CITY OF CENTRALIA
HEARING EXAMINER STAFF REPORT
HEARING DATE: August 27, 2025

TO: Jim Buzzard, Hearing Examiner
FROM: Hillary Hoke, Assistant Director
REPORT DATE: August 20, 2025
APLICATION # 2023 0337
ZONING: M-1, Light Industrial
PROPERTY SIZE: 56.29 acres
LOCATION: 1406 W Reynolds Ave.
ASSESSOR PARCEL NUMBER: 021037-000-000, 021039-000-000, 021041-000-000, 021041-001-000, 021043-001-000, 021043-002-000, 021043-003-000, 021044-002-000, 021044-003-000, 021044-004-000, 021045-000-000, 021059-000-000, 021060-000-000.

A. GENERAL INFORMATION

Applicant:
Darren Peugh, Senior Development Manager
Panattoni Development Company, Inc.
1201 Pacific Avenue, Suite 1700
Tacoma, WA 98402
253.201.5102
DPeugh@panattoni.com

Request:
Construct phased industrial warehouse complex.
- Phase I: Construct all compensatory and mitigation work, Building A approximately 483,276 square feet, associated infrastructure, and public improvements.
- Phase II: Construct Building B approximately 295,356 square feet and associated infrastructure.

Comprehensive Plan Designation: Light Industrial

Public Notice: A Notice of Public Hearing was published in the Chronicle newspaper on August 2, 2025 (Exhibit A).

- The same notice was emailed to staff, agencies and interested parties on July 31, 2025 (Exhibit B).

- The same notice was mailed to property owners within 500' of the project site on July 30, 2025 (Exhibit C).

- The same notice was posted to the City's SEPAs and Public Notices webpage on July 30, 2025 (Exhibit D).

- The same notice was posted in the Community Development Department lobby on July 30, 2025.

- A "Notice of Land Use Application and Notice of Public Hearing" sign was posted on the property in two separate locations on July 31, 2025, (Exhibit E).

Staff Notice And Comments: No additional as of the date of this report.

Public Notice And Comments: No additional as of the date of this report.

B. APPLICABLE REGULATIONS

The entire Centralia Municipal Code, including but not limited to the following sections:

1. CMC 20.02.040: Type III Project Permit – Hearing Examiner Decisions.
2. CMC Title 16 Environment
3. CMC 20.40 M-1, Light Industrial District

C. AUTHORITY

CMC 2.18 and CMC 20.02.040 give the Hearing Examiner authority to conduct public hearings and render decisions on land use applications. CMC 20.02.040 Type III Project Permits identifies the Hearing Examiner as the authority having jurisdiction over Shoreline Substantial Development and Shoreline Conditional Use Permit applications.

D. BACKGROUND

A Notice of Application was issued on May 26, 2023. Comments received resulted in the request for additional information and studies prior to proceeding with a SEPA threshold determination. Five additional information requests were made as follows:

1. A hydrological and hydraulic study to further evaluate potential flooding impacts. Received September 2023 (Exhibit F).

2. Revisions the traffic impact analysis to expand evaluated intersections and evaluate WSDOTs Statewide Transportation Improvement Program (STIP). Received September 2023 (Exhibit G).

3. Drainage path verification to ensure no adverse impact. This item will be a condition of civil plan approval.

4. Additional permitting related to Cultural Resource Studies. This item will be a condition of civil plan approval.

5. Groundwater monitoring through one wet season is required. Received in May 2023 and revised in February 2025 to include drainage around, and lining of, the stormwater ponds to ensure flood storage areas are separated from stormwater system areas (Exhibit H).

A SEPA MDNS with seven mitigating conditions was issued on May 30, 2024. This MDNS was lacking in the list of project permits as it excluded the need for a Shoreline Conditional Use Permit.

An Administrative Appeal of this SEPA decision was received on July 11, 2024, from Mr. Jeremy Ashbeck, 812 W Reynolds Avenue. Following discussions with the applicant's legal consultant, the Washington State Department of Ecology, and the City Attorney, it was decided that the MDNS should be republished with the correct project permits, and the appeal stayed until a decision is made on the underlying shoreline permit applications. The appellant was contacted via email on September 9, 2023, and requested to visit the office for an explanation of the path forward and procedural issues. He requested that all correspondence be via email in writing. Emails were sent on October 1, 2024, and December 9, 2024. The appellant was also cc:d on all documents pertaining to the 2nd MDNS issuance and the Notice of Public Hearing documents. To date, no response has been received. In researching the Lewis County Auditor's Online Records, the appellant no longer owns the property at 812 W Reynolds Avenue, as of October 14, 2024.

E. ANALYSIS

SEPA

For complete historical information on the 1st SEPA decision, see the SEPA Decision Folder under separate cover. The 2nd MDNS SEPA decision process-initiated comments from the Quinault Indian Nation, Washington State Department of Ecology, Washington State Department of Fish and Wildlife, and four citizens (Exhibit K). See section F of this staff report for details.

The 1st MDNS was issued with seven mitigating conditions as follows:

1. Work may not commence until all required local, state, and federal permits and approvals are obtained.

2. Pursuant to CMC 16.04.100.F and CMC 16.04.160.B, mitigation fees will be required for adverse impacts related to traffic, schools, floodplain, etc. that cannot be mitigated by development plan alteration(s). The exact amount of the fee(s) will be determined at the time of civil and construction plan review and must be satisfied prior to the issuance of any permits.

3. Future development is subject to additional archaeological study. All recommendations of the cultural resources study conducted by Archaeological Investigations Northwest, Inc., dated April 7, 2023, must be followed. Future development must be monitored by a professional archaeologist. Upon issuance of all required permits and commencing work, if archaeological or historic materials are encountered during project activity, work in the immediate area (initially allowing a 100' buffer depending on circumstances) must stop, conditions and recommendations of the Cultural Resources Report must be followed, and the following actions taken:

a. Implement reasonable measures to protect the discovery site, including but not limited to covering, stabilization, etc.
b. Take reasonable steps to ensure the confidentiality of the discovery site.
c. Take reasonable steps to restrict access to the discovery site.
d. The proponent shall notify the concerned Tribes and all appropriate local, state and federal agencies, including the Department of Archaeology and Historic Preservation (DAHP) and the City of Centralia Community Development. The agencies and Tribe(s) will discuss possible measures to remove or avoid cultural material and will reach an agreement with the project proponent regarding actions to be taken.

4. Future development must maintain the natural drainage path north-south from north of W Reynolds Avenue, through the existing culvert, and south to the Chehalis River. Civil plans showing compliance must be submitted and approved prior to commencing work.

5. Prior to commencing fill/grade work, standard operating procedures must be submitted identifying training methods and qualified personnel to address potential fish stranding issues after a flood event. All discharge pipes must be screened to prevent fish passage to the greatest extent feasible.

6. Future noise mitigation may be required once operations commence to ensure the development does not exceed the allowable WAC 173-60 ENDA standards.

7. Prior to final inspection or occupancy of the structure, a legally binding contract/deed restriction that maintains flood storage and mitigation areas in perpetuity must be recorded at the Lewis County Auditor's Office in compliance with the Shoreline Master Program section 6.12.b(5)

Conditions one, two, and three are standard conditions that print on nearly every project-specific SEPA issued by the City, with minor modifications specific to each project.

Condition four is meant to protect and maintain a natural drainage path that currently flows from across W Reynolds Avenue to the ditch on the south side of W Reynolds in front of Tax Parcels 021044-003-000 and 021044-002-000 (currently operated by Leal's Landscaping). The drainage ditch channels runoff onto the proposed development site and continues to the Skookumchuck River. The natural drainage path may be piped, ditched, etc., and compliance must be shown through the civil plan process prior to any permits or approvals being issued.

Condition five was developed while working with Karen Adams, WDFW, during the first SEPA publication process. This condition will ensure that properly trained staff are on-site during and after a flood event. The result of that collaboration on condition development is contained in attached Exhibit I and states, "this proposal meets our criteria for responsible development. That these conditions be clearly documented and enforced….." Additional comments were received at a later date from Daron Williams, WDFW, requesting verification that the berms and stormwater ponds can withstand flood waters and will not "blow out". That verification will be obtained through the civil plan process.

Condition six ensures compliance with our noise ordinance. If problems arise in the future, they can be addressed through the City's existing code enforcement process.

Condition seven is a compliance requirement contained in the adopted Centralia Shoreline Master Program (SMP). This condition will ensure as ownership changes, all parties are aware of the maintenance and monitoring requirements. The SMP requires a qualified professional to inspect and monitor the flood and habitat mitigation areas for 10 years. Reports must be submitted in years 1, 2, 3, 5, 7, and 10. If deficiencies are reported, they must be corrected immediately, and reporting requirements will be extended and/or occur more frequently to ensure proper maintenance and functioning of those areas.

The 2nd MDNS was issued with the same seven conditions and the addition of a Shoreline Conditional Use Permit in the project permit list.

The proposal is in compliance with CMC 16.04 Environmental Policy and 16.21 Floodplain Management.

<u>SHORELINE PERMIT</u>

CMC 20.02.040 identifies shoreline substantial development and conditional use permits as under the authority of the Hearing Examiner.

CMC 16.08 Centralia Shoreline Master Program, section 2.3.D grants final authority for shoreline conditions use permit to the Department of Ecology.

A Conditional Use Permit may be granted if the following criteria are met:

1. The proposal is consistent with the policies of RCW 90.58.020 and the master program.
   Staff comment: RCW 90.58.020 requires the preservation of the natural character of the shoreline, long-term benefits, protection of the resources and ecology of the shoreline, increase public access to publicly owned areas, increase recreational opportunities in publicly owned areas, and any other element deemed necessary. The natural character and function of the shoreline will be enhanced, monitored, and maintained on a long-term basis, and a deed restriction will be filed, thus ensuring long-term benefit and resource protections. The parcel is not publicly owned; therefore, public access and public recreational opportunities are not required.

2. The proposal will not interfere with the normal public use of public shoreline.
   Staff comment: public access is not required.

3. The proposal and design are compatible with authorized uses, the comprehensive plan and the SMP.
   The SMP identifies the uses located within the shoreline jurisdiction as Permitted, and the comprehensive plan identifies this property as Light Industrial.

4. The proposed use will cause no significant adverse effect to the shoreline environment.
   Staff comment: environmental documents on file show that no significant adverse impact can be achieved.

5. The public interest suffers no substantial detrimental effect.

   Staff comment: with an end result of no adverse impact, public interest will suffer no substantial detrimental effect.

The proposal is in compliance with CMC 16.08 City of Centralia Shoreline Master Program.

See Section F below for further details.

<u>TRAFFIC</u>

The traffic impact analysis submitted by Heath & Associates, revised on September 25, 2023, shows compliance with WSDOT and City of Centralia standards with a mitigating condition to construct all necessary road and frontage improvements, or pay a prorated share to the City for completion, to ensure impacted intersections do not fail.

The proposal is in compliance with CMC 18.10 Design and Development Guidelines.

ZONING

The property is identified as M-1, Light Industrial, per the adopted Zoning Map of CMC 20.09 Zoning Districts and Boundaries, dated December 12, 2023. The property is identified as Light Industrial, per the adopted City of Centralia Comprehensive Land Use Map, dated August 28, 2018.

CMC 20.11.030 identifies distributive business establishments, such as wholesaling or warehousing, as P = Permitted, in the M-1 zone.

The proposal is in compliance with CMC Title 20 Zoning.

F. ADDRESSING PUBLIC AND OTHER AGENCY COMMENTS:

Comments were received from five public agencies and eleven private citizens during the initial SEPA review process. Because that process neglected to indicate a Shoreline Conditional Use Permit was required, staff republished the SEPA with a new comment and appeal period.

Comments were received from the Washington State Department of Ecology, Quinault Indian Nation, Washington State Department of Fish and Wildlife, Matthew Mullin, Douglas Jensen, Adam Tavares III, and John and Amy Wasson during the 2nd SEPA MDNS process.

Those comments are addressed as follows:

1. Department of Ecology
    a. HAZARDOUS WASTE & TOXICS REDUCTION. A demolition permit is required, and all conditions will be verified prior to issuance of that permit.
    b. SOLID WASTE MANAGEMENT. Certified clean fill will be required as part of the civil plan process.
    c. TOXINS CLEANUP. Inadvertent discovery of contaminated soil language will be added to all future permits. Testing will be required as part of the civil plan process.

2. Quinault Indian Nation
    a. SEPA EIS. Staff have determined the project is, or can be, engineered correctly, with mitigating conditions, to ensure no adverse impact; therefore, an EIS is not required. Comments were considered, but no scientific data or studies were submitted to dispute those studies conducted by the applicant. The best available data shows that compliance with current regulations, no net loss of ecological function, and no significant adverse impact to the environment can be achieved.

Page 13 of the Shoreline No Net Loss Analysis and Habitat Management Plan, found in Exhibit I of the 1st SEPA Decision, discusses the options for project modification that would not impact floodplain or shoreline areas. Because the entire site is located within the floodplain, there are no project modifications that would result in all development being outside the floodplain. The "avoidance" option is not applicable to this site unless the site remains undeveloped and unused. The site is currently used for material storage by the adjacent landscaping business. Those activities include stockpiling of soil, bark, etc. Those uses can also be considered an impact. The mitigation sequence is discussed in further detail on pages 24-26.

Contrary to the statement on page 26 that WSDOE permitting is not required; a shoreline conditional use permit is required for this proposal. That permit will be processed locally, then submitted to the Department of Ecology for final action. To ensure habitat restoration and function, the 5-year monitoring period referenced on page 32 of this report will be extended to a 10-year period with reports in years 1, 2, 3, 5, 7, and 10. If deficiencies are noted, the reporting period may be extended and/or required more frequently.

b. FISH HABITAT. Fish stranding issues will be addressed by trained onsite staff, and WDFW has approved this concept. Documentation of training, SOPs, policies, etc., will be required prior to a final inspection and/or occupancy. Per Table 7-3, on page 97 of the Centralia Shoreline Master Program, industrial development must be located outside of the 175-foot buffer zone to the ordinary high water mark. The southern parking lot, which is the nearest point of development, is proposed at 200 feet and outside of the shoreline jurisdiction associated with the Skookumchuck River. The development to the east associated with Coffee Creek is proposed at 200-207-feet from the ordinary high water mark and also located outside of the shoreline jurisdiction.

Per Table 6-1, on page 49 of the same document, compensatory flood storage of greater than 500 cubic yards requires a Shoreline Conditional Use Permit (SCUP) in the Urban Conservancy environment designation. Per the same table, page 50, Restoration and Enhancement work requires a Shoreline Substantial Development Permit (SSDP). The SSDP is issued at the local level. The SCUP is issued at the State level by the Department of Ecology. None of the proposed activities within the shoreline jurisdiction is listed as X = Prohibited.

Structural development will be located outside the shoreline jurisdiction. Development within the shoreline jurisdiction consists of compensatory flood storage and restoration and enhancement of buffer zones, as allowed via the Shoreline Conditional Use Permit process. See sheet 2, page 37, of the Shoreline No Net Loss Analysis and Habitat Management Plan.

c. FLOODPLAIN ISSUES and ENVIRONMENTAL CONCERNS. The shoreline jurisdiction boundary was modified to meet the City's Shoreline Master Program upon annexation of this property in 2023. The online maps have not been updated and still show the Lewis County jurisdictional boundaries. The area within 200 feet of the ordinary high-water mark of the Skookumchuck River and Coffee Creek are within the Urban Conservancy shoreline environment designation. All other areas of the property are not within the shoreline jurisdiction.

This area is located in Reach CE-02 of the Centralia Shoreline Master Program (CSMP) Appendix B. Per the adopted Shoreline Inventory and Characterization Report, page 158, Coffee Creek does not meet the definition of shorelines of the state but is subject to local shoreline regulations.

Per Table 4.60, page 160, of the same document, Reach CE-02 is considered to have 1% total area that may be subject to erosion hazard, and no areas of channel migration were mapped.

Per the same document, page 173, the hydrologic, habitat, etc. scores for this reach are relatively low, indicating an impaired environmental function.
The above characteristics and studies provided by the applicant indicate that the potential hazard of channel migration and structural stabilization in the future is low. No scientific reports and/or data were provided to dispute this conclusion. If hazardous materials storage is proposed in the future, a new review and approval will be required. That type of use is not proposed; therefore, compliance with hazardous storage is not required at this time.

The No Net Loss Report, Hydrological and Hydraulic Study, Floodplain Memo, Revised Stormwater Drainage Report, and Flood Stage Exhibits all address the flood storage and shoreline environment issues. See Exhibit J for the revised stormwater drainage report and flood stage exhibits. Per the flood volume storage memo on pages 1-8 of Exhibit J, the path of flood waters as they currently enter the undeveloped site will be maintained to the north off Reynolds Avenue, the west via the rail line bridge, the east via Coffee Creek, and the south via the Skookumchuck River. Upon entering the site, the waters will be directed to and contained within the parking lot areas. The proposed storage volume after development exceeds the volumes currently stored on the undeveloped property. The storage volumes do not include areas to be utilized for stormwater treatment.

This concept of compensatory excavation for flood storage was previously proposed at the current UNFI warehouse distribution site located at 4002 Galvin Road, formerly known as the OPUS and/or Benaroya site. Similar to this project, the OPUS project proposed excavating massive volumes of material adjacent to

the Chehalis River and compacting that material at the building site of a 1 million square foot plus distribution facility, to facilitate compensatory excavation for flood storage. The adjacent neighborhood on Mayberry Road had experienced flooding in the past. The proposed flood storage work was essentially complete at the time of the 2007 flood event. The Mayberry Road neighborhood experienced far less damage during that event, and to our knowledge, has not experienced any flood-related damage since. Project proponents are not required to "fix" current flooding problems; however, they cannot exacerbate them in the process of development. Development must result in no significant adverse impact and need not result in an improvement. Historical development, as well as the data provided for this current project, shows that mitigation can not only be effective in maintaining current conditions but can also result in a higher level of protection and a higher functioning ecological system.

3. Washington State Department of Fish and Wildlife.
    a. SHORELINE BUFFER. Only activities allowed by the CSMP will be conducted in the shoreline buffer zone and are subject to conditions and approval by the Department of Ecology.

    b. STORMWATER POND LOCATION. Compliance will be achieved via the civil plan approval process.

    c. BUFFER RESTORATION. Compliance will be achieved via the SCUP and SSDP processes.

    d. FLOOD CONTROL PONDS. Compliance will be achieved via the SCUP and SSDP processes and SEPA condition #7. Future protections will be documented in perpetuity by the recording of the deed restriction referenced SEPA condition #7.

    e. FLOOD RETENTION AND FISH STRANDING. Compliance will be achieved via the civil plan approval process, and fish stranding will be addressed as previously approved by WDFW staff.

4. Matthew Mullin.
    a. Flooplain and other environmental concerns are noted above.

    b. Future noise non-compliance will be addressed via SEPA condition #6 and the City's existing code enforcement process.

    c. The revised Traffic Impact Analysis has been reviewed by local and state agencies. The lack of comment implies approval. Compliance with local and state regulations will be ensured via the civil plan process.

5. Douglas Jensen.
    a. As stated, projects may only be denied when reasonably achievable mitigating conditions cannot provide a likelihood of no significant adverse impact. The proponent has provided several studies, reports, etc. that indicate mitigating measures can be achieved and will result in the likelihood of no significant adverse impact. Without scientific data to dispute those reports, the city is obligated to proceed with review. Flood, shoreline and traffic impacts are addressed above.

6. Adam Tavares III.
    a. This letter is essentially the same as the Matthew Mullin letter and comments as stated above are applicable.

7. John and Amy Wasson.
    a. Flood, noise and traffic have been addressed in above comments.

    b. The property is located within the critical aquifer recharge area, with the majority being designated as category II. Per CMC 16.18.040.H(2), development in category II areas may be allowed subject to critical areas permitting and connection to city water and sanitary sewer. Critical areas permitting are the SSDP and SCUP processes. All city utility services will be extended to the proposed development via the civil plan review process. City water and sanitary sewer are currently not available to the Wasson's property; thus, development is not possible at their location, at this time.

G. FINDINGS OF FACT

1. The site is zoned M-1, Light Industrial District.
2. The property is located in the 100-year floodplain.
3. Portions of the property are located within the Urban Conservancy Shoreline Environmental Designation.
4. Permit reviews and approvals are required by local and state agencies.
5. The project must comply with all applicable local, state, and federal regulations, including, but not limited to, Centralia Municipal Codes, including Title 16 Environment, Title 18 Building Regulations, Title 20 Zoning, and the City of Centralia Design and Development Guidelines.

H. APPLICABLE REGULATIONS / CONCLUSIONS OF LAW

1. The proposed project conforms to the vision of the Centralia Comprehensive Plan.
2. The proposed project meets the Zoning Ordinance, including the following:

a. CMC 20.09 Zoning District and Boundaries identifies the property as being located in the M-1, Light Industrial District.
b. CMC 20.02.040: Type III Project Permit. SSDP and SCUP permits are identified as Hearing Examiner Decisions. Notices were filed in compliance with CMC 20.02 Project Permitting, WAC 197-11 SEPA Rules, and RCW 90.58 Shoreline Management Act of 1971.
c. CMC 20.11.030.B: Table of Uses. Identifies distributive business establishments, such as wholesaling or warehousing, as P = Permitted, in the M-1 zone.
d. The project is in compliance with CMC 16.21 Floodplain Management, with mitigating conditions.
e. The project is in compliance with CMC 16.08 Centralia Shoreline Master Program, with mitigating conditions, and subject to approval by the Washington State Department of Ecology.
f. The project is in compliance with CMC 20.40 M-1, Light Industrial District.
g. The project is in compliance with CMC 20.50 Landscaping, Fencing and Solid Waste Receptacles, with mitigation conditions.
h. The project is in compliance with CMC 20.72 Off-Street Parking and Loading.

3. Permitting and action are required by the Washington State Department of Ecology prior to the issuance of any other permits and approvals.

I. STAFF RECOMMENDATION

Staff recommend approval of the Shoreline Conditional Use Permit and Shoreline Substantial Development Permit, subject to the seven SEPA conditions, Findings of Fact and Conclusions of Law, as identified above, and Department of Ecology review and action.

Exhibits:

A: Affidavit of Publication
B: Staff Agency Interested Parties email list
C: 500' Mailing List
D: City Webpage Posting
E: Property Sign Posting
F: Hydrological & Hydraulics Study
G: Traffic Impact Analysis
H: Groundwater Monitoring Study
I: WDFW Email
J: Revised Stormwater Drainage Report and Flood Stage Exhibits
K: SEPA Comment Letters

Exhibit A

AFFIDAVIT OF PUBLICATION STATE OF WASHINGTON COUNTY OF LEWIS

Tina Anderson, and/or Ronda Pogorelc and/or Cheyenne Denman says that she is the legal clerk of

The Chronicle

a semi-weekly newspaper, which has been established, published in the English language, and circulated continuously as a semi-weekly newspaper in the City of Centralia, and in Lewis County, Washington, general circulation in Lewis County for more than six (6) months prior to the date of the first publication of the notice hereto attached, and that the said Chronicle was on the 7th day of July 1941, approved as a legal newspaper by the Superior Court of said Lewis County. And that the attached is a true copy and was published in regular issues (and not in supplement form) of said newspaper as LEGAL # 134535
RE:Notice of Public Hearing

once each day for a period of 1 day

commencing on **08/02/2025** and ending on **08/02/2025**

and both regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of **$ 287.50**

Cheyenne Denman

Subscribed and sworn to before me 08/02/2025

Ronda Lee Pogorelc

Notary Public in and for the State of Washington, residing at Chehalis

RONDA LEE POGORELC NOTARY PUBLIC STATE OF WASHINGTON Commission Expires February 23, 2027 No. 176878

134535 Notice of Public Hearing

NOTICE OF PUBLIC HEARING BEFORE THE CENTRALIA HEARING EXAMINER

Purpose: The Hearing Examiner will take public testimony regarding shoreline conditional use and shoreline substantial development permit applications for compensatory excavation and habitat restoration work associated with construction of two warehouse structures, totaling 778,632 square feet. The site is located at 1406 W Reynolds Avenue, encompasses 13 parcels and approximately 56 acres.

Date of Notice: 7/30/2025

Case #: 20230337

Applicant: Darren Peugh, Panatttoni Development Co.

Permits Required: Shoreline Conditional Use, Shoreline Substantial Development, Civil Plans, Building, Floodplain. A previous SEPA MDNS with seven conditions was issued on 12/31/2024, file #20230242.

Date, Time and Place: August 27, 2025, at 3:00 PM, City Council Hearing Chambers, 118 W Maple Street, 1st Floor, Centralia, WA 98531

Staff Contact: To view the proposed development documents, make inquiries, or to request copies of documents, please contact: Hillary Hoke, Assistant Director, 118 W Maple Street, Centralia, WA 98531, 360-330-7662, or email hhoke@cityofcentralia.com

Citizens with disabilities requiring special accommodation at the hearing should call 360-330-7662, by 10AM, at least 3 days in advance of the hearing. Anyone interested may appear and be heard at the hearing, or submit comments in writing to the Staff Contact. Please refer to the Case # in all correspondence. The Hearing Examiner will render a decision within 10-days after the hearing date. The decision will be mailed to all those who submit comments, testify at the hearing or request the decision in writing. Any aggrieved party of record may file an appeal with Lewis County Superior Court or the Washington State Shoreline Hearings Board within 21-days of the Notice of Decision date. Written comments will be accepted until 5:00 PM on August 26, 2025.

Published: The Chronicle
August 2, 2025

Exhibit B

Shoreline Permit Routing Form

Date: July 31, 2025

File # SMP 2023 0337

Distribution List:

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Laura O'Keefe
l.okeefe85@gmail.com

Darren Peugh, Panattoni
DPeugh@panattoni.com

Please send all comments, conditions or requests for additional information to:

Hillary Hoke, Assistant Director
City of Centralia Community Development Dept.
P.O. Box 609
Centralia, WA 98531
Phone: 360-330-7662
Email: hhoke@cityofcentralia.com

Comments are due by August 26, 2025, at 5:00 PM, to the City of Centralia.

Exhibit C

OWNER	MAILADD	MAILCITY	STATE	ZIP_POSTAL
TAVARES, ADAM III & TAVARES, ADAM JR	1115 DICKEY RD	CENTRALIA	WA	98531-3235
WRL, LLC	709 N 10TH AVE	WALLA WALLA	WA	99362
PUGET SOUND & PACIFIC RAILROAD	501 N 2ND ST	ELMA	WA	98541
PARKE, SUSAN ANN	919 W 6TH ST	CENTRALIA	WA	98531-3233
SILVA, VICTOR H & STEVEN	11612 PAR CT SW	OLYMPIA	WA	98512
CURRENT RESIDENT	1114 ECKERSON RD	CENTRALIA	WA	98531
CURRENT RESIDENT	1414 SUNSET WAY	CENTRALIA	WA	98531
CURRENT RESIDENT	1516 SUNSET WAY	CENTRALIA	WA	98531
BROWN, RONALD H	1310 SUNSET WAY	CENTRALIA	WA	98531-2138
KRASIK, MICHAEL	1849 N 53RD	SEATTLE	WA	98103
VALENCIA-VALENCIA, ALEJANDRO ET AL	PO BOX 664	CHEHALIS	WA	98532
COX, TAWNY LYNN, ET AL	1601 SUNSET WAY	CENTRALIA	WA	98531
MCGANNON, EDWARD	1603 SUNSET WAY	CENTRALIA	WA	98531-2143
MK & S INVESTMENTS LLC	7022 E MERCER WAY	MERCER ISLAND	WA	98040
STATE OF WASHINGTON	PO BOX 1709	VANCOUVER	WA	98668
WSDOT	11018 NE 51ST CIR	VANCOUVER	WA	98682-6686
WIEGARD, CHARLES	202 E CHESTNUT ST	CENTRALIA	WA	98531
JOE G PROPERTIES LLC	1010 W REYNOLDS AVE	CENTRALIA	WA	98531-3330
JOE G PROPERTIES LLC	1622 LUM RD	CENTRALIA	WA	98531-3330
MORRIS, WILLIAM KODE & DAYNA	868 INDEPENDENCE	ROCHESTER	WA	98579
SMITH, ROBERT IRVIN JR & LINDSEY CAROL	1402 W REYNOLDS AVE	CENTRALIA	WA	98531-3338
B WAGNER GROUP LLC	922 E TIMBERWOOD CIR	SPOKANE	WA	99208
CURRENT RESIDENT	1406 W REYNOLDS AVE	CENTRALIA	WA	98531
MAYS, KIMBERLY	1505 REYNOLDS AVE	CENTRALIA	WA	98531
BRYNESTAD BUILDERS 5 LLC	806 BERG CR NW	GIG HARBOR	WA	98335
CURRENT RESIDENT	1103 W REYNOLDS AVE	CENTRALIA	WA	98531
LEWIS COUNTY	360 NW NORTH ST	CHEHALIS	WA	98532-1900
HOFMEISTER, COREA	5437 LEMON RD NE	OLYMPIA	WA	98506
REDDEN, DAVID L & STEPHANIE	1619 W REYNOLDS AVE	CENTRALIA	WA	98531-3341

LAFARGE NORTH AMERICA INC.	7455 132 ST STE 200	SURREY	BC	V3W 1J8
RELIABLE ENTERPRISES INC	PO BOX 870	CENTRALIA	WA	98531-0870
WOODS, ALAN & BEVERLY	919 W REYNOLDS RD	CENTRALIA	WA	98531
SHARPE, RONALD	1500 W ROANOKE ST	CENTRALIA	WA	98531-2041
BRUMFIELD, WILLIAM T JR & VICKY L	117 W MAGNOLIA ST	CENTRALIA	WA	98531
LEON, RICHARD WILLIAM & LISA A	580 W RIVER RD	CENTRALIA	WA	98531
J&S ENTERPRISES 1 LLC	3305 173RD LN SW	TENINO	WA	98589
CURRENT RESIDENT	1010 W REYNOLDS AVE	CENTRALIA	WA	98531
TURNER REVOCABLE LIVING TRUST DTD 01-14-2022, ST	598 W RIVER RD	CENTRALIA	WA	98531
PORTER, CARL D & SARAH L	1621 J ST	CENTRALIA	WA	98531
MOIR, GREGORY	226 MACOMBER RD	CHEHALIS	WA	98532-8617
NELSON, KIMBERLY & JASON	812 W REYNOLDS AVE	CENTRALIA	WA	98531-3326
WASSON, JOHN & AMY	590 RIVER RD	CENTRALIA	WA	98531
CURRENT RESIDENT	1011 W REYNOLDS AVE	CENTRALIA	WA	98531
CURRENT RESIDENT	1520 LUM RD	CENTRALIA	WA	98531
CURRENT RESIDENT	1720 INDUSTRIAL DR	CENTRALIA	WA	98531
CURRENT RESIDENT	1311 W REYNOLDS AVE	CENTRALIA	WA	98531
CURRENT RESIDENT	1403 W ROANOKE ST	CENTRALIA	WA	98531
CURRENT RESIDENT	1102 W REYNOLDS AVE	CENTRALIA	WA	98531

Exhibit D

SEPAS and Public Notices

Current Information

To view specific information on current public notices and applications please click on the links below. Please contact the Centralia Planning Department at 360-330-7662 if you have any questions.

- Centralia Climate Resilience Plan (Draft May 26, 2025))
- DRAFT Centralia Comprehensive Plan May 21, 2025
- DRAFT APPENDIX May 21, 2025
- DRAFT Transportation Plan

Skookumchuck Commerce Center - Proposed Warehouse Complex W Reynolds Avenue

- Notice of Public Hearing - Skookumchuck Commerce Center Shoreine Permits - 1406 W Reynolds
- Skookumchuck Commerce Center Site Plan
- Skookumchuck Commerce Center Hydrology-Hydraulic Study
- Skookumchuck Commerce Center Floodplain Memo
- Skookumchuck Commerce Center Flood Stage Exhibits
- Skookumchuck Commerce Center Shoreline No Net Loss Analysis
- Skookumchuck Commerce Center Preliminary Storm Drainage Report
- Skookumchuck Commerce Center Traffic Impact Analysis
- Skookumchuck Commerce Center Geotechnical Report

SEPAS and Public Notices	Pages	1 day ago
Hoke, Hillary		*Published*

Exhibit E

NOTICE OF LAND USE APPLICATION

FILE NUMBER: 2023 0337

PERMITS REQUIRED: Shoreline, Building, Civils, SEPA State

PROJECT DESCRIPTION: Construct 2 warehouses, totaling 778,632 sq.ft. with all associated infrastructure and mitigation for flood and habitat.

