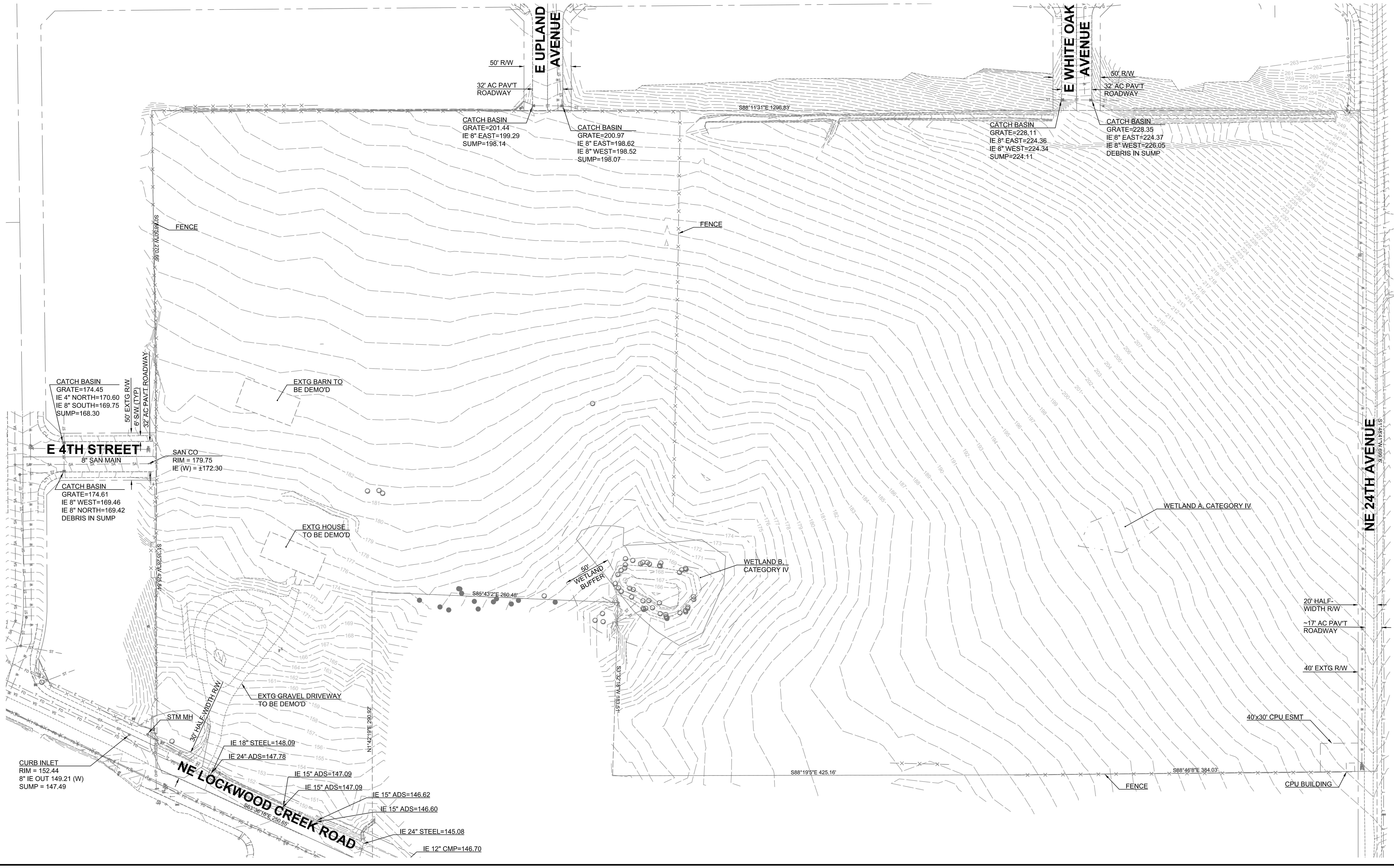
- ST — STORM SEWER LINE
- OHP — OVER HEAD POWER LINE
- W — WATER LINE LOCATE
- SA — SANITARY SEWER PIPE
- T — TELECOMM UTILITY
- E — UNDERGROUND ELECTRIC
- FENCE
- CENTERLINE
- RIGHT OF WAY
- EDGE OF PAVEMENT
- CURB LINE
- EDGE OF GRAVEL
- SIDEWALK
- PAVEMENT STRIPING
- LOT LINE
- PROPERTY BOUNDARY
- 100 — CONTOUR LINE

SYMBOLS

- CATCH BASIN
- STORM MANHOLE
- CURB INLET
- FIRE HYDRANT
- WATER VALVE
- SAN SEWER MH
- UTILITY POLE
- EXTG WELL
- TEL PEDESTAL
- GUY WIRE
- MAILBOX
- EXTG TREES

Scale 1" = 50'

50 25 0 50



PLS ENGINEERING

Existing Conditions Plan For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions

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SCALE:	H: 1" = 50' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ

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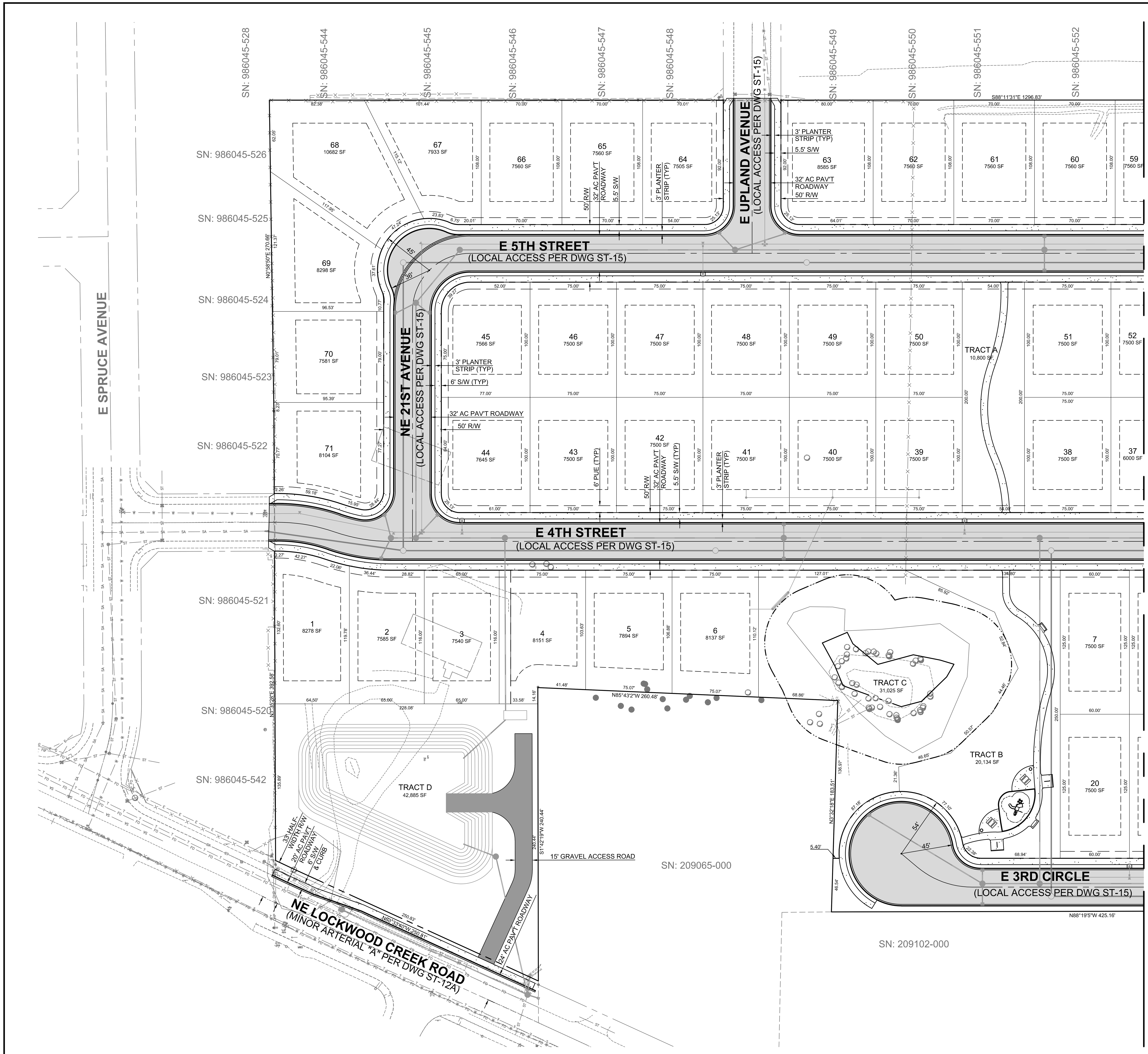

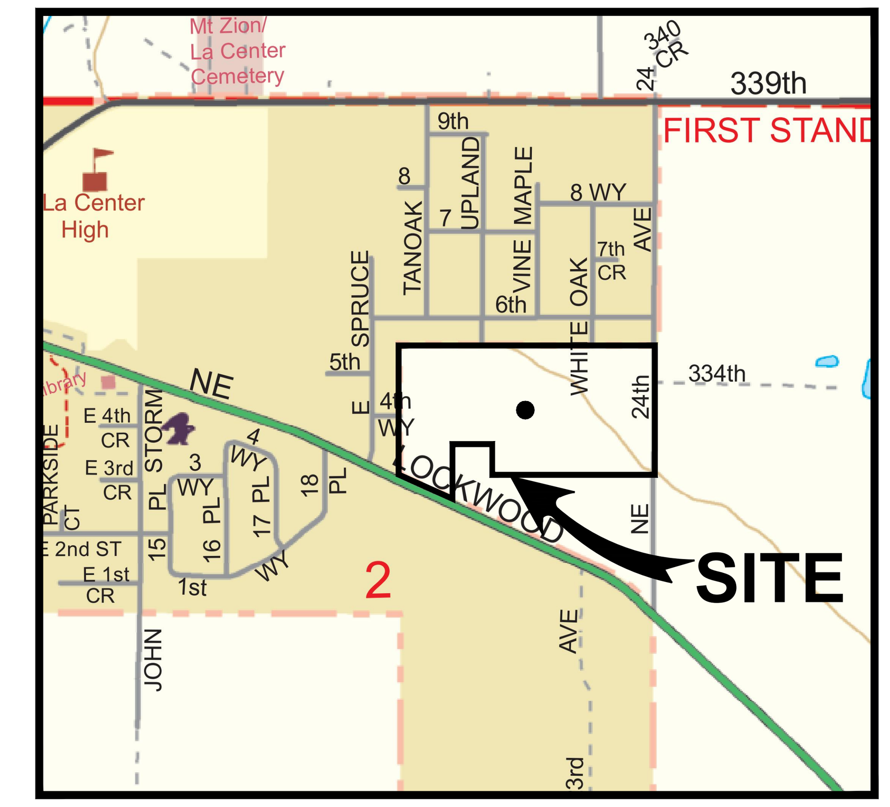

VICINITY MAP
NOT TO SCALE

GENERAL NOTES

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2000 NW Lockwood Creek Rd
La Center, WA 98629

Parcel #: 209113000

Lot Size: 20.0 acres

Hatching Legend

- Proposed Asphalt Concrete
- Proposed Cement Concrete
- Proposed Gravel

Scale 1" = 40'

Preliminary Plat West For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING

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Revisions

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3

11

GENERAL NOTES

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Hatching Legend
Proposed Asphalt Concrete
Proposed Cement Concrete
Proposed Gravel

Scale 1" = 40'
40 20 0 40

N

Preliminary Plat East For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING

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Revisions

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Project No. 3094	
SCALE:	H: 1" = 40' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ

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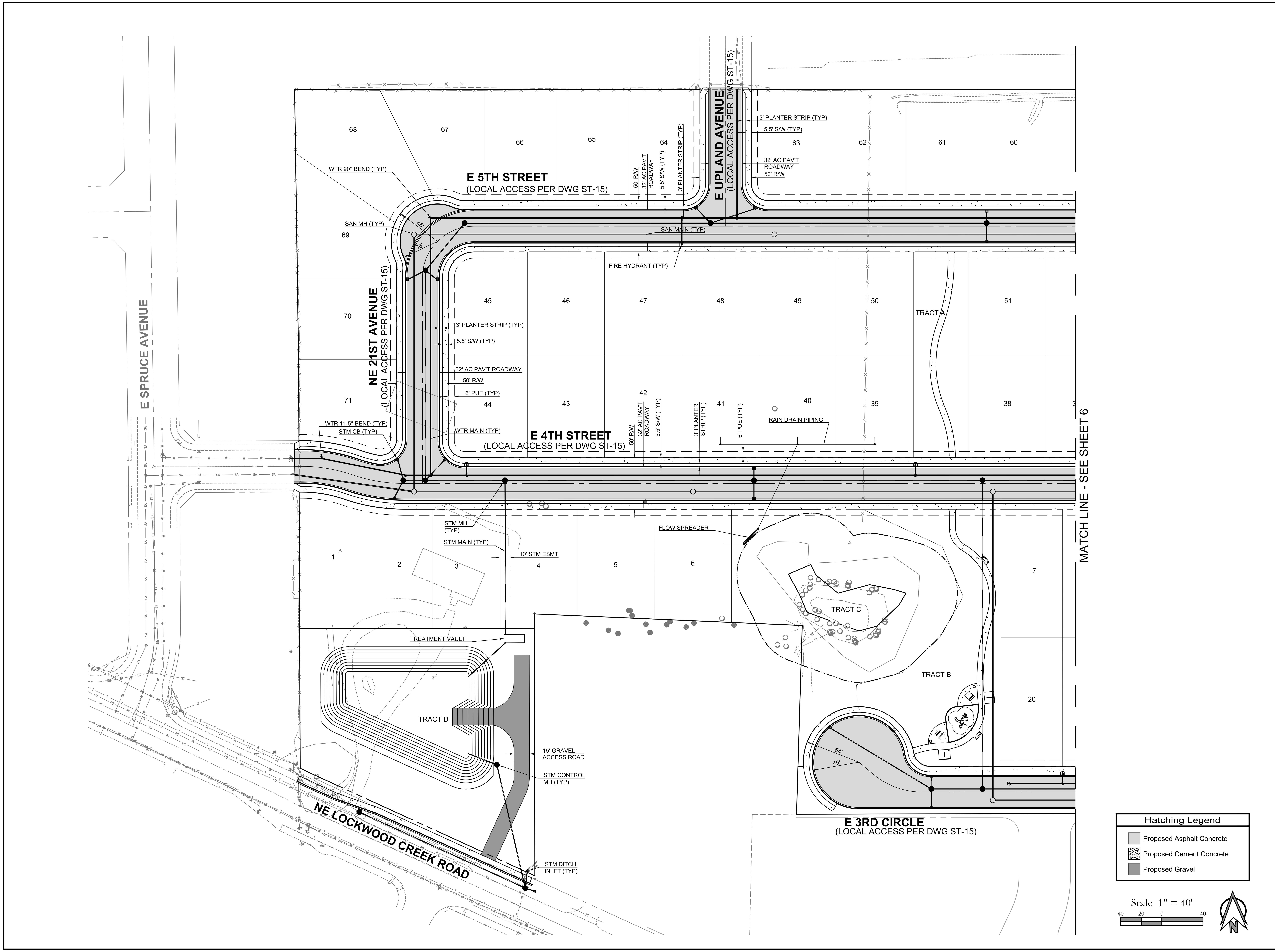

PLS ENGINEERING

Preliminary Stormwater Plan West For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

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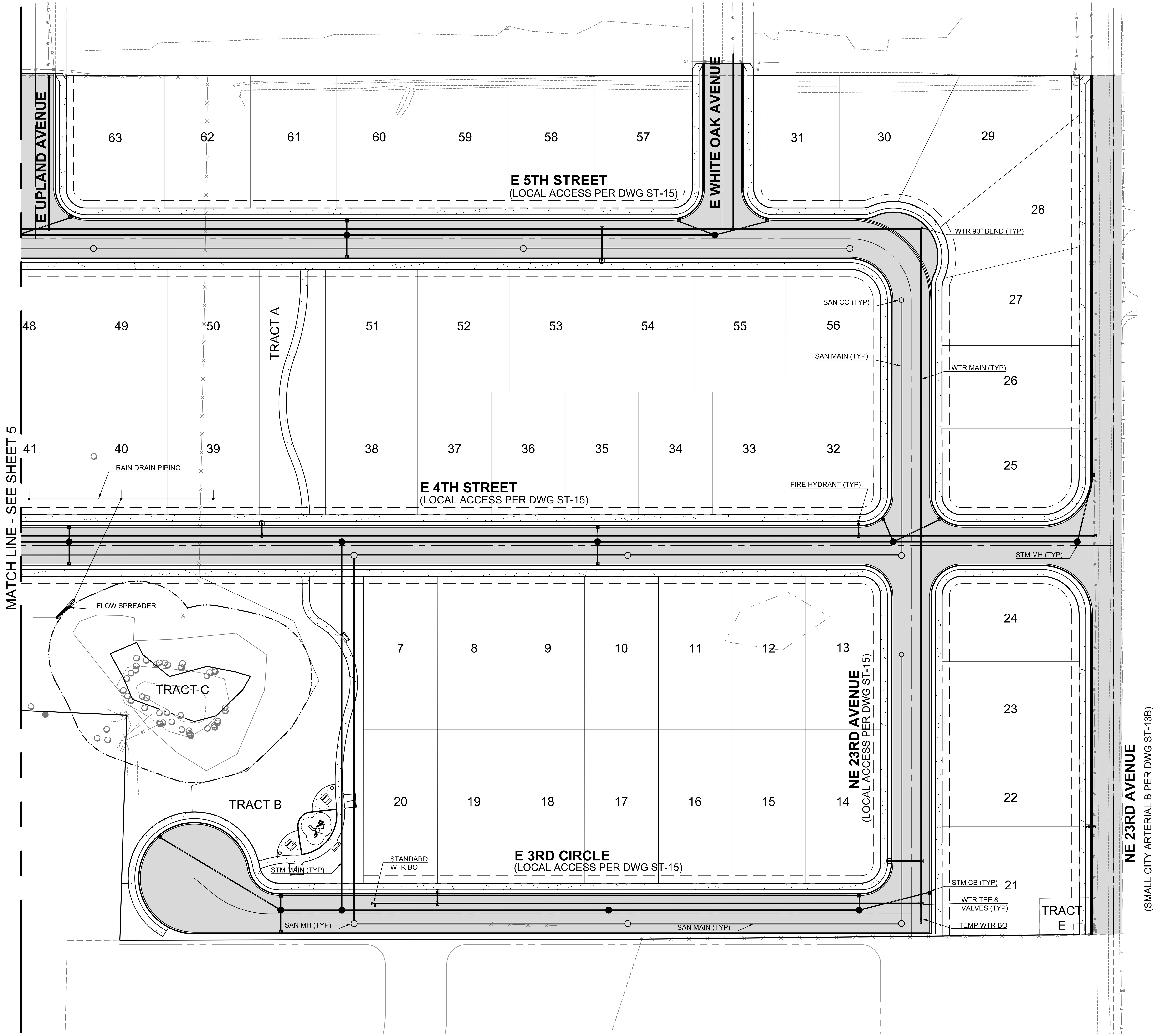