PUBLIC COMMENT PERIOD ENDS: 8-26-25

Complete Application Can Be Reviewed At

Centralia Dept. Of Community Development

118 Maple Street

Centralia, Wa 98531

(360) 330-7662

CENTRALIA
WASHINGTON

PUBLIC HEARING:

August 27, 2025

3:00PM

ARNING THE REMOVAL, MUTILATION, DESTRUCTION OR CONCEALMENT OF THIS NOTICE IS A MISDEMEANOR PUNISHABLE BY FINE

NOTICE OF LAND USE APPLICATION

Exhibit F

Floodplain Development Hydraulics and Hydrology Report

PREPARED FOR:

Panattoni Development Company
1821 Dock Street, Suite 100
Tacoma, WA 98402

PROJECT:

Skookumchuck Commerce Center
Centralia, Washington
AHBL Project No. 2210649.10

PREPARED BY:

Tyler Watkins, PE
Senior Project Engineer

REVIEWED BY:

Bart Brynestad, PE
Associate Principal

DATE

September 2023

Floodplain Development Hydraulics and Hydrology Report

PREPARED FOR:

Panattoni Development Company
1821 Dock Street, Suite 100
Tacoma, WA 98402

PROJECT:

Skookumchuck Commerce Center
Centralia, Washington
AHBL Project No. 2210649.10

PREPARED BY:

Tyler Watkins, PE
Senior Project Engineer

REVIEWED BY:

Bart Brynestad, PE
Associate Principal

DATE

September 2023

09/26/2023

I hereby state that this Floodplain Development Hydraulics and Hydrology Report for the Skookumchuck Commerce Center project has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that City of Centralia does not and will not assume liability for the sufficiency, suitability, or performance of drainage

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3.2.1 January 7, 2022, Flood Event 2

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4.1 Proposed Flood Volumes 3

4.2 Proposed Floodplain Areas and Flow Path Hydraulics 4

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Appendices

Appendix A

Exhibits

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A-2 ..... City Zero Rise Floodplain Overlay Map
A-3 ..... County GIS Floodplain Map with NAVD88 Base Flood Elevations
A-4 ..... Proposed Site Plan
A-5 ..... Existing Flood Volume
A-6 ..... Proposed Flood Volume
A-7 ..... Flood Photos
A-8 ..... Skookumchuck River Flood Profile

Appendix B

Geotechnical Report

1.0 Project Overview

This memo accompanies the Floodplain Development Permit for the Skookumchuck Commerce Center project and explains how the proposed project complies with the City of Centralia floodplain development requirements.

The Skookumchuck Commerce Center project is located at West Reynolds Avenue, Centralia, Washington (Parcel Nos. 021041000000, 021037000000, 021059000000, 021039000000, 021060000000, 021037000000, 021059000000, 021045000000, 021044002000, 021044003000, 021044004000, 021043002000, 021043003000, 021043001000, and 021041001000). The project parcels are approximately 56.77 acres.

1.1 Proposed Project Description

This project proposes two buildings, one 483,276-square foot building and a second 295,356-square foot building, with associated parking and drive aisles. The project will be accessed from West Reynolds Avenue. Other site improvements will include stormwater management facilities, water, sewer, and dry utilities.

2.0 Summary of Requirements

Centralia Municipal Code (CMC) Section 16.21 contains the requirements for development within the floodplain.

Development within this area of the floodplain is allowed if in compliance with the General Standards of CMC 16.21.170. The General Standards cover anchoring, construction materials and methods, utilities, review of building permits, and compensatory mitigation for fill within the floodplain.

For non-commercial structures, the code requires that the building be elevated to at least 1 foot above the Base Flood Elevation (BFE).

For fill within the floodplain, the code requires that all floodplain fill be mitigated with compensatory storage at a one-to-one ratio.

3.0 Existing Site Conditions

The project is located directly adjacent to the Skookumchuck River and Coffee Creek. The site is currently mapped as Zones AE and X (shaded and unshaded), per the effective FEMA Map 5301020043C dated July 17, 2006. Portions of the floodway are also within the parcel boundary, but those floodways are located outside the limits of the proposed development. The project is not located within any of the City's Zero Rise Floodplain Overlay areas.

The BFEs for the site are shown in the FEMA map. The FEMA map uses the NGVD29 datum for elevations. Lewis County has converted these to the NAVD 88 Datum. BFEs on NAVD 88 are available on the Lewis County GIS website. This project and all the below elevations will be on the NAVD88 datum for consistency. The conversion from NGVD29 to NAVD88 is approximately +3.42 feet at the site location.

Because of the size of the site, the BFE varies across the property. The BFE for the property ranges from approximately 184.0 to 186.0. To determine the existing flood volume within the site, a 3D CAD model was used to calculate the flood volume below the varied BFE across the site. The existing site contains 171,170 cubic yards (CY) of flood storage within the project boundary.

3.1 Soils Reports

The entire site is mapped by the Natural Resources Conservation Service (NRCS) as "Maytown-Chehalis-Rennie." This soil is a Hydrologic Soil Group C soil. Erosion potential is low and infiltration is low for this soil type.

A Geotechnical Report prepared by Terra Associates, Inc., dated September 7, 2023, identifies onsite soils as medium dense, dry to moist, alluvial silt, fine sandy silt, and silty fine sand overlaying glacial outwash deposits comprised predominantly of medium dense to very dense, silty gravel with sand to silty sand with gravel, and sand and gravel with varying proportions of silt. Moderate to heavy groundwater was observed in several test pits located in the northern and southeastern portions of the site. Refer to the Geotechnical Report attached as Appendix B.

3.2 Analysis of Previous Flood Event Hydrology

The closest river gaging site to the project is the Skookumchuck River at Centralia (USGS 12026600) located at the Pearl Street Bridge approximately 0.73 mile upstream from the closest part of the project. NOAA maintains a list of the historic crests for this gage, available below.

Historic Crests:

(1) 191.03 ft on 02/08/1996
(2) 190.86 ft on 01/10/1990
(3) 190.34 ft on 01/08/2009
(4) 190.18 ft on 01/07/2022 (P)
(5) 187.57 ft on 01/06/2015 (P)
(P): Preliminary values subject to further review.

Flood Categories (in feet):

Major Flood Stage:	191
Moderate Flood Stage:	190
Flood Stage:	189
Action Stage:	187

3.2.1 January 7, 2022, Flood Event

The most recent flooding event was on January 7, 2022, when the river crested at an elevation of 190.18 at the gage. This was the fourth largest flood event for the history of this gage site. This equates to a Moderate Flood Stage per the NOAA Flood Categories for this gage. Below is the NOAA description of flood impacts at that stage.

At Stage 190:

The Skookumchuck River will cause moderate flooding in Centralia and the surrounding area. The river will flood many roads and residential areas and cover much of the farmland in the Skookumchuck River valley. This stage corresponds roughly to a Phase 2 flood in the Lewis County flood warning system.

While there is no reliable data for high water marks on the project date during the January 7, 2022, flood, there are some aerial photos available that show the extent of the flood. Appendix A-7 shows two undated photos provided by the City. While we cannot confirm that this photo was taken at exactly when the river stage was at a maximum, it is the best available data for the flooding on the project site for that event. Based on the channel visible in the photo that connects Coffee Creek to the rail crossing trestle on the west side of the site, we can approximate the flood elevation to be 182.0 near the middle of the site by comparing the photo to the topographic survey of the project. This is approximately 3 feet below the 100-year BFE of 185.0 near the middle of the site.

The Flood Insurance Study for Lewis County, Washington, contains a flood profile for the Skookumchuck River near the site location. A blue line was drawn on the flood profile to indicate the elevation of the January 7, 2022, flood event (182.00 feet in NAVD88 approximated based on aerial photos and topography maps; see above paragraph). The elevation of the January 7, 2022, flood event, which is the fourth largest flood event for the history of this gage site, was measured on the flood profile to be approximately 3.83 feet below the 100-year BFE at the site location. Therefore, it is conservative to use the 100-year BFE to set the finished floors of the proposed buildings. Refer to Appendix A-8 for the Skookumchuck River Flood Profile.

4.0 Proposed Condition

4.1 Proposed Flood Volumes

The project proposes to fill some areas of the floodplain to support the development. The fill is required to establish the finished floor of the buildings at least 1.5 feet above the BFE and to elevate the areas of the site adjacent to the building.

Because the BFE varies across the site, the BFE for each building will be the highest mapped BFE within the building footprint. The BFE for Building A is 185.64 and the BFE for Building B is 185.29. Both buildings will have a finished floor elevation of 187.14. Therefore, both buildings are elevated at least 1.5 feet above the BFE.

To compensate for all areas of fill, the project will provide compensatory storage, as required in CMC 16.21.170.F. All compensatory storage will be provided at an equivalent elevation to the elevations being displaced; all proposed storage will be available at or below the elevation of the existing storage. To determine the amount of proposed flood storage on the site, a 3D CAD model was used to calculate the flood volume below the varied BFE across the site. The proposed condition includes 204,490 CY of compensatory flood storage, which is greater than the required/existing flood volume of 171,170 CY. Therefore, the provided volumes sufficiently compensate for the volumes being displaced by fill.

The project proposes a cut of 126,400 CY below the BFE, a fill of 93,080 CY below the BFE, and a net cut of 33,320 CY below the BFE. Therefore, the project has a net cut below the BFE and will provide more flood storage than the existing condition.

Including the volumes above the BFE, the project proposes a cut of 158,000 CY, a fill of 153,000 CY, and a net cut of 5,000 CY. This is the overall project earthwork volume. These number are different than the volumes below the BFE because any additional cut or fill above the BFE does not count as fill within the floodplain.

4.2 Proposed Floodplain Areas and Flow Path Hydraulics

Areas of the developed site available for flood storage include access aisles, parking areas, storm ponds, and habitat areas near the Skookumchuck River and Coffee Creek.

The proposed storm ponds are designed as stormwater treatment wetlands. They are intended to provide enhanced treatment for all runoff from the site, but they do not provide any detention because the project is exempt from flow control requirements. The stormwater treatment wetlands are designed to remain full of water at all times below the elevation of 176.50. Therefore, the proposed flood volume excludes volume in the stormwater treatment wetlands below this elevation. The storm ponds are all connected with large diameter pipes that can flow in either direction. The storm pond outlet pipe will have an invert elevation placed at 176.50 and will allow flood waters to flow freely in either direction, but will not impact the ability to provide stormwater treatment.

Flood storage is also provided within shoreline and stream buffers at the south and east edges of the project. These areas are being enhanced for habitat restoration and will also provide additional flood storage for the project. These areas are directly connected to the river by a natural low point along the river.

All onsite flood storage areas will be hydraulically connected. As flood water levels rise within the river, the shoreline and buffer restoration areas will be flooded and water will flow through the pipes back into the storm ponds. Once water levels reach the pavement elevations on the site, flood waters will flow over the surface to all flood storage areas on the site.

As flood waters recede, the opposite will occur. Flood water will flow back to the river over the surface until water levels are at the pavement elevations. After this, all flood waters will flow through the ponds, pipes, and shoreline and buffer restoration areas before being discharged back to the river.

The existing rail line to the southwest of the project has a drainage structure/bridge that will allow some surface waters to enter and exit the site. This drainage path will be maintained by the project. The new rail spur adjacent will also include a culvert, so that is an area that can still be used to provide a surface flow route for flood waters.

Also of note, the City owns and maintains a flood control structure on the second rail line southwest of the project. The City has noted that this structure is to remain closed and is consistent with the FEMA flood map. The project does not propose any changes to this structure.

The geotechnical engineer is monitoring groundwater throughout the 2023 winter season. Once their results are available for the full season, we will provide an updated analysis of how the groundwater will be mitigated by the project. Preliminary results show that groundwater elevations will be near the water surface elevation of 176.50 in the stormwater treatment wetlands. Mitigation will include interceptor trenches around the storm ponds to ensure that groundwater does not impact the proposed flood storage volume.

The project does not propose any grading within the floodway, so the hydraulic capacity of the Skookumchuck River will be unaffected by the development. The project proposes to grade the building finished floors and adjacent areas above the BFE to avoid impacts from flood events. However, other areas within the site will be graded much lower than the existing grades, which will provide more flood storage volume at lower elevations than the existing conditions. The project also proposes more flood storage closer to the Skookumchuck River within the habitat restoration areas, which will increase the conveyance capacity of flood waters flowing onto the site during flood events.

Flood Storage:

Existing Flood Volume = 171.170 CY
Proposed Flood Volume = 204.490 CY*

**The proposed flood volume excludes volume in the stormwater treatment wetlands below elevation 176.50.*

Earthwork Quantities:

Overall Earthwork Quantities
Cut = 158.000 CY
Fill = 153.000 CY
Net = 5.000 CY (export)

Earthwork Quantities Below BFE
Cut = 126.400 CY
Fill = 93.080 CY
Net = 33.320 CY (export)

Notes:
The above quantities are estimates only intended for the permitting process. Do not use for bid purposes. The quantities do not have stripping, compaction, or cut and fill adjustment factors applied to them, nor do they account for pavement, sidewalk, or building sections.

4.3 Phasing

The project will be constructed in two main phases, with the first phase broken into two sub-phases. Please refer to the separate phasing memo for a detailed description of the work proposed for each phase.

Phase 1 will be broken into two sub-phases to account for the timing of the possible delayed permitting for the work within the Shoreline Zone and Stream Buffer. The work in those areas will affect the available compensatory storage volumes and pond discharge pipes. Therefore, the initial phase, Phase 1A, will ensure that all compensatory storage requirements are met during each phase of the project.

Phase 1A generally includes the grading for both building pads and stormwater ponds. Phase 1B generally includes Building A, most of the site improvements, and the habitat restoration work within the Shoreline Zone and Stream Buffer.

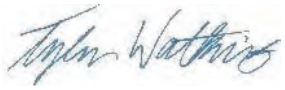
Phase 2 generally includes Building B and the remaining site improvements. The compensatory storage and earthwork volumes described in this memo reflect the final improvements. A separate memo will be written during each phase of the project to demonstrate how the required compensatory storage is provided.

5.0 Conclusion

The proposed Skookumchuck Commerce Center project proposes to construct a 483,276-square foot and a 295,356-square foot warehouse/distribution facility. Site improvements include parking areas for passenger cars and trailers, truck docks, maneuvering areas, concrete aprons, storm drainage improvements, water and sewer connections, and landscaping. Per the above information, this project complies with all applicable flood control regulations of Centralia Municipal Code Section 16.21.

This analysis is based on data and records either supplied to or obtained by AHBL. These documents are referenced within the text of the analysis. The analysis has been prepared using procedures and practices within the standard accepted practices of the industry. We conclude that this project, as proposed, will not create any new problems within the existing downstream drainage system. This project will not noticeably aggravate any existing downstream problems due to either water quality or quantity.

AHBL, Inc.



Tyler Watkins, PE
Senior Project Engineer

TDW/lsk

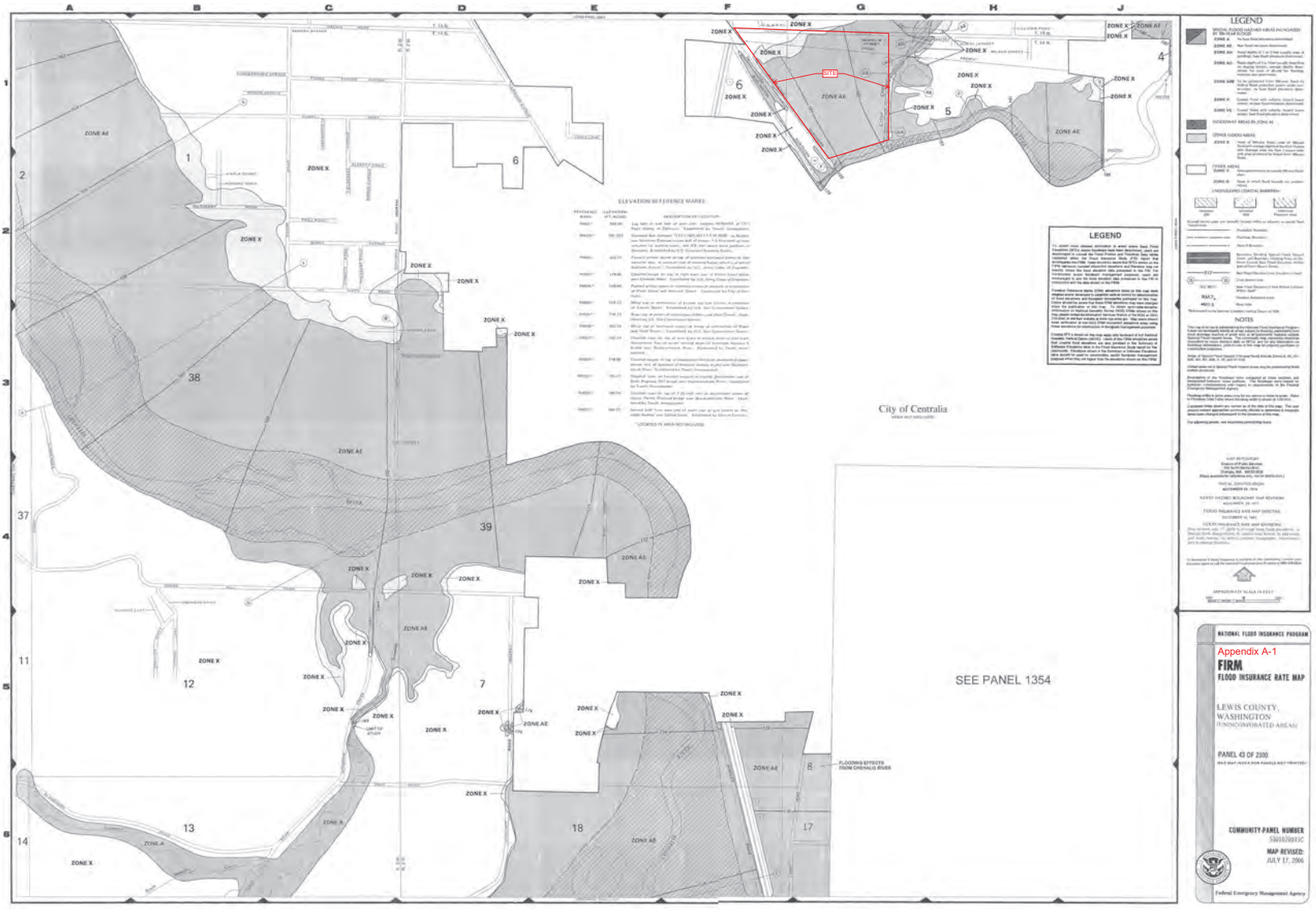
September 2023

Q:\2021\2210649\WORDPROC\Reports\20230926 Rpt (H&H) 2210649.10.docx

Appendix A

Exhibits

A-1 .....FEMA FIRM Map 5301020043C
A-2 .....City Zero Rise Floodplain Overlay Map
A-3 .....County GIS Floodplain Map with NAVD88 Base Flood Elevations
A-4 .....Proposed Site Plan
A-5 .....Existing Flood Volume
A-6 .....Proposed Flood Volume
A-7 .....Flood Photos
A-8 .....Skookumchuck River Flood Profile



Appendix A-1

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

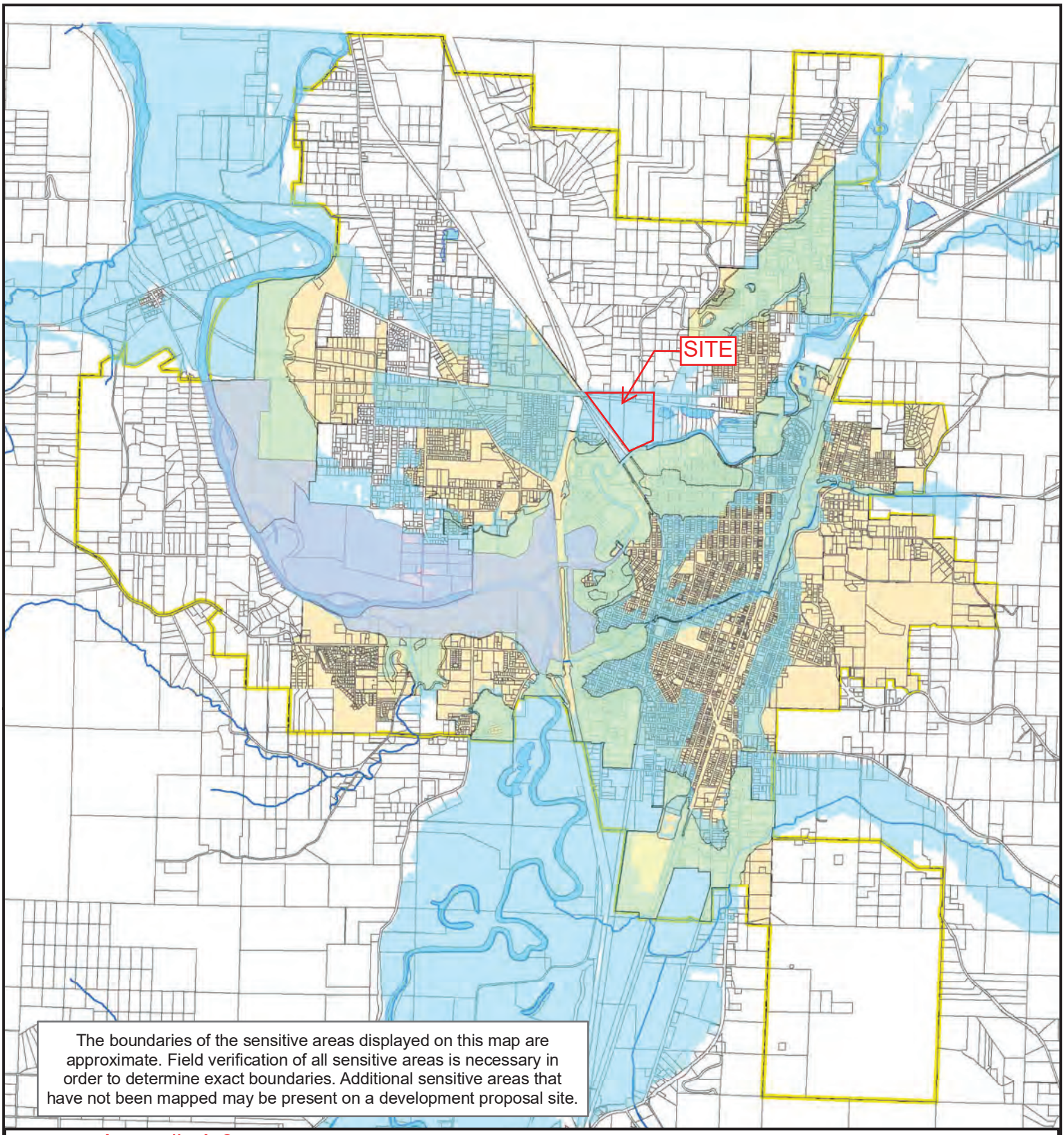
LEWIS COUNTY, WASHINGTON
(UNINCORPORATED AREAS)

PANEL 43 OF 2500

COMMUNITY-PANEL NUMBER
530070043C

MAP REVISED:
JULY 17, 2006

Federal Emergency Management Agency



The boundaries of the sensitive areas displayed on this map are approximate. Field verification of all sensitive areas is necessary in order to determine exact boundaries. Additional sensitive areas that have not been mapped may be present on a development proposal site.

Appendix A-2

City of Centralia Zero Rise Floodplain Overlay Map

N
W E
S

0 0.2 0.4 0.8 1.2
Miles

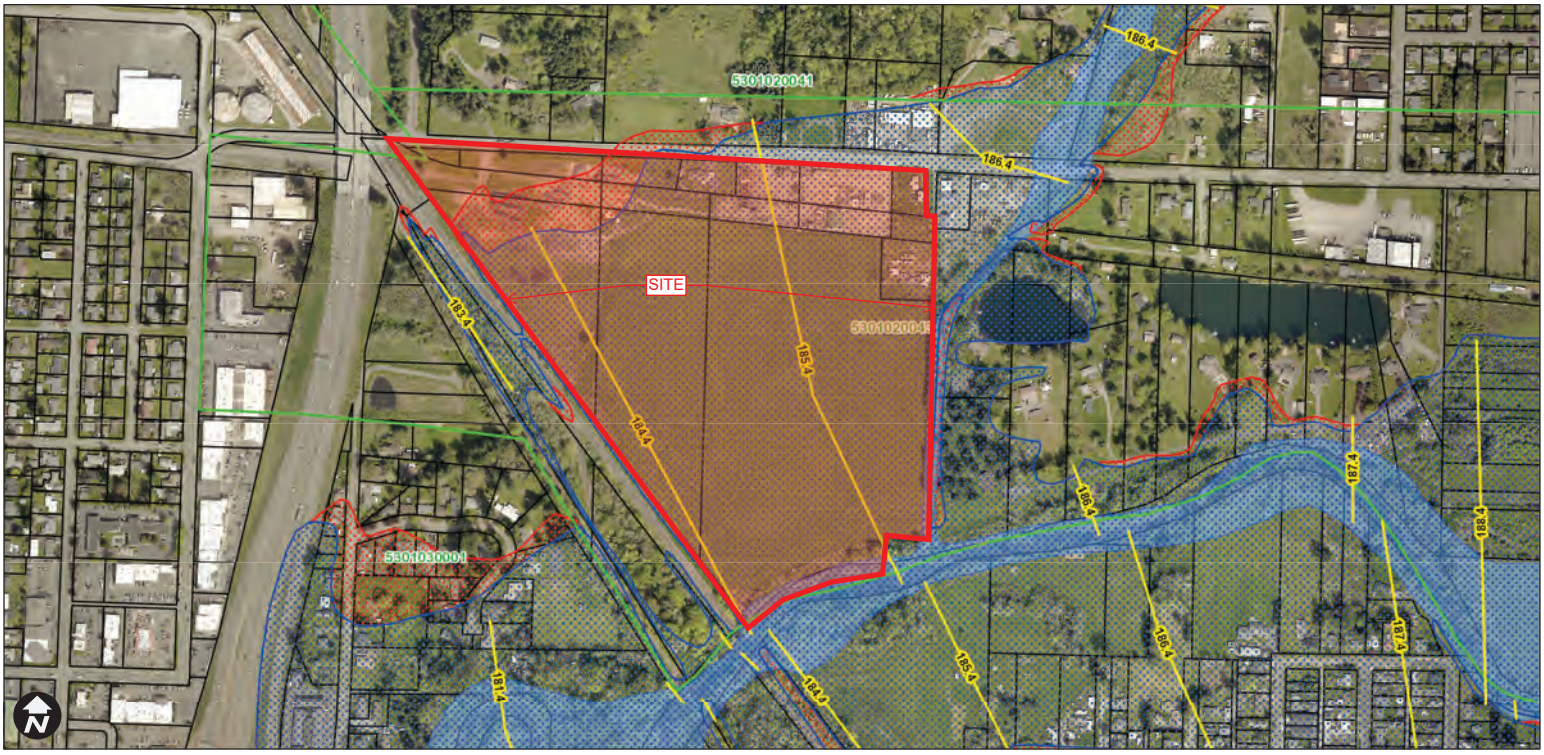
CENTRALIA
Community Development

- Zero Rise Floodplain Overlay
- 1982 FEMA Floodplain
- 100 year Flood Plain
- Lakes and Rivers
- City Limits
- UGA Boundary

Created on January 14, 2009

Appendix A-3

Lewis County GIS Web Map



11/4/2021, 12:31:51 PM

1:4,514

0 240 480 960 ft

NAD 1983 StatePlane Washington South FIPS 4602 Feet

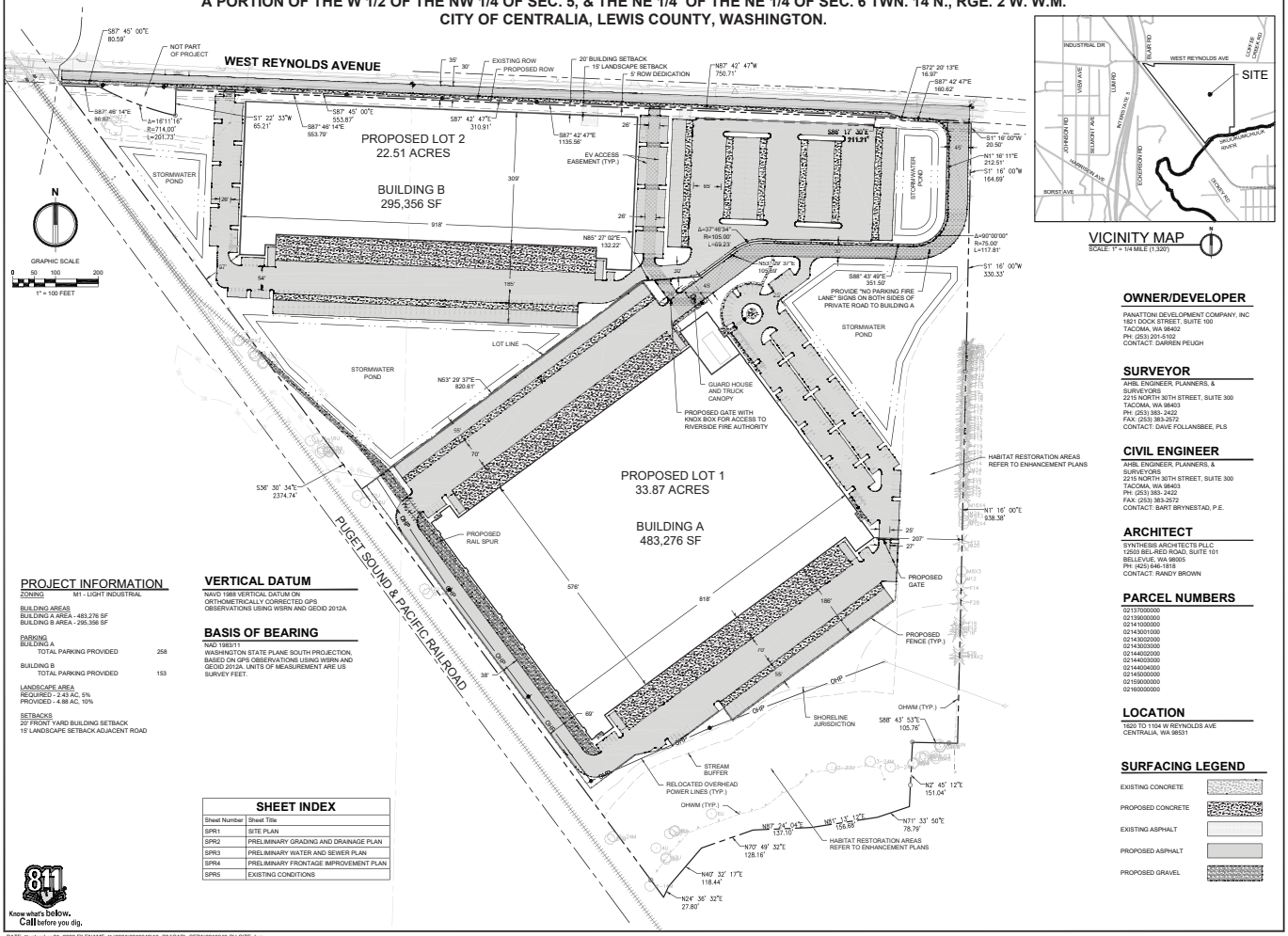
- FEMA BFE (NAVD88)
- Parcels
- FEMA Panels
- FEMA 100-Year
- FEMA 500-Year
- Floodway

Lewis County does not guarantee the accuracy of the information shown on this map and is not responsible for any use or misuse by others regarding this material. It is provided for general informational purposes only. This map does not meet legal, engineering, or survey standards. Please practice due diligence and consult with licensed experts before making decisions.

© Lewis County GIS | 2019 Imagery © Pictometry & Lewis County

SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC. 6 TWN. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.



VICINITY MAP
SCALE: 1" = 1/4 MILE (1,320')

PROJECT INFORMATION

ZONING: M1 - LIGHT INDUSTRIAL

BUILDING AREAS
BUILDING A AREA - 483,276 SF
BUILDING B AREA - 295,356 SF

PARKING
BUILDING A
TOTAL PARKING PROVIDED 258
BUILDING B
TOTAL PARKING PROVIDED 153

LANDSCAPE AREA
REQUIRED - 2.43 AC. 5%
PROVIDED - 4.88 AC. 10%

SETBACKS
20' FRONT YARD BUILDING SETBACK
15' LANDSCAPE SETBACK ADJACENT ROAD

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

SHEET INDEX

Sheet Number	Sheet Title
SPR1	SITE PLAN
SPR2	PRELIMINARY GRADING AND DRAINAGE PLAN
SPR3	PRELIMINARY WATER AND SEWER PLAN
SPR4	PRELIMINARY FRONTAGE IMPROVEMENT PLAN
SPR5	EXISTING CONDITIONS

811 Know what's below. Call before you dig.

OWNER/DEVELOPER

PANATTONI DEVELOPMENT COMPANY, INC
1821 DOCK STREET, SUITE 100
TACOMA, WA 98402
PH: (253) 201-5102
CONTACT: DARREN PEUGH

SURVEYOR

AHBL ENGINEER, PLANNERS, & SURVEYORS
2215 NORTH 30TH STREET, SUITE 300
TACOMA, WA 98403
PH: (253) 383- 2422
FAX: (253) 383-2572
CONTACT: DAVE FOLLANSBEE, PLS

CIVIL ENGINEER

AHBL ENGINEER, PLANNERS, & SURVEYORS
2215 NORTH 30TH STREET, SUITE 300
TACOMA, WA 98403
PH: (253) 383- 2422
FAX: (253) 383-2572
CONTACT: BART BRYNESTAD, P.E.

ARCHITECT

SYNTHESIS ARCHITECTS PLLC
12503 BEL-RED ROAD, SUITE 101
BELLEVUE, WA 98005
PH: (425) 646-1818
CONTACT: RANDY BROWN

PARCEL NUMBERS

02137000000
02139000000
02141000000
02143001000
02143002000
02143003000
02144002000
02144003000
02144004000
02145000000
02159000000
02160000000

LOCATION

1620 TO 1104 W REYNOLDS AVE
CENTRALIA, WA 98531

SURFACING LEGEND

EXISTING CONCRETE
PROPOSED CONCRETE
EXISTING ASPHALT
PROPOSED ASPHALT
PROPOSED GRAVEL

DATE: September 21, 2023 FILENAME: I:\2021\2210649\10_CIVIL\CAD_SEPA\2210649-SH-SITE.dwg

AHBL
TACOMA • SEATTLE • SPOKANE • TRI-CITIES
2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

Project Title:
SKOOKUMCHUCK COMMERCE CENTER

Client:
PANATTONI DEVELOPMENT COMPANY, LLC
1821 DOCK STREET, SUITE 100
TACOMA, WA 98402

Project No.
2210649.10

Issue Set & Date:
SEPA AND SITE PLAN REVIEW
9/21/2023

NOTICE

Revisions:

Sheet Title:
Proposed Site Plan

Designed by:	Drawn by:	Checked by:
TDW	TDW	BEB

Sheet No.
Appendix A-4

Exhibit G

SKOOKUMCHUCK COMMERCE

Centralia, WA

TRAFFIC IMPACT ANALYSIS (TIA)

Updated September 25, 2023

HEATH & ASSOCIATES

Transportation Planning & Engineering

September 25, 2023

Patty Page, City Engineer
City of Centralia
Community Development Department
118 West Maple Street
Centralia, WA 98531

Subject: Revisions to Skookumchuck Commerce Center Traffic Impact Analysis

This letter is in response to the city of Centralia (7/10/2023), Port of Centralia (6/12/2023) and WSDOT (6/12/2023) comments regarding the TIA for the Skookumchuck Commerce Center project.

City of Centralia County Comments

- Projects on the STIP for Lewis County are not included in the project listing in the report. At the time of the last STIP update, Reynolds Road fronting this property was county right of way.

  Comment acknowledged. The TIA has been updated to include projects on the Lewis County STIP.

- Provide information on the existing facility that is being used for the site-specific calculations used for Building A trip data. Once total daily trips are revised per WSDOT comments, the Transportation Mitigation Fee will be determined and any offsite improvements (in addition to those required by the development guidelines) will be determined. All offsite improvements and frontage improvements needed to accommodate this project will be required to be completed prior to occupancy of the first building. Transportation Mitigation Fees assessed for the development shall be paid prior to construction approval.

  ITE data has been utilized to derive Building A daily trip generation outputs in the updated report. All figures, narrative and analysis have been updated accordingly.

- Provide right turn deceleration lane for Building A private road access (Meeting exhibit 1310-20) and turning corner radius (meeting 1310.03(1)) in the WSDOT Design Manual and provide the AutoTurn exhibit showing the design vehicle as the largest truck expected to utilize this site.

Comment acknowledged. A right turn deceleration lane will be included at the access. Moreover, an AutoTURN analysis has been conducted at the access using the largest design vehicle anticipated. No turning issues are identified.

- Intersection Control Evaluation (ICE) may be required for Reynolds Avenue/Johnson Road, Reynolds Avenue/Harrison Avenue and N. Belmont/Haviland Street intersections after technical review completed. ICE is required for Harrison Avenue/SB I-5 intersection since it fails for the right turn movement. Approval of the development will require improvements at this intersection prior to occupancy.

  New signal timing sheets and Synchro inputs provided by WSDOT have been utilized to update modeling for Harrison Avenue/SB I-5 and the Harrison Avenue corridor. The updated LOS analysis indicates no level of service deficiencies at any of the intersections of study along the Harrison Avenue corridor. Moreover, the eastbound right-turn movement at Harrison Avenue/SB I-5 is shown to comprise acceptable existing and forecast level of service. As such, no additional evaluation/ICE is deemed necessary at this time.

- Provide information on rail spur regarding number of train cars/day, impacts to Blakeslee Junction for both rail and vehicle traffic. Analyze delays caused on Reynolds Road due to the rail spur. Provide justification for not installing rail spur connection at the south end of the development as requested. Provide complete design drawings along with the Civil Plans as well as railroad permit approval prior to construction.

  Any information pertaining to the proposed development's rail spur and Blakeslee Junction will be provided by the applicant.

Port of Centralia County Comments

- As you are aware, the Port was required to identify and mitigate for traffic impacts associated with the implementation of the Port of Centralia Industrial and Commercial Parks Master Plan ("Master Plan") as part of SEPA review. This SEPA review analyzed the future impacts of the Master Plan on a comprehensive scale, including those for pending developments on properties such as the Northpark Warehouse in the Port Master Plan area. Section 4.3 of the TIA states the pipeline volume of the Northpark Warehouse is included in its forecast analysis; however, a more complete analysis would consider the traffic impacts of the Port at full Master Plan buildout, as those impacts have already been identified and mitigated for as part of Master Plan approval. Implementation of the Project using the assumptions of a pipeline forecast that omits the full extent of impacts associated with the approved

Master Plan runs the risk of unmitigated long-term traffic impacts in Centralia, as the Port retains undeveloped properties that are not considered in the current TIA but that may be developed in the future consistent with existing SEPA analysis. Instead, the Port recommends that the existing baseline condition anticipate the traffic impacts at the Master Plan's full buildout so as to avoid degradation of traffic conditions in the future resulting from a failure to incorporate impacts that have already been approved and mitigated for.

Discussions with the City indicate that the Port will not achieve full Master Plan build-out at the time of the Skookumchuck project build-out. As such, the City has indicated that full Master Plan build-out is not required to be accounted for within the TIA. However, pipeline volumes from the Northpark Warehouse development have been included in forecast analysis.

- The TIA uses a 5-year horizon for analysis of future traffic delays. The TIA does not include an analysis of the Master Plan's full buildout in its pipeline forecasting, meaning that the year 2028 may be too soon to meaningfully understand the cumulative impacts of this development. If the TIA is not required to consider the traffic impacts of the Master Plan's buildout condition, we recommend the horizon year be further extended ten or even twenty years, in order to preserve the long-term viability of the economically significant freight and shipping routes in the vicinity of the Project and the Port Master Plan area.

  The City has indicated that the horizon year utilized within the TIA is acceptable.

- The Centralia Transportation Plan implements two methods by which level of service ("LOS") traffic impacts are evaluated: a volume to capacity analysis is utilized for individual roadway segments, and a time delay analysis is used to determine impacts to intersections (Section 2.6, Goal T-7). While the TIA provides time delay analyses for thirteen existing intersections, it does not include a volume to capacity analysis for road segments that will clearly be impacted by Project implementation. Roadway segment analyses would be especially helpful in determining impacts to segments of Harrison Avenue west of 1-5 to Johnson Road, for which the 2015 Lewis County Comprehensive Plan identifies an existing volume to capacity ratio resulting in LOS "D" for some individual segments and anticipates major roadway capacity issues by 2040, ranging from LOS "C" to "F" (Lewis County Transportation Element, Map T-5), and for which the City of Centralia Comprehensive Plan identifies Disegments experiencing LOS "F" by 2030 (Table 9, City of Centralia Transportation Plan). The long-term functionality of Harrison Avenue is essential to Port operations and as such, it is requested that the scope of the TIA be expanded to provide a more comprehensive understanding of traffic impacts to this corridor.

The City's level of service methodologies were adhered to within the TIA. As such, the City has indicated that no modifications are required concerning level of service analysis.

- Despite providing analysis for thirteen existing intersections in proximity to the Project, the TIA does not analyze the intersection of W Reynolds Avenue/Galvin Road and Harrison Avenue. Presumably, this is because there are more direct routes to the Project that bypass this intersection. The TIA only mentions additional trips through this intersection when describing utilization of nighttime truck routes (9:00 PM - 6:00 AM), and thereby avoids a discussion of peak AM and PM impacts. However, Figures 7 and 8 indicate that at least some additional PM peak hour trips will continue westbound on W Reynolds Avenue through the intersection with Johnson Road as a result of the Project - with some likely continuing as far as its intersection with Harrison Avenue. It is reasonable to imagine that the construction of 800,000 square feet of warehousing uses will add at least some peak PM trips to the intersection of W Reynolds Avenue/Galvin Road and Harrison Avenue. This intersection is trafficked by freight and shipping to and from the Port of Centralia, as well as other sources in the City of Centralia and beyond. The TIA should be revised to include an analysis of the Project's impacts upon the intersection of W Reynolds Avenue/Galvin Road and Harrison Avenue in addition to the intersections already studied.

  During the scoping process with the City, no indication was made regarding including W Reynolds Avenue/Galvin Road and Harrison Avenue as a study intersection. As such, intersection parameters currently included are deemed acceptable.

WSDOT Comments

- Tenant-provided data for Building A appears to significantly under-report daily vehicle trips when compared to Institute of Transportation Engineers (ITE) Trip Generation Manual (TGM) data for the Warehousing land use code. However, the PM peak-hour trips appear to be similar. Therefore, we concur with the use of the tenant-provided trip generation data for the Synchro analysis, but ITE TGM data should be used for any analyses requiring daily trip volumes.

  Comment acknowledged. The updated TIA will utilize ITE data to derive all average weekday daily trips for the proposed development.

- At study intersection #8, signal timing was adjusted to revise operations from dual-entry permissive movements to protected split-phase operations. The analysis for this intersection does not reflect this change and will have

significant impact to the results of the analysis of existing conditions and horizon year operations. Please verify that the signal timing used in the analysis of this intersection matches the existing timing and phasing.

Comment acknowledged. Signal timing was recently requested and obtained from WSDOT in July of 2023. Modeling at the intersection has been revised to reflect data from the updated signal timing sheets and the noted phasing modifications.

- For the analysis of the I-5 Exit 82 SB ramp terminal (study intersection #11), it was noted that EB right turns on red were prohibited. Right turns on red are permitted at this location. Additionally, the right movement was coded as a permissive movement (perm), when the movement functions as a protected overlap (pt+ov). Please revise the analysis of this intersection as appropriate.

  Comment acknowledged. The analysis has been updated at this intersection to reflect the noted movement functions.

- At the I-5 SB ramp terminal, a 3 percent heavy vehicle volume was applied to the EB right movement in the forecast year. This appears to be low given the pipeline trips and the additional PM peak-hour heavy vehicles that would head to the I-5 Exit 82 SB ramp terminal. Please revise as appropriate or provide reasoning for maintaining the heavy vehicle volumes as proposed.

  Comment acknowledged. The analysis has been updated to reflect more conservative heavy vehicle percentages (6%) at the I-5 SB Ramp terminal eastbound movements. It should be noted that the proposed development is anticipated to only add 6 heavy vehicle trips to the EB right turn movement during the PM peak hour (0.8% proportion of all heavy vehicle trips). As such, the delta 2% proportion of additional heavy vehicles is anticipated to capture pipeline trips.

- It appears that a safety analysis was not completed as a part of this TIA. WSDOT requests that, at a minimum, the TIA include a safety analysis of all state route intersections (including ramp terminals) using the methodology provided in the WSDOT Safety Analysis Guide. Please contact Courtney Sell, WSDOT SWR Traffic, at SellCo@wsdot.wa.gov for more information and to discuss the scope of the safety analysis necessary for this project.

  Comment acknowledged. A Safety Analyses has been included in the updated report of all state route intersections.

- SEPA p13: Why was a PM peak of 3-5p chosen? 4-6p or 5-7p is more typical. This being the case the assumption of truck traffic departing at 6p (as described in subsection 'h') creating less of an impact doesn't hold up as well.

  The PM peak timeframe included in analysis was scoped, recommended and approved by the City. As such, no modifications to the analysis timeframe are proposed given City analysis conformity

- Provide any available AADTs of the major roadways involved in the study.

  Comment acknowledged. All available AADTs of the major roadways involved in the study provided within WSDOT's Traffic Data Reporting System are illustrated in blue in Figure 3.

- TIA p6: Verify that the proposed frontage improvements along Reynolds covered by the STIP are, in fact, funded. If they are not funded, frontage improvements may need to be carried out as part of this development in the interim.

  Both the City of Centralia TIP and the Lewis County TIP (2023-2028) indicate that funding is pending for the Reynolds Road Improvements project. As such, frontage improvements should be coordinated with the City/County.

- TIA p7: In the SEPA, a PM peak of 3-5p was chosen, but in the TIA, 3:30-5:30p is stated. Is there a reason behind this incongruence? Also, why was 3:30-5:30 chosen specifically?

  Per City direction, 3:30-5:30 PM was the requested time period for evaluation due to local traffic characteristics. However, the proposed use may comprise a slightly earlier peak starting at 3:00 PM. With overlapping hours, both adjacent street and project peak have been accounted for.

- TIA p7: Will bicycling facilities be built alongside the sidewalks?

  The Lewis County STIP Project Notification Fact Sheet indicates that bicycle lanes will be built along the Reynolds Avenue corridor as a part of the proposed project/improvements.

- TIA p9: Is the site expected to produce an uptick in the demand for transit use, requiring pedestrians and cyclists to travel the half- mile to the west?

  Given the industrial nature of the proposed development and location, the site is not anticipated to produce an appreciable an uptick in transit use demand.

- TIA p9: Were WSDOT protocol employed in the course of the Synchro analysis?

  WSDOT signal timing sheets were utilized for available intersections. New signal timing sheets have been requested and obtained from WSDOT, which have been utilized in the updated report. Moreover, WSDOT protocol (ideal saturated flow rate and future peak hour factor) for all intersections under WSDOT jurisdiction has been utilized.

- TIA p11: What is the size and type of trucks expected to frequent the site?

  Heavy vehicles frequenting the site are anticipated to be in the form of WB-67 trucks.

- TIA p13: Unless specifically signed as not permitting trucks, some may end up passing through the intersection at Reynolds and Pearl. Has it been verified that the size of trucks expected to visit the site can pass through the intersection unencumbered? The other intersections in the study, as well?

  Comment acknowledged. The majority of truck traffic is anticipated to route to/from I-5. The City comprises specific day vs. night truck routing to/from I-5 that is permissible, which all trucks generated by the proposed development must adhere to. This routing does not include travel through Reynolds & Pearl.

- TIA p10: Please add sentence, "Highways of Statewide Significance (HSS) including their ramp intersections in Urban Areas is LOS "D."

  Comment acknowledged.

Please call if you require anything further.

Sincerely,
Aaron Van Aken, P.E., PTOE

SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

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SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

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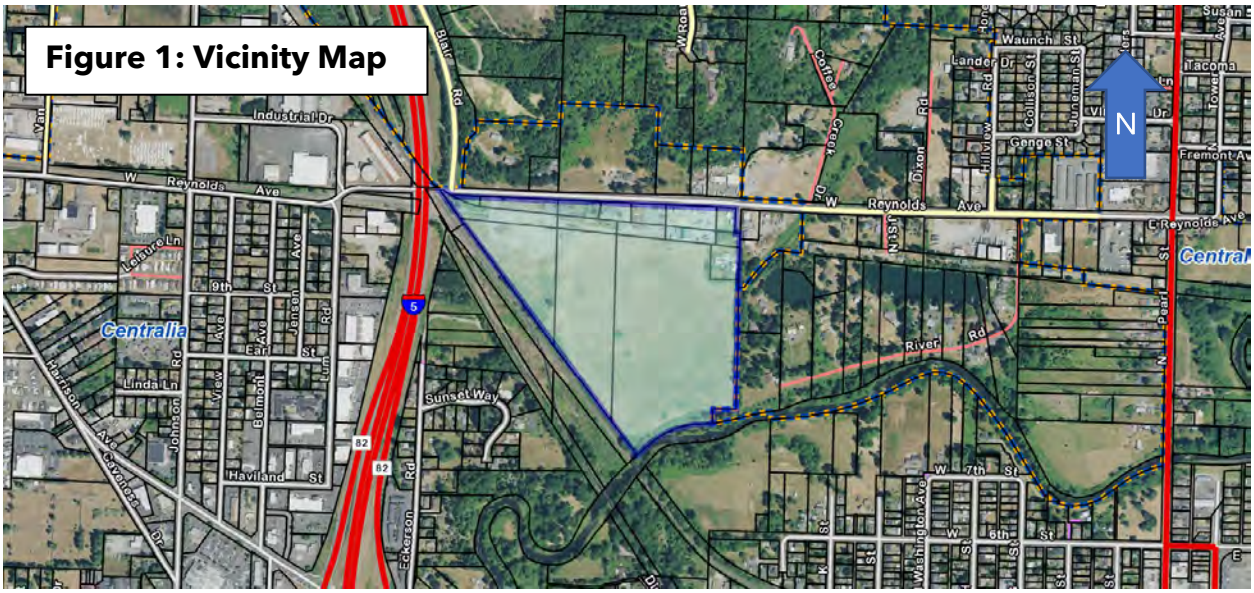
SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

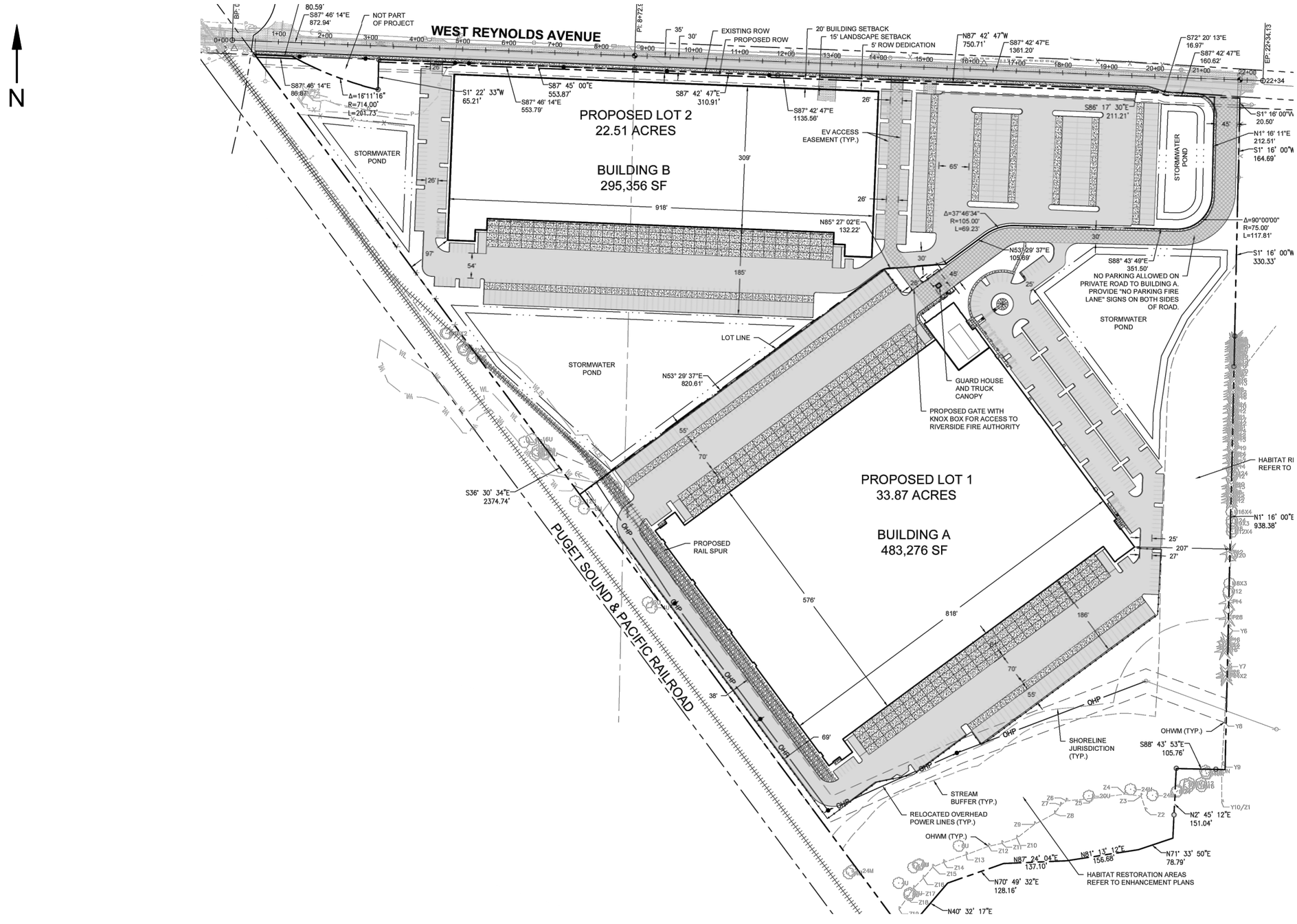
1. INTRODUCTION

The main goals of this study focus on the assessment of existing roadway conditions and forecasts of newly generated project traffic. The first task includes the review of general roadway information on the adjacent street system and baseline vehicular volumes. Forecasts of future traffic and dispersion patterns on the street system are then determined using established trip generation and distribution techniques. As a final step, appropriate conclusions and mitigation measures are defined if needed.

2. PROJECT DESCRIPTION

Skookumchuck Commerce proposes for the construction of a new industrial site comprising two buildings in the city of Centralia. The proposed project, with a site address of 1406 W Reynolds Avenue, includes ten parcels totaling approximately 54 acres. All existing structures on-site are to be demolished prior to new development. Building A is to comprise approximately 483,276 square feet while Building B is proposed to entail 295,356 square feet. Vehicular access to the subject site is proposed via three driveways extending south from W Reynolds Avenue. Moreover, a rail spur is proposed to extend into the subject site, providing direct access to Building A. Figure 1 below shows the general site location with surrounding street network and primary arterials. A site plan illustrating the overall project and access configuration is given in Figure 2.





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SKOOKUMCHUCK COMMERCE

CONCEPTUAL SITE PLAN
FIGURE 2

3. EXISTING CONDITIONS

3.1 Existing Street System

The primary roadway serving the project is *W Reynolds Avenue*, an east-west, two to three-lane minor arterial bordering the subject site to the north. Travel lanes are approximately 11-feet in width, and additional turn-lanes are provided at major intersections. Curb, gutter and sidewalk are available along the south side of the roadway from Lum Road to Blair Road. Paved shoulders varying in width are typically provided along both sides of the roadway. The Blakeslee Junction rail crossing traverses W Reynolds Avenue approximately 130-feet west of Blair Road. The posted speed limit in the subject site vicinity is 35-mph.

3.2 Roadway Improvements

The City of Centralia's 2023-2028 Capital Improvement Program and WSDOT's Statewide Transportation Improvement Program (STIP) were reviewed. Several improvement projects are planned in the vicinity of the subject site, which are summarized in Table 1 below.

Table 1: Transportation Improvement Projects

Name	Location	Improvement	Cost
City of Centralia TIP (2023-2028)			
Galvin Rd Repaving (Project #1)	Harrison to city limits	New HMA wearing course; new lane markings and signs	$761,000
Harrison Ave (Project #4)	Galvin Rd to city limits	Roadway widening; construct sidewalks, streetlights, etc.	$2,100,000
Reynolds Ave W (Project #5)	Harrison to city limits (I-5)	Roadway widening; construct sidewalks, streetlights, new lane markings and signs etc.	$2,200,000
Reynolds Ave E (Project #6)	N Tower to city limits	Roadway widening; construct sidewalks, streetlights, etc.	$2,200,000
Harrison Ave (Project #9)	Belmont to Johnson Rd	Asphalt overlay; ADA intersection improvements; signage, striping, etc.	$581,000
Harrison Ave Bike/Ped Safety (Project #17)	Belmont to High St	Improve non-motorist safety; signal modifications; sidewalk, striping, painted bike lanes, traffic revisions	$300,000
WSDOT STIP (2023-2026)			
Railroad Switch Upgrades (STIP ID: WA-14420)	Reynolds Ave & Blakeslee Junct. rail crossing	Upgrade two manual RR turnouts to Dual-Tone, Multi-Frequency (DTMF) power switches	$250,711
Harrison Ave Improvements (STIP ID: WA-13259)	MP 0.57 – 2.717	Roadway widening; sidewalk, streetlights, etc.	$1,000,000

Table 1: Transportation Improvement Projects (Cont.)

Name	Location	Improvement	Cost
Lewis County TIP (2023-2028)			
RR Switch Upgrades (Project #11)	Harrison to city limits	New HMA wearing course; new lane markings and signs	$251,000
Harrison Ave Improvements (Project #: 21)	Reynolds Ave to Goodrich Rd-Kuper Rd	Roadway widening to provide a through lane in each direction, a continuous TWLTL, curb, gutter, sidewalk, bike lanes and street lights	$1,000,000
Reynolds Ave Improvements (Project #: 26)	Harrison to Pearl Street	Roadway widening to provide a through lane in each direction, a continuous TWLTL, curb, gutter, sidewalk, bike lanes and street lights	$2,200,000

3.3 Existing Peak Hour Volumes

Field data for this study was collected by our firm in February of 2023. The following intersections were directed be included in analysis by the City:

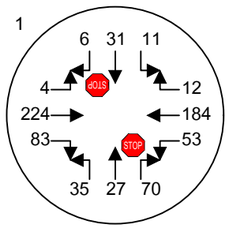
1. W Reynolds Ave & Johnson Rd (2/7/2023)
2. W Reynolds Ave & Lum Rd (2/7/2023)
3. W Reynolds Ave & Industrial Dr (2/7/2023)
4. W Reynolds Ave & Puget Sound & Pacific Railroad Crossing (2/7/2023)
5. W Reynolds Ave & Blair Rd (2/7/2023)
6. W Reynolds Ave & Hillview Rd (2/7/2023)
7. E/W Reynolds Ave & N Pearl St (2/7/2023)
8. Harrison Ave & Johnson Rd (2/7/2023)
9. Harrison Ave & N Belmont Ave/Safeway Access (2/8/2023)
10. Harrison Ave & S Belmont Ave (2/8/2023)
11. Harrison Ave & Exit 82 I-5 SB Ramps (2/8/2023)
12. Harrison Ave & Exit 82 I-5 NB Ramps (2/8/2023)
13. Haviland St & N Belmont Ave (2/7/2023)

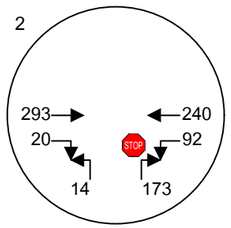
A. W Reynolds Ave & West Access (2/7/2023)
B. W Reynolds Ave & East Access (2/7/2023)

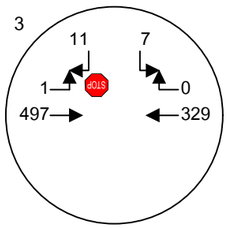
Counts were performed between the PM peak period of 3:30 PM - 5:30 PM. The single hour exhibiting highest overall intersection volumes is then derived (peak hour) and is used for analysis for each respective location. Figure 3 on the following page identifies baseline PM peak hour volumes. Full count sheets have been attached in the appendix for reference. Moreover, most recent WSDOT AADT volumes (2022) available are illustrated in blue in Figure 3.

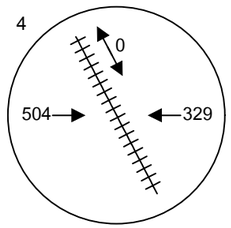
It should be noted that rail activity was observed at the Blakeslee Junction (Puget Puget Sound & Pacific Railroad crossing) on W Reynolds Avenue. No trains were observed to cross the roadway during the PM peak hour. Moreover, volumes were observed at the existing driveways serving Lael's Landscape & Stone Supply facility currently on-site. Approximately 11 PM peak hour trips (7 in / 4 out) were observed entering/existing the subject site – all in the form of passenger vehicles.

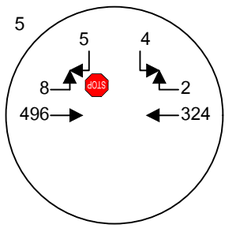
N

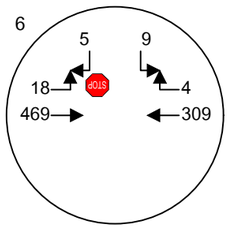


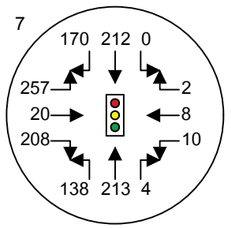


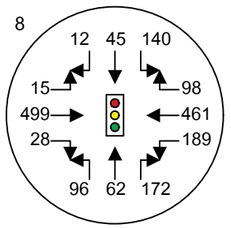


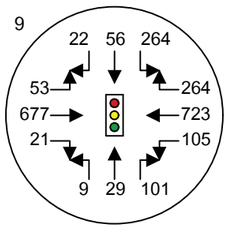


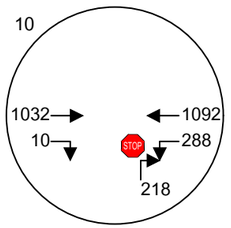


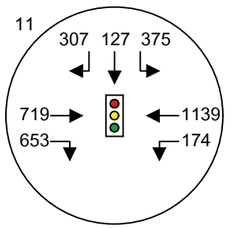


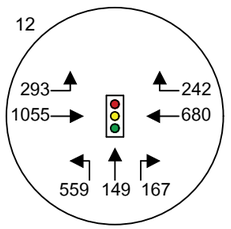


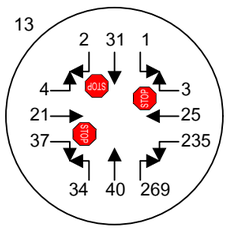


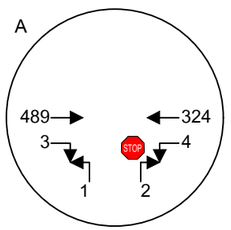


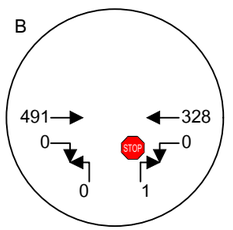


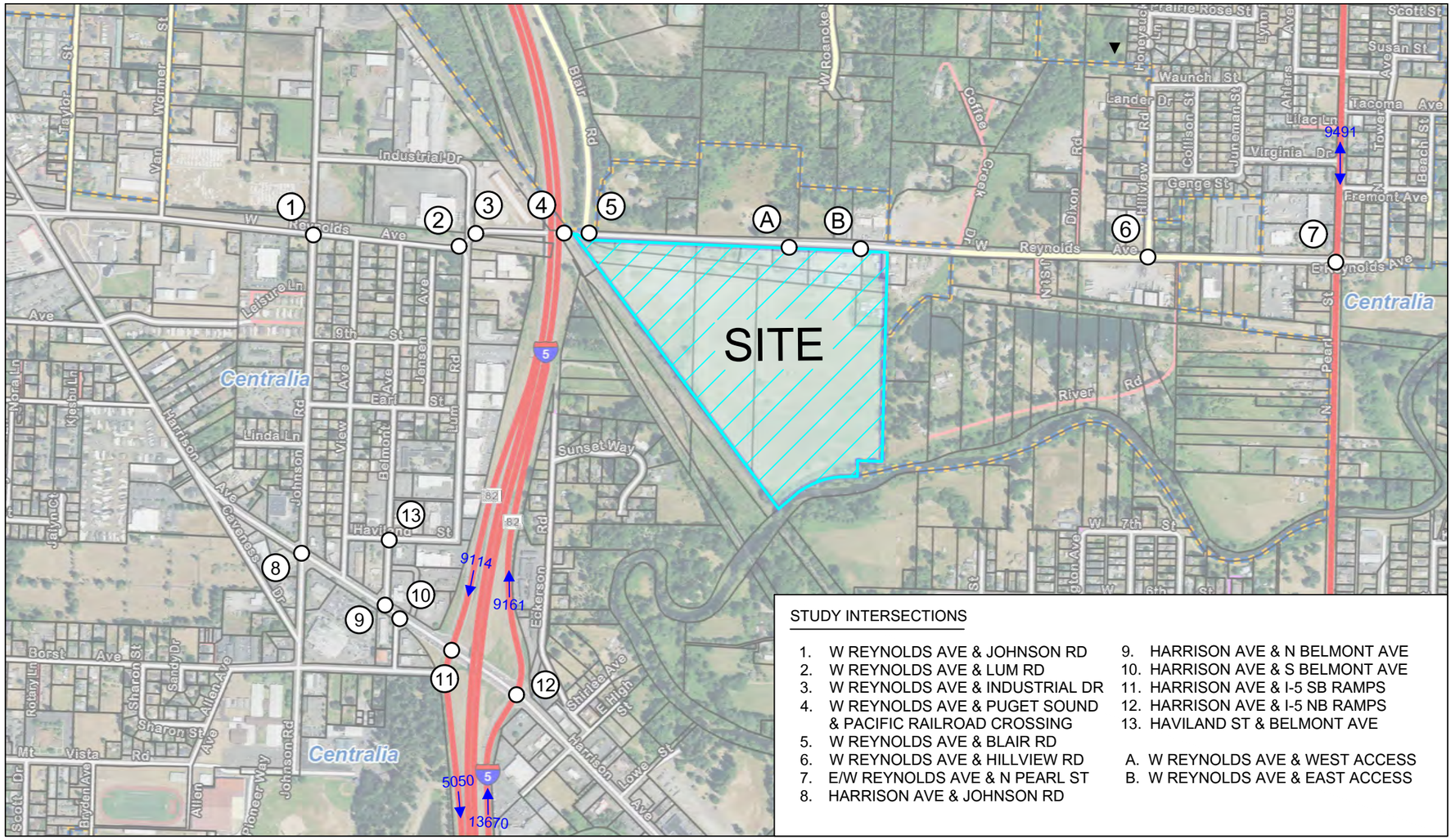












STUDY INTERSECTIONS

1. W REYNOLDS AVE & JOHNSON RD
2. W REYNOLDS AVE & LUM RD
3. W REYNOLDS AVE & INDUSTRIAL DR
4. W REYNOLDS AVE & PUGET SOUND & PACIFIC RAILROAD CROSSING
5. W REYNOLDS AVE & BLAIR RD
6. W REYNOLDS AVE & HILLVIEW RD
7. E/W REYNOLDS AVE & N PEARL ST
8. HARRISON AVE & JOHNSON RD
9. HARRISON AVE & N BELMONT AVE
10. HARRISON AVE & S BELMONT AVE
11. HARRISON AVE & I-5 SB RAMPS
12. HARRISON AVE & I-5 NB RAMPS
13. HAVILAND ST & BELMONT AVE

A. W REYNOLDS AVE & WEST ACCESS
B. W REYNOLDS AVE & EAST ACCESS

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BASELINE 2023 PM PEAK HOUR VOLUMES
FIGURE 3

3.4 Non-Motorist Infrastructure

Non-motorist volumes were observed along the W Reynolds Avenue project frontage during routine peak hour counts. No non-motorists were observed traveling along the south side of W Reynolds Avenue along the project frontage during the PM peak hour. Non-motorist infrastructure is generally limited or discontinuous along W Reynolds Avenue. Discontinuous sidewalk segments are provided along the south side of the roadway. ADA ramps, sidewalk and signage are available at the Blakeslee Junction rail crossing on W Reynolds Avenue, just west of the subject site. Lastly, the Reynolds project, outlined in the City's TIP, would construct sidewalk along the roadway from Harrison Avenue to N Tower Avenue.