Hatching Legend

- Proposed Asphalt Concrete
- Proposed Cement Concrete
- Proposed Gravel

Scale 1" = 40'

40 20 0 40

N

Preliminary Stormwater Plan East For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING

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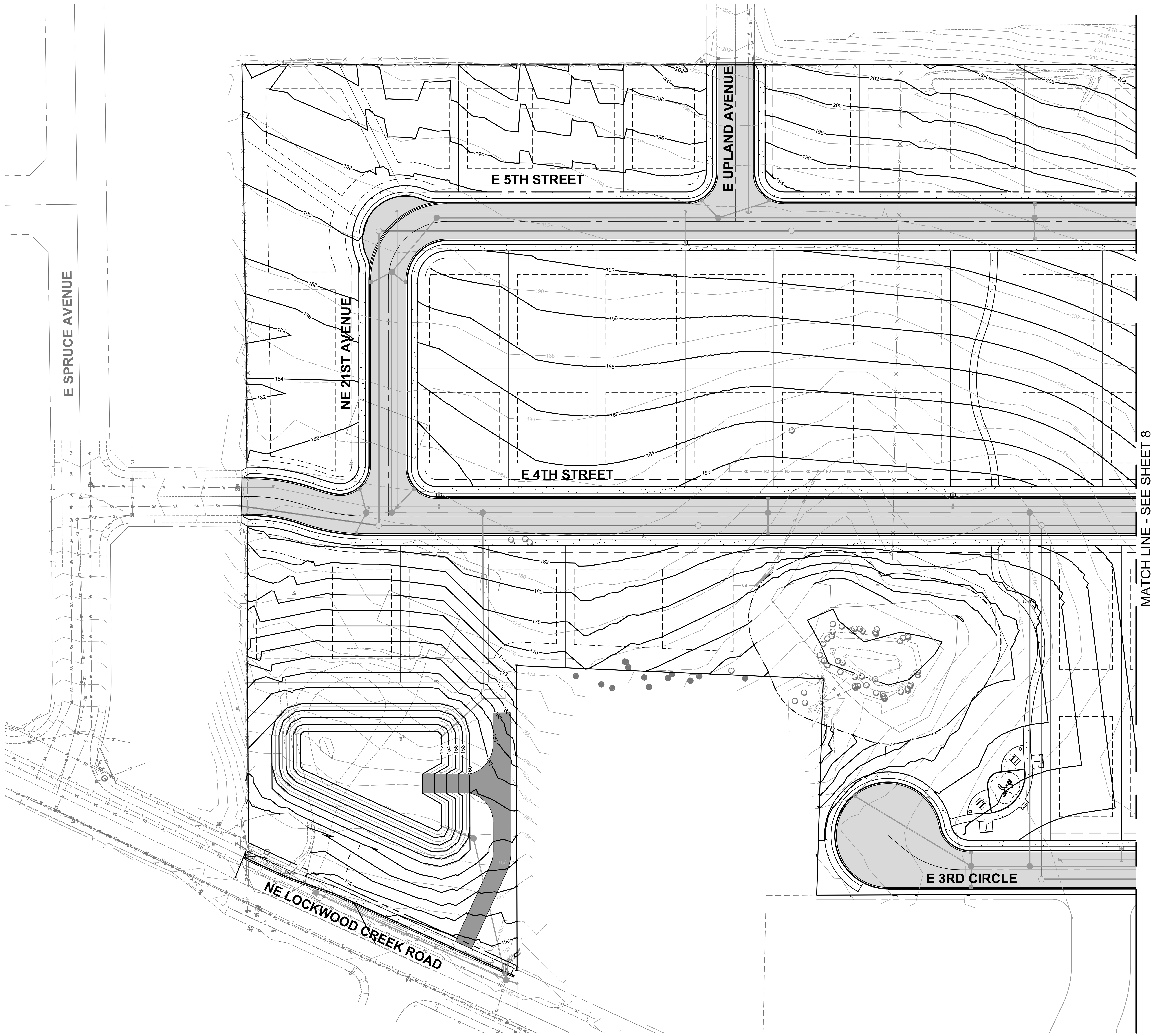

Hatching Legend

- Proposed Asphalt Concrete
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- Proposed Gravel

Scale 1" = 40'

40 20 0 40

Preliminary Grading & Erosion Control Plan West For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

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Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

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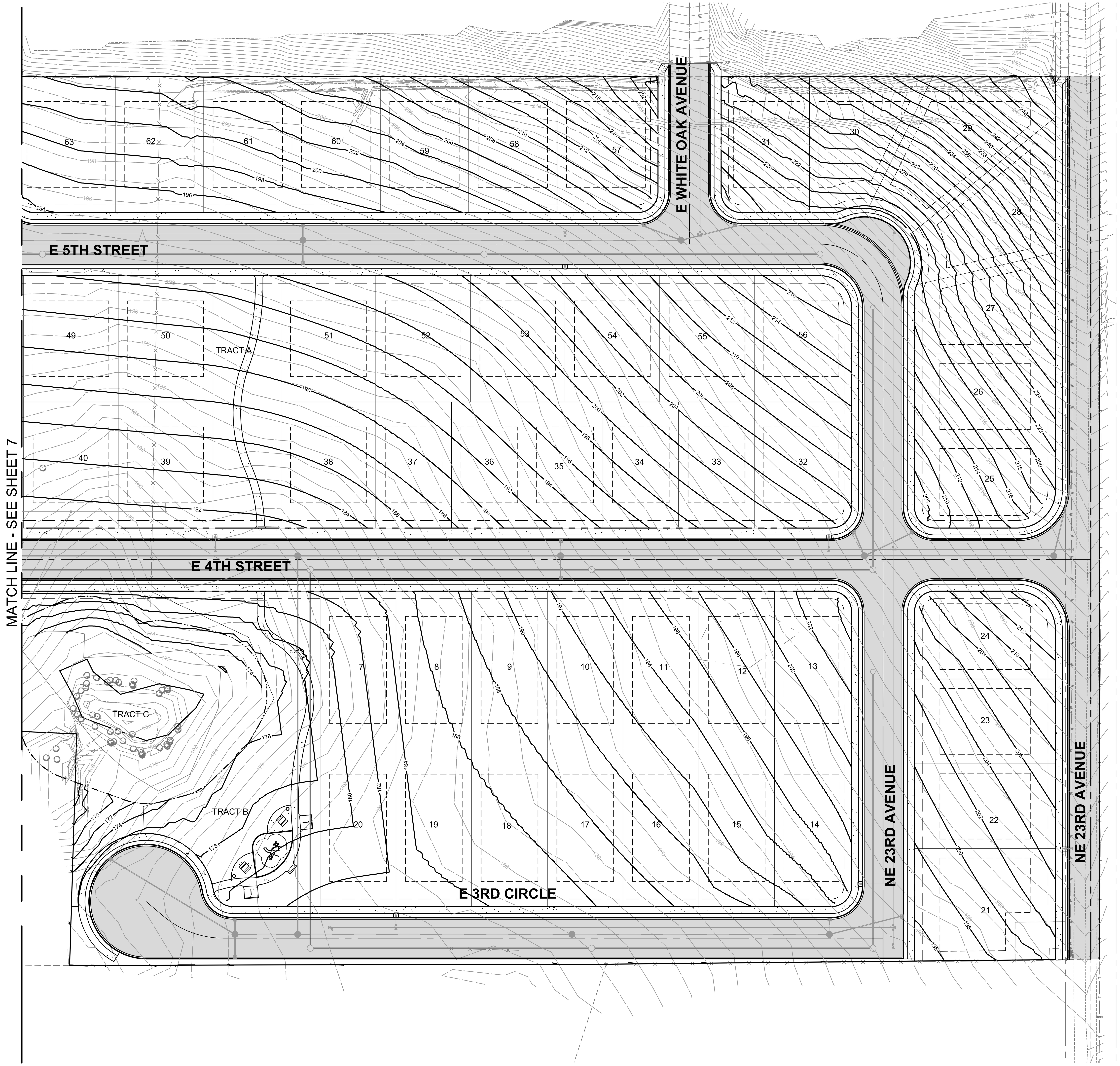

Hatching Legend

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- Proposed Gravel

Scale 1" = 40'

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Preliminary Grading & Erosion Control Plan East For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

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DESIGNED BY:	JMW
DRAFTED BY:	JSV
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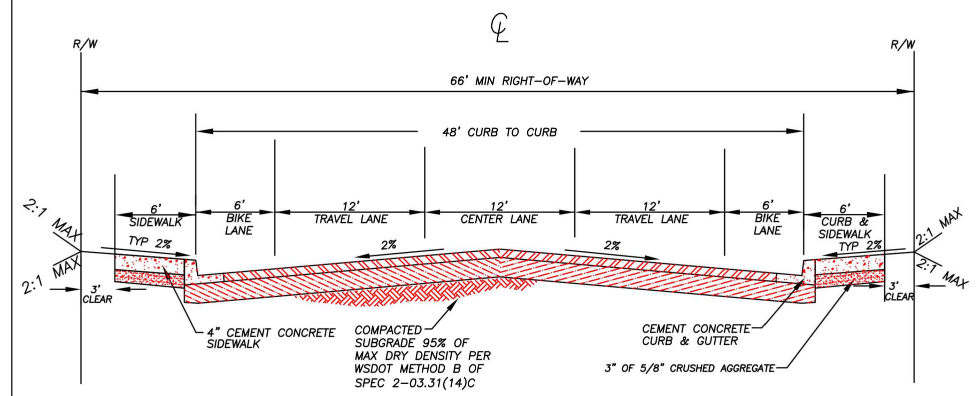


CONVENTIONAL CONSTRUCTION

AASHTO SOIL TYPE	ASPHALT THICKNESS	BASE ROCK THICKNESS
A-1	0.45'	0.45'
A-2	0.45'	0.45'
A-3	0.45'	0.55'
A-4	0.45'	0.85'
A-5	0.45'	1.15'
A-6	0.45'	1.55'
A-7	0.50'	2.00'
OTHER	NO SECTION	ESTIMATED

THICK ASPHALT CONSTRUCTION

AASHTO SOIL TYPE	ASPHALT THICKNESS	BASE ROCK THICKNESS
A-1	0.52'	0.25'
A-2	0.52'	0.25'
A-3	0.55'	0.25'
A-4	0.62'	0.25'
A-5	0.72'	0.25'
A-6	0.82'	0.25'
A-7	1.00'	0.25'
OTHER	NO SECTION	ESTIMATED

NOTES:

1. WIDER SIDEWALKS MAY BE REQUIRED BY REVIEWING AUTHORITY UNDER CERTAIN CIRCUMSTANCES.
2. SUBGRADE REINFORCEMENT GEOTEXTILES SHALL BE INSTALLED OVER A-6 AND A-7 SOILS PRIOR TO CONSTRUCTING THE BASE AND SURFACING.
3. ASPHALT SURFACE FOR ALL ROADS SHALL BE CLASS ½" PG 64-22 HMA PER WSDOT STANDARD SPECIFICATIONS.
4. THE PAVEMENT STRUCTURE THICKNESSES IDENTIFIED FOR THESE SOIL TYPES ARE REQUIRED UNLESS A SITE SPECIFIC PAVEMENT DESIGN IS DONE. THE TOTAL PAVEMENT STRUCTURE SHALL NOT EXCEED 2.5 FEET.
4. EITHER CONVENTIONAL OR THICK ASPHALT CONSTRUCTION IS ALLOWED.
5. BASE ROCK SECTION SHALL BE TWO (2) INCHES OF 5/8"- 0" TOP COURSE, OVER REMAINING DEPTH OF BASE COURSE PER WSDOT STANDARD SPECIFICATION SECTION 9-03.9(3). TOTAL BASE ROCK SECTION THICKNESS AS INDICATED IN THE TABLES.

MINOR ARTERIAL "A"

PLAN #

CITY OF LA CENTER APPROVED

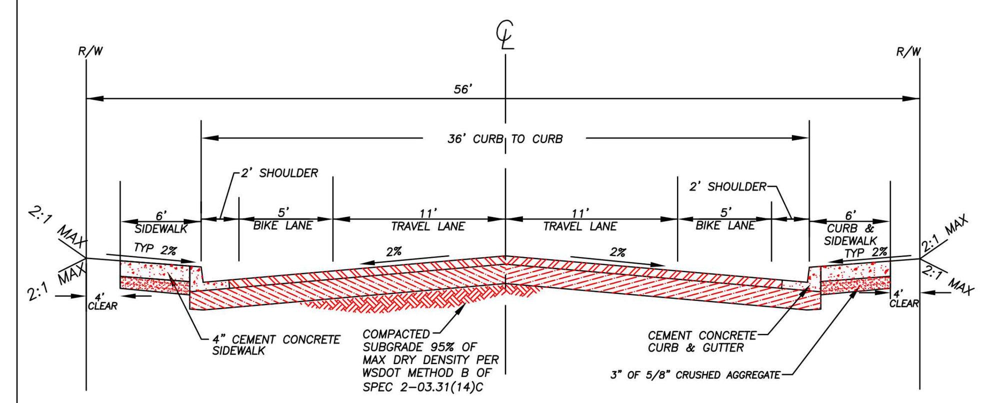
TONY COOPER 8/23/16

CITY ENGINEER DATE

REVISIONS:	DATE:	DRAWN:	DESIGNED:
1	8/23/16	ALC	ALC

ST-12A

FOR LEFT TURN BAYS TO ACCOMODATE ADJACENT STREET ACCESS, "ARTERIAL ROAD SECTION" SHALL BE USED



CONVENTIONAL CONSTRUCTION

AASHTO SOIL TYPE	ASPHALT THICKNESS	BASE ROCK THICKNESS
A-1	0.35'	0.50'
A-2	0.35'	0.50'
A-3	0.35'	0.50'
A-4	0.35'	0.60'
A-5	0.35'	0.90'
A-6	0.35'	1.20'
A-7	0.40'	1.60'
OTHER	NO SECTION	ESTIMATED

THICK ASPHALT CONSTRUCTION

AASHTO SOIL TYPE	ASPHALT THICKNESS	BASE ROCK THICKNESS
A-1	0.42'	0.25'
A-2	0.42'	0.25'
A-3	0.42'	0.25'
A-4	0.45'	0.25'
A-5	0.55'	0.25'
A-6	0.62'	0.25'
A-7	0.80'	0.25'
OTHER	NO SECTION	ESTIMATED

NOTES:

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NOTE: DETAIL ONLY FOR ADT UP TO 2000
A TRAFFIC STUDY MAY BE REQUIRED TO JUSTIFY THIS DESIGN

RURAL MINOR COLLECTOR

PLAN #

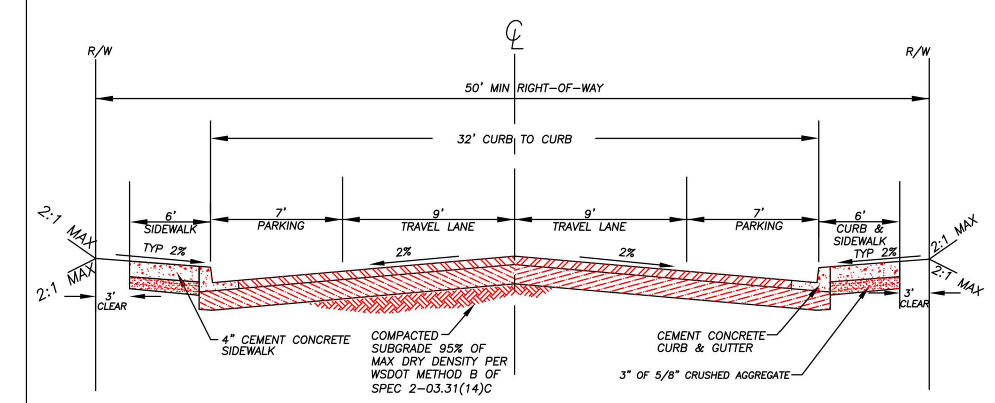
CITY OF LA CENTER APPROVED

Anthony Lee Cooper 12/9/14

CITY ENGINEER DATE

REVISIONS:	DATE:	DRAWN:	DESIGNED:
1	12/9/14	ALC	ALC

ST-13B



CONVENTIONAL CONSTRUCTION

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A-1	0.35'	0.50'
A-2	0.35'	0.50'
A-3	0.35'	0.50'
A-4	0.35'	0.60'
A-5	0.35'	0.90'
A-6	0.35'	1.20'
A-7	0.40'	1.60'
OTHER	NO SECTION	ESTIMATED