3.5 Transit Service

The review of the Twin Transit bus schedule indicated that the nearest transit service provided in the vicinity of the subject site is via the Orange Route. The loop route services West Centralia. Major destinations include the Mellen Street Energy Station, Providence Hospital, the Centralia Outlets, Centralia College and more. The nearest stop in relation to the subject site is located ~0.5-miles walking-distance west at Cascade Health - 1605 Johnson Road. Weekday service is provided from 6:00 AM – 7:00 PM with approximately 60-minute headways. Weekend service is provided from 7:00 AM – 4:00 PM with approximately 60-minute headways. Refer to the Twin Transit bus schedule for further details.

3.6 Level of Service

Existing intersection delays were determined through the use of the *Highway Capacity Manual* 7th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range[1] for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Detailed descriptions of intersection LOS are given in the 2016 Highway Capacity Manual. Level of service calculations were made through the use of the *Synchro 12* analysis program.

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[1] *Signalized Intersections - Level of Service*

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤20
C	>20 and ≤35
D	>35 and ≤55
E	>55 and ≤80
F	>80

Stop Controlled Intersections – Level of Service

Level of Service	Control Delay per Vehicle (sec)
A	≤10
B	>10 and ≤15
C	>15 and ≤25
D	>25 and ≤35
E	>35 and ≤50
F	>50

Highway Capacity Manual, 7th Edition

For signalized intersections, LOS is determined by the intersection's overall weighted average delay for each approaching leg. Side-street stop-controlled intersections LOS is determined by the approach with the highest delay. Table 2 on the following page presents existing PM peak hour LOS delays for the key intersections/driveways of study.

Table 2: Existing Weekday PM Peak Hour Level of Service

Delays given in seconds per vehicle

Ref. #	Intersection	Control	Movement	LOS	Delay
1	W Reynolds Ave & Johnson Rd	Stop	NB	C	19.2
2	W Reynolds Ave & Lum Rd	Stop	NB	B	12.3
3	W Reynolds Ave & Industrial Dr	Stop	SB	B	13.1
4	W Reynolds Ave & Blair Rd	Stop	SB	B	13.7
6	W Reynolds Ave & Hillview Rd	Stop	SB	C	15.7
7	E/W Reynolds Ave & N Pearl St	Signal	Overall	C	22.1
8	Harrison Ave & Johnson Rd	Signal	Overall	D	38.4
9	Harrison Ave & N Belmont Ave	Signal	Overall	C	23.3
10	Harrison Ave & S Belmont Ave	Stop	NB	C	18.7
11	Harrison Ave & I-5 SB Ramps	Signal	Overall EB R	B A	18.2 5.2
12	Harrison Ave & I-5 NB Ramps	Signal	Overall	C	26.4
13	Haviland St & Belmont Ave	Stop	WB	A	7.6
A	W Reynolds Ave & W Access	Stop	NB	B	13.6
B	W Reynolds Ave & E Access	Stop	NB	B	11.8

The City of Centralia has an adopted level of service standard of LOS D or better[2]. Highways of Statewide Significance (HSS) including their ramp intersections in Urban Areas is LOS "D." As shown in Table 2, all study intersections are shown to operate with LOS D or better conditions, meeting City standards.

It should be noted that the intersection configuration for Haviland Street & Belmont Avenue currently comprises stop controls at the east, west and north legs of the intersection. No control is provided at the south leg, providing free flow conditions for northbound movements. The noted intersection configuration is not supported under HCM 7th modeling. As such, *SimTraffic* modeling software was utilized to derive delay outputs for the intersection.

Lastly, while overall intersection delays at Harrison Ave & I-5 SB Ramps were shown to operate with LOS C delays, outputs for the eastbound right-turn lanes were shown to comprise LOS A conditions as right turns on red at permitted. Video footage of the intersection corroborated that minimal delays were observed at the eastbound right turn movement.

[2] Centralia Transportation Plan, Section 2.6: Level of Service and Concurrency (May 2018)

4. FORECAST TRAFFIC DEMAND & ANALYSIS

4.1 Project Trip Generation

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is usually denoted by the quantity or specific number of new trips that enter and exit a project during a designated time period, such as a specific peak hour (AM or PM) or an entire day. A combination of site-specific trip generation data (Building A – peak hour trip generation) and ITE data (Building A – AADT and Building B) was utilized to derive total site trip generation. Respective trip generation methodologies are outlined below.

Building A

A tenant has been identified for proposed Building A, which is to entail warehouse and distribution uses. Site characteristics/operational details have been provided by the tenant and applicant, which were used to derive specific trip generation estimates for the building. Building A will entail two shifts of employees. The first shift is to occur from 7:00 AM – 3:30 PM, comprising 50 employees. The second shift is to occur from 3:30 PM – 12:00 AM, comprising 30 employees. Approximately 60 trucks are anticipated to enter and exit the site each day. Moreover, 40 of the outbound truck trips will leave the site after 6:00 PM, shipping at night for next day delivery. Rail access will be provided to the building via a spur from the Puget Sound & Pacific rail line. Lastly, up to 10 miscellaneous trips per day may be generated from the site. A use-specific trip generation can therefore be broken down as such. It should be noted that the City and WSDOT requested that average daily weekday trip generation estimates for Building A be derived via ITE data (LUC 150 – Warehousing).

AM Peak Hour Trip Generation:
Shift 1 arriving: 50 inbound
4%[3] of trucks arriving: 2 inbound
4%[3] of trucks departing: 3 outbound
Miscellaneous: 2 inbound / 2 outbound
Total AM Peak Hour Trip Generation: 59 trips (54 inbound / 5 outbound)

PM Peak Hour Trip Generation:
Shift 1 departing: 50 outbound
Shift 2 arriving: 30 inbound
6.5%[3] of trucks arriving: 4 inbound
6.5%[3] of trucks departing: 4 outbound
Miscellaneous: 2 inbound / 2 outbound
Total PM Peak Hour Trip Generation: 92 trips (36 inbound / 56 outbound)

[3] Heavy vehicle percentages derived via ITE data and known site characteristics. Refer to appendix.

Building B

No tenant is currently identified for Building B. As such, trip generation data for the ~295,356 square foot building was obtained from the Institute of Transportation Engineer's publication Trip Generation Manual, 11th Edition. The designated land use for Building B is defined under Land Use Code (LUC) 150 – Warehousing. Attached in the appendix are ITE trip generation sheets for the specified land use.

Total Site Trip Generation

Table 3 below summarizes the estimated trip generation of the subject site (Building A and B) using the previously outlined site-specific tenant data and ITE data. Included are the average weekday daily traffic (AWDT) and the AM and PM peak hours. Also illustrated are PM peak hour trips associated with the existing land uses on-site. Data for the three existing single-family structures on-site (LUC 210 – Single-Family) was derived via ITE data using average rates with dwelling units as the input variable.

Table 3: Project Trip Generation

Land Use	Size	Trip Type	AWDT	AM Peak-Hour Trips			PM Peak-Hour Trips		
				In	Out	Total	In	Out	Total
Building A: Warehouse (ITE & tenant data)	483,276 SF	Heavy	290	2	3	**5**	4	4	**8**
		Pass.	536	52	2	**54**	32	52	**84**
Building B: Warehouse (ITE data)	295,356 SF	Heavy	177	5	5	**10**	8	8	**16**
		Pass.	328	34	6	**40**	7	30	**37**
Total Site Trips		Heavy	467	7	8	**15**	12	12	**24**
		Pass.	864	86	8	**94**	39	82	**121**
		Total	*1331*	*93*	*16*	***109***	*51*	*94*	***145***
Exist. Site: Landscape Supply Store		Total	-	-	-	-	-7	-4	-11
Exist. Site: 3 S-F D.U.s (LUC 210)		Total	-	-	-	-	-2	-1	-3
			Net New PM Peak Hour Trips				*42*	*89*	***131***

Based on site-specific tenant information and ITE data, the project is anticipated to generate 1331 average weekday daily trips with 109 total trips (93 in / 16 out) occurring during the AM peak hour and 145 trips (51 in / 94 out) occurring during the PM peak hour. Moreover, accounting for existing trips observed at the site driveways and the demolition of three existing single-family structures on-site, the development proposal is anticipated to generate 131 net new PM peak hour trips (42 in / 89 out).

As illustrated in Table 3, a portion of site-generated trips are anticipated to be in the form of heavy vehicle (15 AM peak hour trips; 24 PM peak hour trips). Attached in the appendix is a spreadsheet outlining the proposed development's hourly truck trip generation. Summarized are hourly anticipated truck volumes throughout a 24-hour average weekday period. Hourly truck volume estimates for Buildings A and B were derived via ITE available for LUC 150 – Warehousing within the *Truck Time of Day Distribution for ITETripGen Appendices*. Hourly truck volume estimates for Building A were derived via a combination of the available ITE data and known tenant truck trip generation/ time-of-day distribution characteristics.

4.2 Distribution & Assignment

Trip distribution describes the anticipated travel routes for inbound and outbound project traffic during the peak hour study periods. PM peak hour trip distribution and assignment for Buildings A and B are illustrated in Figures 4 and 5, respectively. Illustrated in the figures are both passenger vehicle and heavy vehicle trips. All project-generated traffic associated with Building A was assigned to the easterly proposed access on W Reynolds Avenue. All Building B trips were assigned to a consolidated westerly access on W Reynolds Avenue. As such, project trips at the westerly project access represent conservative volumes as actual trips would be disseminated between the two driveways serving Building B.

Figure A, attached in the appendix, illustrates primary truck travel routes during the day versus during the nighttime. It should be noted that the majority of truck traffic is anticipated to route to/from I-5, which is illustrated in Figures 4 and 5. During the day, Johnson Road is to serve as the dedicated truck route providing access between the subject site and I-5. During the night, Harrison Avenue is to serve as the dedicated heavy vehicle route. No trucks will be permitted to route to/from the subject site via Belmont Avenue. Also illustrated in Figure A are average weekday daily truck trips anticipated to traverse the daytime route (254 trucks from 6:00 AM - 9:00 PM) and the nighttime route (43 trucks from 9:00 PM – 6:00 AM).

Passenger vehicles routing to the subject site to/from the south/southeast are anticipated to travel primarily via Lum Road, with a small portion of vehicles also utilizing Belmont Avenue as an alternate corridor.

4.3 Future Peak Hour Volumes

A 5-year horizon of 2028 was used for future traffic delay analysis. The proposed development is located within the city of Centralia, which is forecasted to grow at an annual rate of 1.79%[4]. Therefore, forecast 2028 background traffic volumes were derived by applying a 2.0 percent compound annual growth rate to the baseline 2023 PM peak hour volumes shown in Figure 3 to remain conservative.

Moreover, pipeline volumes associated with the Midway Logistics (Harrison Avenue Warehouse) and Northpark Warehouse projects were included in forecast analysis. PM peak hour pipeline volumes are illustrated in Figure 6. Forecast 2028 PM peak hour volumes without and with the addition of project-generated traffic are shown in Figures 7 and 8, respectively.

[4] Centralia Comprehensive Plan 2018-2040: Chapter 3 Land Use Element, pg. 53

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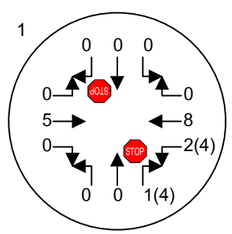
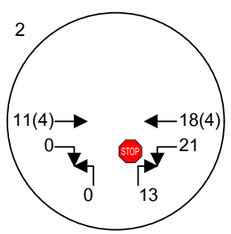
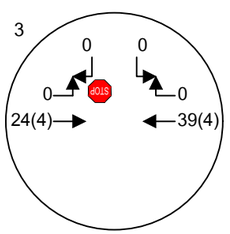
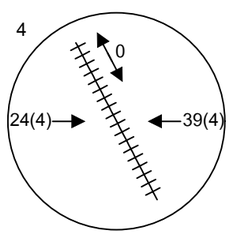
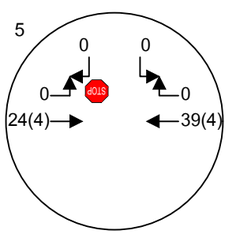
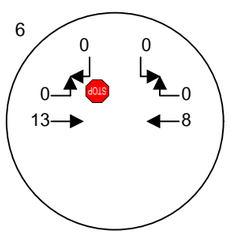


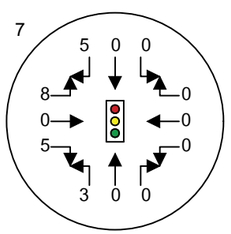


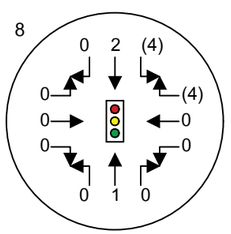


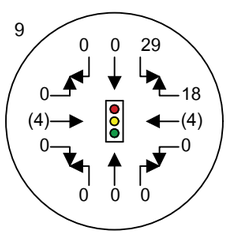


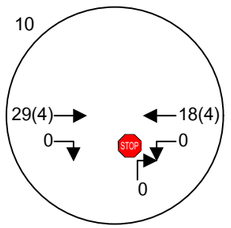


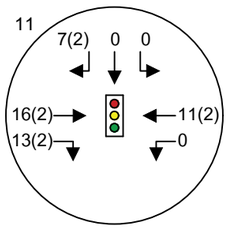


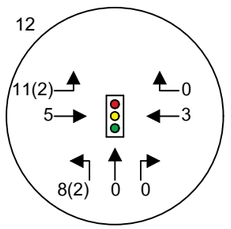


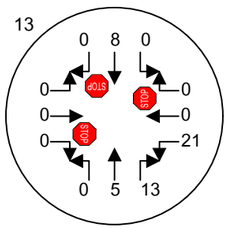


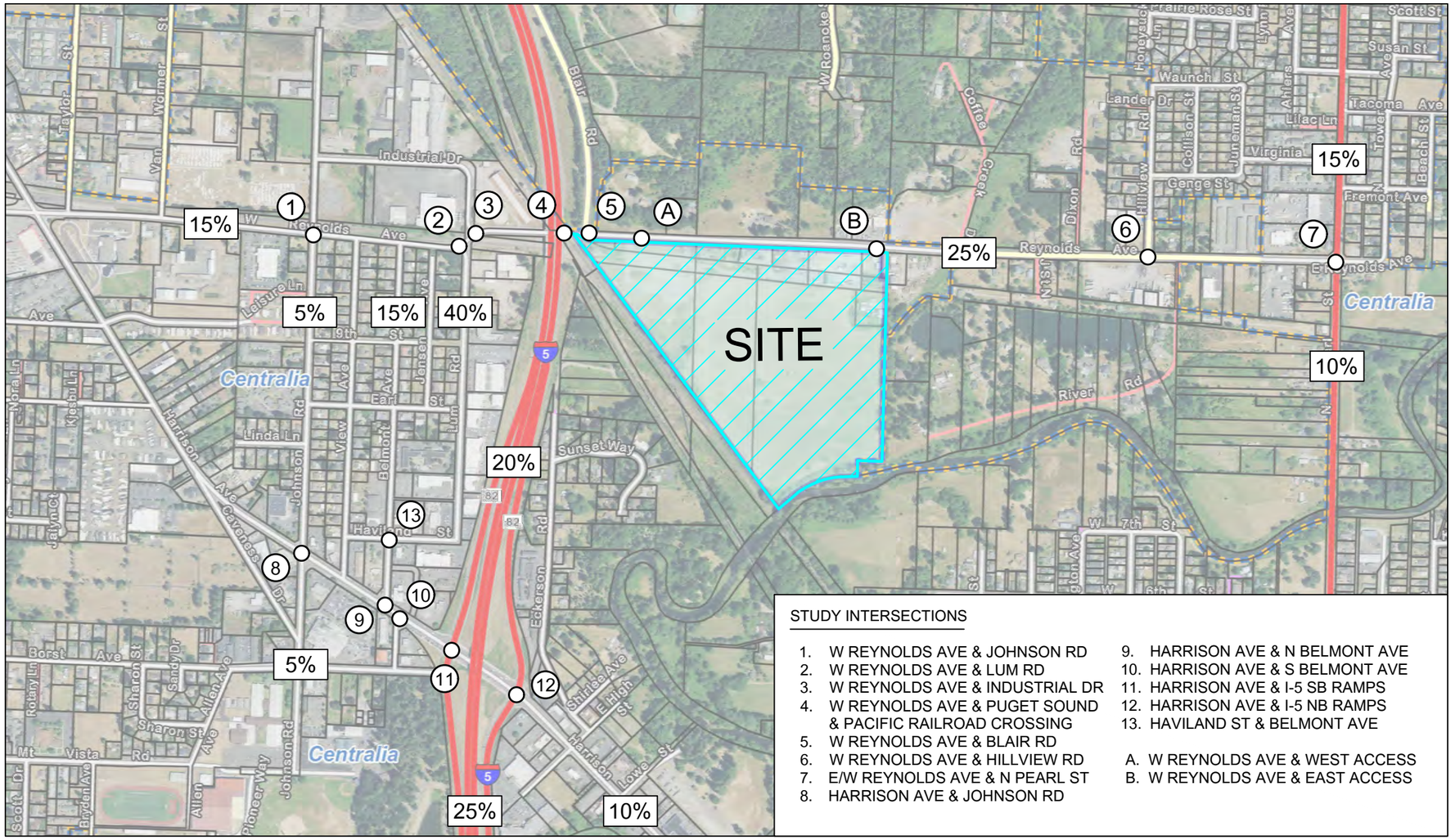








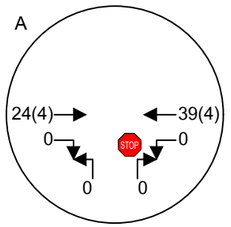


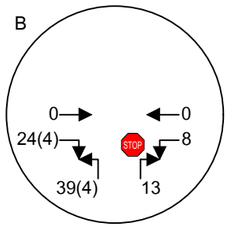


STUDY INTERSECTIONS

1. W REYNOLDS AVE & JOHNSON RD
2. W REYNOLDS AVE & LUM RD
3. W REYNOLDS AVE & INDUSTRIAL DR
4. W REYNOLDS AVE & PUGET SOUND & PACIFIC RAILROAD CROSSING
5. W REYNOLDS AVE & BLAIR RD
6. W REYNOLDS AVE & HILLVIEW RD
7. E/W REYNOLDS AVE & N PEARL ST
8. HARRISON AVE & JOHNSON RD
9. HARRISON AVE & N BELMONT AVE
10. HARRISON AVE & S BELMONT AVE
11. HARRISON AVE & I-5 SB RAMPS
12. HARRISON AVE & I-5 NB RAMPS
13. HAVILAND ST & BELMONT AVE

A. W REYNOLDS AVE & WEST ACCESS
B. W REYNOLDS AVE & EAST ACCESS





NEW PASSENGER VEHICLE PM PEAK HOUR TRIPS
INBOUND: 32 VPH OUTBOUND: 52 VPH
NEW HEAVY VEHICLE PM PEAK HOUR TRIPS
INBOUND: (4 VPH) OUTBOUND: (4 VPH)

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PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT: BUILDING A
FIGURE 4

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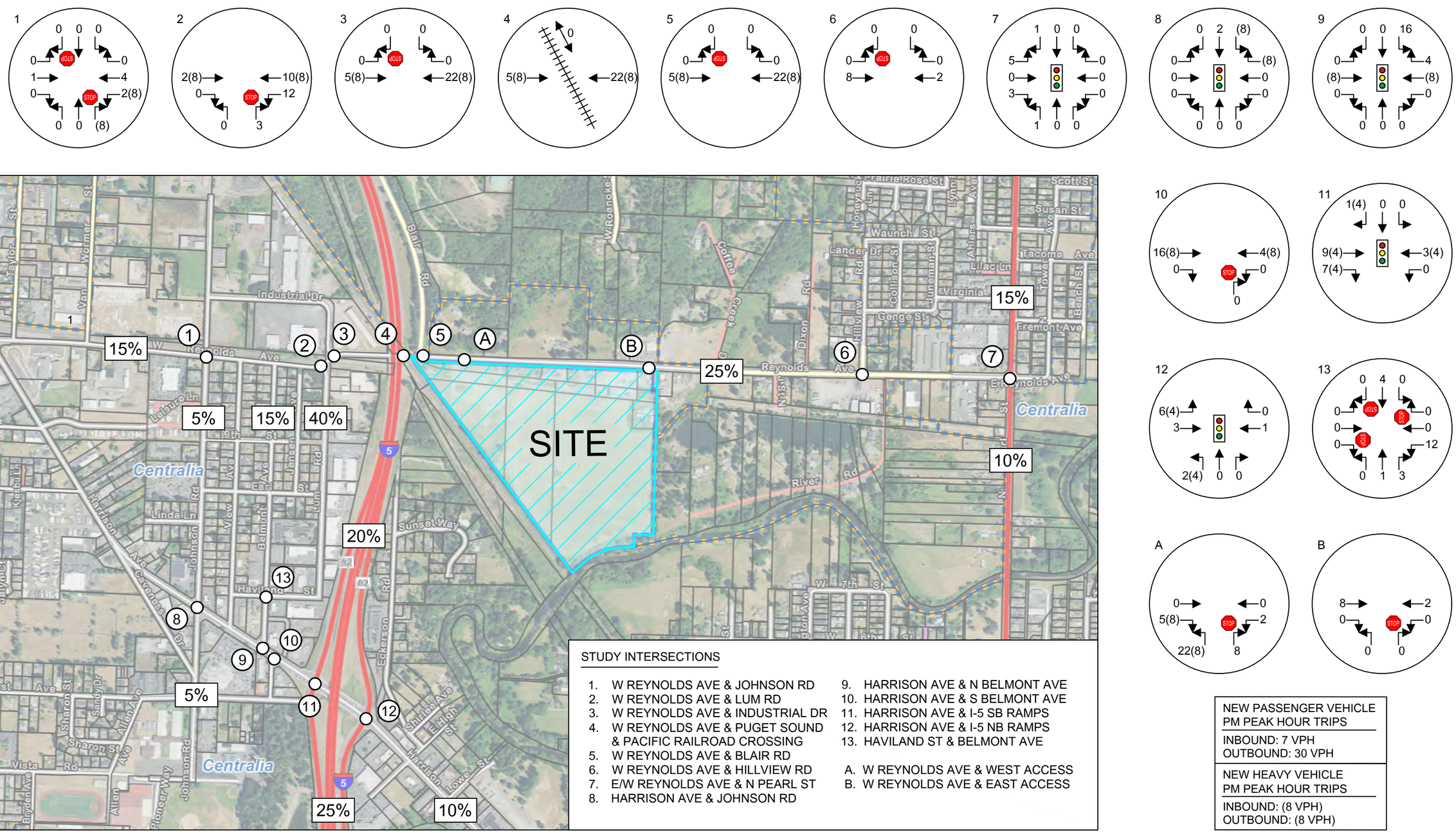

STUDY INTERSECTIONS

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11. HARRISON AVE & I-5 SB RAMPS
12. HARRISON AVE & I-5 NB RAMPS
13. HAVILAND ST & BELMONT AVE

A. W REYNOLDS AVE & WEST ACCESS
B. W REYNOLDS AVE & EAST ACCESS

NEW PASSENGER VEHICLE PM PEAK HOUR TRIPS
INBOUND: 7 VPH OUTBOUND: 30 VPH
NEW HEAVY VEHICLE PM PEAK HOUR TRIPS
INBOUND: (8 VPH) OUTBOUND: (8 VPH)

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PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT: BUILDING B
FIGURE 5

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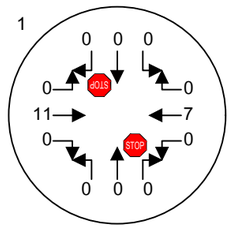

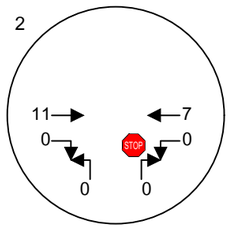

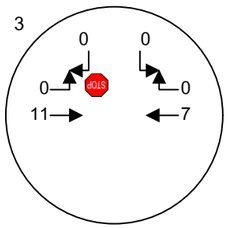

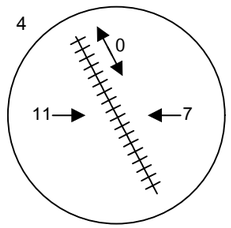

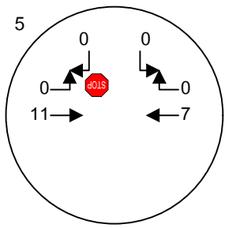

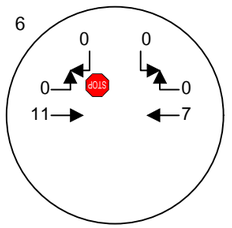

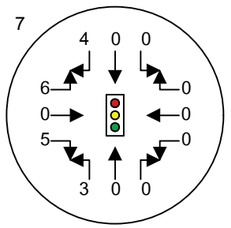

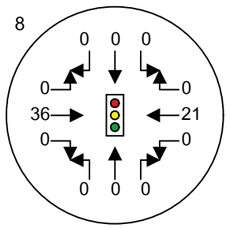

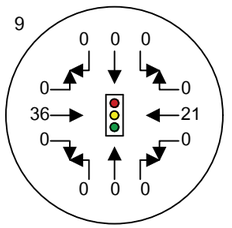

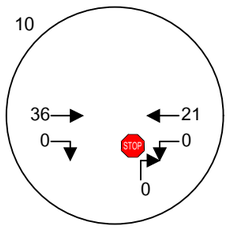

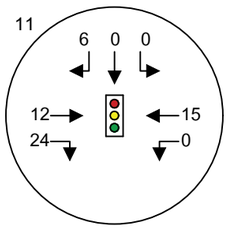

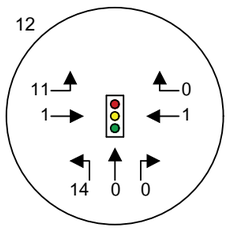

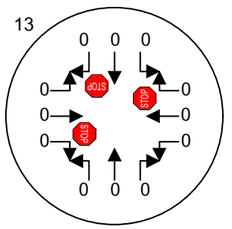

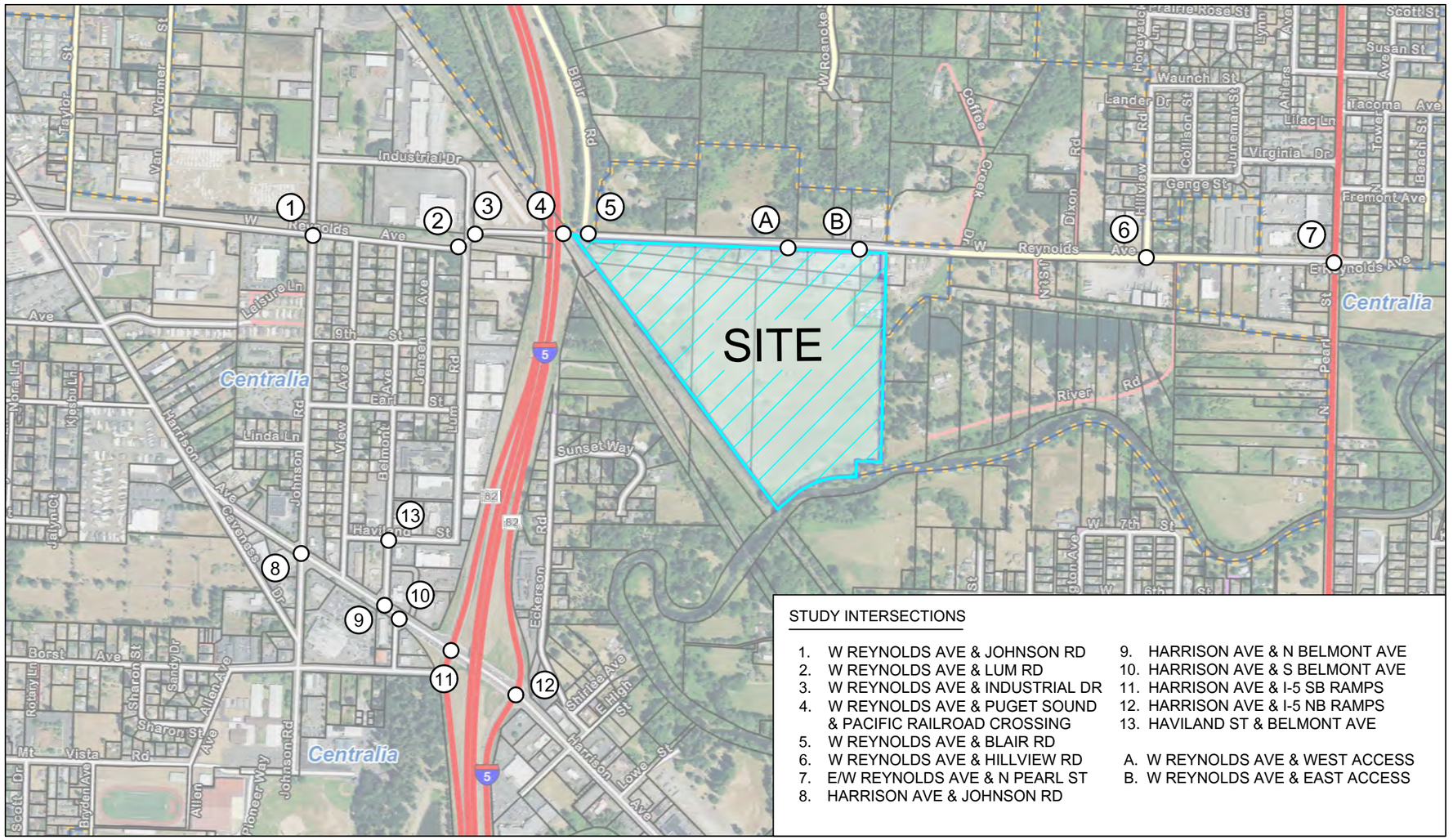

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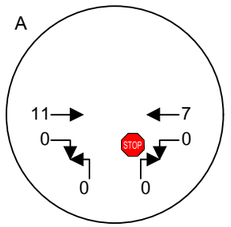

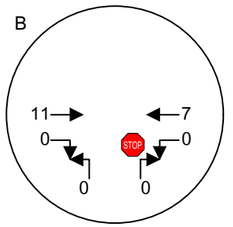

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PM PEAK HOUR PIPELINE VOLUMES
FIGURE 6

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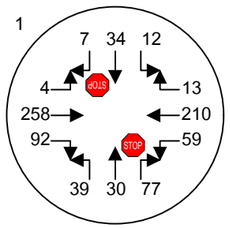