THICK ASPHALT CONSTRUCTION

AASHTO SOIL TYPE	ASPHALT THICKNESS	BASE ROCK THICKNESS
A-1	0.42'	0.25'
A-2	0.42'	0.25'
A-3	0.42'	0.25'
A-4	0.45'	0.25'
A-5	0.55'	0.25'
A-6	0.62'	0.25'
A-7	0.80'	0.25'
OTHER	NO SECTION	ESTIMATED

NOTES:

1. WIDER SIDEWALKS MAY BE REQUIRED BY REVIEWING AUTHORITY UNDER CERTAIN CIRCUMSTANCES.
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LOCAL ACCESS

PLAN #

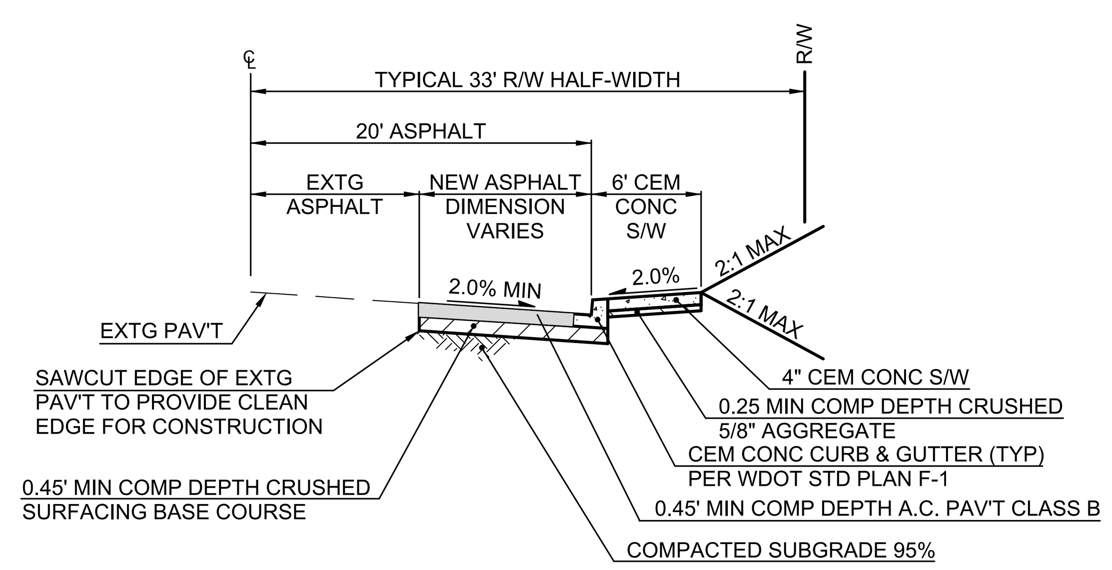
CITY OF LA CENTER APPROVED

Bart Stepp, PE 9/27/10

CITY ENGINEER DATE

REVISIONS:	DATE:	DRAWN:	DESIGNED:
1	9/27/10	BES	BES

ST-15



NE Lockwood Creek Road
Typical Section
NTS

Miscellaneous Details For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING
Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions

1	
2	
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4	
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6	

Project No. 3094

SCALE: H: N/A V: N/A

DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ

VICINITY MAP

NOT TO SCALE

Catalog Number WFCL2-P20-30K-AS-BK-FC3-S-P7-PCLC-HSS-NL1X1

Notes

Type

WFCL2

Utility Washington Series Luminaire
Full Cutoff LED2

Mechanical
- Heavy grade A360 cast aluminum (<1% copper)
- Tool-less access with a spring-loaded latch
- Hidden hinge door allowing the door to swing open and remain open
- Optional internal or external NEMA twist lock photocontrol receptacle. Housing contains a tempered glass window to allow light to reach the cell for internal versions.
- Mount to slip-fitter that will accept 3″ high by 2-7/8″ to 3-1/8″ O.D. pole tenon
- Decorative top cover contains stainless steel hinge which secures entry the LED optical chamber
- Polyester power coat paint to ensure maximum durability
- Rigorous multi-stage pre-treating and painting process yields a finish that achieves a scribe creepage rating of 8 (per ASTM D1654) after over 5,000 hours exposure to salt fog chamber (operated per ASTM B117) on standard and RAL finish options.
- RAL (RALxxxxSDCR) paint colors are Super Durable Corrosion Resistant, 80% gloss.

Electrical
- All surge protection meets ANSI/IEEE C62.41.2 10kV/10kA.
- Standard SPD meets 10kV/5kA per ANSI C136.2-2015.
- 20KV Option meets 20kV/10kA per ANSI C136.2-2015.
- Quick disconnect connectors for ease of installation and maintenance.
- Three pole terminal block is standard, with optional prewired leads for ease of installation
- LLED drivers meet maximum total harmonic distortion (THD) of 20%, >0.90 Power Factor and are ROHS compliant. Minimum operating temperature is -40°C. Electronic driver has an estimated minimum life of 100,000 hours at 25°C.

Optical
- IP65 rated optical compartment
- LED circuit board located in the top cover
- Asymmetric or Symmetric full cutoff distributions
- 2700K, 3000K, 4000K, and 5000K CCT
- 70CRI Standard

Control Options
- Field Adjustable Output (AO) module - Onboard device that adjusts the light output and input wattage to meet site specific requirements. The AO module is preset at the factory to position number 8 (see chart).
- Factory Programmed Driver (FPDxx) - Customize lumen output prior to manufacturing and still enables control leads so other options can also be used
- Long Life Photocontrols (PCLL) - 20 Year Life
- 3 and 7 pin photocontrol receptacles internally (PR3, PR7) or externally (PR3E, PR7E) mounted

Testing/Compliance
- UL 1598 - Wet Locations Safety Listing
- Suitable for ambient temperatures -40°C to 40°C

Manufacturing
- Manufactured in Crawfordsville, Indiana, ARRA compliant
- 100% electrical testing on all luminaires before shipment
- Ten (10) years minimum experience in manufacturing LED based products

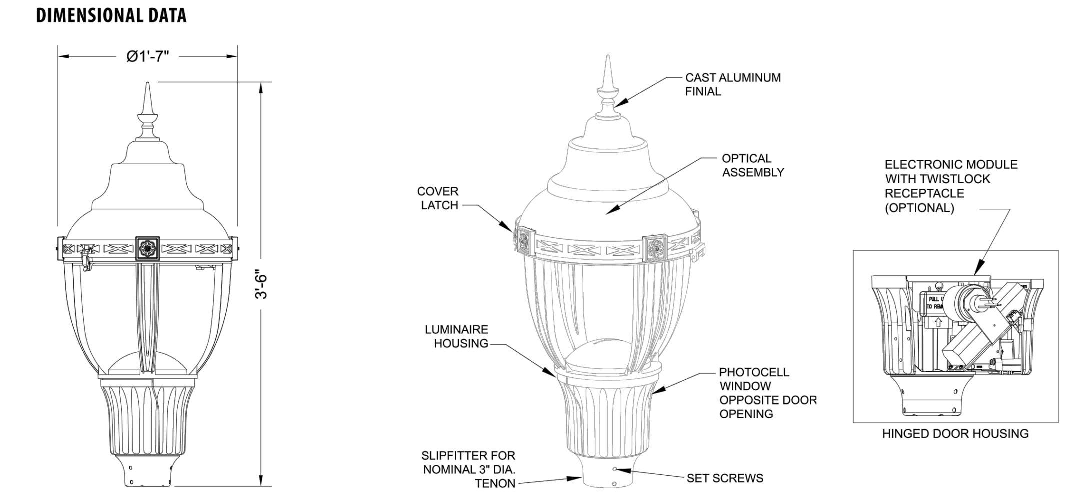
Buy American
This product is assembled in the USA and meets the Buy America(n) government procurement requirements under FAR, DFARS and DOT. Please refer to www.acuitybrands.com/resources/buy-american for additional information.

Warranty
5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/support/warranty/terms-and-conditions

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25°C.
Specifications subject to change without notice.

LED | c UL us LISTED | IP RATED | Buy American

DIMENSIONAL DATA



Maximum Weight - 57 lbs
Maximum Effective Projected Area - 1.72 sq. ft.

AcuityBrands | Holophane | 3825 Columbus Rd., Granville, OH 43023 | Phone: 866-HOLOPHANE | www.holophane.com — WFCL2

 Rev. 10/18/21 Specifications subject to change without notice. — Page 1 of 5

MANUFACTURER AND CATALOG NUMBER	SYMBOL	QTY	WATTAGE
LITHONIA DSX1 P2 40K T4M MVOLT	⊢●	37	45

Hatching Legend
- Proposed Asphalt Concrete
- Proposed Cement Concrete
- Proposed Gravel

Scale 1" = 40'
40 20 0 40

N

Preliminary Lighting Plan West For:

Lockwood Meadows Subdivision

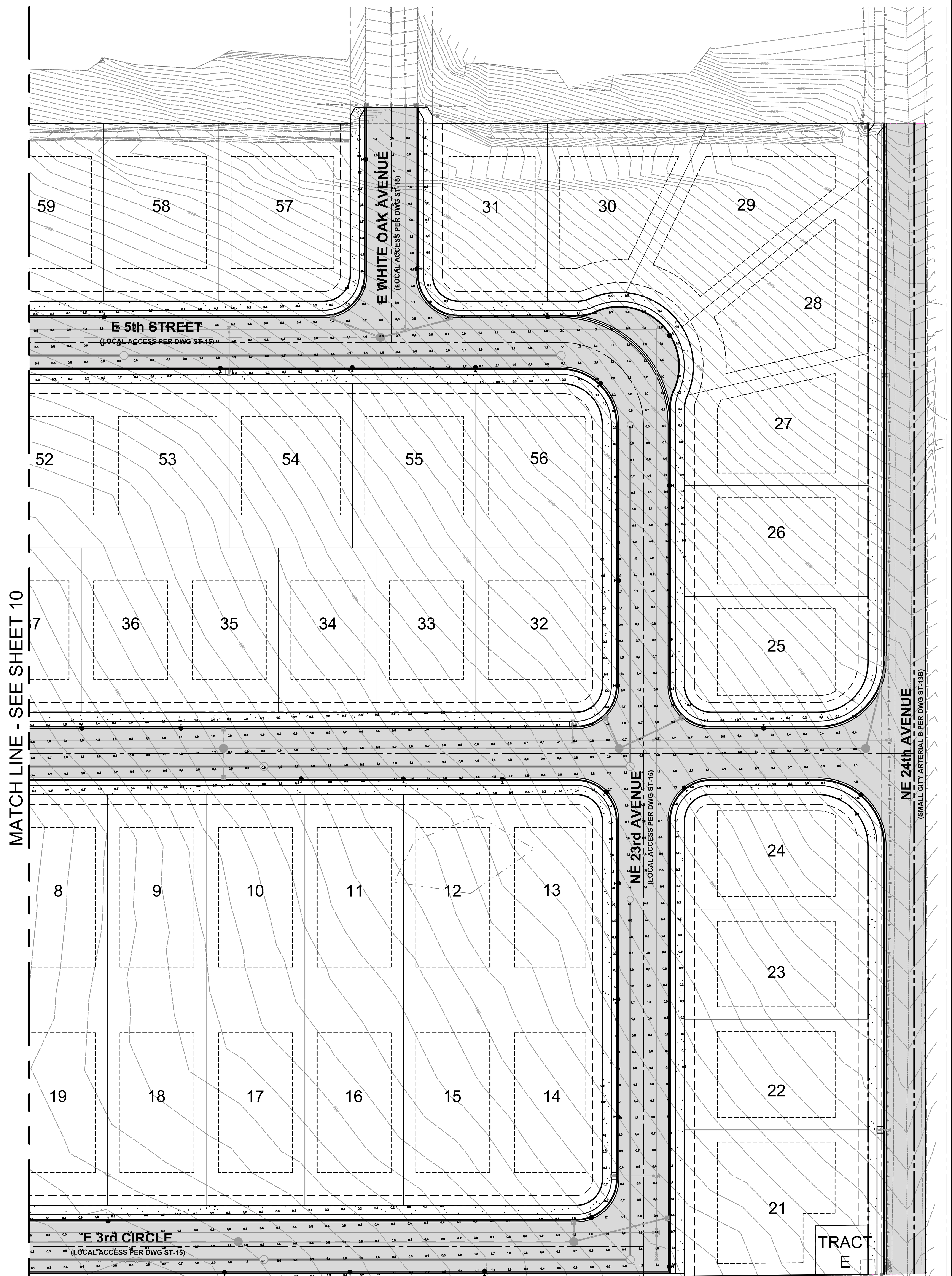
A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING
Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions
1 2 3 4 5 6

Project No. 3094

SCALE:	H: 1" = 40' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ



HOLOPHANE

LEADER IN LIGHTING SOLUTIONS

Catalog Number	
WFCL2-P20-30K-AS-BK-FC3-S-P7-PCLC-HSS-NL1X1	
Notes	Type

WFCL2

Utility Washington Series Luminaire Full Cutoff LED2

Mechanical

- Heavy grade A360 cast aluminum (<1% copper)
- Tool-less access with a spring-loaded latch
- Hidden hinge door allowing the door to swing open and remain open
- Optional internal or external NEMA twist lock photocontrol receptacle. Housing contains a tempered glass window to allow light to reach the cell for internal versions.
- Mount to slip-fitter that will accept 3" high by 2-7/8" to 3-1/8" O.D. pole tenon
- Decorative top cover contains stainless steel hinge which secures entry the LED optical chamber
- Polyester power coat paint to ensure maximum durability
- RAL (RALxxxxSDCR) paint colors are Super Durable Corrosion Resistant, 80% gloss.

Electrical

Optical

- IP65 rated optical compartment
- LED circuit board located in the top cover
- Asymmetric or Symmetric full cutoff distributions
- 2700K, 3000K, 4000K, and 5000K CCT
- 70CRI Standard

Control Options

Testing/Compliance

Manufacturing

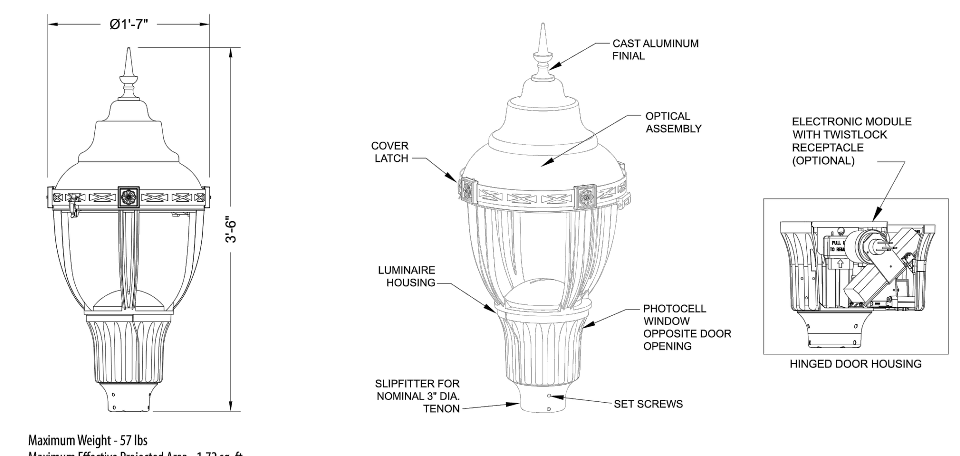
Buy American

Warranty

Note: Actual performance may differ as a result of end-user environment and application.
All values are design or typical values, measured under laboratory conditions at 25°C.
Specifications subject to change without notice.

Buy American

DIMENSIONAL DATA



Maximum Weight - 57 lbs
Maximum Effective Projected Area - 1.72 sq. ft.

WFCL2

Utility Washington Series Luminaire Full Cutoff LED2

HOLOPHANE

ORDERING INFORMATION

Example: WFCL2 P20 30K AS GN L2 N P73

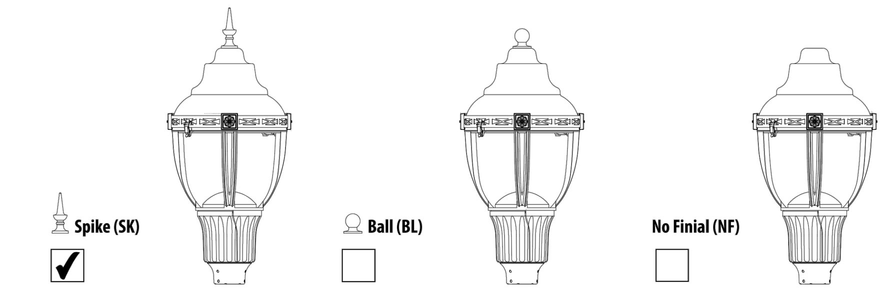
Series | LED performance package | LED Color Temperature | Voltage | Optics | Housing Color | Finial

Options:

Accessories:

FINIAL INFORMATION

Mark Appropriate Box for Finial Options



WFCL2

Utility Washington Series Luminaire Full Cutoff LED2

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OPTIONS MATRIX

Mounting		AO	FPDxx	PR3	PR3E	PR7	PR7E	P34	P48	PCLL	SH	20kV
		SELECTED OPTION (start here)										
LED Performance Package	P10	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P20	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P30	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P40	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P50	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Voltage	MVOLT	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y
	HVOLT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Finial	BL	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y
	SK	Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y
	NF	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Compatible Options	AO		Y	Y	Y	N	N	Y	Y	Y	Y	Y
	FPDxx	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y
	PR3	Y	Y		N	N	N	Y	Y	Y	Y	Y
	PR3E	Y	Y	N		N	N	Y	Y	Y	Y	Y
	PR7	N	Y	N	N		N	Y	Y	Y	Y	Y
	PR7E	N	Y	N	N	N		Y	Y	Y	Y	Y
	P34	Y	Y	Y	Y	Y	Y		N	N	N	Y
	P48	Y	Y	Y	Y	Y	Y	N		N	N	Y
	PCLL	Y	Y	Y	Y	Y	Y	N	N		N	Y
	SH	Y	Y	Y	Y	Y	Y	N	N	N		Y
	20kV	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	

Y = Valid Option Combination
N = Combination Not available

LUMEN AMBIENT TEMPERATURE (LAT) MULTIPLIERS

Use the factors to determine relative lumen output for average ambient temperatures from 0-40C (32-104F)

Ambient Temp (degrees C) Lumen Multiplier								
0	5	10	15	20	25	30	35	40
1.05	1.04	1.03	1.02	1.01	1.00	0.99	0.98	0.97

PROJECTED LED LUMEN MAINTENANCE

Data references the extrapolated performance projections for the platforms noted in 25C ambient, based on 6,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11). To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Package	Lumen Maintenance						L70 Hrs
	25k hrs	36k hrs	50k hrs	60k hrs	75k hrs	100k hrs	
P20-P40	0.97	0.96	0.95	0.94	0.93	0.91	383,000
P50	0.96	0.94	0.93	0.91	0.90	0.87	267,667

WFCL2

Utility Washington Series Luminaire Full Cutoff LED2

HOLOPHANE

PERFORMANCE DATA

LED Package	Distribution	SystemWatts	2700K Lumens	2700K LPW	3000K Lumens	3000K LPW	4000K Lumens	4000K LPW	5000K Lumens	5000K LPW
P20	FC2	45	4174	93	4265	95	4701	104	4853	108
	FC3	45	3756	83	3838	85	4230	94	4357	97
	FC4	45	3968	88	4054	90	4468	99	4603	102
	FC5	45	4120	92	4210	94	4640	103	4780	106
P30	FC2	66	5952	90	6082	92	6703	102	6905	105
	FC3	66	5355	81	5472	83	6031	91	6213	94
	FC4	66	5657	86	5781	88	6371	97	6563	99
	FC5	66	5874	89	6002	91	6615	100	6815	103
P40	FC2	89	7656	86	7823	88	8622	97	8882	100
	FC3	89	6888	77	7038	79	7757	87	7991	90
	FC4	89	7277	82	7436	84	8195	92	8442	95
	FC5	89	7667	85	7721	87	8509	96	8766	98
P50	FC2	139	11058	80	11300	81	12454	90	12830	92
	FC3	139	9959	72	10166	73	11205	81	11543	83
	FC4	139	10511	76	10740	77	11837	85	12195	88
	FC5	139	10914	79	11152	80	12291	88	12662	91

FPDXX DATA OPTIONS

FPDxx Setting	Wattage	P20 27K FC2	FC3	FC4	FC5	P20 30K FC2	FC3	FC4	FC5	P20 40K FC2	FC3	FC4	FC5	P20 50K FC2	FC3	FC4	FC5
Standard	45	4174	3756	3968	4120	4265	3838	4054	4210	4701	4230	4468	4640	4843	4357	4603	4780
FPD95	43	3966	3568	3769	3914	4052	3646	3852	3999	4466	4018	4245	4408	4601	4139	4373	4541
FPD90	41	3757	3380	3571	3708	3839	3454	3649	3789	4231	3807	4021	4176	4359	3921	4143	4302
FPD85	38	3548	3192	3372	3502	3626	3262	3446	3578	3996	3595	3798	3944	4117	3704	3913	4063
FPD80	36	3339	3004	3174	3296	3412	3070	3243	3368	3761	3384	3575	3712	3874	3486	3683	3824

FPDxx Setting	Wattage	P30 27K FC2	FC3	FC4	FC5	P30 30K FC2	FC3	FC4	FC5	P30 40K FC2	FC3	FC4	FC5	P30 50K FC2	FC3	FC4	FC5
Standard	66	5952	5355	5657	5874	6082	5472	5781	6002	6703	6031	6371	6615	6905	6213	6563	6815
FPD95	63	5654	5087	5374	5580	5778	5198	5492	5702	6368	5729	6053	6285	6560	5902	6235	6474
FPD90	59	5357	4819	5092	5287	5474	4925	5203	5402	6033	5428	5734	5954	6215	5591	5907	6134
FPD85	56	5059	4552	4809	4993	5170	4651	4914	5102	5698	5126	5415	5623	5870	5281	5579	5793
FPD80	53	4762	4284	4526	4699	4865	4377	4625	4802	5362	4825	5097	5292	5524	4970	5251	5452
FPD75	50	4464	4016	4243	4406	4561	4104	4336	4502	5027	4523	4778	4962	5179	4660	4923	5111
FPD70	46	4166	3748	3960	4112	4257	3830	4046	4202	4692	4221	4460	4631	4834	4349	4594	4771

FPDxx Setting	Wattage	P40 27K FC2	FC3	FC4	FC5	P40 30K FC2	FC3	FC4	FC5	P40 40K FC2	FC3	FC4	FC5	P40 50K FC2	FC3	FC4	FC5
Standard	89	7656	6888	7277	7556	7823	7038	7436	7721	8622	7757	8195	8509	8882	7991	8442	8766
FPD95	85	7273	6543	6913	7178	7432	6686	7064	7335	8191	7369	7785	8084	8438	7592	8020	8328
FPD90	80	6890	6199	6549	6800	7041	6334	6692	6949	7760	6891	7375	7658	7994	7192	7598	7889
FPD85	76	6507	5855	6185	6422	6649	5982	6320	6562	7329	6593	6966	7233	7550	6792	7176	7451
FPD80	71	6125	5510	5821	6045	6258	5631	5948	6176	6897	6206	6566	6807	7106	6393	6754	7013

FPDxx Setting	Wattage	P50 27K FC2	FC3	FC4	FC5	P50 30K FC2	FC3	FC4	FC5	P50 40K FC2	FC3	FC4	FC5	P50 50K FC2	FC3	FC4	FC5
Standard	139	11058	9949	10511	10914	11300	10166	10740	11152	12454	11205	11837	11291	12830	11543	12195	12662
FPD95	132	10506	9452	9985	10368	10735	9658	10203	10594	11831	10644	11245	11677	12188	10966	11585	12029
FPD90	125	9953	8954	9460	9822	10170	9150	9666	10037	11209	10084	10654	11062	11547	10389	10975	11396
FPD85	118	9400	8457	8934	9277	9605	8641	9129	9479	10586	9524	10062	10447	10905	9811	10365	10763
FPD80	111	8847	7959	8409	8731	9040	8133	8592	8922	9963	8964	9470	9833	10264	9234	9756	10130

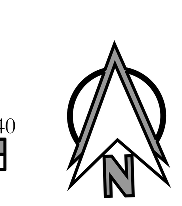
MANUFACTURER AND CATALOG NUMBER	SYMBOL	QTY	WATTAGE
HOLOPHANE WFCL2 P20 30K AS BK FC3 S P7 PCLC HSS NL1X1		30	45

Hatching Legend

- Proposed Asphalt Concrete
- Proposed Cement Concrete
- Proposed Gravel

Scale 1" = 40'

40 20 0 40



Preliminary Lighting Plan East For:

Lockwood Meadows Subdivision

A Subdivision Located In The City Of La Center, Washington

PLS ENGINEERING
Engineering - Surveying - Planning | 604 W. Evergreen Blvd., Vancouver, WA 98660 | PH (360) 944-6519 | Fax (360) 944-6539

Revisions

1	
2	
3	
4	
5	
6	

Project No. 3094

SCALE:	H: 1" = 40' V: N/A
DESIGNED BY:	JMW
DRAFTED BY:	JSV
REVIEWED BY:	TGJ

11

11

Planning Solutions, Inc.
Creating Solutions to Complex Issues
4400 NE 77th Avenue
Suite 275
VANCOUVER, WA 98662
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PRELIMINARY
NOT FOR CONSTRUCTION
SUBJECT TO APPROVAL

LOCKWOOD MEADOWS SUBDIVISION

2000 NE Lockwood Creek Road
La Center, Washington

TREE RECOMMENDATIONS	
R	TREE DESIGNATED FOR RETENTION (RETAIN & PROTECT DURING CONSTRUCTION)
X	TREE DESIGNATED FOR REMOVAL
TREE CONFLICTS WITH CONSTRUCTION	
CRC	CONFLICT WITH ROAD CONSTRUCTION
CGD	CONFLICT WITH SITE GRADING / DRAINAGE
CSW	CONFLICT WITH STORMWATER FACILITY
CBE	CONFLICT WITH BUILDING ENVELOPE
CUT	CONFLICT WITH UTILITY TRENCH
CDR	CONFLICT WITH DRIVE AND PATIO LOCATION
TREE CONDITION / DEFECTS	
DT	DEAD TREE

TREE PROTECTION NOTES

1) No person may conduct any of the following activities within the drip line of the trees designated to remain including, but not limited to: parking equipment, fueling, servicing equipment, placing solvents, storing building material and soil deposits, dumping concrete washout and locating burn holes.

2) During construction, no person shall attach any object to the trees designated for protection.

3) The contractor shall follow the grading plan provided by the project civil engineer. Grading activities shall be conducted in a manner to minimize the impacts to the trees marked for preservation.

4) The excavator shall keep a sharp pair of loppers and a sharp 12" pruning saw accessible on-site during grading operations. Any roots larger than ½" shall be pruned to the face of the cut (using a sharp pair of loppers or a sharp 12" pruning saw) and shall not be torn from the ground by mechanical excavation.

5) Special care shall be exercised in working within 20 feet of the trees to be retained. This includes hand excavating the roots at the edge of the excavation and cutting roots with a lopper or pruning saw. Pruning the roots at the edge of excavation will minimize breakage of healthy roots beyond the edge of the proposed excavation.

6) Except for the proposed improvements shown within the drip lines of the trees noted to be retained the grade shall not be elevated or reduced from existing grade.

7) If the grade adjacent to a preserved tree is raised such that it could slough or erode into the tree's drip line, it shall be permanently stabilized.

8) The trees noted to retained shall be protected from erosion and sedimentation. Clearing operations shall be conducted so as to expose the smallest practical area of soil to erosion for the least possible time. Refer to the project's erosion control plan for more information.

9) The project shall not install an impervious surface other than those specifically shown on the plans within the drip line of the trees to be retained.

10) Utility trenches shall be located outside of the drip line of the trees to be retained.

11) Ongoing Tree Maintenance shall be the responsibility of the land owner. Trees shall be maintained in accordance with ANSI American National Standards Institute's as well as other applicable Federal, State and Local standards pertaining to Tree Care Operations.

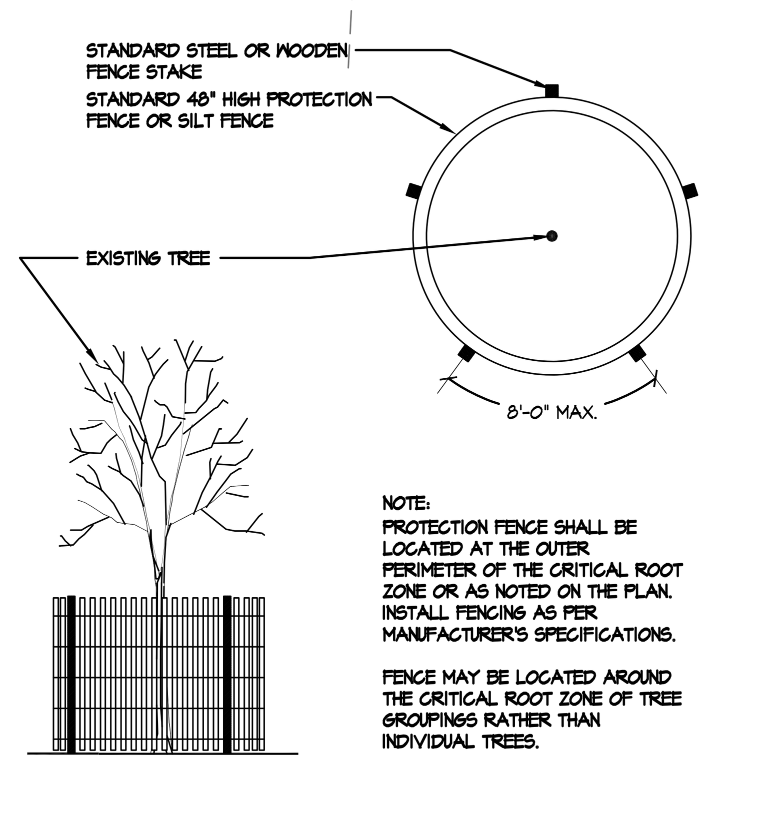
- ANSI Z133 Arboricultural Operations: Safety Requirements
- ANSI A300 Part 1 Pruning

SITE STATISTICS

20+/- AC	SITE AREA
4	NUMBER OF JURISDICTIONAL TREES TO BE REMOVED
47	NUMBER OF JURISDICTIONAL TREES ON SITE

SYMBOL LEGEND

SYMBOL	DESCRIPTION
	EXISTING TREE
	EXISTING TREE TO BE REMOVED
	TREE PROTECTION FENCE LOCATION (4' CHAIN LINK, ORANGE PVC FENCE OR SILT FENCE) (ALSO DENOTES AREA WHERE NO IMPACTS TO CRITICAL ROOT ZONE SHALL OCCUR)



A **Tree Protection Fencing Detail**
Not To Scale — SECTION / PLAN VIEW

EXISTING TREE MATRIX

#	TYPE	COMMENTS	SIZE	RECOMMENDATIONS
1	Fir	off-site	10"	R
2	Fir	off-site	8"	R
3	Fir	off-site	8"	R
4	Fir	CGD	8"	X
5	Fir	CGD	8"	X
6	Fir	CGD	8"	X
7	Fir	off-site	12"	R
8	Fir	off-site	6"	R
9	Fir	off-site	10"	R
10	Fir	off-site	8"	R
11	Fir	off-site	10"	R
12	Fir	off-site	6"	R
13	Cottonwood	CGD	10"	X
14	Fir	off-site	10"	R
15	Cottonwood	off-site	6"	R
16	Cottonwood	off-site	6"	R
17	Cottonwood	off-site	6"	R
18	Cottonwood		14"	R
19	Cottonwood		8"	R
20	Cottonwood		12"	R
21	Cottonwood		19"	R
22	Cottonwood		6"	R
23	Cottonwood		8"	R
24	Cottonwood		8"	R
25	Cottonwood		16"	R
26	Cottonwood		16"	R
27	Cottonwood		8"	R
28	Cottonwood		8"	R
29	Cottonwood		10"	R
30	Cottonwood		6"	R
31	Cottonwood		6"	R
32	Cottonwood		6"	R
33	Cottonwood		8"	R
34	Cottonwood		6"	R
35	Cottonwood		10"	R
36	Cottonwood		10"	R
37	Cottonwood		12"	R
38	Cottonwood		14"	R
39	Cottonwood		12"	R
40	Cottonwood		8"	R
41	Cottonwood		10"	R
42	Cottonwood		10"	R
43	Cottonwood		12"	R
44	Cottonwood		8"	R
45	Cottonwood		16"	R
46	Cottonwood		16"	R
47	Cottonwood		16"	R
48	Cottonwood		16"	R