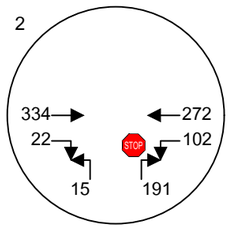

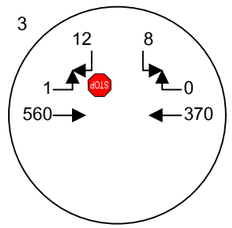

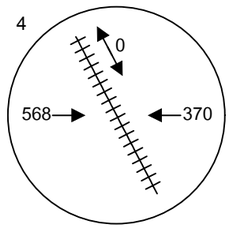

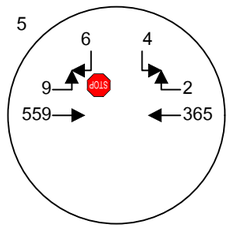

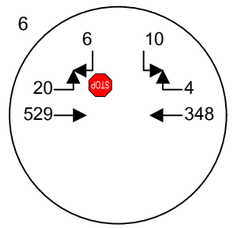

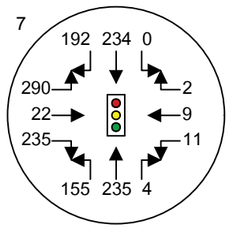

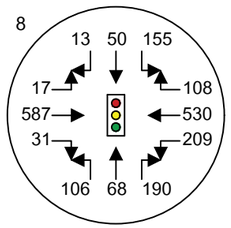

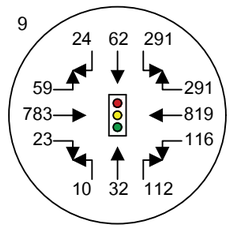

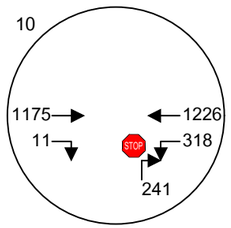

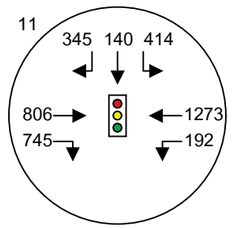

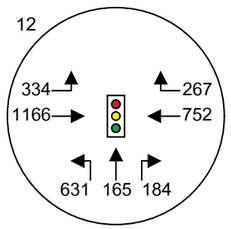

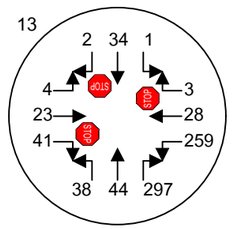

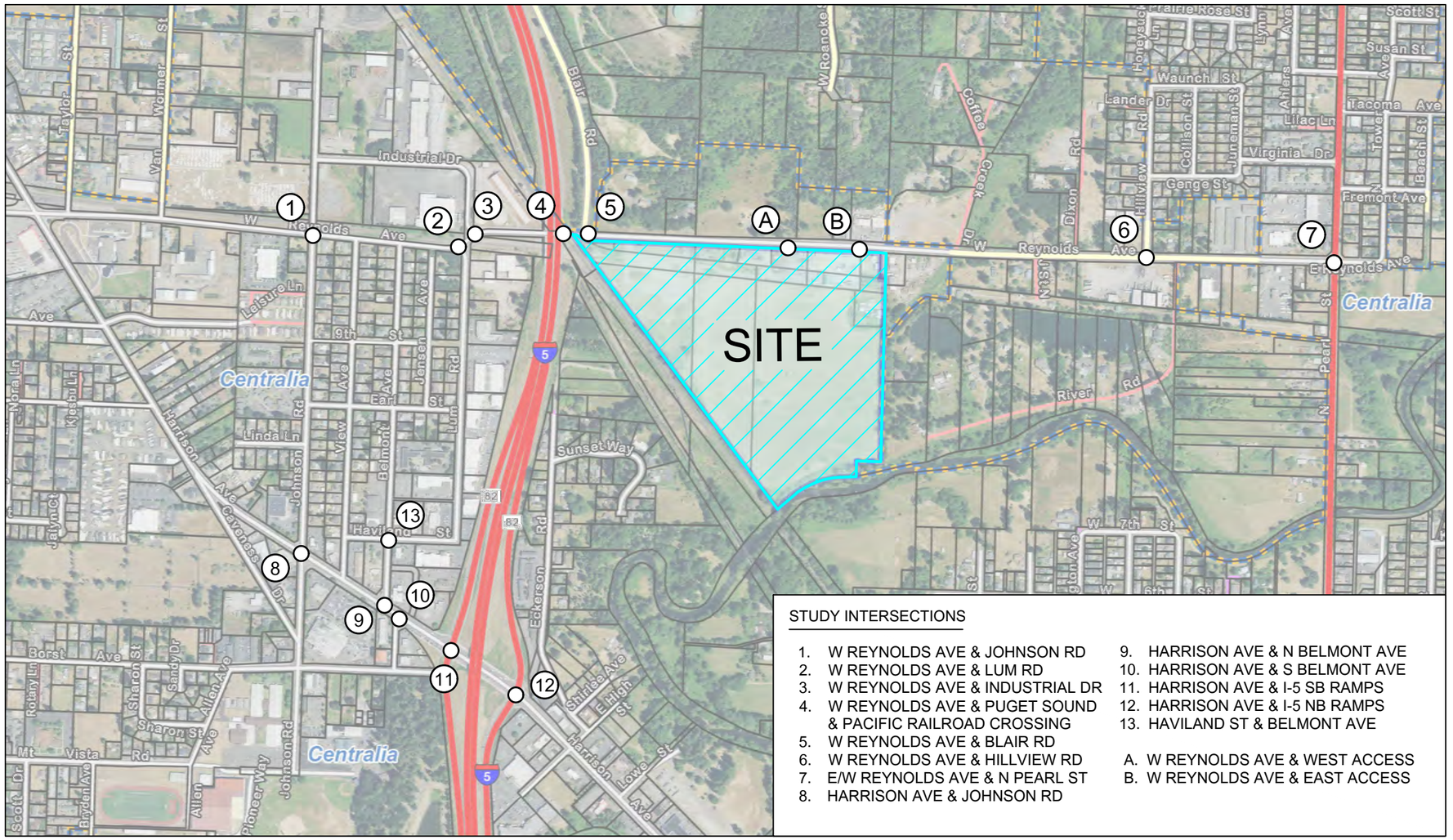

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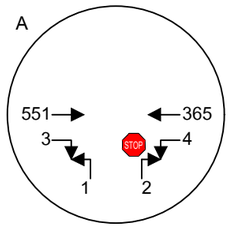

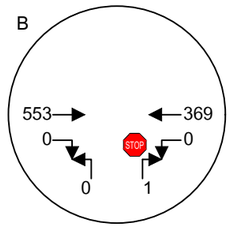

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FORECAST 2028 PM PEAK HOUR BACKGROUND VOLUMES
FIGURE 7

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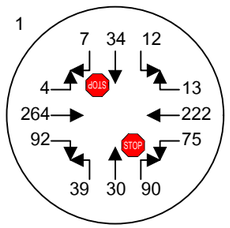

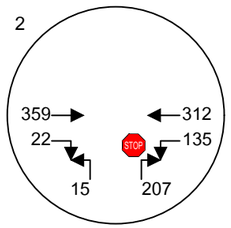

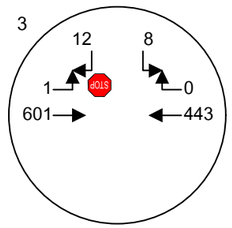

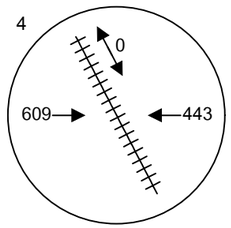

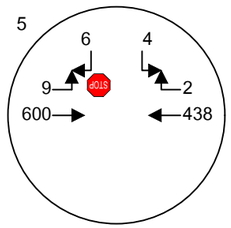

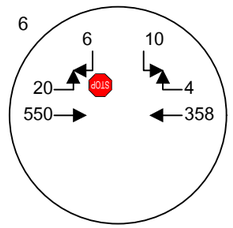

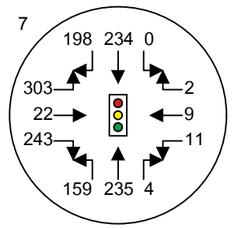

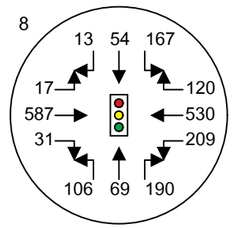

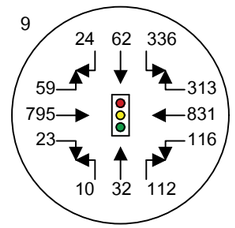

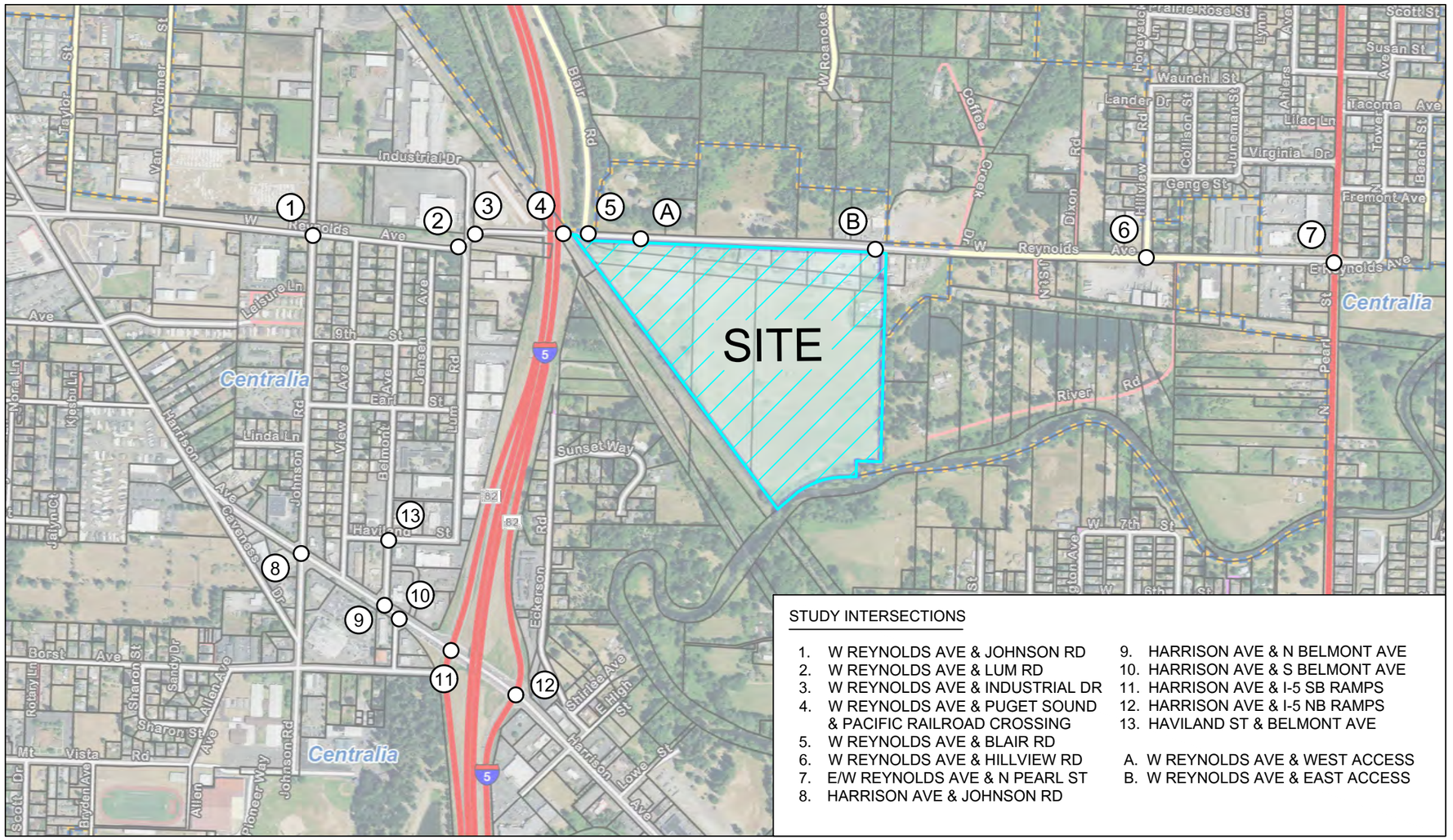

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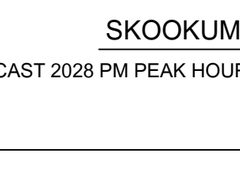

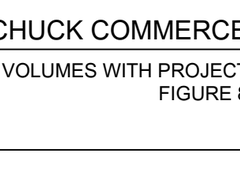

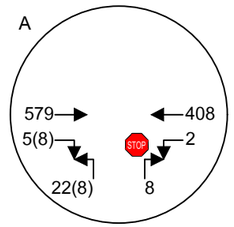

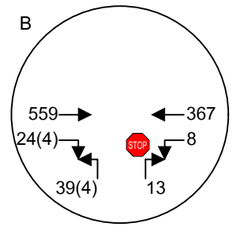

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FORECAST 2028 PM PEAK HOUR VOLUMES WITH PROJECT
FIGURE 8

4.4 Future Level of Service

Level of service analyses were made of the future PM peak hour volumes without (background) and with project related trips added to the key roadways and intersections. This analysis once again involved the use of the *Synchro 12* analysis program. Delays for the outlying study intersections and project accesses under future conditions are shown below in Table 4.

Table 4: Forecast 2028 Weekday PM Peak Hour Level of Service

Delays Given in Seconds per Vehicle

				Without Project		*With Project*	
Ref. #	**Intersection**	**Control**	**Movement**	**LOS**	**Delay**	**LOS**	**Delay**
1	W Reynolds Ave & Johnson Rd	Stop	NB	D	25.2	D	31.3
2	W Reynolds Ave & Lum Rd	Stop	NB	B	13.3	B	14.2
3	W Reynolds Ave & Industrial Dr	Stop	SB	B	14.3	C	15.8
4	W Reynolds Ave & Blair Rd	Stop	SB	B	14.6	C	16.2
6	W Reynolds Ave & Hillview Rd	Stop	SB	C	17.5	C	18.1
7	E/W Reynolds Ave & N Pearl St	Signal	Overall	C	23.4	C	24.2
8	Harrison Ave & Johnson Rd	Signal	Overall	D	43.1	D	45.3
9	Harrison Ave & N Belmont Ave	Signal	Overall	C	24.7	C	27.3
10	Harrison Ave & S Belmont Ave	Stop	NB	C	24.0	D	26.0
11	Harrison Ave & I-5 SB Ramps	Signal	Overall EB R	C A	20.0 9.0	C B	20.7 11.0
12	Harrison Ave & I-5 NB Ramps	Signal	Overall	C	27.1	C	28.0
13	Haviland St & Belmont Ave	Stop	WB	A	8.8	B	13.9
A	W Reynolds Ave & W Access	Stop	NB	B	14.7	C	23.1
B	W Reynolds Ave & E Access	Stop	NB	B	12.5	C	21.7

Forecast 2028 PM peak hour level of service at the outlying study intersections were shown to operate with LOS D or better conditions without and with project-generated traffic. As such, all study intersections were shown to meet City service level standards.

As illustrated in Table 4, acceptable LOS B conditions are calculated for the eastbound right turn lane at the Harrison Ave & I-5 Southbound Ramps intersection. Phasing for this movement was modified to permit right-turns on red.

Lastly, the proposed accesses on W Reynolds Avenue were shown to operate with LOS C conditions with project-generated traffic. It should be noted that corridor improvements are outlined in the City's TIP for W Reynolds Avenue from Harrison Avenue to N Tower Avenue, which includes the project frontage. To present a conservative analysis, W Reynolds Avenue along the project frontage was modeled as currently configured under forecast analysis (i.e.: no two-way left-turn lane). Service levels were shown to operate acceptably at the proposed project accesses on W Reynolds Avenue. The corridor improvement would likely reduce future delays. Overall, no operational deficiencies are identified as a result of the development proposal.

4.5 Project Access

Primary access to/from the subject site is proposed via three driveways extending south from W Reynolds Avenue. Access to Building A is to be provided solely via the easterly driveway. The westerly and central driveways are to provide access to Building B, with both heavy and passenger vehicle trips occurring at both driveways. By providing two accesses to Building B, greater vehicular maneuverability will be available. No internal connectivity is to be provided between the two buildings and accesses serving each respective structure. Refer to Figure 2 for more details regarding site access.

Accounting for heavy vehicle turning maneuvers, minimum entering sight distance (ESD) of 595-feet is recommended at the three project driveways on W Reynolds Avenue using AASHTO standards based on the 35-mph speed limit. Preliminary measurements indicate that sight lines are available in excess of 650-feet at all proposed project driveways in both the east and west directions. Overall, no sight line deficiencies are identified as a result of the development proposal.

4.6 Turn Warrant Analysis

Turn lanes are a means of providing necessary storage space for right and left turning vehicles at intersections. For this impact study, procedures described by the WSDOT Design Manual Exhibit 1310-19 (right turn) and Exhibit 1310-7a (left turn) were used to ascertain storage requirements at the driveways on W Reynolds Avenue serving the subject site. As previously noted, volumes at the westerly driveway represent a consolidated access scenario, as two driveways are proposed to serve Building B. Table 5 on the following page outlines the respective turn lane warrants conducted for each project access and outputs identified within the warrant nomographs. The turn lane exhibit sheets have been included in the appendix.

Table 5: Turn Lane Warrant Analysis at Project Accesses

Intersection	Turn Lane Warrant	Nomograph Output
Building B: W Reynolds Ave & West Consolidated Access	Right	Consider pocket/taper
	Left	Not warranted
Building A: W Reynolds Ave & East Access	Right	Not warranted
	Left	Not warranted

Based on the criteria set forth in the warrant calculations, left turn lanes *would not be warranted* under forecast 2028 PM peak hour conditions at the proposed project driveways. No right turn lane was found to be warranted at the westerly consolidated access serving Building B. However, the nomograph indicted a right turn pocket or taper may be considered at the easterly project access serving Building A. Despite the consideration, it should be noted that acceptable level of service (LOS C delays) was identified at the access.

Given turn lane warrants and discussions with the City, a right turn deceleration lane will be included at the easterly project access. An AutoTurn analysis was conducted at the easterly access, which showed no turning movement deficiencies. AutoTurn exhibits are attached in the appendix for reference.

4.7 Safety Analysis

Collision History Analysis

A list of the recorded incident history for the five most recent full years (beginning of 2018 through end of 2022) for all state route intersections (including ramp terminals) was requested from WSDOT. Table 6 below outlines yearly incident history and crash rates per million entering vehicles at the WSDOT study intersections, noting collisions that occurred at and/or related to the study intersection.

Table 6: Collision History Overview

Intersection	AADT	2018	2019	2020	2021	2022	Avg/Yr	Crash Rate (MEV)
7. Reynolds Ave & SR 507 (Pearl)	12,420	4	7	3	2	3	3.8	0.84
11. Harrison Ave & I-5 SB Ramps	34,940	14	8	10	11	12	11.0	0.86
12. Harrison Ave & I-5 NB Ramps	31,450	17	15	13	8	10	12.6	1.10

A total of 137 collisions were recorded at the three study intersections. The following sections analyze collision types, severity and contributing factors in an effort to identify any potential trends. Lastly, *Highway Safety Manual (HSM)* tools were utilized to analyze predicted versus expected average crash rate frequencies for all WSDOT intersections.

Collision Type Analysis

Summaries of collision types that occurred at and/or related to each study intersection are provided in Table 7 below.

Table 7: Collision History Crash Types

Crash Type	Number of Crashes (2018-2022)		
	Int. Ref. #7	Int. Ref. #11	Int. Ref. #12
Rear-end	7	19	27
Entering at angle	3	19	17
From opp. direction – one left, one straight	6	4	1
From opp. direction – one left, one right		4	2
From same direction – one left, one straight		2	5
Sideswipe		6	9
From same direction - all others	1		
From opp. – all others		1	
Vehicle strikes signpost/barrier/fence	1	2	2
Vehicle - pedalcyclist	1	1	
Vehicle – pedestrian		1	

7. Reynolds Ave & SR 507 (Pearl): a total of 19 collisions were recorded over the 5-year study timeframe, resulting in an average of 3.8 incidents per year. Collision types included "rear-ends" (7/19), "from opposite direction - one left turn - one straight" (6/19), "entering at angle" (3/19), "from same direction - all others" (1/19), "metal signpost" (1/19) and "pedalcyclist strikes moving vehicle" (1/19).

11. Harrison Ave & I-5 SB Ramps: a total of 55 collisions were recorded over the 5-year study timeframe, resulting in an average of 11.0 incidents per year. Collision types included "rear-ends" (19/55), "entering at angle" (19/55), "sideswipe" (6/55), "from opposite direction - one left turn - one straight" (4/55), "from same direction – one left, one straight" (2/55), "concrete barrier/linear curb" (2/55), "from opposite – all others" (1/55), "vehicle turning right hits pedestrian" (1/55) and "vehicle strikes pedalcyclist" (1/55).

12. Harrison Ave & I-5 NB Ramps: a total of 63 collisions were recorded over the 5-year study timeframe, resulting in an average of 12.6 incidents per year. Collision types included "rear-ends" (27/63), "entering at angle" (17/63), "sideswipe" (9/63), "from same direction - one left turn - one straight" (5/63), "from opposite direction - one left turn - one right turn" (2/63), "fence/street light pole" (2/63) and "from opposite direction - one left turn - one straight" (1/63).

Collision Severity Analysis

A collision severity summary associated with the study intersection is provided below in Table 8.

Table 8: Collision History Severity

Crash Type	Number of Crashes (2018-2022)		
	Int. Ref. #7	Int. Ref. #11	Int. Ref. #12
Fatal (K)	0	0	0
Incapacitating Injury (A)	0	1	0
Non-incapacitating Injury (B)	1	2	1
Possible Injury (C)	4	14	13
Property Damage Only (PDO)	14	38	49

7. Reynolds Ave & SR 507 (Pearl): a total of 19 collisions were recorded over the 5-year study timeframe, resulting in an average of 3.8 incidents per year. The majority of collisions resulted in "no apparent injury / property damage only / unknown" (14/19) with the remaining collisions resulting in "possible injury" (4/19), "suspected minor injury" (1/19). The collision resulting in suspected minor injury involved a pedalcyclist striking a moving vehicle. No fatalities were recorded.

11. Harrison Ave & I-5 SB Ramps: a total of 55 collisions were recorded over the 5-year study timeframe, resulting in an average of 11.0 incidents per year. The majority of collisions resulted in "no apparent injury / property damage only / unknown" (38/55). The remaining collisions resulted in "possible injury" (14/55), "suspected minor injury" (2/55) and "suspected serious injury" (1/55). The collision resulting in suspected minor injury involved a vehicle turning right striking a pedestrian. The collision resulting in suspected serious injury involved a vehicle turning left striking a pedalcyclist. No fatalities were recorded.

12. Harrison Ave & I-5 NB Ramps: a total of 63 collisions were recorded over the 5-year study timeframe, resulting in an average of 12.6 incidents per year. The majority of collisions resulted in "no apparent injury / property damage only" (49/63) with the remaining collisions resulting in "possible injury" (13/63) and "suspected minor injury" (1/63). The collision resulting in suspected minor injury involved a vehicles striking fencing on the side of the roadway and the driver was under the influence. No fatalities were recorded at the intersection.

Collision Contributing Factor Analysis & Trends

Summaries of factors contributing to the collisions recorded at each respective intersection are outlined below. Moreover, given the preceding collision data (i.e.: severity, type, etc.), general trends are discussed for each intersection.

7. Reynolds Ave & SR 507 (Pearl): Over the 5-year analysis period, collision circumstances were primarily contributed to "inattention/distraction" (9/19). Additional circumstances included "did not grant RW to vehicle" (4/9), "improper turn/merge/backing" (3/19) and "following too closely" (2/19). The incident involving the pedalcyclist was contributed to the cyclist being under the influence of alcohol and not granting right-of-way to the vehicle. The remaining incident (1/19) did not have a contributing collision circumstance listed. In review of overall trends, minimal injury occurred as a result of the collisions and incidents were primarily contributed to driver inattention. No intersection geometry concerns are identified.

11. Harrison Ave & I-5 SB Ramps: Over the 5-year analysis period, collision circumstances were primarily contributed to driver error via "inattention/distraction" (17/55), "disregard traffic signal" (12/55) and "following too closely" (11/55). Additional circumstances included "improper turn/merge" (3/55), "exceeding reasonably safe speed" (2/55) and "did not grant RW to vehicle" (1/55). The incident involving the pedalcyclist was contributed to the non-motorist being on the wrong side of the road as the vehicle performed a westbound left-turn maneuver (suspected serious injury). The incident involving the pedestrian involved a distracted driver performing an eastbound right-turn striking the non-motorist (suspected minor injury) The remaining incidents (8/55) did not have a contributing collision circumstance listed. In review of overall trends, minimal injury occurred as a result of the collisions and incidents were primarily contributed to driver error/inattention. No intersection geometry concerns are identified.

12. Harrison Ave & I-5 NB Ramps: Over the 5-year analysis period, collision circumstances were primarily contributed to driver error via "inattention/distraction" (20/63), "disregard traffic signal" (11/63) and "following too closely" (6/63). Additional circumstances included "did not grant RW to vehicle" (7/63), "improper turn/merge" (4/63), "driver under influence of alcohol" (4/63), "exceeding reasonably safe speed" (2/63) and "operating defective equipment (1/63). The remaining incidents (8/63) did not have a contributing collision circumstance listed. No incidents involved non-motorists. In review of overall trends, minimal injury occurred as a result of the collisions and incidents were primarily contributed to driver error/inattention. No intersection geometry concerns are identified.

Safety Analysis: Highway Safety Manual & WSDOT Protocol

Based on comments by WSDOT, a predictive safety analysis was conducted for the three WSDOT study intersections utilizing *AASHTO: Highway Safety Manual (HSM) Tools - Predictive Method for Urban and Suburban Arterials* methodologies. Table 9 below summarizes HSM predicted and expected average crash frequencies for the intersections under forecast conditions with project traffic. Data is broken down to depict average crash frequencies for fatal/injury collisions and collisions involving property damage only (PDO).

Table 9: HSM Predictive Method Crash Rates – Forecast 2028 With Project

Safety Performance Metric	***Typical performance of similar intersections: Predicted ave. crash frequency (crashes/yr)***			***Ave. performance of study intersection: Expected ave. crash frequency (crashes/yr)***			***Potential for improvement: Excess ave. crash frequency (crashes/ yr)***		
	Int. #7	*Int. #11*	*Int. #12*	*Int. #7*	*Int. #11*	*Int. #12*	*Int. #7*	*Int. #11*	*Int. #12*
Injury & Fatal	*0.52*	*2.07*	*1.77*	*0.50*	*1.96*	*1.74*	*0.00*	*0.00*	*0.00*
PDO	*1.04*	*3.80*	*3.23*	*1.01*	*3.60*	*3.31*	*0.00*	*0.00*	*0.08*
Total	*1.56*	*5.87*	*5.00*	*1.51*	*5.56*	*5.05*	*0.00*	*0.00*	*0.05*

As illustrated in Table 9 and based on the analysis, it is anticipated that the intersections of Reynolds Avenue & SR 507 (Pearl) and Harrison Avenue & I-5 Southbound Ramps will have a safety performance similar to other intersections that have the same roadway characteristics and traffic volumes. Moreover, while Harrison Avenue & I-5 Northbound Ramps has a slightly higher overall expected average crash frequency compared to predicted, the increase in average crashes is to comprise property damage only type collisions.

As such, all of the study intersections indicated the potential to comprise lesser "fatal and all injury crashes" per year compared for similar intersections with the same traffic volume. In other words, the intersections are performing as expected.

5. CONCLUSIONS & MITIGATION

Skookumchuck Commerce proposes for the development of two industrial buildings in the city of Centralia. Development is to occur within an approximate 54-acre area, which comprises a site address of 1406 W Reynolds Avenue. Building A is to comprise approximately 483,276 square feet while Building B is proposed to entail 295,356 square feet. Three driveways extending south from W Reynolds Avenue are proposed to serve the subject site. A rail spur is proposed to extend into the subject site from the Puget Sound & Pacific rail line located just west of the subject site. Refer to Figure 2, the conceptual site plan, for more details.

Based on ITE (AWDT) and operational data provided by the tenant for Building A, the 483,276 square foot building is anticipated to generate 826 average weekday daily trips, 59 AM peak hour trips and 92 PM peak hour trips. ITE data for Building B indicates the westerly building to generate approximately 505 AWDT, 50 AM peak hour trips and 53 PM peak hour trips. A portion of these trips are anticipated to be in the form of heavy vehicle, which is outlined in Table 3.

Existing PM peak hour level of service (LOS) at the intersections of study indicated LOS C or better conditions. Forecast LOS analysis was performed using a five-year horizon which included a background growth rate, pipeline volumes associated with two nearby projects and project-generated traffic added to the roadway network. Forecast 2028 PM peak hour delays are anticipated to operate with LOS D or better delays at all outlying study intersections. Moreover, the project driveways on W Reynolds Avenue were shown to operate acceptably with LOS C conditions. No operational deficiencies from the development proposal are identified.

Lastly, turn lane warrants were analyzed at the consolidated west access serving Building B and the easterly access serving Building A. No left-turn lanes were found to be warranted at the accesses based on forecast 2028 PM peak hour conditions with project-generated traffic. A right-turn pocket/taper may be considered at the easterly W Reynolds Avenue project driveway. However, the driveways are shown to operate with acceptable service levels and meet City standards.

Based on this analysis, recommended mitigation is as follows:

1. Pay traffic impact fees as required by the city of Centralia. Exact fees and calculations will be determined by the City per building based on their respective trip generations. Building A on-site is anticipated to generate 84 PM peak hour trips while Building B is estimated to generate 54 PM peak hour trips. Credit may be received for the removal of existing on-site structures, which include three single-family residences and a landscaping supply store/facility. Refer to Table 3 for trip generation estimates associated with Buildings A and B and net new site trips.

2. The City's Transportation Improvement Program indicates that corridor improvements are planned for W Reynolds Avenue along the project frontage, which include roadway widening and the construction of a center two-way left-turn lane. Warrant nomographs indicated that left-turn lanes were not found to be warranted at the project driveways on W Reynolds Avenue at the time of full project build-out. As such, coordination should be made with the City regarding right-of-way dedication and/or frontage improvements required along the project frontage.

No other mitigation is identified at this time.