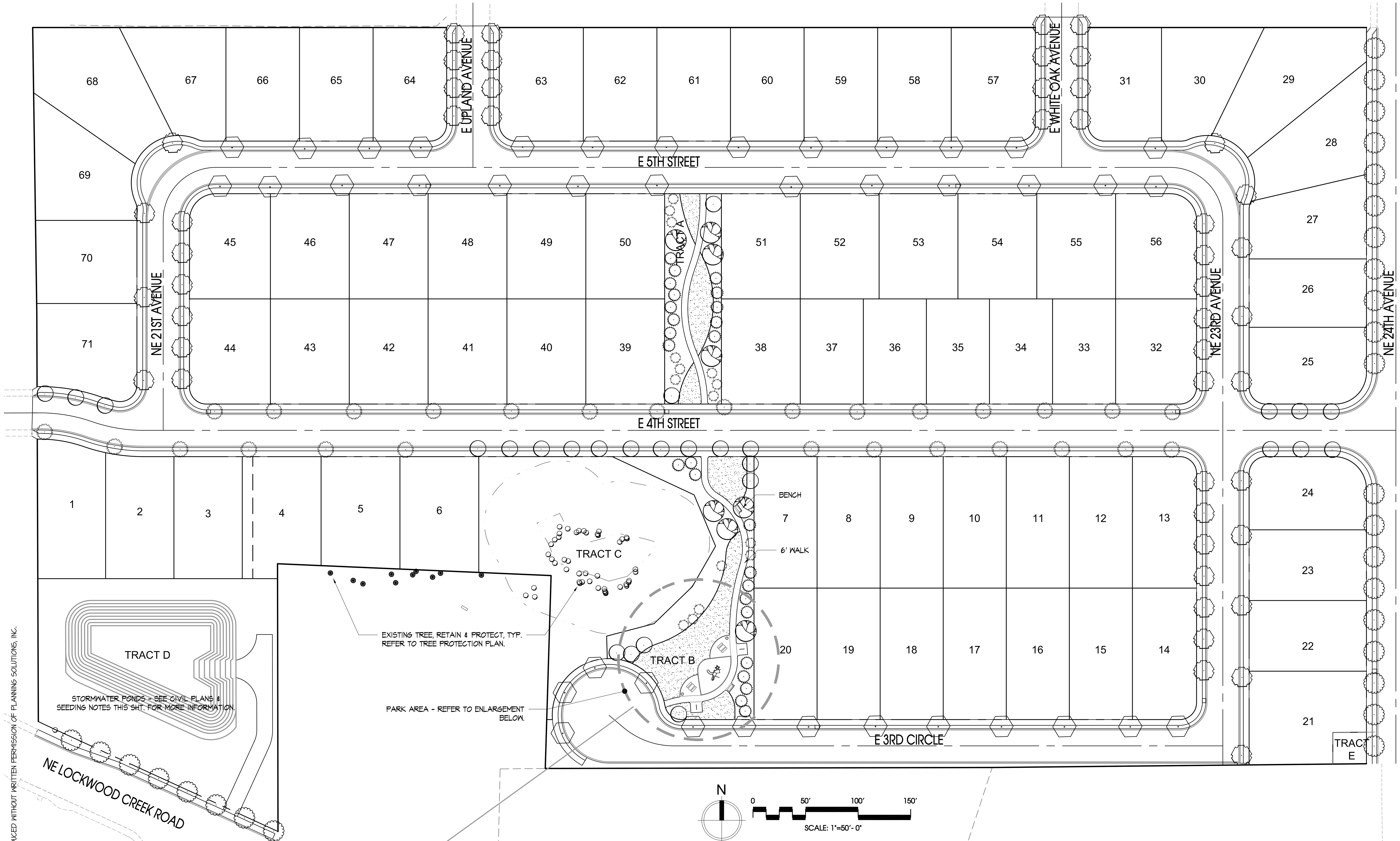
EXISTING TREE MATRIX

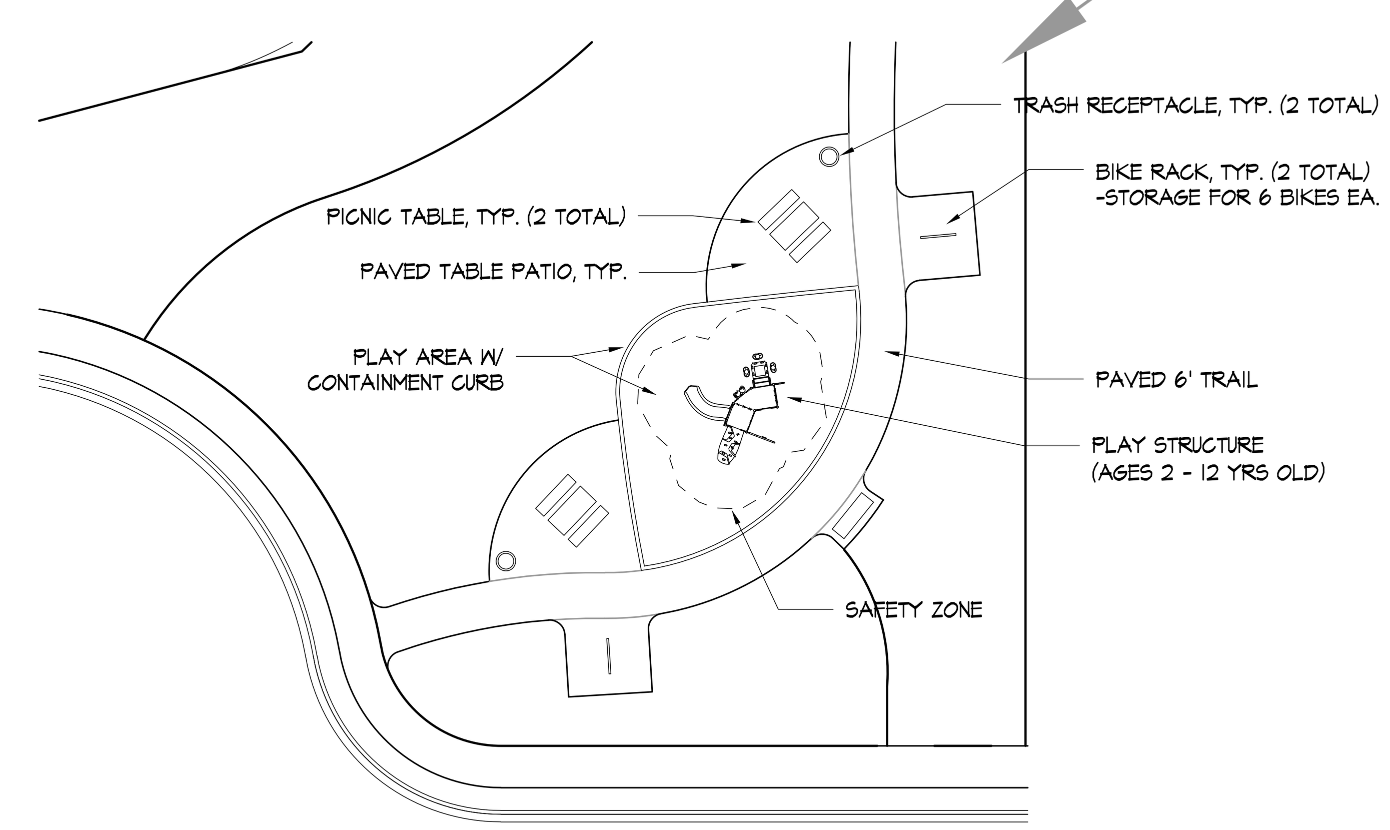
#	TYPE	COMMENTS	SIZE	RECOMMENDATIONS
49	Cottonwood		16"	R
50	Cottonwood		16"	R
51	Cottonwood		10"	R
52	Cottonwood		12"	R
53	Cottonwood		8"	R
54	Cottonwood		16"	R
55	Cottonwood		16"	R
56	Cottonwood		8"	R
57	Cottonwood		9"	R
58	Cottonwood		9"	R
59	Cottonwood		9"	R
60	Oak		52"	R

DRAWN: CB	CHECKED: CB
SCALE: 1" = 50'-0"	DATE: 10.30.21
JOB #: 21-1683	
ISSUED FOR: PLR	
REVISIONS:	

SHEET NAME:
PRELIMINARY TREE PROTECTION PLAN

SHEET #:
T1
SHEET 1 OF 3





PARK AREA ENLARGEMENT - 1"=20'

IRRIGATION NOTE

ALL LANDSCAPE AREAS SHALL BE IRRIGATED WITH A DRIP, SPRAY OR HOSE BIB IRRIGATION SYSTEM. REFER TO CIVIL ENGINEERING PLANS FOR WATER SOURCE.

PLANT LEGEND

SYMBOL	BOTANICAL / COMMON NAME	SIZE	QTY
TREES			
	ACER RUBRUM 'ARMSTRONG' / ARMSTRONG MAPLE	2" Cal. Min.	49
	ACER RUBRUM 'RED SUNSET' RED SUNSET MAPLE	2" Cal. Min.	28
	CALOCEDRUS DECURRENS INCENSE CEDAR	6' ht. Min.	26
	CUPRESSUS NOOTKATENSIS ALASKAN CEDAR	6' ht. Min.	15
	PARROTIA PERSICA PERSIAN PARROTIA	2" Cal. Min.	28
	PYRUS CALLERYANA 'CAPITAL' CAPITAL ORNAMENTAL PEAR	2" Cal. Min.	27
	TILIA CORDATA 'GREENSPIRE' GREENSPIRE LINDEN	2" Cal. Min.	8
	ZELKOVA SERRATA / VILLAGE GREEN SELKOVA	2" Cal. Min.	39
SHRUBS			
PER FINAL DESIGN	FESTUCA GLAUCA / BLUE FESCUE ILEX X MESERVEAE 'BLUE BOY / BLUE BOY HOLLY KALMIA LATIFOLIA 'ELF' / ELF MOUNTAIN LAUREL MAHONIA AQUIFOLIUM 'COMPACTA' / COMPACT OREGON GRAPE MISCANTHUS SINENSIS 'MORNING LIGHT' / MORNING LIGHT MAIDEN GRASS NANDINA DOMESTICA 'FIREPOWER' / FIREPOWER NANDINA NANDINA DOMESTICA 'MOONBAY' / MOONBAY NANDINA PIERIS JAPONICA 'CAVATINE' / CAVATINE PIERIS PIERIS JAPONICA 'VARIEGATA' / VARIEGATED PIERIS PRUNUS LAUROCERASUS 'SCHIPKAENSIS' SCHIPKA CHERRY LAUREL VIBURNUM DAVIDII / DAVID VIBURNUM		
GROUNDCOVER			
NO SYMBOL	ARCTOSTAPHYLOS UVA-URSI / KINNIKINNICK (ALL PLANTER STRIPS)	1 GAL. Min.	36" O.C.
	TURF, DROUGHT RESISTANT, SUN & SHADE MIX (SEED OR SOD)		

REFER TO SHEET L2 FOR NOTES & DETAILS.

TREES AND SHRUBS IN SIGHT DISTANCE TRIANGLE, TYP. ALL SHRUBS WITHIN SIGHT DISTANCE TRIANGLES SHALL BE MAINTAINED SO THAT FOLIAGE HEIGHT ABOVE PAVEMENT DOES NOT EXCEED 2.5 FEET. STREET TREES WITHIN SIGHT DISTANCE TRIANGLES SHALL BE LIMBED UP TO A HEIGHT OF 10 FEET CONSISTENT WITH ANSI A300 STANDARDS TO PROVIDE FOR SIGHT DISTANCE VISIBILITY.

LANDSCAPE PLAN NOTES

1) STREET TREE LOCATIONS SUBJECT TO CHANGE PER FINAL DRIVEWAY, UTILITY AND STREET LIGHTING LOCATIONS.
2) LANDSCAPE WITHIN ALL TRACTS TO BE MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.
3) ALL LANDSCAPE SHALL BE IRRIGATED VIA AN AUTOMATIC UNDERGROUND SYSTEM OR HAND WATERING TO INSURE LONG-TERM SURVIVABILITY.
4) BMP's 1.15 AND 1.35 OF THE STORMWATER MANAGEMENT MANUAL FOR THE PUGET SOUND BASIN SHALL BE IMPLEMENTED AS PART OF THIS LANDSCAPE PLAN'S INSTALLATION.

STORMWATER POND SEEDING NOTES

Exposed earth on the pond bottom and side slopes shall be sodded or seeded with the appropriate seed mixture as soon as is practicable (see Erosion and Sediment Control BMP E1.35 in Volume II). Establishment of protective vegetative cover shall be ensured with jute mesh or other protection and reseeded as necessary (see Erosion and Sediment Control BMPs E1.15 and E1.35 in Volume II).

Rural Application:

Kentucky Bluegrass (*Poa pratensis*)	15%	85	80
Tall Fescue (*Festuca arundincea*)	40%	95	90
Perennial Rye (*Lolium perenne*)	30%	95	90
Chewings Fescue	15%	95	90

Cover the seed with topsoil or mulch no deeper than ½ inch. It is better to work topsoil into the upper soil layer rather than spread a layer of it directly onto the top of the native soil.

"Hydro-seeding" applications with approved seed-mulch-fertilizer mixtures may also be used.

Planning Solutions, Inc.
Creating Solutions to Complex Issues
4400 NE 77th Avenue
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www.planningsolutionsinc.com

STATE OF WASHINGTON
CHRISTOPHER A BAUMANN
NO. 635 EXP. 02-20-2023
LICENSED LANDSCAPE ARCHITECT

PRELIMINARY
NOT FOR CONSTRUCTION
SUBJECT TO APPROVAL

LOCKWOOD MEADOWS SUBDIVISION

2000 NE Lockwood Creek Road
La Center, Washington

DRAWN: CB	CHECKED: CB
SCALE: 1" = 50'-0"	DATE: 10.30.21
JOB #: 21-1683	
ISSUED FOR: PLR	
REVISIONS:	
1	
2	
3	
4	
5	
6	

SHEET NAME:
PRELIMINARY LANDSCAPE & PARK PLAN

SHEET #:
L1

PLANTING NOTES

1. ALL BOUNDARIES, EASEMENTS, UTILITIES AND LEGAL ENCUMBRANCES TO BE CONFIRMED WITH OWNER PRIOR TO BEGINNING WORK. PROPERTY LINES AND SURVEY INFORMATION PROVIDED BY PLS ENGINEERING, INC.

2. IN NO WAY IS THIS PLAN TO BE INTERPRETED TO EXCEED THE LEGAL BOUNDARIES OF THE OWNER'S REAL PROPERTY.

3. THE LANDSCAPE DESIGNER ASSUMES NO RESPONSIBILITY FOR THE LOCATION OF BOUNDARIES, UTILITIES AND WETLANDS.

4. THIS PLAN SHALL BE INSTALLED TO MEET ALL APPLICABLE CITY, COUNTY, STATE AND FEDERAL CODES.

5. THIS PLAN SHALL BE CONSIDERED PRELIMINARY UNTIL APPROVED BY ALL GOVERNING AGENCIES. IMPLEMENTATION OF THIS PLAN SHALL NOT PROCEED UNTIL ISSUANCE OF ALL RELATED PERMITS.

6. PLANT QUANTITIES ARE FOR INFORMATION ONLY. IN CASE OF ANY DISCREPANCY, THE PLAN SHALL GOVERN.

7. ALL WORK IS TO BE PERFORMED BY LICENSED CONTRACTORS AND EXPERIENCED WORKERS.

8. THE CONTRACTOR IS TO VERIFY THE LOCATION OF EXISTING UNDERGROUND UTILITIES AND STRUCTURES PRIOR TO PERFORMING ANY EXCAVATION. CONTRACTOR SHALL REPAIR ANY DAMAGE TO UTILITIES CAUSED BY THE CONTRACTOR'S WORK, AT NO ADDITIONAL COST TO THE OWNER. CONTACT ALL UTILITY PROVIDERS SERVING THE SITE AREA 48 HOURS PRIOR TO ANY EXCAVATION.

9. ALL PLANT MATERIALS SHALL MATCH SPECIFICATIONS PER SPECIES AND SHALL COMPLY WITH ANSI Z60.1 'STANDARD FOR NURSERY STOCK'.

10. THE CONTRACTOR SHALL ADHERE TO THE WASHINGTON ASSOCIATION OF NURSERYMEN'S GUIDELINES FOR PLANTING PRACTICES.

11. THE CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING ELEMENTS ON AND OFF SITE, RESULTING FROM THE CONTRACTOR'S WORK.

12. THE CONTRACTOR IS RESPONSIBLE FOR THE VIABILITY OF ALL PLANT MATERIAL FOR 2 YEARS AFTER COMPLETION OF PLANTING. DISEASED, DYING, OR DEAD PLANT MATERIAL SHALL BE REPLACED BY THE CONTRACTOR DURING THE TWO YEAR PERIOD AND MAINTAINED FOR AN ADDITIONAL 2 YEAR PERIOD.

13. IMMEDIATELY UPON BID AWARD, CONTRACTOR SHALL SECURE THE PLANT MATERIALS AS SPECIFIED FROM AVAILABLE SOURCES. IN THE EVENT THAT PLANT MATERIALS ARE NOT AVAILABLE, CONTACT THE CITY OF LACENTER & THE LANDSCAPE ARCHITECT FOR APPROVED SUBSTITUTIONS. NO SUBSTITUTION FOR PLANT MATERIAL WILL BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL OF THE LANDSCAPE ARCHITECT.

14. TOP DRESS ALL SHRUB AND GROUND COVER AREAS (NOT LAWN) WITH 2" OF FIR BARK MULCH. SUBMIT SAMPLE TO THE CITY OF LACENTER & THE LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO CONSTRUCTION.

15. TREE LOCATIONS MAY BE ADJUSTED IN THE FIELD TO SUIT SITE REQUIREMENTS AS DIRECTED BY THE LANDSCAPE ARCHITECT.

16. THE CONTRACTOR SHALL ENSURE THAT ALL EXCAVATED PLANTING PITS HAVE POSITIVE DRAINAGE. PLANT PITS FULLY FLOODED WITH WATER SHALL DRAIN WITHIN (12) HOURS OF FILLING.

17. FINISH GRADE SHALL BE SET TO ALLOW POSITIVE DRAINAGE

18. ROTOTILL 2" OF COMPOST INTO ALL PLANTED AREAS.

19. INCORPORATE PEAT INTO THE ROOT ZONE OF RHODODENDRONS, AZALEAS AND OTHER ACID LOVING PLANTS.

20. INCORPORATE 10-20-20 FERTILIZER INTO THE ROOT ZONE OF ALL NEW PLANTINGS.

21. RONSTAR, OR APPROVED EQUAL, PREEMERGENT HERBICIDE TO BE APPLIED TO ALL PLANTED AREAS PER MANUFACTURERS INSTRUCTIONS.

22. EXISTING VEGETATION TO BE SPRAYED WITH ROUNDUP, OR APPROVED EQUAL, PER MANUFACTURERS INSTRUCTIONS. SUFFICIENT TIME SHALL BE GIVEN TO ALLOW EXISTING MATERIAL TO DIE. REMOVE EXISTING VEGETATION MAT AND ROTOTILL OR SCARIFY EXISTING SOIL.