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

INTERSECTION COUNT SHEETS

Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 5075l
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Johnson Rd Southbound				W Reynolds Ave Westbound				Johnson Rd Northbound				W Reynolds Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	3	8	3	14	2	58	18	78	24	7	9	40	34	70	1	105	237
03:45 PM	1	7	4	12	0	47	15	62	23	10	8	41	20	52	1	73	188
Total	4	15	7	26	2	105	33	140	47	17	17	81	54	122	2	178	425
04:00 PM	1	11	1	13	4	39	9	52	14	6	7	27	16	44	2	62	154
04:15 PM	1	5	3	9	6	40	11	57	9	4	11	24	13	58	0	71	161
04:30 PM	0	8	2	10	1	44	25	70	18	4	2	24	29	38	0	67	171
04:45 PM	1	2	5	8	1	30	17	48	33	4	9	46	9	44	2	55	157
Total	3	26	11	40	12	153	62	227	74	18	29	121	67	184	4	255	643
05:00 PM	2	5	2	9	3	26	10	39	14	1	6	21	7	37	0	44	113
05:15 PM	1	1	3	5	2	33	16	51	16	5	10	31	10	38	2	50	137
Grand Total	10	47	23	80	19	317	121	457	151	41	62	254	138	381	8	527	1318
Apprch %	12.5	58.8	28.8		4.2	69.4	26.5		59.4	16.1	24.4		26.2	72.3	1.5		
Total %	0.8	3.6	1.7	6.1	1.4	24.1	9.2	34.7	11.5	3.1	4.7	19.3	10.5	28.9	0.6	40	
Passenger +	10	47	23	80	19	311	118	448	148	41	62	251	134	370	8	512	1291
% Passenger +	100	100	100	100	100	98.1	97.5	98	98	100	100	98.8	97.1	97.1	100	97.2	98
Heavy	0	0	0	0	0	6	3	9	3	0	0	3	4	11	0	15	27
% Heavy	0	0	0	0	0	1.9	2.5	2	2	0	0	1.2	2.9	2.9	0	2.8	2

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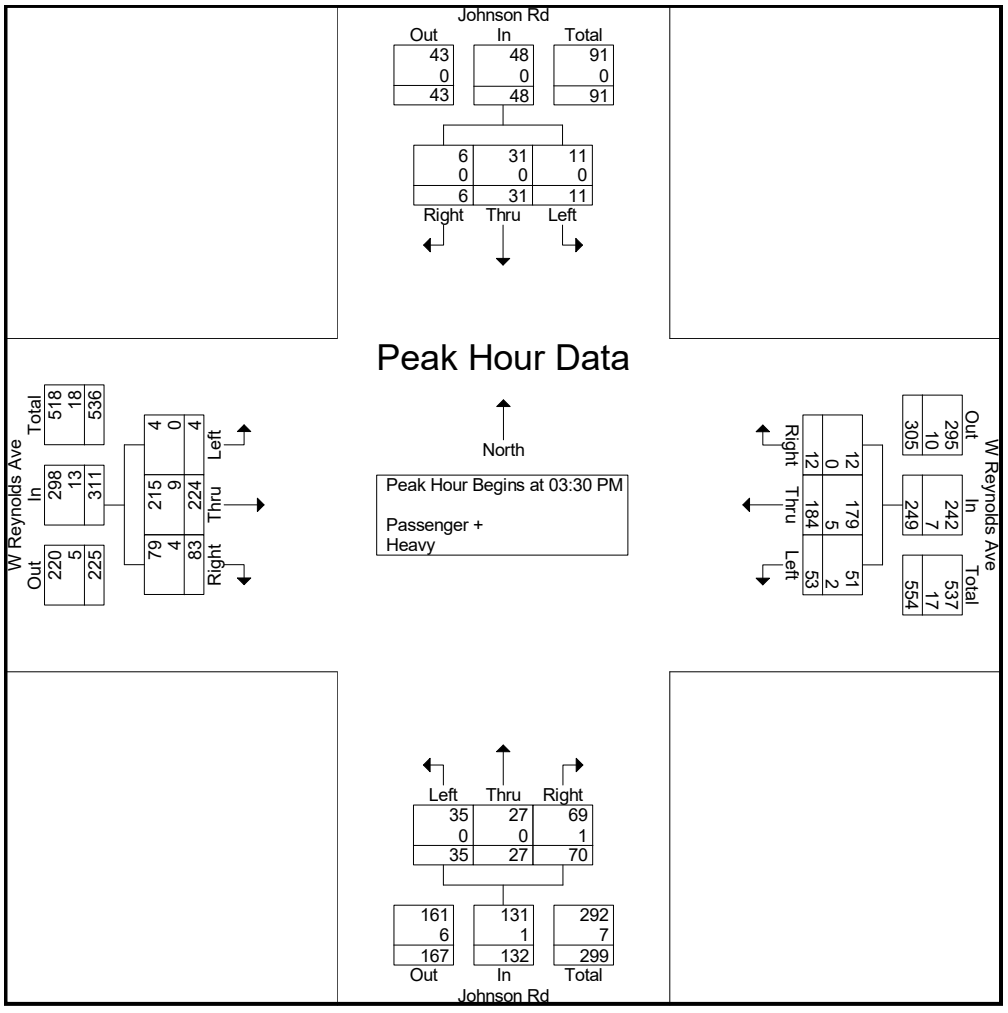
PO Box 397 Puyallup, WA 98371

File Name : 5075l
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Johnson Rd Southbound				W Reynolds Ave Westbound				Johnson Rd Northbound				W Reynolds Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	**3**	8	3	**14**	2	**58**	**18**	**78**	**24**	7	9	40	**34**	**70**	1	**105**	**237**
03:45 PM	1	7	**4**	12	0	47	15	62	23	**10**	8	**41**	20	52	1	73	188
04:00 PM	1	**11**	1	13	4	39	9	52	14	6	7	27	16	44	**2**	62	154
04:15 PM	1	5	3	9	**6**	40	11	57	9	4	**11**	24	13	58	0	71	161
Total Volume	6	31	11	48	12	184	53	249	70	27	35	132	83	224	4	311	740
% App. Total	12.5	64.6	22.9		4.8	73.9	21.3		53	20.5	26.5		26.7	72	1.3		
PHF	.500	.705	.688	.857	.500	.793	.736	.798	.729	.675	.795	.805	.610	.800	.500	.740	.781
Passenger +	6	31	11	48	12	179	51	242	69	27	35	131	79	215	4	298	719
% Passenger +	100	100	100	100	100	97.3	96.2	97.2	98.6	100	100	99.2	95.2	96.0	100	95.8	97.2
Heavy	0	0	0	0	0	5	2	7	1	0	0	1	4	9	0	13	21
% Heavy	0	0	0	0	0	2.7	3.8	2.8	1.4	0	0	0.8	4.8	4.0	0	4.2	2.8



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PO Box 397 Puyallup, WA 98371

File Name : 5075m
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	W Reynolds Ave Westbound			Lum Rd Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
03:30 PM	77	21	98	33	4	37	5	88	93	228
03:45 PM	60	18	78	43	5	48	6	77	83	209
Total	137	39	176	76	9	85	11	165	176	437
04:00 PM	43	25	68	48	3	51	4	61	65	184
04:15 PM	60	28	88	49	2	51	5	67	72	211
04:30 PM	69	26	95	36	3	39	12	52	64	198
04:45 PM	44	26	70	39	3	42	4	74	78	190
Total	216	105	321	172	11	183	25	254	279	783
05:00 PM	36	33	69	51	1	52	3	58	61	182
05:15 PM	45	24	69	46	2	48	4	54	58	175
Grand Total	434	201	635	345	23	368	43	531	574	1577
Apprch %	68.3	31.7		93.8	6.2		7.5	92.5		
Total %	27.5	12.7	40.3	21.9	1.5	23.3	2.7	33.7	36.4	
Passenger +	427	201	628	337	21	358	40	520	560	1546
% Passenger +	98.4	100	98.9	97.7	91.3	97.3	93	97.9	97.6	98
Heavy	7	0	7	8	2	10	3	11	14	31
% Heavy	1.6	0	1.1	2.3	8.7	2.7	7	2.1	2.4	2

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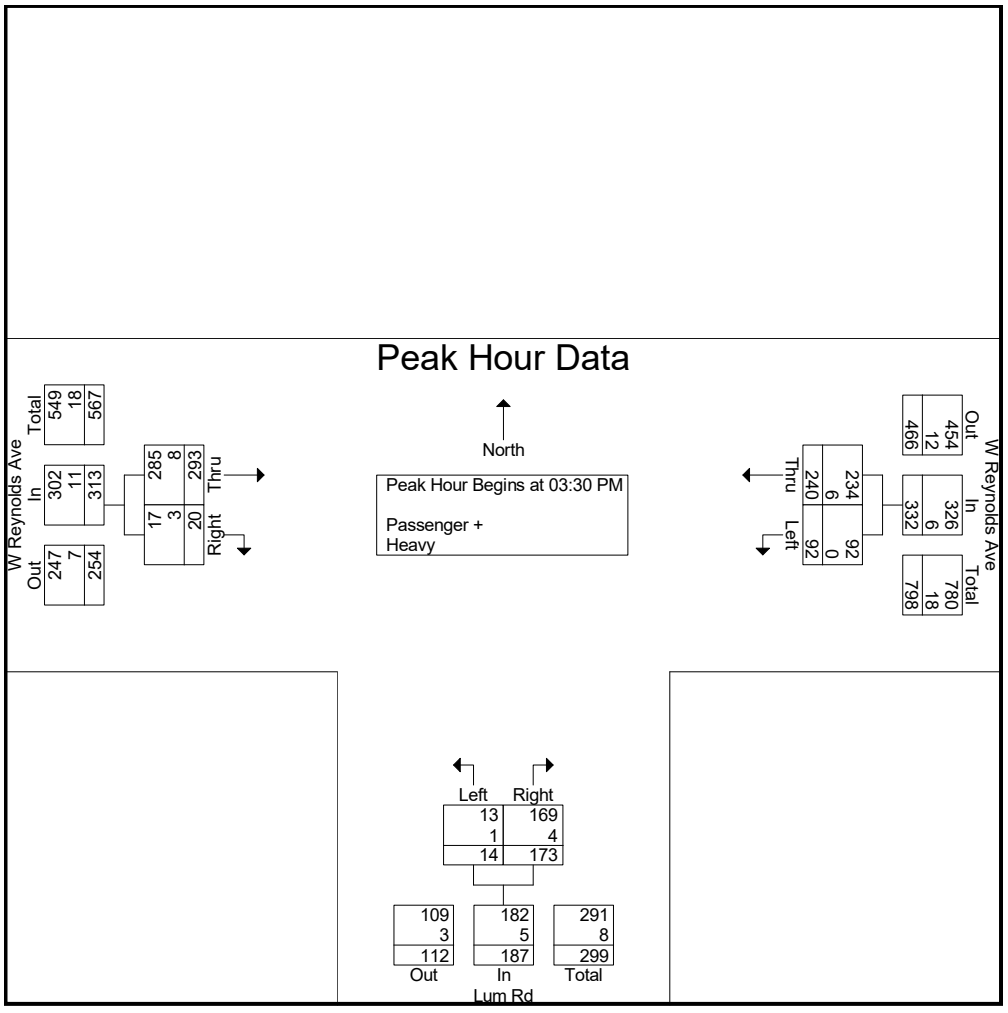
PO Box 397 Puyallup, WA 98371

File Name : 5075m
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	W Reynolds Ave Westbound			Lum Rd Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	**77**	21	**98**	33	4	37	5	**88**	**93**	**228**
03:45 PM	60	18	78	43	**5**	48	**6**	77	83	209
04:00 PM	43	25	68	48	3	**51**	4	61	65	184
04:15 PM	60	**28**	88	**49**	2	51	5	67	72	211
Total Volume	240	92	332	173	14	187	20	293	313	832
% App. Total	72.3	27.7		92.5	7.5		6.4	93.6		
PHF	.779	.821	.847	.883	.700	.917	.833	.832	.841	.912
Passenger +	234	92	326	169	13	182	17	285	302	810
% Passenger +	97.5	100	98.2	97.7	92.9	97.3	85.0	97.3	96.5	97.4
Heavy	6	0	6	4	1	5	3	8	11	22
% Heavy	2.5	0	1.8	2.3	7.1	2.7	15.0	2.7	3.5	2.6



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PO Box 397 Puyallup, WA 98371

File Name : 5075n
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Industrial Dr Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
03:30 PM	4	0	4	0	0	0	0	1	1	5
03:45 PM	1	0	1	0	0	0	0	0	0	1
Total	5	0	5	0	0	0	0	1	1	6
04:00 PM	6	7	13	0	0	0	0	0	0	13
04:15 PM	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	1	1	0	0	0	0	0	0	1
Total	6	8	14	0	0	0	0	0	0	14
05:00 PM	0	1	1	1	0	1	0	0	0	2
05:15 PM	1	2	3	1	0	1	0	0	0	4
Grand Total	12	11	23	2	0	2	0	1	1	26
Apprch %	52.2	47.8		100	0		0	100		
Total %	46.2	42.3	88.5	7.7	0	7.7	0	3.8	3.8	
Passenger +	11	11	22	2	0	2	0	0	0	24
% Passenger +	91.7	100	95.7	100	0	100	0	0	0	92.3
Heavy	1	0	1	0	0	0	0	1	1	2
% Heavy	8.3	0	4.3	0	0	0	0	100	100	7.7

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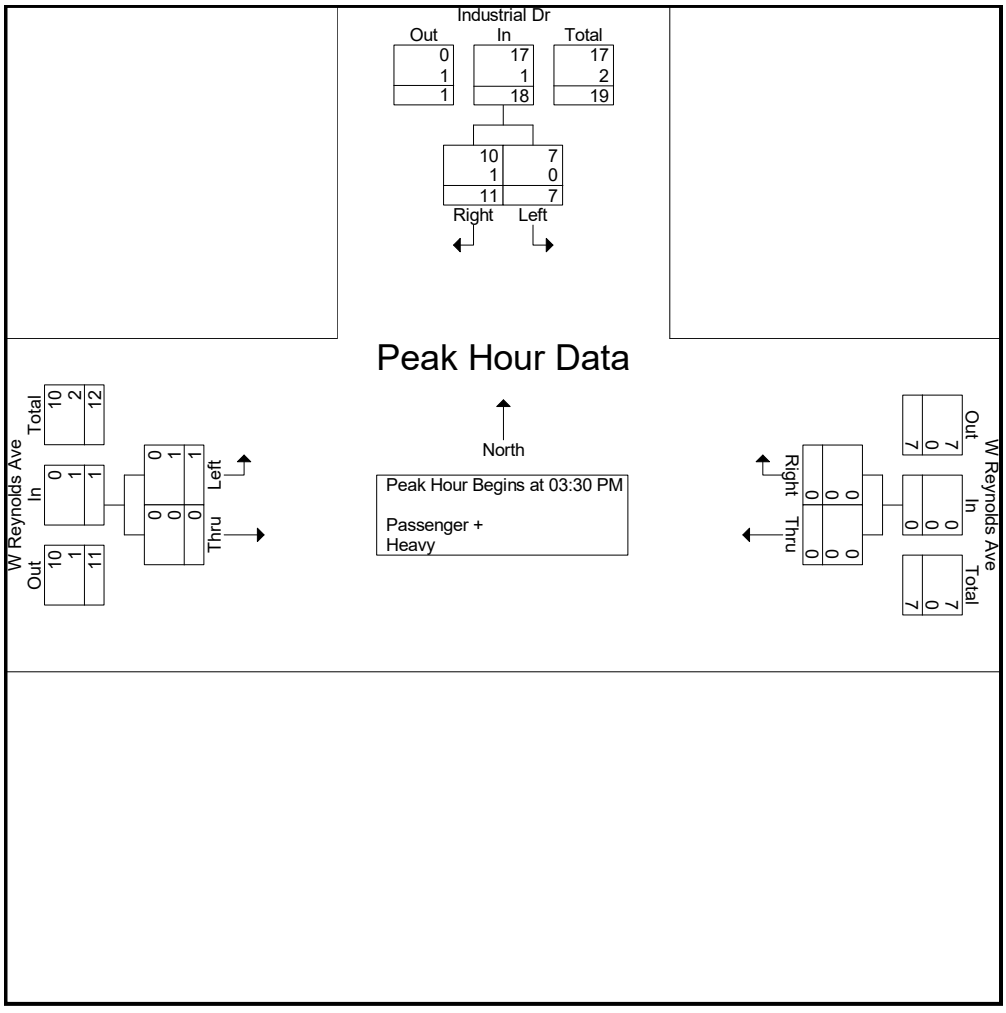
PO Box 397 Puyallup, WA 98371

File Name : 5075n
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Industrial Dr Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	4	0	4	0	0	0	0	**1**	**1**	5
03:45 PM	1	0	1	0	0	0	0	0	0	1
04:00 PM	**6**	**7**	**13**	0	0	0	0	0	0	**13**
04:15 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	11	7	18	0	0	0	0	1	1	19
% App. Total	61.1	38.9		0	0		0	100		
PHF	.458	.250	.346	.000	.000	.000	.000	.250	.250	.365
Passenger +	10	7	17	0	0	0	0	0	0	17
% Passenger +	90.9	100	94.4	0	0	0	0	0	0	89.5
Heavy	1	0	1	0	0	0	0	1	1	2
% Heavy	9.1	0	5.6	0	0	0	0	100	100	10.5



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PO Box 397 Puyallup, WA 98371

File Name : 5075c
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Blair Rd Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
03:30 PM	2	1	3	1	91	92	137	1	138	233
03:45 PM	1	0	1	0	79	79	122	4	126	206
Total	3	1	4	1	170	171	259	5	264	439
04:00 PM	0	2	2	1	77	78	122	1	123	203
04:15 PM	2	1	3	0	77	77	115	2	117	197
04:30 PM	2	0	2	0	97	97	87	1	88	187
04:45 PM	1	0	1	1	68	69	116	1	117	187
Total	5	3	8	2	319	321	440	5	445	774
05:00 PM	2	0	2	0	73	73	115	0	115	190
05:15 PM	0	0	0	1	73	74	107	1	108	182
Grand Total	10	4	14	4	635	639	921	11	932	1585
Apprch %	71.4	28.6		0.6	99.4		98.8	1.2		
Total %	0.6	0.3	0.9	0.3	40.1	40.3	58.1	0.7	58.8	
Passenger +	9	4	13	3	626	629	903	11	914	1556
% Passenger +	90	100	92.9	75	98.6	98.4	98	100	98.1	98.2
Heavy	1	0	1	1	9	10	18	0	18	29
% Heavy	10	0	7.1	25	1.4	1.6	2	0	1.9	1.8

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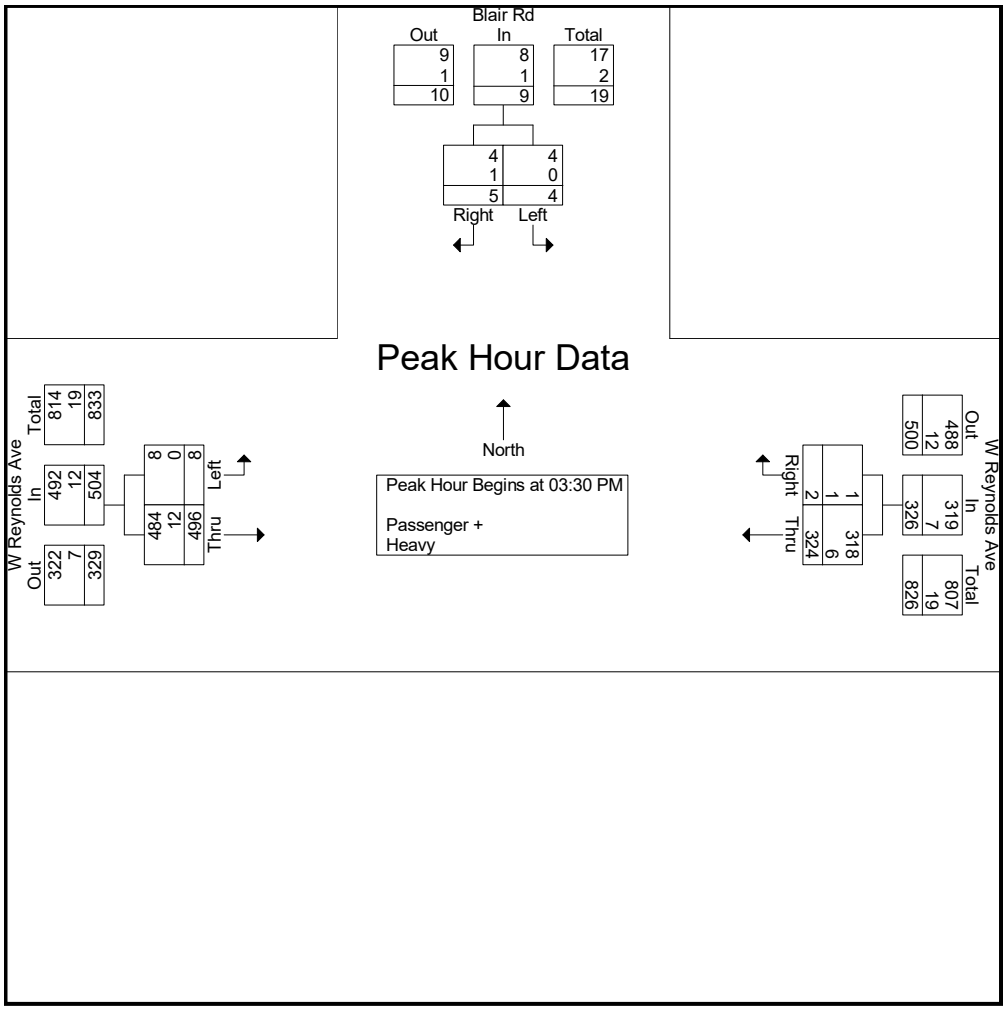
File Name : 5075c
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Blair Rd Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	2	1	3	1	91	92	137	1	138	233
03:45 PM	1	0	1	0	79	79	122	4	126	206
04:00 PM	0	2	2	1	77	78	122	1	123	203
04:15 PM	2	1	3	0	77	77	115	2	117	197
Total Volume	5	4	9	2	324	326	496	8	504	839
% App. Total	55.6	44.4		0.6	99.4		98.4	1.6		
PHF	.625	.500	.750	.500	.890	.886	.905	.500	.913	.900
Passenger +	4	4	8	1	318	319	484	8	492	819
% Passenger +	80.0	100	88.9	50.0	98.1	97.9	97.6	100	97.6	97.6
Heavy	1	0	1	1	6	7	12	0	12	20
% Heavy	20.0	0	11.1	50.0	1.9	2.1	2.4	0	2.4	2.4



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File Name : 5075a
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

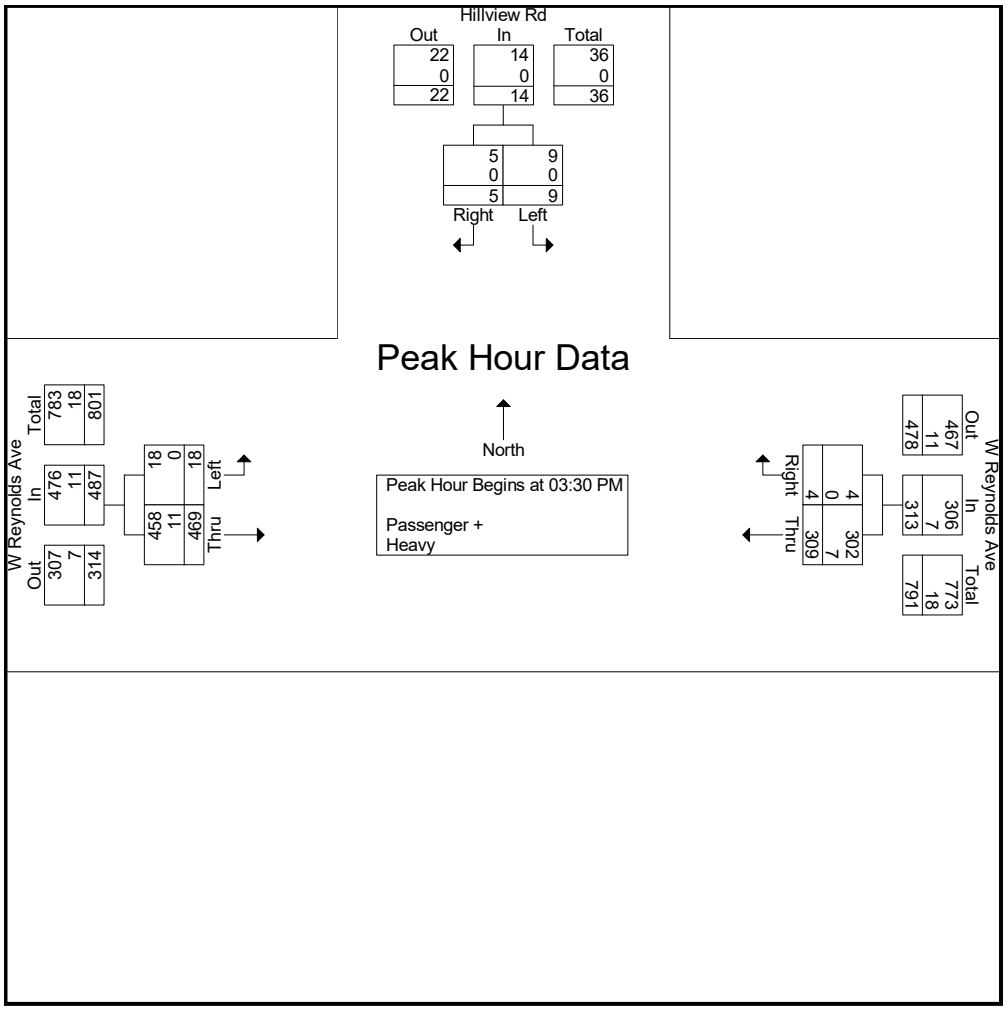
	Hillview Rd Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
03:30 PM	0	4	4	3	96	99	133	3	136	239
03:45 PM	0	0	0	0	69	69	117	3	120	189
Total	0	4	4	3	165	168	250	6	256	428
04:00 PM	4	2	6	1	74	75	117	6	123	204
04:15 PM	1	3	4	0	70	70	102	6	108	182
04:30 PM	5	4	9	6	94	100	88	4	92	201
04:45 PM	0	0	0	3	66	69	110	5	115	184
Total	10	9	19	10	304	314	417	21	438	771
05:00 PM	2	1	3	1	73	74	118	1	119	196
05:15 PM	1	3	4	3	66	69	97	4	101	174
Grand Total	13	17	30	17	608	625	882	32	914	1569
Apprch %	43.3	56.7		2.7	97.3		96.5	3.5		
Total %	0.8	1.1	1.9	1.1	38.8	39.8	56.2	2	58.3	
Passenger +	13	17	30	17	600	617	863	32	895	1542
% Passenger +	100	100	100	100	98.7	98.7	97.8	100	97.9	98.3
Heavy	0	0	0	0	8	8	19	0	19	27
% Heavy	0	0	0	0	1.3	1.3	2.2	0	2.1	1.7

Heath & Associates

PO Box 397 Puyallup, WA 98371

File Name : 5075a
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Hillview Rd Southbound			W Reynolds Ave Westbound			W Reynolds Ave Eastbound			
Start Time	Right	Left	App. Total	Right	Thru	App. Total	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	0	**4**	4	**3**	**96**	**99**	**133**	3	**136**	**239**
03:45 PM	0	0	0	0	69	69	117	3	120	189
04:00 PM	**4**	2	**6**	1	74	75	117	**6**	123	204
04:15 PM	1	3	4	0	70	70	102	6	108	182
Total Volume	5	9	14	4	309	313	469	18	487	814
% App. Total	35.7	64.3		1.3	98.7		96.3	3.7		
PHF	.313	.563	.583	.333	.805	.790	.882	.750	.895	.851
Passenger +	5	9	14	4	302	306	458	18	476	796
% Passenger +	100	100	100	100	97.7	97.8	97.7	100	97.7	97.8
Heavy	0	0	0	0	7	7	11	0	11	18
% Heavy	0	0	0	0	2.3	2.2	2.3	0	2.3	2.2



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PO Box 397 Puyallup, WA 98371

File Name : 5075b
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	N Pearl St Southbound				Reynolds Ave Westbound				N Pearl St Northbound				W Reynolds Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	53	54	0	107	0	1	5	6	0	58	43	101	66	3	70	139	353
03:45 PM	35	53	0	88	1	2	1	4	1	45	29	75	44	6	66	116	283
Total	88	107	0	195	1	3	6	10	1	103	72	176	110	9	136	255	636
04:00 PM	48	54	0	102	0	0	2	2	2	50	29	81	55	8	69	132	317
04:15 PM	34	51	0	85	1	5	2	8	1	60	37	98	43	3	52	98	289
04:30 PM	59	63	0	122	0	1	3	4	1	55	38	94	41	1	40	82	302
04:45 PM	35	48	0	83	0	2	2	4	3	51	29	83	55	5	62	122	292
Total	176	216	0	392	1	8	9	18	7	216	133	356	194	17	223	434	1200
05:00 PM	46	46	0	92	0	0	1	1	0	42	24	66	37	5	74	116	275
05:15 PM	38	48	0	86	0	1	1	2	4	86	26	116	33	4	70	107	311
Grand Total	348	417	0	765	2	12	17	31	12	447	255	714	374	35	503	912	2422
Apprch %	45.5	54.5	0		6.5	38.7	54.8		1.7	62.6	35.7		41	3.8	55.2		
Total %	14.4	17.2	0	31.6	0.1	0.5	0.7	1.3	0.5	18.5	10.5	29.5	15.4	1.4	20.8	37.7	
Passenger +	343	397	0	740	1	12	17	30	12	432	253	697	370	35	488	893	2360
% Passenger +	98.6	95.2	0	96.7	50	100	100	96.8	100	96.6	99.2	97.6	98.9	100	97	97.9	97.4
Heavy	5	20	0	25	1	0	0	1	0	15	2	17	4	0	15	19	62
% Heavy	1.4	4.8	0	3.3	50	0	0	3.2	0	3.4	0.8	2.4	1.1	0	3	2.1	2.6

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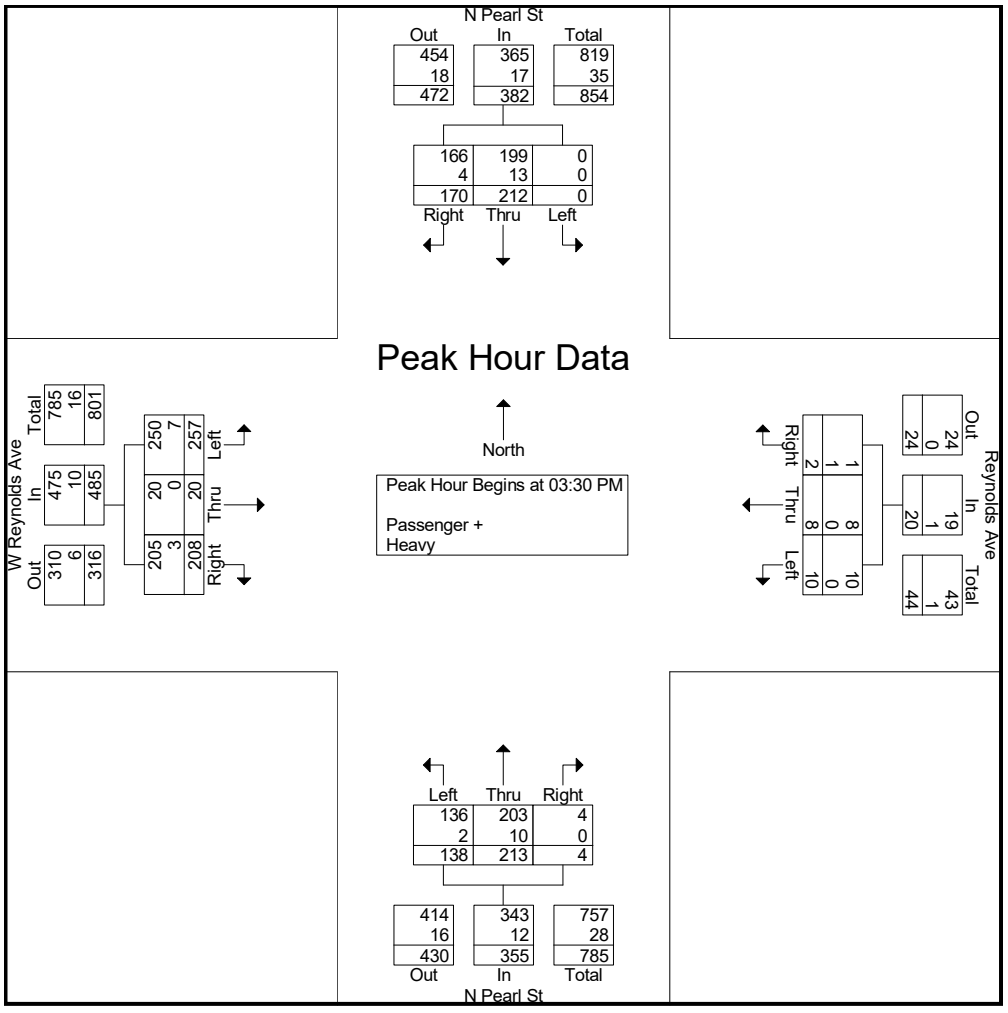
PO Box 397 Puyallup, WA 98371

File Name : 5075b
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	N Pearl St Southbound				Reynolds Ave Westbound				N Pearl St Northbound				W Reynolds Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	**53**	**54**	0	**107**	0	1	**5**	6	0	58	**43**	**101**	**66**	3	**70**	**139**	**353**
03:45 PM	35	53	0	88	**1**	2	1	4	1	45	29	75	44	6	66	116	283
04:00 PM	48	54	0	102	0	0	2	2	**2**	50	29	81	55	**8**	69	132	317
04:15 PM	34	51	0	85	1	**5**	2	**8**	1	**60**	37	98	43	3	52	98	289
Total Volume	170	212	0	382	2	8	10	20	4	213	138	355	208	20	257	485	1242
% App. Total	44.5	55.5	0		10	40	50		1.1	60	38.9		42.9	4.1	53		
PHF	.802	.981	.000	.893	.500	.400	.500	.625	.500	.888	.802	.879	.788	.625	.918	.872	.880
Passenger +	166	199	0	365	1	8	10	19	4	203	136	343	205	20	250	475	1202
% Passenger +	97.6	93.9	0	95.5	50.0	100	100	95.0	100	95.3	98.6	96.6	98.6	100	97.3	97.9	96.8
Heavy	4	13	0	17	1	0	0	1	0	10	2	12	3	0	7	10	40
% Heavy	2.4	6.1	0	4.5	50.0	0	0	5.0	0	4.7	1.4	3.4	1.4	0	2.7	2.1	3.2



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PO Box 397 Puyallup, WA 98371

File Name : 5075k
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Johnson Rd Southbound				Harrison Ave Westbound				Johnson Rd Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	0	8	38	46	16	98	26	140	31	11	25	67	4	137	1	142	395
03:45 PM	5	12	30	47	18	103	53	174	34	13	28	75	5	150	6	161	457
Total	5	20	68	93	34	201	79	314	65	24	53	142	9	287	7	303	852
04:00 PM	4	10	38	52	26	106	52	184	49	14	27	90	9	124	3	136	462
04:15 PM	2	11	33	46	30	132	51	213	52	14	17	83	7	121	4	132	474
04:30 PM	1	12	39	52	24	120	33	177	37	21	24	82	7	104	2	113	424
04:45 PM	4	23	30	57	21	122	43	186	37	22	26	85	5	95	2	102	430
Total	11	56	140	207	101	480	179	760	175	71	94	340	28	444	11	483	1790
05:00 PM	1	10	26	37	18	110	29	157	50	16	18	84	8	122	2	132	410
05:15 PM	0	13	25	38	21	110	45	176	42	28	23	93	7	112	3	122	429
Grand Total	17	99	259	375	174	901	332	1407	332	139	188	659	52	965	23	1040	3481
Apprch %	4.5	26.4	69.1		12.4	64	23.6		50.4	21.1	28.5		5	92.8	2.2		
Total %	0.5	2.8	7.4	10.8	5	25.9	9.5	40.4	9.5	4	5.4	18.9	1.5	27.7	0.7	29.9	
Passenger +	17	98	246	361	166	861	328	1355	325	138	186	649	51	922	22	995	3360
% Passenger +	100	99	95	96.3	95.4	95.6	98.8	96.3	97.9	99.3	98.9	98.5	98.1	95.5	95.7	95.7	96.5
Heavy	0	1	13	14	8	40	4	52	7	1	2	10	1	43	1	45	121
% Heavy	0	1	5	3.7	4.6	4.4	1.2	3.7	2.1	0.7	1.1	1.5	1.9	4.5	4.3	4.3	3.5

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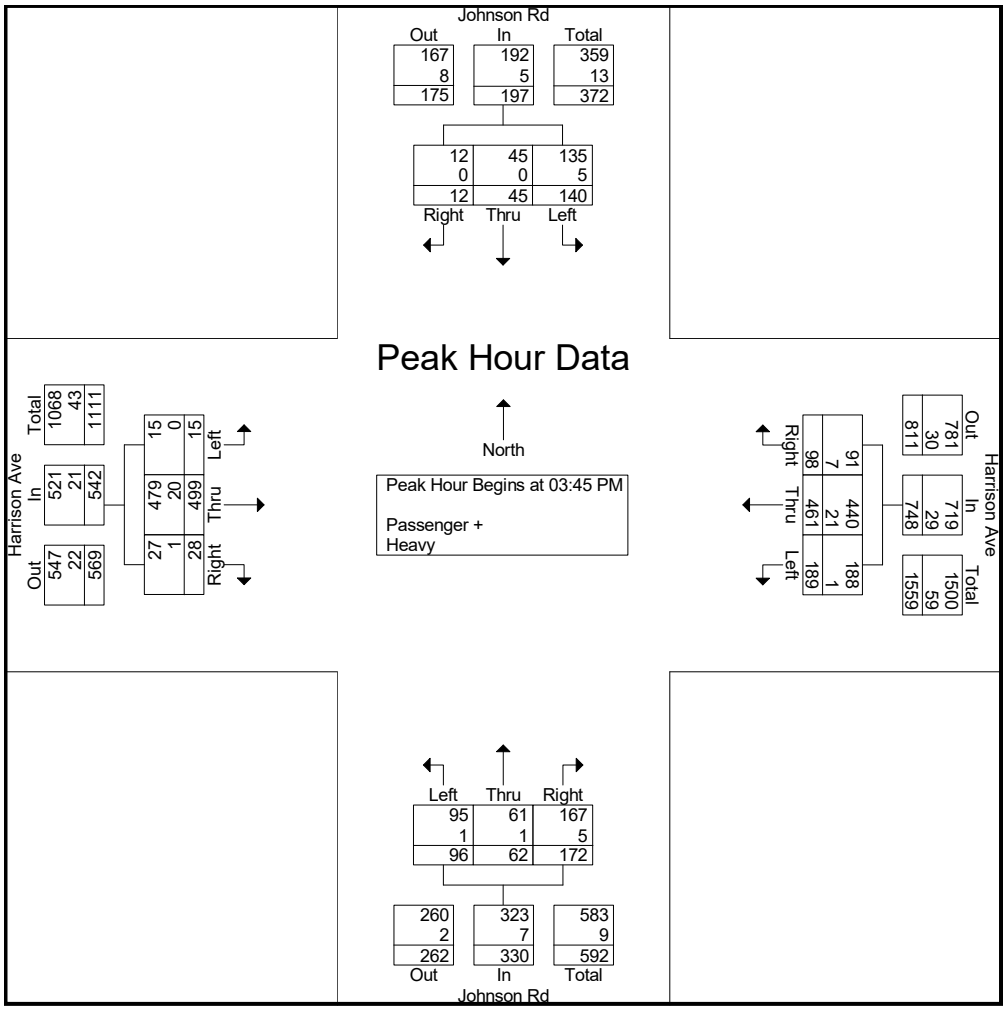
File Name : 5075k
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Johnson Rd Southbound				Harrison Ave Westbound				Johnson Rd Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	**5**	**12**	30	47	18	103	**53**	174	34	13	**28**	75	5	**150**	**6**	**161**	457
04:00 PM	4	10	38	**52**	26	106	52	184	49	14	27	**90**	**9**	124	3	136	462
04:15 PM	2	11	33	46	**30**	**132**	51	**213**	**52**	14	17	83	7	121	4	132	**474**
04:30 PM	1	12	**39**	52	24	120	33	177	37	**21**	24	82	7	104	2	113	424
Total Volume	12	45	140	197	98	461	189	748	172	62	96	330	28	499	15	542	1817
% App. Total	6.1	22.8	71.1		13.1	61.6	25.3		52.1	18.8	29.1		5.2	92.1	2.8		
PHF	.600	.938	.897	.947	.817	.873	.892	.878	.827	.738	.857	.917	.778	.832	.625	.842	.958
Passenger +	12	45	135	192	91	440	188	719	167	61	95	323	27	479	15	521	1755
% Passenger +	100	100	96.4	97.5	92.9	95.4	99.5	96.1	97.1	98.4	99.0	97.9	96.4	96.0	100	96.1	96.6
Heavy	0	0	5	5	7	21	1	29	5	1	1	7	1	20	0	21	62
% Heavy	0	0	3.6	2.5	7.1	4.6	0.5	3.9	2.9	1.6	1.0	2.1	3.6	4.0	0	3.9	3.4



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PO Box 397 Puyallup, WA 98371

File Name : 5075i
Site Code : 00005075
Start Date : 2/8/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Belmont Ave Southbound				Harrison Ave Westbound				Safeway Access Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	7	11	57	75	66	143	25	234	27	4	5	36	3	195	3	201	546
03:45 PM	9	21	68	98	70	178	30	278	32	5	1	38	5	161	24	190	604
Total	16	32	125	173	136	321	55	512	59	9	6	74	8	356	27	391	1150
04:00 PM	4	18	69	91	58	184	28	270	20	11	1	32	1	171	9	181	574
04:15 PM	7	11	68	86	65	183	27	275	24	5	3	32	10	182	7	199	592
04:30 PM	2	6	59	67	71	178	20	269	25	8	4	37	5	163	13	181	554
04:45 PM	5	6	65	76	47	185	31	263	18	5	2	25	3	138	29	170	534
Total	18	41	261	320	241	730	106	1077	87	29	10	126	19	654	58	731	2254
05:00 PM	5	12	60	77	58	170	27	255	28	8	3	39	5	179	14	198	569
05:15 PM	4	2	66	72	66	170	29	265	23	10	4	37	4	190	8	202	576
Grand Total	43	87	512	642	501	1391	217	2109	197	56	23	276	36	1379	107	1522	4549
Apprch %	6.7	13.6	79.8		23.8	66	10.3		71.4	20.3	8.3		2.4	90.6	7		
Total %	0.9	1.9	11.3	14.1	11	30.6	4.8	46.4	4.3	1.2	0.5	6.1	0.8	30.3	2.4	33.5	
Passenger +	42	86	511	639	495	1339	217	2051	197	56	23	276	36	1321	106	1463	4429
% Passenger +	97.7	98.9	99.8	99.5	98.8	96.3	100	97.2	100	100	100	100	100	95.8	99.1	96.1	97.4
Heavy	1	1	1	3	6	52	0	58	0	0	0	0	0	58	1	59	120
% Heavy	2.3	1.1	0.2	0.5	1.2	3.7	0	2.8	0	0	0	0	0	4.2	0.9	3.9	2.6

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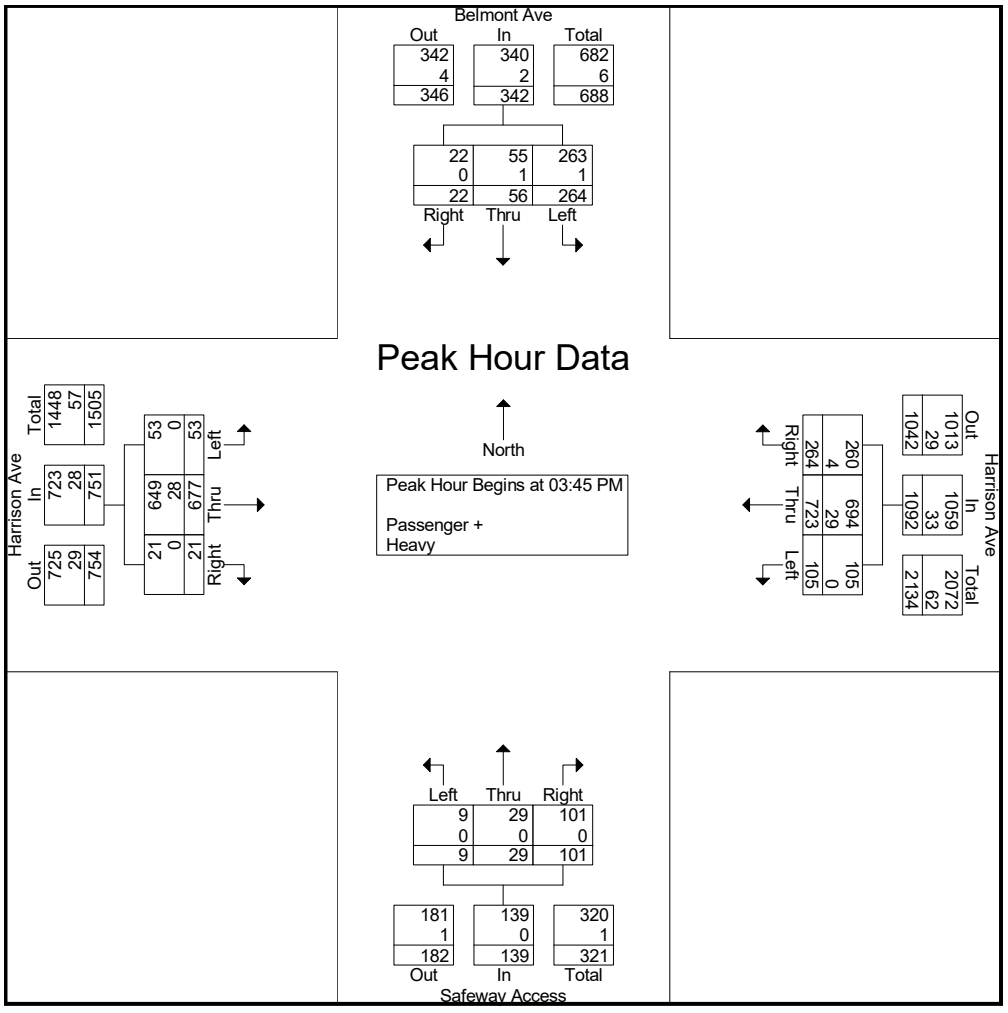
File Name : 5075i
Site Code : 00005075
Start Date : 2/8/2023
Page No : 2

	Belmont Ave Southbound				Harrison Ave Westbound				Safeway Access Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	**9**	**21**	68	**98**	70	178	**30**	**278**	**32**	5	1	**38**	5	161	**24**	190	**604**
04:00 PM	4	18	**69**	91	58	**184**	28	270	20	**11**	1	32	1	171	9	181	574
04:15 PM	7	11	68	86	65	183	27	275	24	5	3	32	**10**	**182**	7	**199**	592
04:30 PM	2	6	59	67	**71**	178	20	269	25	8	**4**	37	5	163	13	181	554
Total Volume	22	56	264	342	264	723	105	1092	101	29	9	139	21	677	53	751	2324
% App. Total	6.4	16.4	77.2		24.2	66.2	9.6		72.7	20.9	6.5		2.8	90.1	7.1		
PHF	.611	.667	.957	.872	.930	.982	.875	.982	.789	.659	.563	.914	.525	.930	.552	.943	.962
Passenger +	22	55	263	340	260	694	105	1059	101	29	9	139	21	649	53	723	2261
% Passenger +	100	98.2	99.6	99.4	98.5	96.0	100	97.0	100	100	100	100	100	95.9	100	96.3	97.3
Heavy	0	1	1	2	4	29	0	33	0	0	0	0	0	28	0	28	63
% Heavy	0	1.8	0.4	0.6	1.5	4.0	0	3.0	0	0	0	0	0	4.1	0	3.7	2.7



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PO Box 397 Puyallup, WA 98371

File Name : 5075j
Site Code : 00005075
Start Date : 2/8/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Harrison Ave Westbound			Belmont Ave Northbound			Harrison Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
03:30 PM	0	48	48	41	0	41	3	0	3	92
03:45 PM	0	64	64	52	0	52	1	0	1	117
Total	0	112	112	93	0	93	4	0	4	209
04:00 PM	0	72	72	52	0	52	4	0	4	128
04:15 PM	0	65	65	56	0	56	2	0	2	123
04:30 PM	0	62	62	52	0	52	3	0	3	117
04:45 PM	0	81	81	53	0	53	3	0	3	137
Total	0	280	280	213	0	213	12	0	12	505
05:00 PM	0	80	80	57	0	57	2	0	2	139
05:15 PM	0	70	70	47	0	47	3	0	3	120
Grand Total	0	542	542	410	0	410	21	0	21	973
Apprch %	0	100		100	0		100	0		
Total %	0	55.7	55.7	42.1	0	42.1	2.2	0	2.2	
Passenger +	0	539	539	408	0	408	21	0	21	968
% Passenger +	0	99.4	99.4	99.5	0	99.5	100	0	100	99.5
Heavy	0	3	3	2	0	2	0	0	0	5
% Heavy	0	0.6	0.6	0.5	0	0.5	0	0	0	0.5

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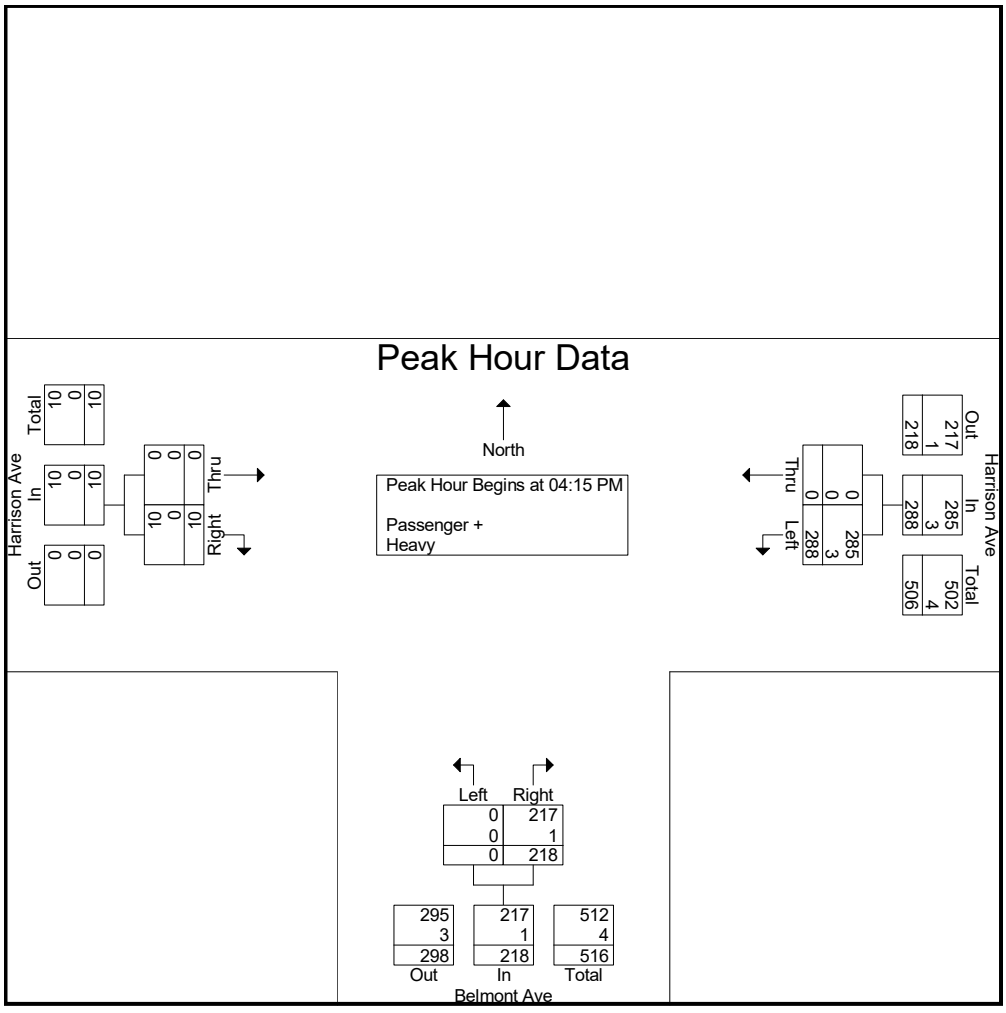
PO Box 397 Puyallup, WA 98371

File Name : 5075j
Site Code : 00005075
Start Date : 2/8/2023
Page No : 2

	Harrison Ave Westbound			Belmont Ave Northbound			Harrison Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 04:15 PM										
04:15 PM	0	65	65	56	0	56	2	0	2	123
04:30 PM	0	62	62	52	0	52	**3**	0	**3**	117
04:45 PM	0	**81**	**81**	53	0	53	3	0	3	137
05:00 PM	0	80	80	**57**	0	**57**	2	0	2	**139**
Total Volume	0	288	288	218	0	218	10	0	10	516
% App. Total	0	100		100	0		100	0		
PHF	.000	.889	.889	.956	.000	.956	.833	.000	.833	.928
Passenger +	0	285	285	217	0	217	10	0	10	512
% Passenger +	0	99.0	99.0	99.5	0	99.5	100	0	100	99.2
Heavy	0	3	3	1	0	1	0	0	0	4
% Heavy	0	1.0	1.0	0.5	0	0.5	0	0	0	0.8



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PO Box 397 Puyallup, WA 98371

File Name : 5075h
Site Code : 00005075
Start Date : 2/8/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Exit 82 SB Off Southbound				Harrison Ave Westbound				Exit 82 SB On Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	58	21	78	157	0	212	55	267	0	0	0	0	147	195	0	342	766
03:45 PM	84	34	108	226	0	281	44	325	0	0	0	0	168	186	0	354	905
Total	142	55	186	383	0	493	99	592	0	0	0	0	315	381	0	696	1671
04:00 PM	68	31	92	191	0	299	54	353	0	0	0	0	153	188	0	341	885
04:15 PM	79	25	92	196	0	289	48	337	0	0	0	0	170	189	0	359	892
04:30 PM	76	37	83	196	0	270	28	298	0	0	0	0	162	156	0	318	812
04:45 PM	76	33	89	198	0	310	24	334	0	0	0	0	136	179	0	315	847
Total	299	126	356	781	0	1168	154	1322	0	0	0	0	621	712	0	1333	3436
05:00 PM	72	34	81	187	0	274	40	314	0	0	0	0	151	203	0	354	855
05:15 PM	82	35	89	206	0	289	32	321	0	0	0	0	171	175	0	346	873
Grand Total	595	250	712	1557	0	2224	325	2549	0	0	0	0	1258	1471	0	2729	6835
Apprch %	38.2	16.1	45.7		0	87.2	12.8		0	0	0		46.1	53.9	0		
Total %	8.7	3.7	10.4	22.8	0	32.5	4.8	37.3	0	0	0	0	18.4	21.5	0	39.9	
Passenger +	576	246	703	1525	0	2179	323	2502	0	0	0	0	1218	1446	0	2664	6691
% Passenger +	96.8	98.4	98.7	97.9	0	98	99.4	98.2	0	0	0	0	96.8	98.3	0	97.6	97.9
Heavy	19	4	9	32	0	45	2	47	0	0	0	0	40	25	0	65	144
% Heavy	3.2	1.6	1.3	2.1	0	2	0.6	1.8	0	0	0	0	3.2	1.7	0	2.4	2.1

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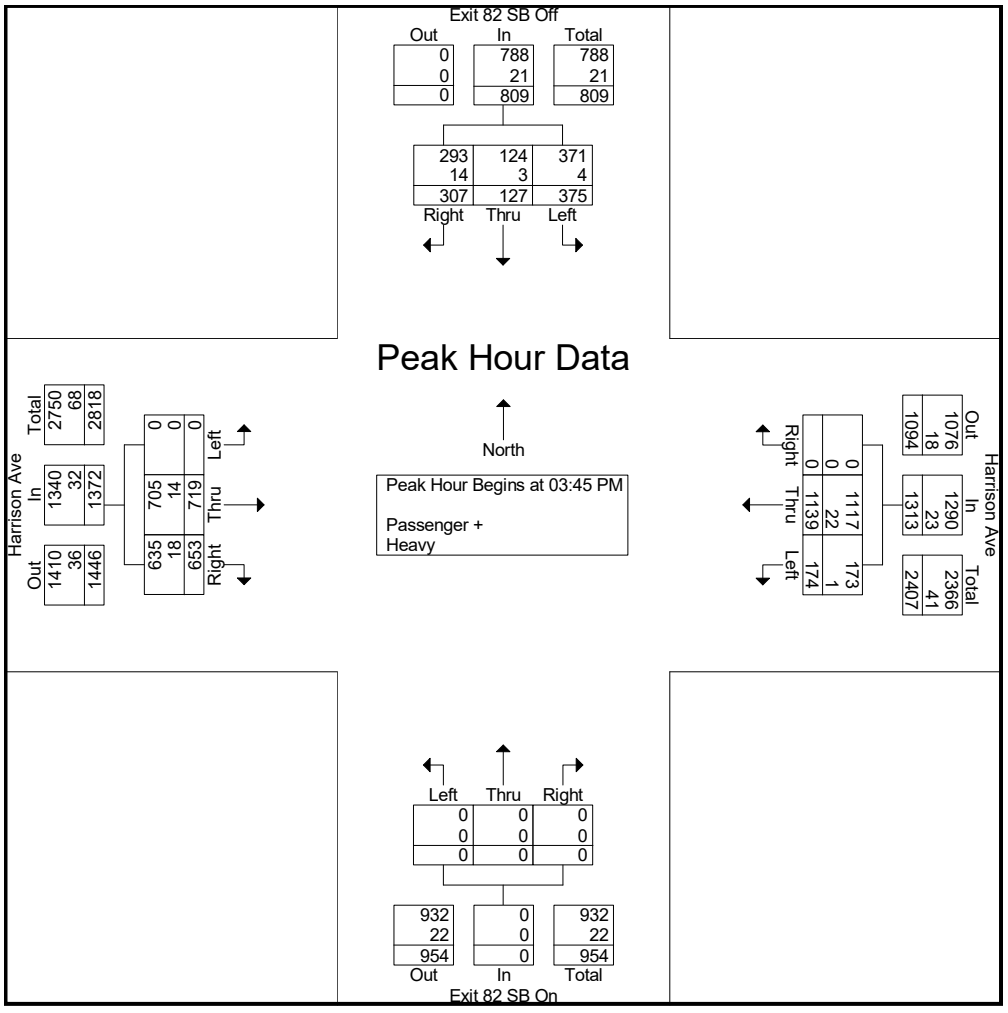
File Name : 5075h
Site Code : 00005075
Start Date : 2/8/2023
Page No : 2

	Exit 82 SB Off Southbound				Harrison Ave Westbound				Exit 82 SB On Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:45 PM																	
03:45 PM	**84**	34	**108**	**226**	0	281	44	325	0	0	0	0	168	186	0	354	**905**
04:00 PM	68	31	92	191	0	**299**	**54**	**353**	0	0	0	0	153	188	0	341	885
04:15 PM	79	25	92	196	0	289	48	337	0	0	0	0	**170**	**189**	0	**359**	892
04:30 PM	76	**37**	83	196	0	270	28	298	0	0	0	0	162	156	0	318	812
Total Volume	307	127	375	809	0	1139	174	1313	0	0	0	0	653	719	0	1372	3494
% App. Total	37.9	15.7	46.4		0	86.7	13.3		0	0	0		47.6	52.4	0		
PHF	.914	.858	.868	.895	.000	.952	.806	.930	.000	.000	.000	.000	.960	.951	.000	.955	.965
Passenger +	293	124	371	788	0	1117	173	1290	0	0	0	0	635	705	0	1340	3418
% Passenger +	95.4	97.6	98.9	97.4	0	98.1	99.4	98.2	0	0	0	0	97.2	98.1	0	97.7	97.8
Heavy	14	3	4	21	0	22	1	23	0	0	0	0	18	14	0	32	76
% Heavy	4.6	2.4	1.1	2.6	0	1.9	0.6	1.8	0	0	0	0	2.8	1.9	0	2.3	2.2



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PO Box 397 Puyallup, WA 98371

File Name : 5075g
Site Code : 00005075
Start Date : 2/8/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Exit 82 NB On Southbound				Harrison Ave Westbound				Exit 82 NB Off Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	0	0	0	0	54	142	0	196	48	31	123	202	0	386	122	508	906
03:45 PM	0	0	0	0	62	156	0	218	38	34	149	221	0	264	42	306	745
Total	0	0	0	0	116	298	0	414	86	65	272	423	0	650	164	814	1651
04:00 PM	0	0	0	0	67	193	0	260	35	49	139	223	0	197	61	258	741
04:15 PM	0	0	0	0	59	189	0	248	46	35	148	229	0	208	68	276	753
04:30 PM	0	0	0	0	72	136	0	208	47	45	154	246	0	182	53	235	689
04:45 PM	0	0	0	0	53	172	0	225	48	40	152	240	0	193	47	240	705
Total	0	0	0	0	251	690	0	941	176	169	593	938	0	780	229	1009	2888
05:00 PM	0	0	0	0	91	162	0	253	36	59	121	216	0	199	48	247	716
05:15 PM	0	0	0	0	73	176	0	249	33	48	135	216	0	221	64	285	750
Grand Total	0	0	0	0	531	1326	0	1857	331	341	1121	1793	0	1850	505	2355	6005
Apprch %	0	0	0		28.6	71.4	0		18.5	19	62.5		0	78.6	21.4		
Total %	0	0	0	0	8.8	22.1	0	30.9	5.5	5.7	18.7	29.9	0	30.8	8.4	39.2	
Passenger +	0	0	0	0	522	1313	0	1835	329	335	1087	1751	0	1828	484	2312	5898
% Passenger +	0	0	0	0	98.3	99	0	98.8	99.4	98.2	97	97.7	0	98.8	95.8	98.2	98.2
Heavy	0	0	0	0	9	13	0	22	2	6	34	42	0	22	21	43	107
% Heavy	0	0	0	0	1.7	1	0	1.2	0.6	1.8	3	2.3	0	1.2	4.2	1.8	1.8

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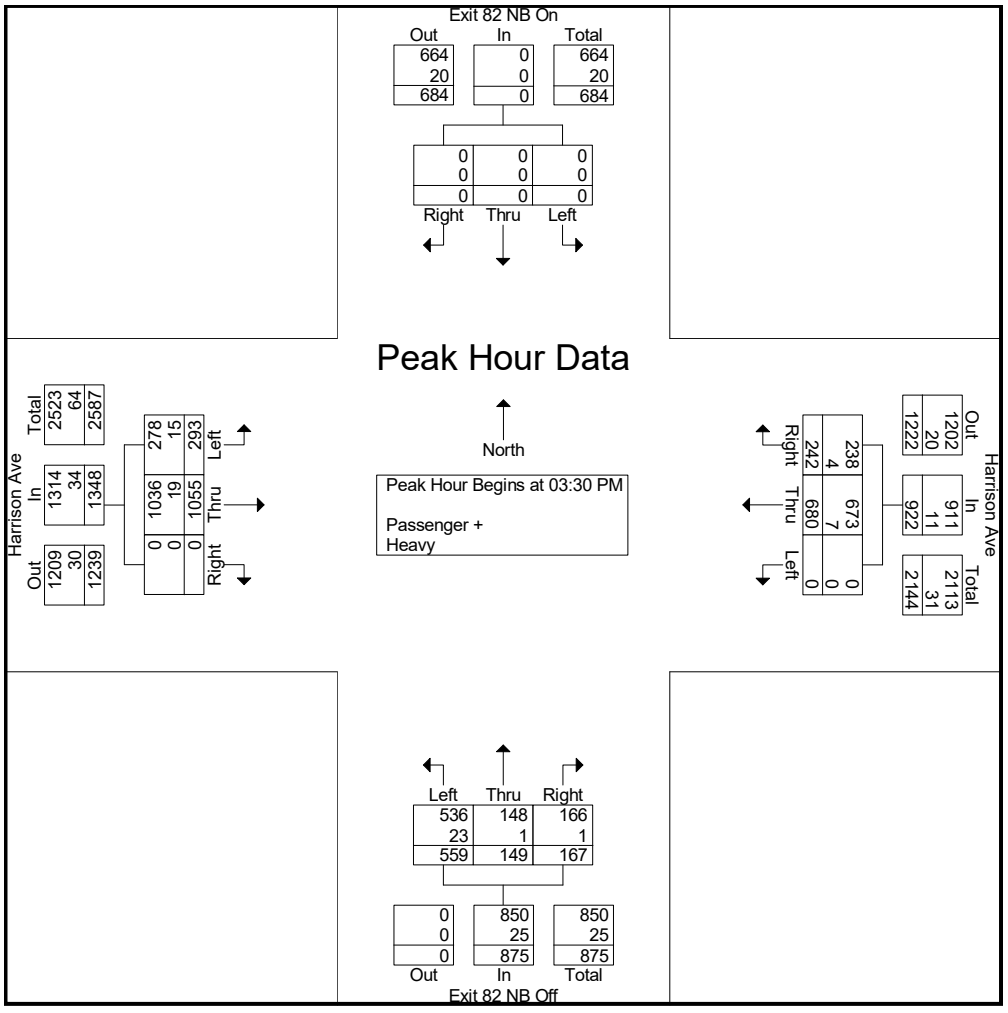
File Name : 5075g
Site Code : 00005075
Start Date : 2/8/2023
Page No : 2

	Exit 82 NB On Southbound				Harrison Ave Westbound				Exit 82 NB Off Northbound				Harrison Ave Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	0	0	0	0	54	142	0	196	**48**	31	123	202	0	**386**	**122**	**508**	**906**
03:45 PM	0	0	0	0	62	156	0	218	38	34	**149**	221	0	264	42	306	745
04:00 PM	0	0	0	0	**67**	**193**	0	**260**	35	**49**	139	223	0	197	61	258	741
04:15 PM	0	0	0	0	59	189	0	248	46	35	148	**229**	0	208	68	276	753
Total Volume	0	0	0	0	242	680	0	922	167	149	559	875	0	1055	293	1348	3145
% App. Total	0	0	0		26.2	73.8	0		19.1	17	63.9		0	78.3	21.7		
PHF	.000	.000	.000	.000	.903	.881	.000	.887	.870	.760	.938	.955	.000	.683	.600	.663	.868
Passenger +	0	0	0	0	238	673	0	911	166	148	536	850	0	1036	278	1314	3075
% Passenger +	0	0	0	0	98.3	99.0	0	98.8	99.4	99.3	95.9	97.1	0	98.2	94.9	97.5	97.8
Heavy	0	0	0	0	4	7	0	11	1	1	23	25	0	19	15	34	70
% Heavy	0	0	0	0	1.7	1.0	0	1.2	0.6	0.7	4.1	2.9	0	1.8	5.1	2.5	2.2



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File Name : 5075e
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	Belmont Ave Southbound				Haviland St Westbound				Belmont Ave Northbound				Haviland St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
03:30 PM	1	8	1	10	2	6	39	47	78	18	5	101	9	2	0	11	169
03:45 PM	1	14	1	16	0	4	41	45	67	18	7	92	14	1	1	16	169
Total	2	22	2	26	2	10	80	92	145	36	12	193	23	3	1	27	338
04:00 PM	1	5	1	7	0	7	47	54	62	15	3	80	16	8	0	24	165
04:15 PM	0	9	0	9	2	6	49	57	72	12	11	95	10	8	2	20	181
04:30 PM	1	6	0	7	1	7	63	71	59	5	8	72	14	3	0	17	167
04:45 PM	1	7	1	9	0	5	61	66	64	8	3	75	5	6	1	12	162
Total	3	27	2	32	3	25	220	248	257	40	25	322	45	25	3	73	675
05:00 PM	0	9	0	9	0	7	62	69	74	15	12	101	8	4	1	13	192
05:15 PM	1	6	1	8	0	4	54	58	79	14	4	97	6	3	1	10	173
Grand Total	6	64	5	75	5	46	416	467	555	105	53	713	82	35	6	123	1378
Apprch %	8	85.3	6.7		1.1	9.9	89.1		77.8	14.7	7.4		66.7	28.5	4.9		
Total %	0.4	4.6	0.4	5.4	0.4	3.3	30.2	33.9	40.3	7.6	3.8	51.7	6	2.5	0.4	8.9	
Passenger +	6	63	5	74	4	46	416	466	544	103	53	700	79	35	5	119	1359
% Passenger +	100	98.4	100	98.7	80	100	100	99.8	98	98.1	100	98.2	96.3	100	83.3	96.7	98.6
Heavy	0	1	0	1	1	0	0	1	11	2	0	13	3	0	1	4	19
% Heavy	0	1.6	0	1.3	20	0	0	0.2	2	1.9	0	1.8	3.7	0	16.7	3.3	1.4