23. CROWN LAWN AREAS AND GRADE TO PROVIDE POSITIVE DRAINAGE.

24. ROLL LAWN AREA TO INSURE PROPER COMPACTION TO MINIMIZE SETTLING.

25. AMEND SOIL IN LAWN AREAS WITH 80 LBS. OF DOLOMITE LIME AND 40 LBS. OF 10-20-20 SLOW RELEASE FERTILIZER OR EQUIVALENT. PROVIDE A 3" LAYER OF SANDY LOAM TOPSOIL FOR LAWN AND BED AREA.

26. SEED LAWN AREAS WITH GRASS SEED MANUFACTURER'S RECOMMENDATIONS. COVER SEED WITH FINE MULCH APPLIED WITH ROLLER OR HYDROSEED.

27. THE PROPERTY OWNER IS RESPONSIBLE FOR MAINTAINING TURF PLANTED WITHIN THE RIGHT OF WAY.

28. PLANT MATERIAL SHALL BE PLANTED W/ ROOT CROWN 1" ABOVE FINISHED GRADE TO ALLOW POSITIVE DRAINAGE AWAY FROM CROWN.

29. STAKE ALL TREES OVER 6 FT. IN HEIGHT PER DETAIL 'A' AND 'B' ON THIS SHEET.

30. REFER TO DETAILS FOR ADDITIONAL INFORMATION.

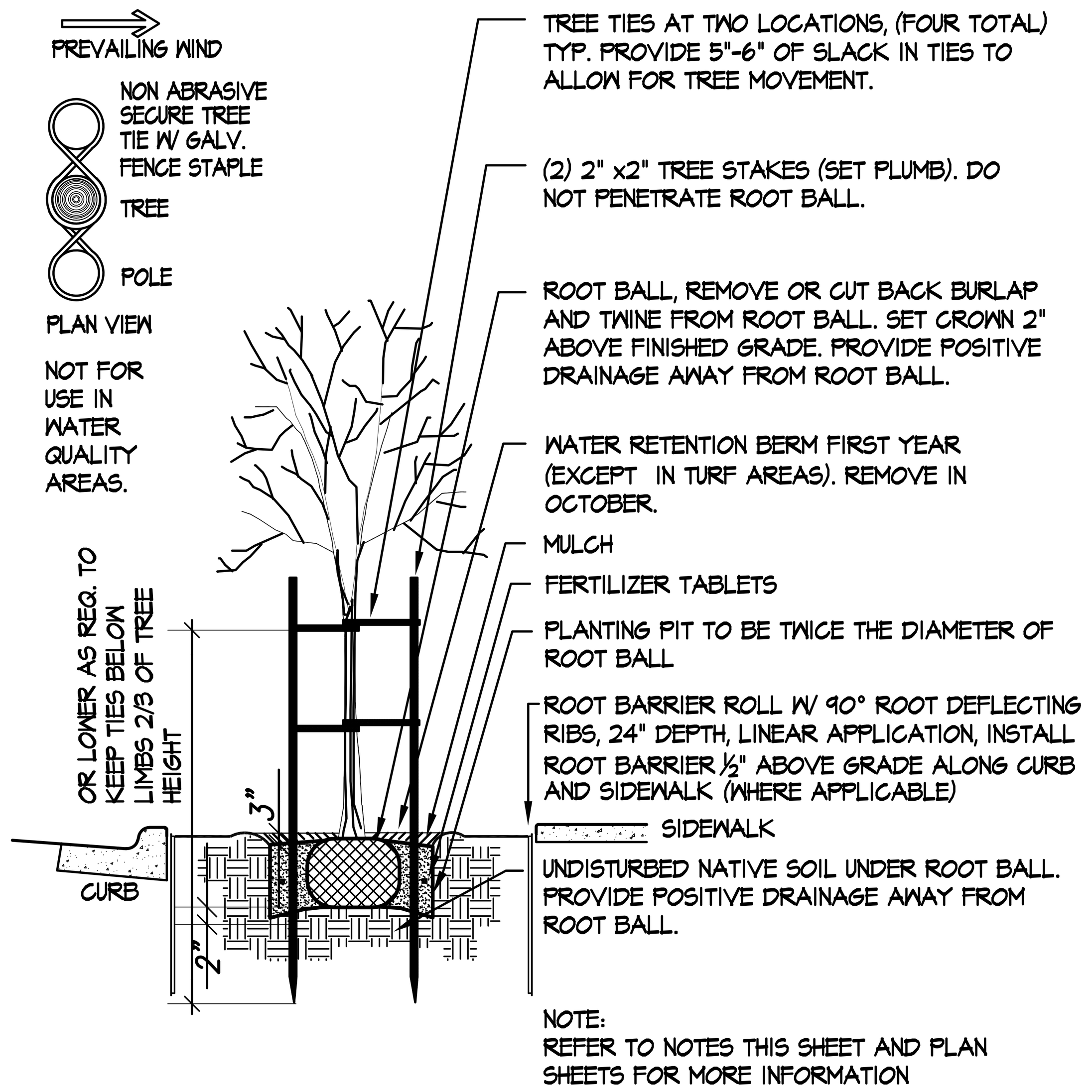
31. ALL PLANTING SHALL BE IRRIGATED BY AN AUTOMATIC UNDERGROUND SPRINKLER SYSTEM.

32. ALL PLANT MATERIALS FURNISHED ARE TO BE HEALTHY, UNIFORMLY BRANCHED AND WITH WELL DEVELOPED FIBROUS ROOT SYSTEMS.

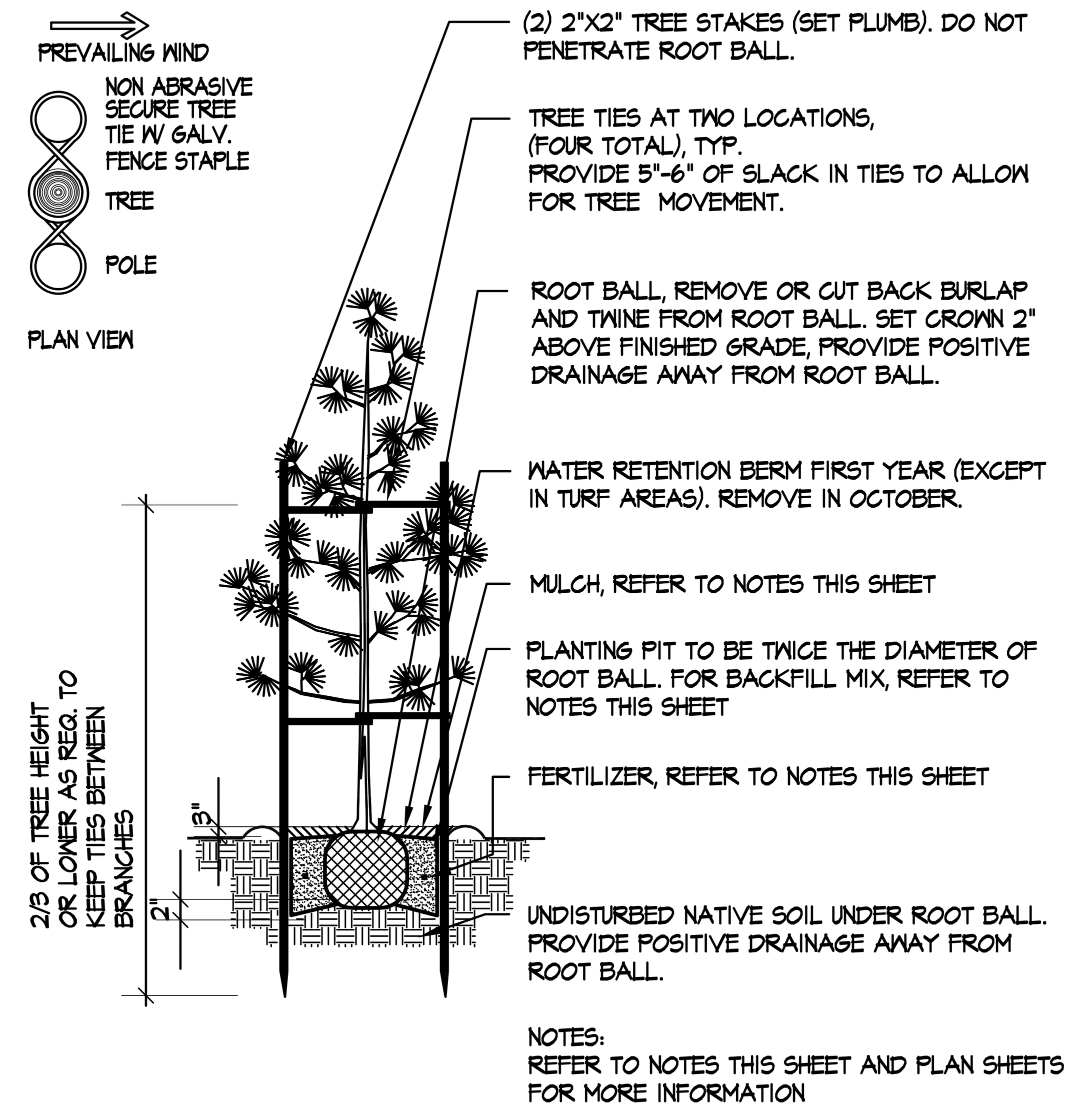
33. ALL PLANT MATERIALS FURNISHED ARE TO BE FREE FROM DEAD OR BROKEN BRANCHES, LICHENS, SCARS, BROKEN BARK OR WOUNDS. ALL PLANT MATERIALS WILL BE INSECT, WEED, AND DISEASE FREE ACCORDING TO THE REQUIREMENTS OF THE WASHINGTON STATE DEPARTMENT OF AGRICULTURE FOR NURSERY PLANT MATERIALS SOLD FOR WHOLESALE OR RETAIL. ALL PRUNING WOUNDS MUST BE WELL HEALED WITH NO EVIDENCE OF DECAY.

34. SIX (6) MONTHS PRIOR TO THE FINAL CITY OF LACENTER ACCEPTANCE & AT FINAL CITY OF LACENTER ACCEPTANCE ALL LANDSCAPING SHALL BE WEED FREE. LAWN AREAS WITH CLOVER WILL NOT BE ACCEPTED.

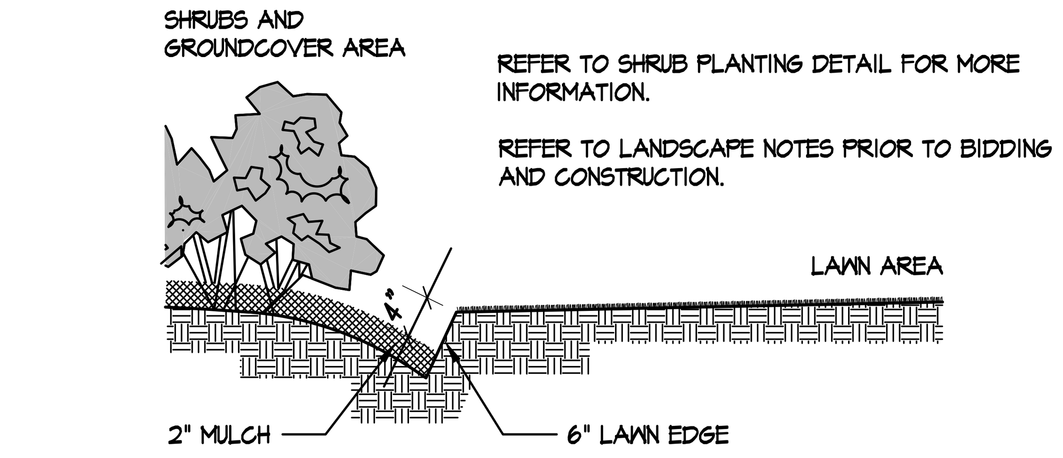
35. HYDROSEEDED LAWN AREAS MUST BE ACTIVELY GROWING FOR LONGER THAN 4 FOUR (4) MONTHS PRIOR TO FINAL CITY OF LACENTER ACCEPTANCE.



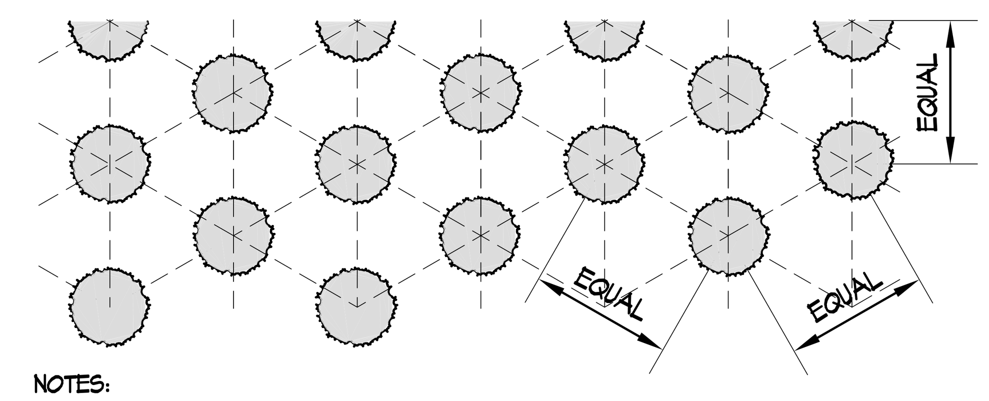
A **B & B Tree Planting Detail**
Not To Scale — SECTION / PLAN VIEW



B **B & B Tree Planting Detail: Evergreen under 8' Height**
Not To Scale — SECTION / PLAN VIEW



C **Lawn Edge Detail**
Not To Scale — SECTION

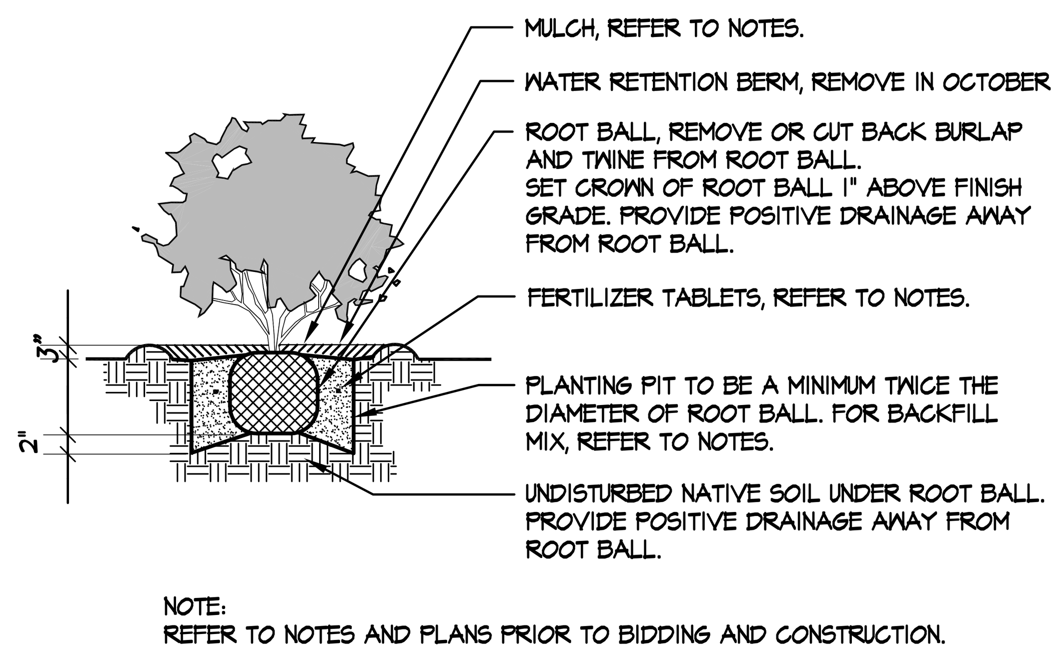


NOTES:

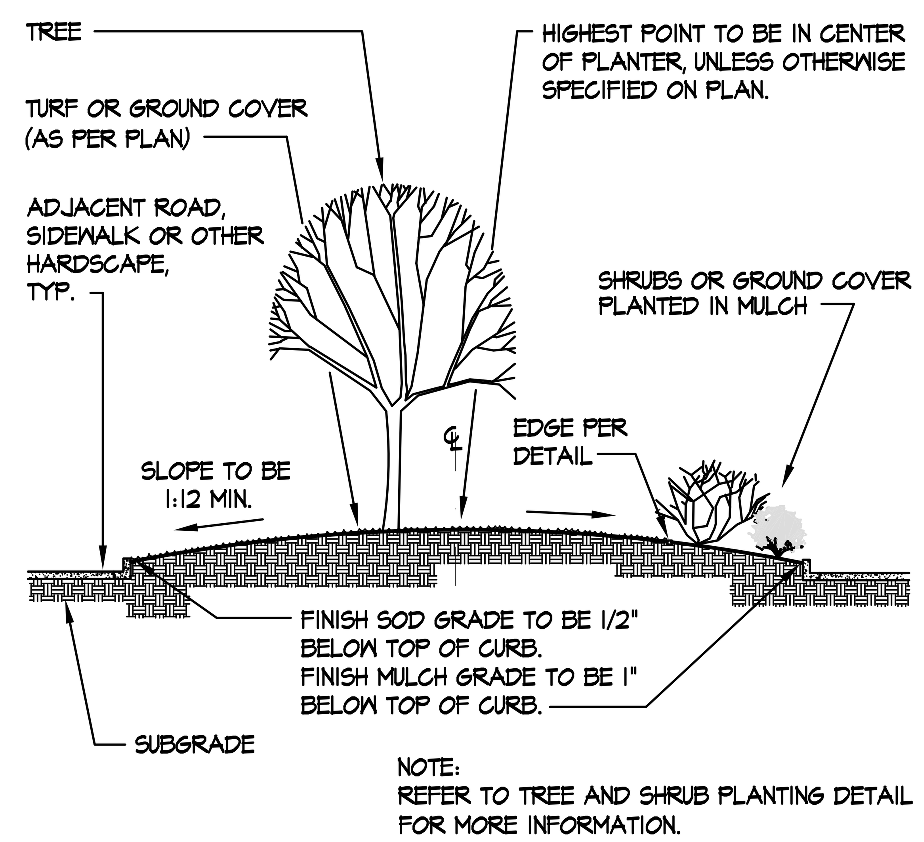
ALL GROUND COVER SHALL BE PLANTED AT EQUAL TRIANGULAR SPACING AS SPECIFIED IN PLANTING LEGEND.

GROUND COVER TO BE LOCATED ONE HALF OF SPECIFIED SPACING DISTANCE FROM ANY HARD SURFACE, UNLESS OTHERWISE SPECIFIED.

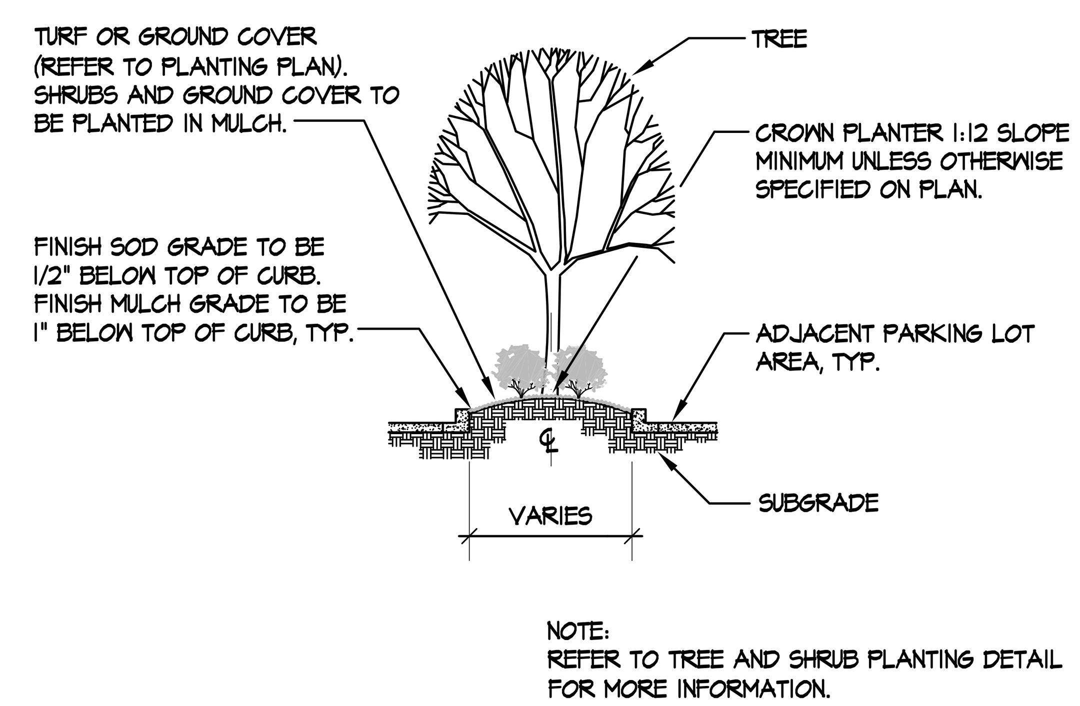
D **Ground Cover Planting Detail**
Not To Scale — PLAN VIEW



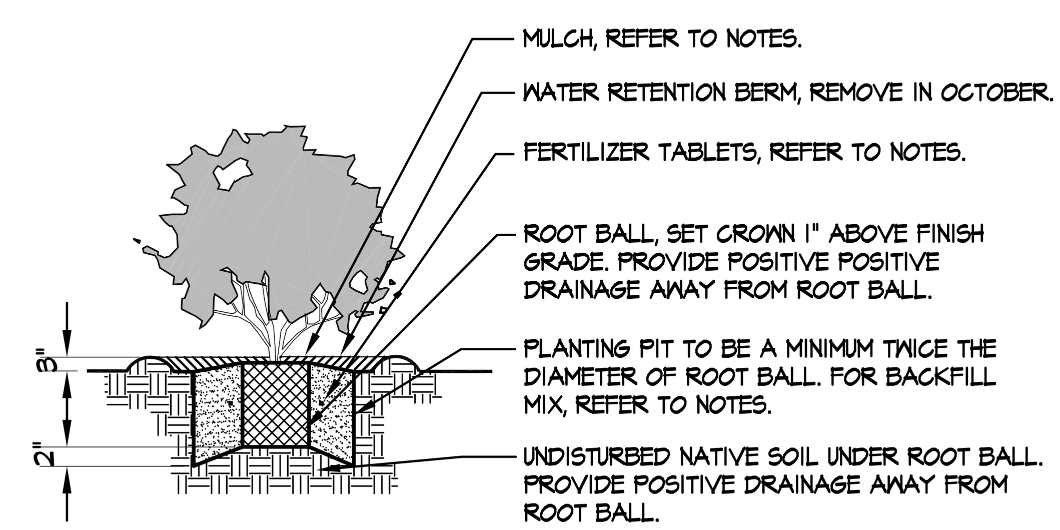
E **B & B Shrub Planting Detail**
Not To Scale — SECTION



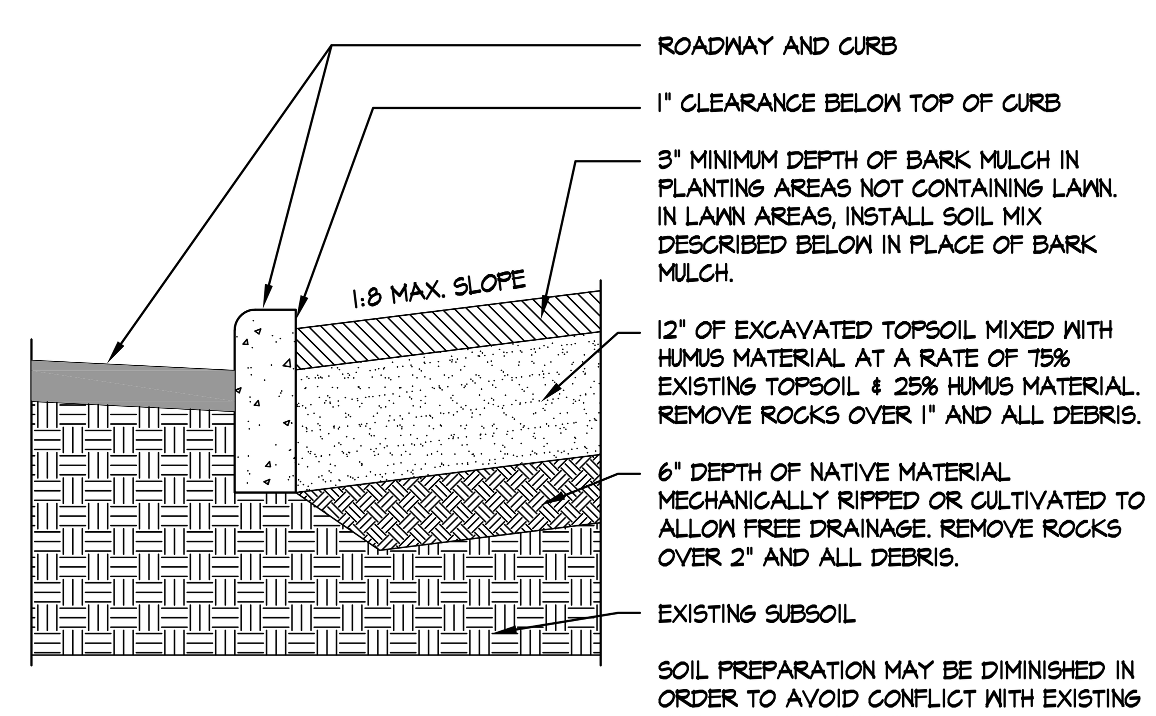
F **Typical Curbed Planter Area**
Not To Scale — SECTION A-A



G **Typical Parking Finger Planter Area**
Not To Scale — SECTION B-B



H **Container Ground Cover Planting Detail**
Not To Scale — SECTION



I **Soil Section at Curb within Planting Strips & Finger Islands**
Not To Scale — SECTION

ALL DETAILS SHOWN MAY NOT BE REQUIRED FOR THIS PROJECT.

Planning Solutions, Inc.
Creating Solutions to Complex Issues
4400 NE 77th Avenue
Suite 275
VANCOUVER, WA 98662
VOICE: 360-750-9000 FAX: 360-713-6102
www.planningsolutionsinc.com

STATE OF WASHINGTON — CHRISTOPHER A. BALMAIN — LICENSED LANDSCAPE ARCHITECT — EXP.

PRELIMINARY
NOT FOR CONSTRUCTION
SUBJECT TO APPROVAL

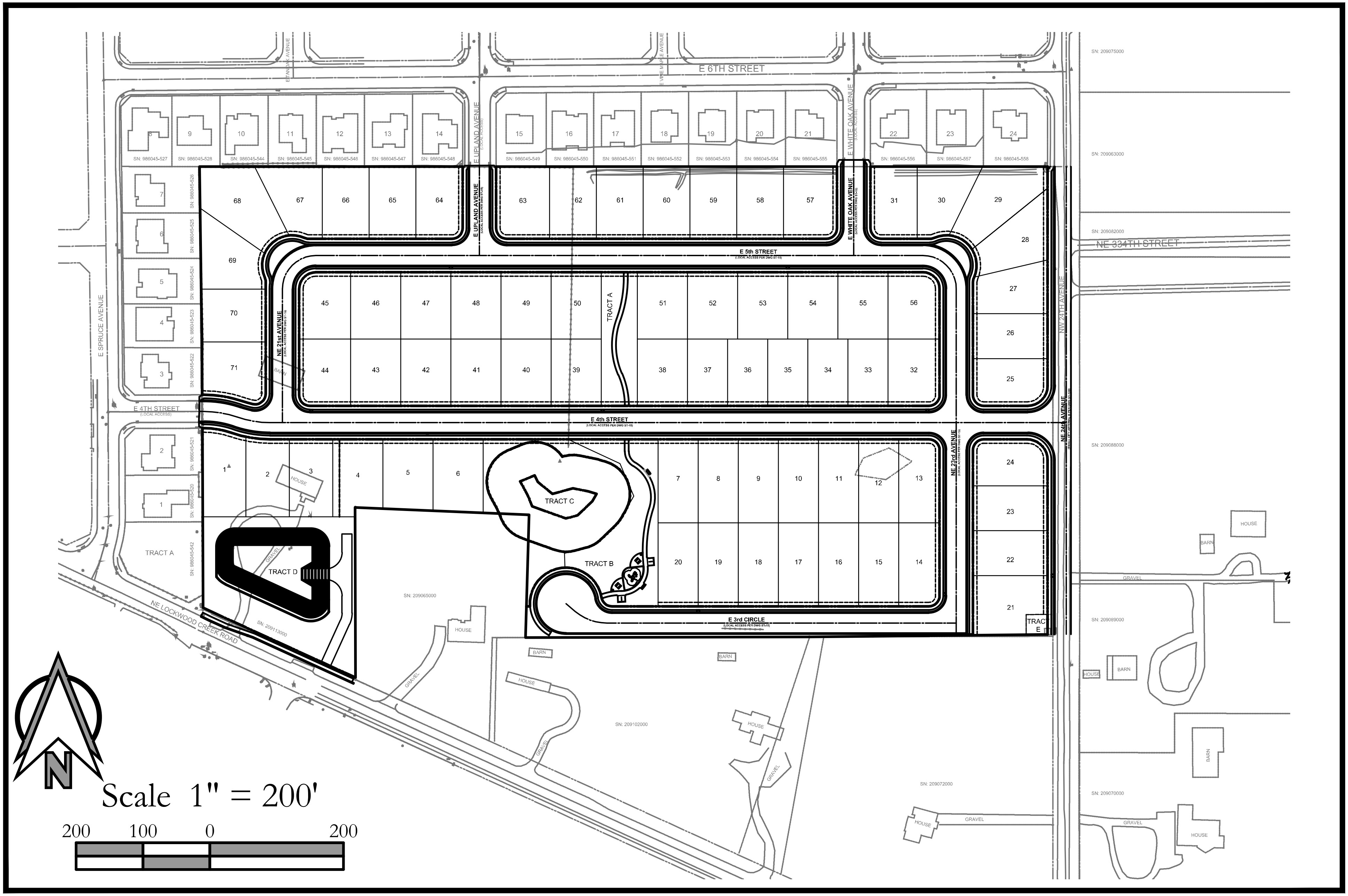
LOCKWOOD MEADOWS SUBDIVISION
2000 NE Lockwood Creek Road
La Center, Washington

DRAWN: BOP	CHECKED: CB
SCALE: AS SHOWN	DATE: 10.30.21
JOB #: 21-1683	
ISSUED FOR: PLR	
REVISIONS:	

SHEET NAME:
LANDSCAPE DETAILS

SHEET #:
L2
SHEET 3 OF 3

Exhibit A.21



PLS ENGINEERING
604 W. Evergreen Blvd., Vancouver, WA 98660
PH: (360) 944-6519 Fax: (360) 944-6539

LOCKWOOD CREEK

SCALE: 1"= 200'	**DATE:** 02/24/2022
JOB NO.: 3094	**DRAWING:** OFF-SITE/ON-SITE PLAN

Exhibit B.1

NOTICE OF APPLICATION
AND LIKELY SEPA DETERMINATION OF NON-SIGNIFICANCE
Lockwood Meadows Subdivision Type III Preliminary Plat, Variance, and SEPA
(File # 2022-004-SUB/VAR/SEPA)

Description of proposal: The applicant proposes to subdivide the 20-acre site located at 2000 NE Lockwood Creek Road (Parcel 209113000) into 71 lots for single-family detached residences. A public road system would serve the development connecting to existing street stubs to the north and west in the Country Hills Estates development and to the east from NE 24th Avenue. Tract B of the development would be a 0.46-acre park. Lots within the development would range in size from 6,000 square feet to 10,682 square feet. The applicant is proposing to use the density transfer provisions to preserve the wetland and buffer area within Tract C and reduce five lots below the minimum lot size of 7,500 square feet. The applicant is also requesting a variance application to increase the maximum building coverage from 35 percent to 50 percent and the maximum impervious surface area from 50 percent to 65 percent for each lot.

Likely SEPA DNS: NOTICE IS HEREBY GIVEN that, an application has been submitted as noted below and based on a review of that application, the City of La Center expects to issue a Mitigated Determination of Non-Significance (MDNS) for this proposal pursuant to the "Optional DNS process" allowed by State Law (WAC 197-11-355) and the La Center Municipal Code (LCMC 18.310). A copy of the determination may be requested now and will be mailed when available. Comments received within the deadline, will be considered in the review of the proposal and the State Environmental Policy Act (SEPA) environmental checklist. ***This may be the only opportunity to comment on the environmental impacts of the proposal and no additional comment period will be provided, unless probable significant environmental impacts are identified during the review process, which would require additional study or special mitigation.*** The proposal may include mitigation under applicable codes, and the project review process may incorporate or require mitigation measures.

Any person has the right to comment on this application, receive notice of and participate in any hearings, request a copy of the decision once made, and appeal the final SEPA determination of the project. **Written comments submitted by 5:00 PM on March 14, 2022 will be considered in the application and amended SEPA determination.** Please send comments to the City of La Center, Community Development, 210 E 4th Street, La Center, WA 98629 or by email to Jessica Nash, Permit Technician, at jnash@ci.lacenter.wa.us

Application: Lockwood Meadows Subdivision Type III Preliminary Plat, Variance, and SEPA (File # 2022-004-SUB/VAR/SEPA)

Application date: February 1, 2022

Technically Complete: February 15, 2022

Proponent/applicant: Representative: Travis Johnson, PLS Engineering, 604 W Evergreen Blvd, Vancouver, WA 98660. Applicant: Susanna S. Hung Trust, 701 Columbia Street #414, Vancouver, WA 98660.

Property owner: Susanna S. Hung Trust, 701 Columbia Street #414, Vancouver, WA 98660.

Location of proposal: 2000 NE Lockwood Creek Road, La Center, WA 98629 (Parcel No. 209113000).

Public Hearing: A public hearing is required and will be scheduled at a later date. A separate notice will be provided at least 14 days in advance of the public hearing.

Existing Environmental Documents relied upon: SEPA requires that a review of the potential environmental impacts be conducted. City staff and interested agencies will review the proposal for compliance with applicable state requirements and city codes. Through this process, a determination will be made as noted under the following statement of determination.

The following environmental documents were relied upon in the City's assessment of a likely determination of non-significance: SEPA Environmental Checklist dated, October 28, 2021; Narrative (PLS Engineering, January 2022); Variance Narrative (PLS Engineering); Preliminary Technical Information Report (PLS Engineering, January 2022); Geotechnical Site Investigation (Columbia West Engineering Inc. September 23, 2021); Water Availability Letter (Clark Public Utilities, June 4, 2021); Public Health Review Letter (Clark County Public Health, August 10, 2021); Circulation Plan (PLS Engineering, October, 2021); Road Modification Request (PLS Engineering); Traffic Analysis Report (Charbonneau Engineering, Inc. August 2021); Trip Generation and Assessment (Charboneau Engineering, Inc. October 26, 2021); Clark County Archaeological Predetermination Survey for the Lockwood Creek Subdivision Project Area (September 23, 2021); Bank Use Plan (Ecological Land Services, November 2, 2021); Critical Areas Report (Ecological Land Services, March 24, 2021); Lockwood Meadows Subdivision Plans (PLS Engineering).

Statement of Determination: As lead agency under the State Environmental Policy Act (SEPA) rules [Chapter 197-11, Washington Administrative Code] the City of La Center must determine if there are potential significant adverse environmental impacts associated with this proposal. The options include the following:

- Determination of Significance – (DS). The impact cannot be mitigated and therefore requires the preparation of an Environmental Impact Statement (EIS).
- Mitigated Determination of Nonsignificance – (MDNS). The impact can be mitigated through conditions of approval, or;
- Determination of Nonsignificance – (DNS). The impacts can be addressed by applying the city codes.

Approval Standards/Applicable Laws: The following standards will apply to the application: 18.30 Procedures; 18.130 Low Density Residential; 18.147 Parks and Open Space; 18.190 Urban Holding District; 18.200 General Provisions; 18.210 Subdivision Provisions; 18.225 Legal Lot Determinations; 18.230 Monumentation, Survey, and Drafting Standards; 18.240 Mitigation of Adverse Impact; 18.245 Supplementary Development Standards; 18.260 Variances; 18.280 Off-Street Parking and Loading Requirements; 18.282 Outdoor Lighting; 18.300 Critical Areas; 18.310 Environmental Policy; 18.320 Stormwater and Erosion Control; 18.340 Native Plant List; 18.350 Tree Protection; 18.360 Archaeological Resource Protection.

Mitigation Measures: The applicant will be required to comply with all applicable approval standards and laws in addition to the following project-specific mitigation measures:

- <u>Earth:</u> The applicant must comply with the design recommendations of the geotechnical site investigation by Columbia West Engineering, Inc. dated September 23, 2021.
- <u>Air:</u> The applicant is required to sprinkle the site with water during construction to reduce dust.
- <u>Water:</u> The applicant must comply with the recommendations of the critical areas report (ELS, March 24, 2021), the Bank Use Plan (ELS, November 2, 2021).
- <u>Water:</u> The applicant must comply with the recommendations of the Preliminary Technical Information Report dated January, 2022.
- <u>Water:</u> The applicant must use approved erosion control best management practices during construction.
- <u>Plants:</u> The applicant shall retain the priority habitat Oregon White oak and plant street trees spaced 30-feet on center, and plant landscaping as required by LCMC 18.245.
- <u>Environmental Health:</u> The applicant shall comply with approved construction hours as required by the City of La Center.
- <u>Light and Glare:</u> The applicant shall comply with the requirements of LCMC 18.282 (Outdoor Lighting).
- <u>Recreation:</u> The applicant shall comply with LCMC 18.147 (Parks and Open Space).
- <u>Recreation:</u> The applicant is required to pay park impact fees prior to issuance of building permits.
- <u>Historic and cultural preservation:</u> In the event any archaeological or historic materials are encountered during project activity, work in the immediate area (initially allowing for a 100' buffer; this number may vary by circumstance) must stop and the following actions taken:

- Implement reasonable measures to protect the discovery site, including any appropriate stabilization or covering;
- Take reasonable steps to ensure confidentiality of the discovery site; and,
- Take reasonable steps to restrict access to the site of discovery.

The applicant shall notify the concerned Tribes and all appropriate county, city, state, and federal agencies, including the Washington Department of Archaeology and Historic Preservation and the City of La Center. The agencies and Tribe(s) will discuss possible measures to remove or avoid cultural material, and will reach an agreement with the applicant regarding actions to be taken and disposition of material. If human remains are uncovered, appropriate law enforcement agencies shall be notified first, and the above steps followed. If the remains are determined to be Native, consultation with the affected Tribes will take place in order to mitigate the final disposition of said remains.

See the Revised Code of Washington, Chapter 27.53, "Archaeological Sites and Resources," for applicable state laws and statutes. See also Washington State Executive Order 05-05, "Archaeological and Cultural Resources." Additional state and federal law(s) may also apply.

Copies of the above inadvertent discovery language shall be retained on-site while project activity is underway.

Contact	Information
Cowlitz Indian Tribe, Nathan Reynolds, Interim Cultural Resources Manager	Phone: 360-575-6226; email: nreynolds@cowlitz.org
City of La Center, Tony Cooper, City Engineer	Phone: 360-263-2889; email: acooper@ci.lacenter.wa.us
Office of the Clark County Medical Examiner (for human remains)	Phone: 564-397-8405; email: medical.examiner@clark.wa.gov
Washington DAHP, Dr. Allison Brooks, Ph.D, Director	Phone: 360-586-3066; email: Allyson.Brooks@dahp.wa.gov

- Transportation: The applicant shall comply with the recommendations of the Traffic Analysis Report (Charbonneau Engineering, August 2021) and Trip Generation Update and Assessment Memorandum (Charbonneau Engineering, October 26, 2021).
- Transportation: The applicant is required to pay transportation impact fees prior to issuance of building permits.
- Utilities: The applicant is required to pay sewer system development charges prior to issuance of building permits.

Responsible Official: Greg Thornton, Mayor

Date: 1-25-22 **Signature:** Greg Thornton

Issued: February 28, 2022

File Name: Tapani/Carlson Type II Temporary Use Permit/SEPA (File # 2022-005-TUP/SEPA)

Date Published: February 28, 2022

Attached is a likely SEPA environmental Mitigated Determination of Non-Significance (MDNS) and associated environmental checklist issued pursuant to the State Environmental Policy Act (SEPA) rules (WAC 197-11). The City (lead agency) completed evaluation of the environmental checklist as required by WAC 197-11. You may comment on this likely determination within fourteen (14) days of the issuance of this notice February 28, 2022. The lead agency will not act on this proposal until the close of the **14-day comment period, which ends February 28, 2022.**

Please address any correspondence to:

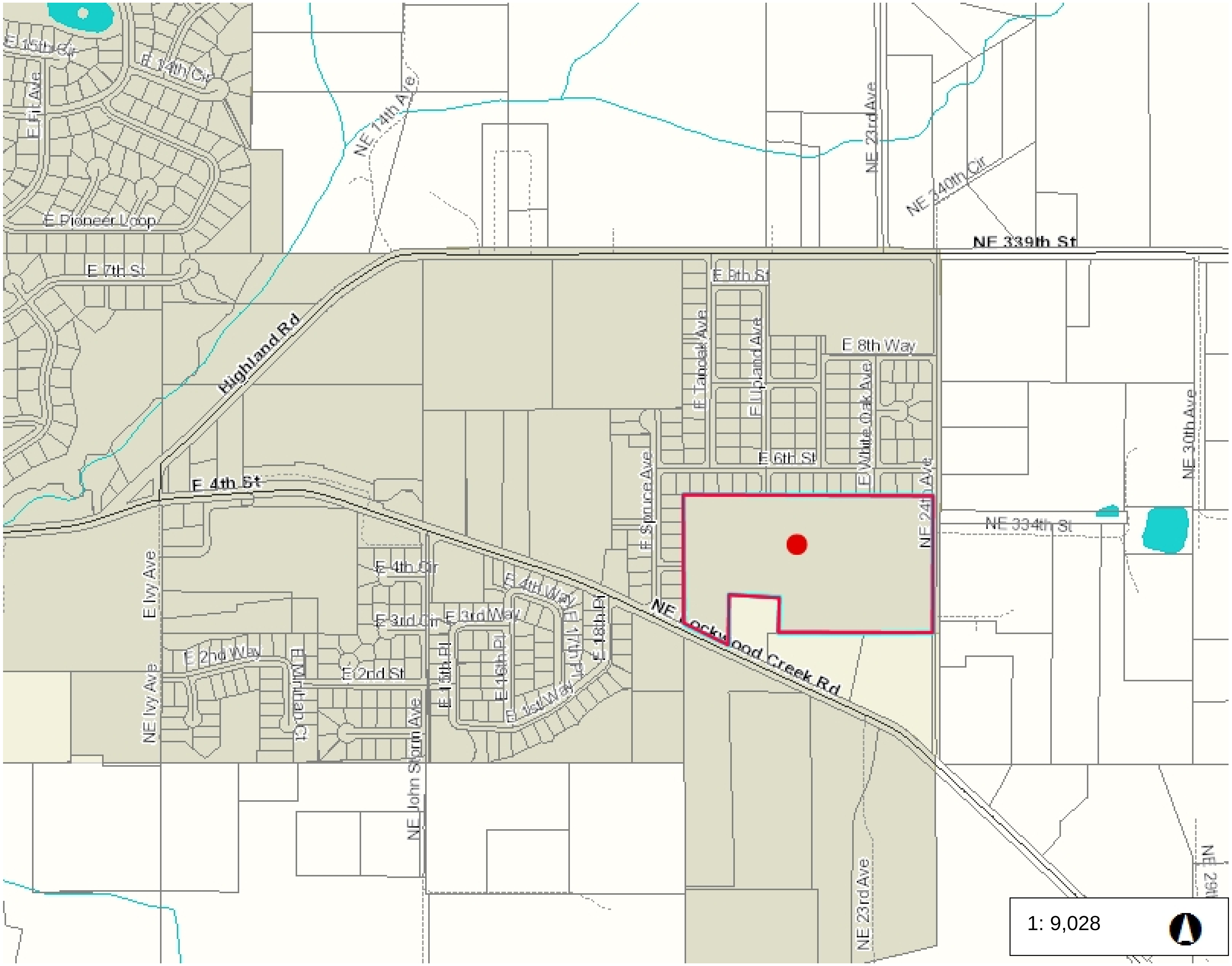
Jessica Nash, Permit Technician
ATTN: SEPA COMMENTS – Tapani/Carlson Temporary Use Permit
c/o 305 NW Pacific Highway
La Center, WA 98629

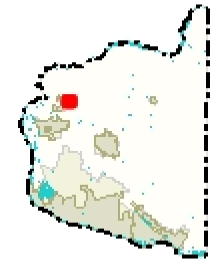
DISTRIBUTION:

Federal Agencies:	National Marine Fisheries, PRD Division (Mail) US Army Corps of Engineers, Regulatory Functions (Mail)
Native American Interests:	Confederated Tribes of the Grande Ronde (Mail) Cowlitz Tribe, Longview, WA (Mail and email)
State Agencies:	Dept of Ecology (Email) Dept of Health, Office of Drinking Water (Email) Dept of Commerce (Email) Dept of Fish & Wildlife, Region 5 (Email) Dept of Natural Resources, SEPA Center (Email) Dept of Transportation, Environmental Services (Email) Dept of Transportation, SW Region (Email) Department of Archaeology & Historic Preservation (Email) Washington Parks & Recreation Commission (Email)
Local Agencies:	City of Ridgefield (Email) Clark County, Dept of Community Development (Email) Clark County, Dept of Health (Email) Clark County, Dept of Parks & Recreation (Mail) Clark County, Dept of Public Works (Email) Clark County Sheriff Clark County Fire and Rescue Town of Yacolt (Email) La Center Police Department
School Districts:	La Center (WA) School District (Mail)
Special Purpose Agencies:	Clark Public Utilities (Email) Columbia River Economic Development Council (Email) C-TRAN (Email) Lower Columbia Fish Recovery Board

	Southwest Clean Air Agency Southwest Washington Regional Transportation Council Clark Regional Wastewater District
Libraries:	Fort Vancouver Regional Library, La Center (Mail)
Fire Districts:	Clark County Fire & Rescue
Media:	The Columbian
Other Interested Parties:	Audubon Society, Vancouver (Mail) Clark County Natural Resources Council (Email) NW Natural (Mail) Vancouver Wildlife League (Mail)

Lockwood Meadows Subdivision - 209113000





Legend

- Taxlots
- Cities Boundaries
- Urban Growth Boundaries

1: 9,028

Notes:

1,504.7 | 0 | 752.33 | 1,504.7 Feet

WGS_1984_Web_Mercator_Auxiliary_Sphere
Clark County, WA. GIS - http://gis.clark.wa.gov

Exhibit B.2

From: PAUL JONES
To: Jessica Nash
Subject: Re: [External] Lockwood Meadows Subdivision
Date: Thursday, March 10, 2022 7:12:41 PM

Hi Jennifer,

As a resident of Heritage Country Estates, (Lot #22, at 2300 E. 6th Street) we are writing to express some questions and concerns about the proposed development.
Our lot overlooks the beautiful trees of the parcel in question for the new subdivision. While I acknowledge that development of those fields is inevitable, I trust the City of La Center will do it's due diligence to preserve the space and beauty of our area.

Here are some of the questions and thoughts we have:
1). We would hope there will be sufficient setbacks (30-60 ft.) between the trees/ditch area and the new the subdivision. It would be great if there could be a greenbelt walkway developed around the subdivision (such as in the Heritage Trail, or the Brezee Creek Trail). What will happen to all those beautiful Christmas trees in the area?

2) We noted that there is to be a .46 community park developed on Tract B. That's great. Is it possible to see a layout of where that is being proposed? I did not see any specification of where Tract B is.

3) The notice of application mentioned they would preserve the wetland and buffer area within Tract C. Where is that located? How large is the buffer area? What would that mean?

4) Our home is on the corner of 6th and White Oak, one of the stub roads that would lead into the new subdivision. Would there be a bridge made for crossing over the runoff waterway ditch? Also, how will the banks off the back of our properties be secured/protected to prevent erosion?

5) We would also question the call for a variance in increasing the maximum building coverage. Will that not make the lots seem crowded together. We are concerned as well for having 71 additional homes with all their vehicles congesting the flow of traffic by the Middle School and on into the town center. Could not any development be made within the current guidelines/specifications?

6). What impacts and improvements will need to be made on 24th Avenue to accommodate the traffic?

These are the concerns rolling around in our minds. They may not be all applicable to the specific SEPA determination being currently made, but I did want to communicate our thoughts.

Please continue to send me any further copies of the determination, or other matters of concern regarding the Lockwood Meadows subdivision.

Thank you so much for your service to our community in making this a great place to live!

Sincerely,
Paul and Mary Jones
2300 E 6th St.
La Center, WA 98629

253-225-6264

Sent from my iPad

From:	richard oakley
To:	Jessica Nash
Cc:	pastorpbj@mac.com
Subject:	[External] 2000 NE Lockwood Creek rd
Date:	Thursday, March 10, 2022 7:07:41 PM

I live at 2304 NE 6th st above the proposed development. There are several concerns about his project which need addressing. 1. Is the traffic problems that we are already seeing with the new JR High school another 71 houses will likely cause major problems not only at that location but also going through town and the road east of this sub division which would need to be totally reconstructed and widen. Has a traffic study been done to address this problem from the east county line down through town and the bridge. On the north end of the property is a seasonal creek that runs the full length of the properties is this under the watershed act? What will be the easement situation along this border since they are proposing major drainage along this border. There are also concerns with the increase in maximum building coverage and maximum imprervious at each lot. It seems to be jamming alot of houses in a very short area. where is the impact study from the city? not an engineer from the developer. Please address these issues before any approval. Thank you

From:	Rick Kirkendall
To:	Jessica Nash
Cc:	Ann Kirkendall
Subject:	[External] Lockwood Meadows Subdivision Type III Preliminary Plat, Variance and SEPA (File # 2022-004-SUB/Var/SEPA)
Date:	Sunday, March 13, 2022 5:51:08 PM

As La Center residents of 11 years, formerly of 1415 E. 4th Street, and now residing at 2308 E. 6th Street, we are writing to share our comments and concerns regarding the proposed development.

We are concerned that so many new developments are being proposed and are being approved by the city. The infrastructure of this city does not support such rapid growth. That being said, we know this new development has been approved and appreciate being able to give some feedback.

Traffic - How is the city addressing the increase in traffic? The roads in and out of LA Center already are over traveled and need attention. Specifically, the traffic in and out of the subdivision are concerns for families with children while the development is being constructed and then once 71 new families move in.

We live on the corner of E. 6th Street and 24th Ave. The sidewalk on 24th Ave. now ends at the end of our lot, #24, of Heritage Country Estates. We are concerned about the traffic on 24th Avenue increasing and know that the street as it is currently is inadequate and crowded. There is a beautiful, large fir tree on the edge of the proposed development that should be saved. (See picture.) Can some of the other trees in the area be saved to provide homes for birds and wildlife and to preserve some of the natural habitat.

We are concerned about erosion from the creek/ditch south of our property line. What is going to be done about this ditch and the buffer trees? Can the trees be saved? Could this be a greenbelt and walkway? How will the banks off the back of our properties be secured/protected to prevent erosion? Will there be sufficient setbacks?

We are opposed to the proposed Increase in maximum building coverage and impervious surfaces - overcrowding in general.

Will the new subdivision “match” the one it is being connected to (Heritage Country Estates) i.e. in terms of size and value? Will there be similar landscaping and CC& Rs?

The park that is being proposed is appreciated and will be used by both communities since Heritage Country Estates has none. Preserving the wetland is also very desirable.

We appreciate the opportunity to share our thoughts and concerns. Please continue to keep us informed.

Sent from Mail for Windows