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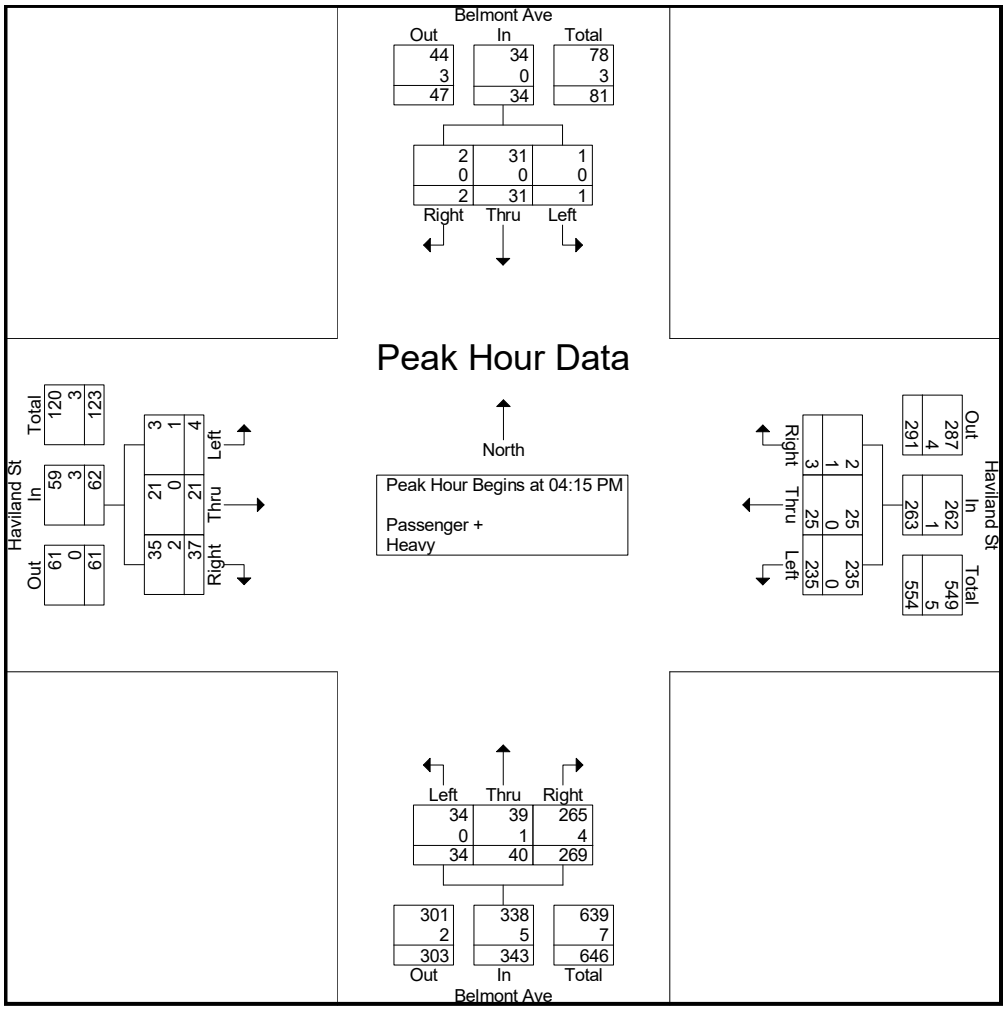
File Name : 5075e
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	Belmont Ave Southbound				Haviland St Westbound				Belmont Ave Northbound				Haviland St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:15 PM																	
04:15 PM	0	**9**	0	**9**	**2**	6	49	57	72	12	11	95	10	**8**	**2**	**20**	181
04:30 PM	**1**	6	0	7	1	**7**	**63**	**71**	59	5	8	72	**14**	3	0	17	167
04:45 PM	1	7	**1**	9	0	5	61	66	64	8	3	75	5	6	1	12	162
05:00 PM	0	9	0	9	0	7	62	69	**74**	**15**	**12**	**101**	8	4	1	13	**192**
Total Volume	2	31	1	34	3	25	235	263	269	40	34	343	37	21	4	62	702
% App. Total	5.9	91.2	2.9		1.1	9.5	89.4		78.4	11.7	9.9		59.7	33.9	6.5		
PHF	.500	.861	.250	.944	.375	.893	.933	.926	.909	.667	.708	.849	.661	.656	.500	.775	.914
Passenger +	2	31	1	34	2	25	235	262	265	39	34	338	35	21	3	59	693
% Passenger +	100	100	100	100	66.7	100	100	99.6	98.5	97.5	100	98.5	94.6	100	75.0	95.2	98.7
Heavy	0	0	0	0	1	0	0	1	4	1	0	5	2	0	1	3	9
% Heavy	0	0	0	0	33.3	0	0	0.4	1.5	2.5	0	1.5	5.4	0	25.0	4.8	1.3



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File Name : 5075f
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	W Reynolds Ave Westbound			West Access Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
03:30 PM	95	0	95	0	0	0	0	137	137	232
03:45 PM	77	1	78	1	0	1	1	118	119	198
Total	172	1	173	1	0	1	1	255	256	430
04:00 PM	77	1	78	1	0	1	1	126	127	206
04:15 PM	75	2	77	0	1	1	1	108	109	187
04:30 PM	97	1	98	0	0	0	1	92	93	191
04:45 PM	69	0	69	0	0	0	0	116	116	185
Total	318	4	322	1	1	2	3	442	445	769
05:00 PM	74	0	74	1	0	1	0	109	109	184
05:15 PM	70	0	70	0	0	0	0	113	113	183
Grand Total	634	5	639	3	1	4	4	919	923	1566
Apprch %	99.2	0.8		75	25		0.4	99.6		
Total %	40.5	0.3	40.8	0.2	0.1	0.3	0.3	58.7	58.9	
Passenger +	625	5	630	3	1	4	4	901	905	1539
% Passenger +	98.6	100	98.6	100	100	100	100	98	98	98.3
Heavy	9	0	9	0	0	0	0	18	18	27
% Heavy	1.4	0	1.4	0	0	0	0	2	2	1.7

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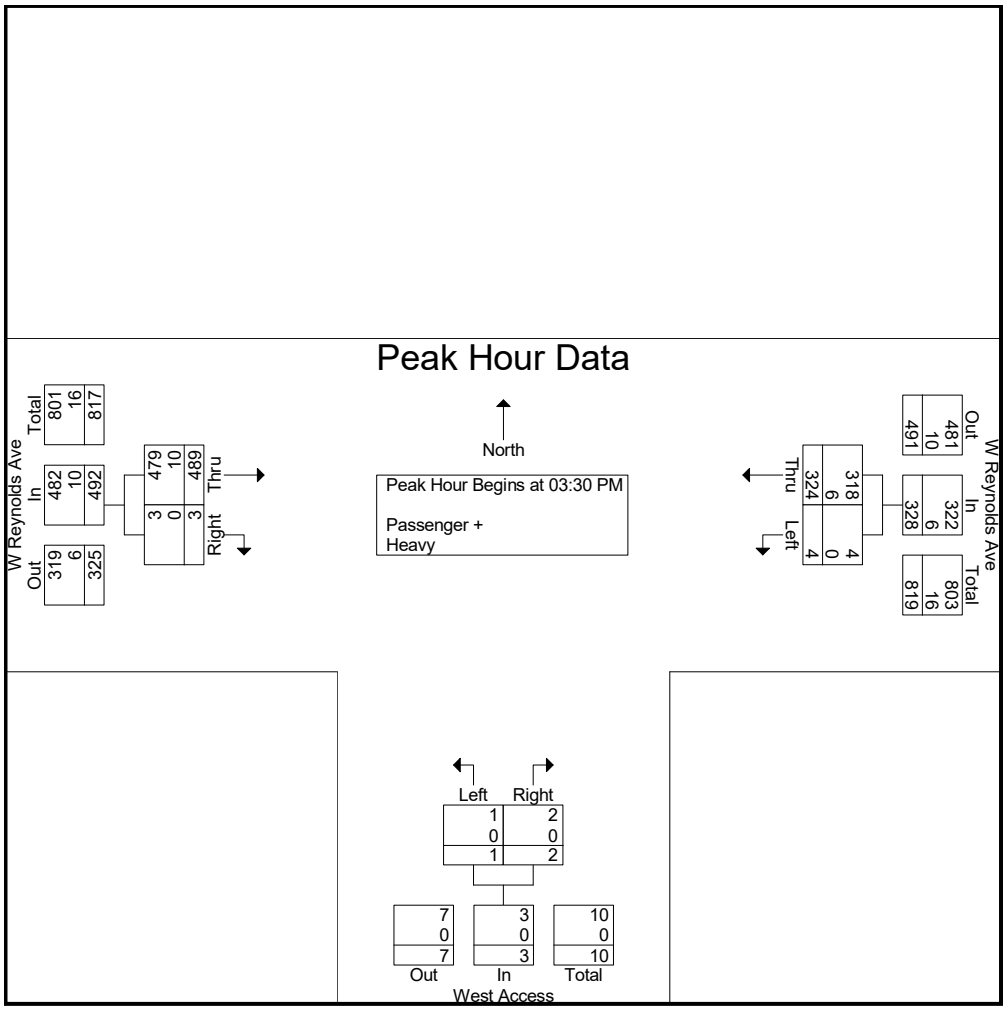
File Name : 5075f
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	W Reynolds Ave Westbound			West Access Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	95	0	95	0	0	0	0	137	137	232
03:45 PM	77	1	78	1	0	1	1	118	119	198
04:00 PM	77	1	78	1	0	1	1	126	127	206
04:15 PM	75	2	77	0	1	1	1	108	109	187
Total Volume	324	4	328	2	1	3	3	489	492	823
% App. Total	98.8	1.2		66.7	33.3		0.6	99.4		
PHF	.853	.500	.863	.500	.250	.750	.750	.892	.898	.887
Passenger +	318	4	322	2	1	3	3	479	482	807
% Passenger +	98.1	100	98.2	100	100	100	100	98.0	98.0	98.1
Heavy	6	0	6	0	0	0	0	10	10	16
% Heavy	1.9	0	1.8	0	0	0	0	2.0	2.0	1.9



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File Name : 5075d
Site Code : 00005075
Start Date : 2/7/2023
Page No : 1

Groups Printed- Passenger + - Heavy

	W Reynolds Ave Westbound			East Access Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
03:30 PM	95	0	95	0	0	0	0	137	137	232
03:45 PM	78	0	78	0	0	0	0	119	119	197
Total	173	0	173	0	0	0	0	256	256	429
04:00 PM	78	0	78	1	0	1	0	127	127	206
04:15 PM	77	0	77	0	0	0	0	108	108	185
04:30 PM	98	0	98	1	0	1	0	92	92	191
04:45 PM	68	0	68	0	1	1	0	116	116	185
Total	321	0	321	2	1	3	0	443	443	767
05:00 PM	74	0	74	0	0	0	0	110	110	184
05:15 PM	70	0	70	0	0	0	0	113	113	183
Grand Total	638	0	638	2	1	3	0	922	922	1563
Apprch %	100	0		66.7	33.3		0	100		
Total %	40.8	0	40.8	0.1	0.1	0.2	0	59	59	
Passenger +	629	0	629	2	1	3	0	904	904	1536
% Passenger +	98.6	0	98.6	100	100	100	0	98	98	98.3
Heavy	9	0	9	0	0	0	0	18	18	27
% Heavy	1.4	0	1.4	0	0	0	0	2	2	1.7

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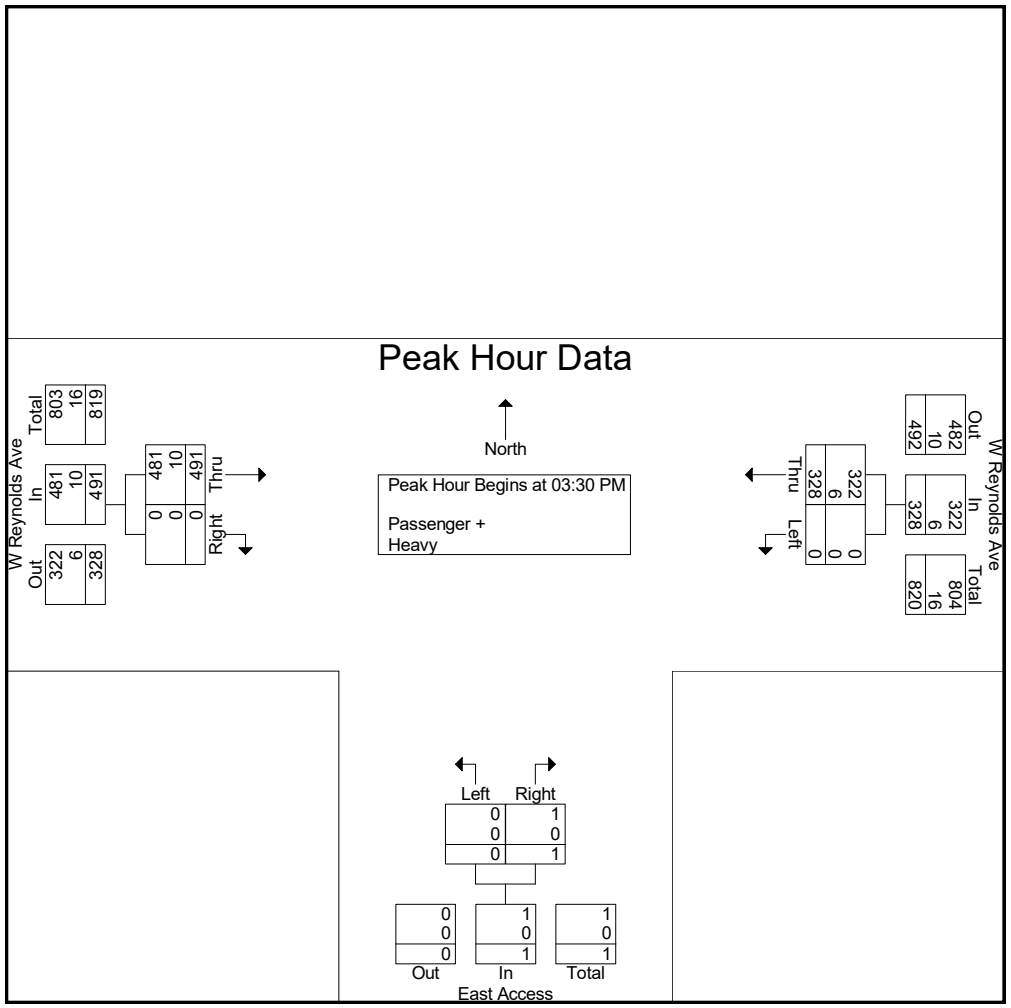
File Name : 5075d
Site Code : 00005075
Start Date : 2/7/2023
Page No : 2

	W Reynolds Ave Westbound			East Access Northbound			W Reynolds Ave Eastbound			
Start Time	Thru	Left	App. Total	Right	Left	App. Total	Right	Thru	App. Total	Int. Total
Peak Hour Analysis From 03:30 PM to 05:15 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 03:30 PM										
03:30 PM	95	0	95	0	0	0	0	137	137	232
03:45 PM	78	0	78	0	0	0	0	119	119	197
04:00 PM	78	0	78	1	0	1	0	127	127	206
04:15 PM	77	0	77	0	0	0	0	108	108	185
Total Volume	328	0	328	1	0	1	0	491	491	820
% App. Total	100	0		100	0		0	100		
PHF	.863	.000	.863	.250	.000	.250	.000	.896	.896	.884
Passenger +	322	0	322	1	0	1	0	481	481	804
% Passenger +	98.2	0	98.2	100	0	100	0	98.0	98.0	98.0
Heavy	6	0	6	0	0	0	0	10	10	16
% Heavy	1.8	0	1.8	0	0	0	0	2.0	2.0	2.0



SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

APPENDIX

ITE TRIP GENERATION SHEETS
LUC 150: WAREHOUSING

Warehousing
(150)

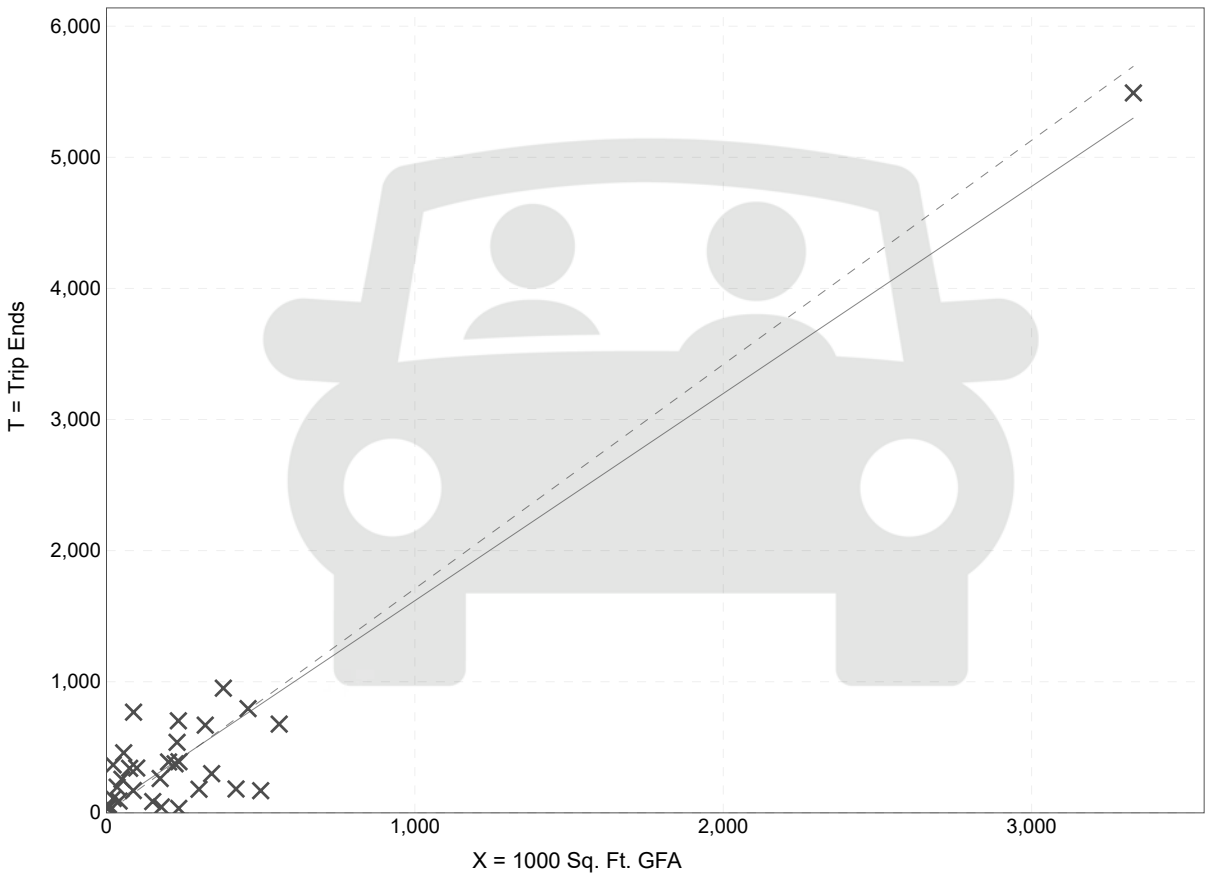
Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 31
Avg. 1000 Sq. Ft. GFA: 292
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
1.71	0.15 - 16.93	1.48

Data Plot and Equation



Fitted Curve Equation: T = 1.58(X) + 38.29

R^2= 0.92

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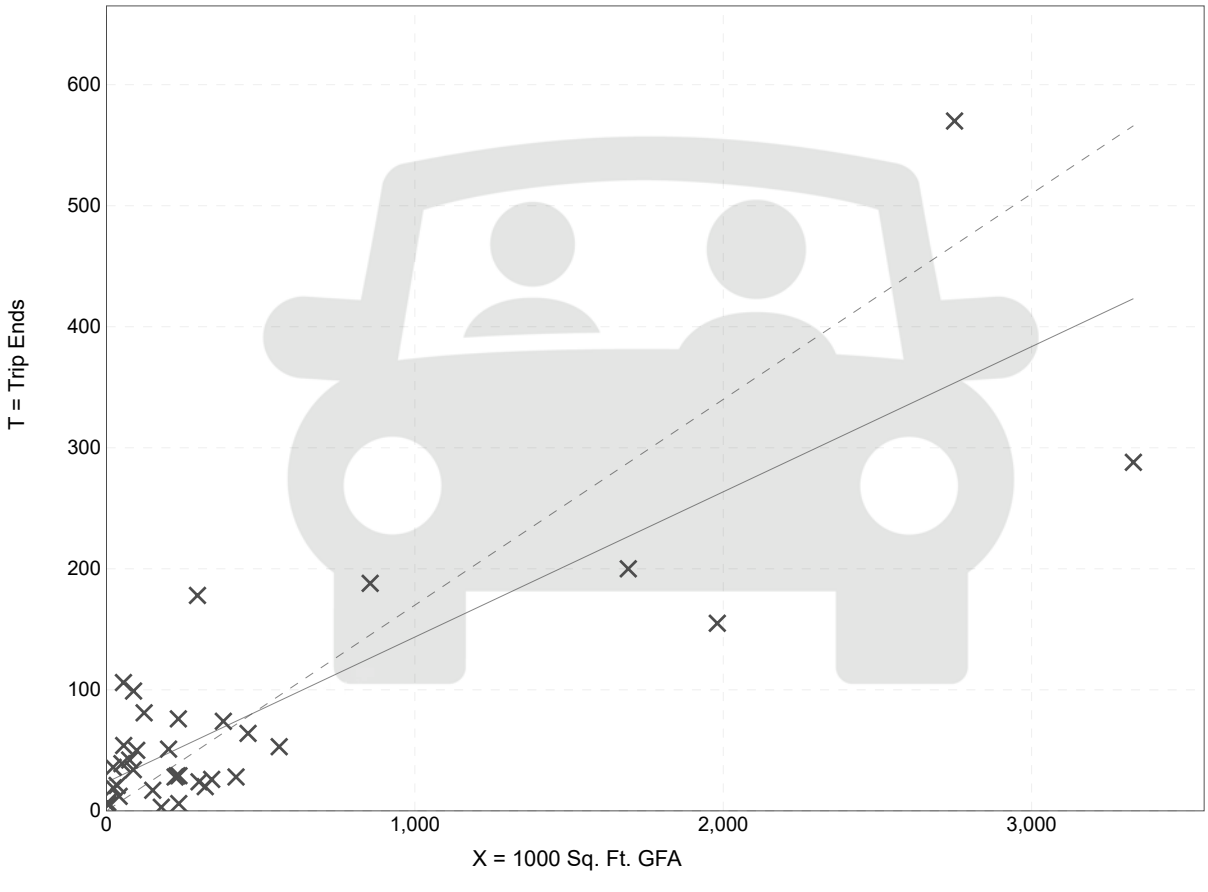
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 36
Avg. 1000 Sq. Ft. GFA: 448
Directional Distribution: 77% entering, 23% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.17	0.02 - 1.93	0.19

Data Plot and Equation



Fitted Curve Equation: T = 0.12(X) + 23.62

R^2= 0.69

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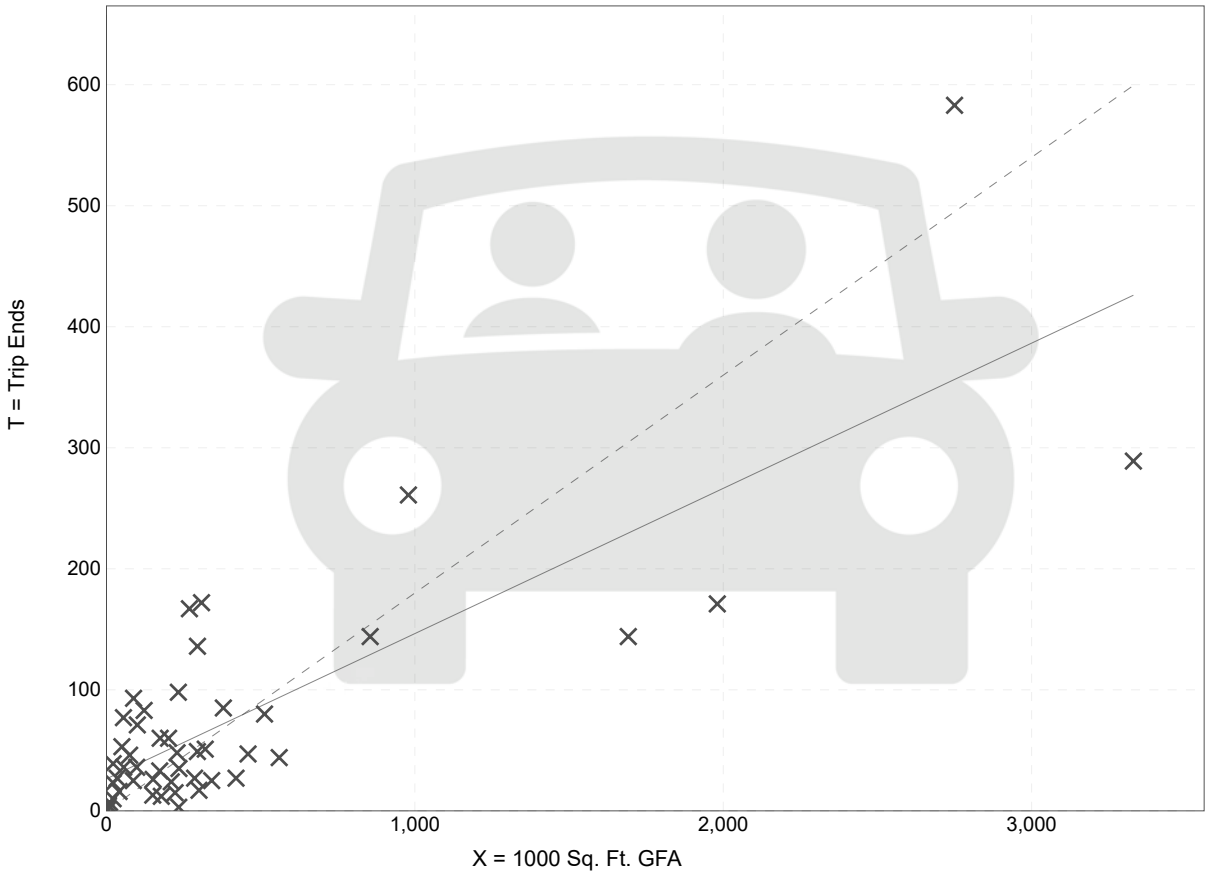
Warehousing
(150)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 49
Avg. 1000 Sq. Ft. GFA: 400
Directional Distribution: 28% entering, 72% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
0.18	0.01 - 1.80	0.18

Data Plot and Equation



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SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

APPENDIX

HEAVY VEHICLE TIME-OF-DAY
TRIP GENERATION

TRUCK TIME-OF-DAY TRIP GENERATION

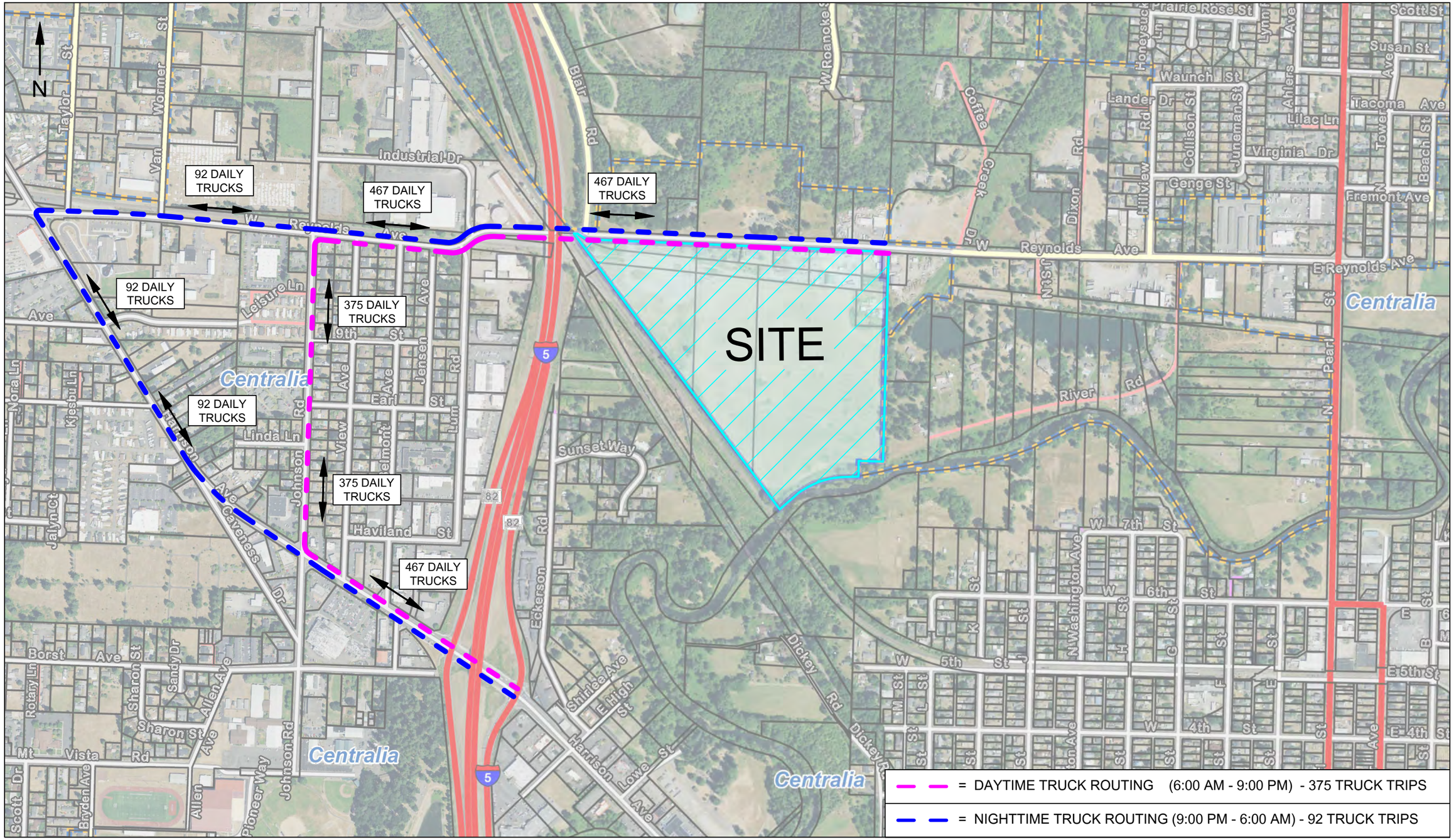
Use	Warehouse (Tenant Data) - Building A		Warehouse (LUC 150) - Building B		Sum of Truck Trips
Size	483.276	KSF	295.356	KSF	
ITE AWDT Truck Trip Rate	-		0.6		
AWDT Truck Trip Generation	290	trips	177	trips	467 trips
Start Time	% of 24-Hour Truck Trips	Truck Trips	% of 24-Hour Truck Trips	Truck Trips	**Total Hourly Truck Volumes**
12:00 AM	4.60%	13	0.31%	1	14
1:00 AM	0.11%	0	0.16%	0	0
2:00 AM	0.88%	3	1.26%	2	5
3:00 AM	0.88%	3	1.26%	2	5
4:00 AM	1.63%	5	2.36%	4	9
5:00 AM	2.39%	7	3.46%	6	13
6:00 AM	3.08%	9	4.40%	8	17
7:00 AM	3.74%	11	5.35%	10	21
8:00 AM	1.89%	**5**	5.50%	**10**	**15**
9:00 AM	6.93%	20	9.91%	18	38
10:00 AM	6.82%	20	9.75%	17	37
11:00 AM	*7.81%*	*23*	*11.16%*	*20*	*43*
12:00 PM	4.73%	14	6.76%	12	26
1:00 PM	5.61%	16	8.02%	14	30
2:00 PM	4.23%	12	6.13%	11	23
3:00 PM	2.93%	**8**	9.28%	**16**	**24**
4:00 PM	4.84%	14	6.92%	12	26
5:00 PM	2.71%	8	3.93%	7	15
6:00 PM	8.30%	24	0.94%	2	26
7:00 PM	5.20%	15	0.63%	1	16
8:00 PM	5.20%	15	1.57%	3	18
9:00 PM	5.20%	15	0.79%	1	16
10:00 PM	5.20%	15	0.00%	0	15
11:00 PM	5.20%	15	0.16%	0	15
Total Truck Trips	Building A:	**290**	Building B:	**177**	**467 Total Site Truck Trips**

Daytime; Nighttime

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

FIGURE A: TRUCK ROUTING & VOLUMES
NIGHT VS. DAY



HEATH&ASSOCIATES
Transportation Planning & Engineering

SKOOKUMCHUCK COMMERCE

TRUCK ROUTING & VOLUMES: NIGHT VS. DAY

Skookumchuck Commerce TIA

FIGURE A

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

PIPELINE VOLUME SUMMATION

1. W Reynolds Ave & Johnson Rd

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

2. W Reynolds Ave & Lum Rd

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

3. W Reynolds Ave & Industrial Dr

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

4. W Reynolds Ave & Puget RR Crossing

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

5. W Reynolds Ave & Blair Rd

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

6. W Reynolds Ave & Hillview Rd

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

7. W Reynolds Ave & N Pearl St

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)	4				0				3	5		6
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	4	0	0	0	0	0	0	0	3	5	0	6

8. Harrison Ave & Johnson Rd

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					17						26	
Northpark Warehouse					4						10	
Pipeline Totals	0	0	0	0	21	0	0	0	0	0	36	0

9. Harrison Ave & N Belmont Ave

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					17						26	
Northpark Warehouse					4						10	
Pipeline Totals	0	0	0	0	21	0	0	0	0	0	36	0

10. Harrison Ave & S Belmont Ave

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					17						26	
Northpark Warehouse					4						10	
Pipeline Totals	0	0	0	0	21	0	0	0	0	0	36	0

11. Harrison Ave & I-5 SB Ramps

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)	5				12					18	8	
Northpark Warehouse	1				3					6	4	
Pipeline Totals	6	0	0	0	15	0	0	0	0	24	12	0

12. Harrison Ave & I-5 NB Ramps

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)									12			8
Northpark Warehouse					1				2		1	3
Pipeline Totals	0	0	0	0	1	0	0	0	14	0	1	11

13. Haviland St & Belmont Ave

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)	0	0	0	0	0	0	0	0	0	0	0	0
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	0	0	0	0	0	0	0	0

A. W Reynolds Ave & West Driveway

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

B. W Reynolds Ave & East Driveway

PM Peak Hour
Pipeline Volume Summations

Harrison Ave Warehouse (Midway Log.)					7						11	
Northpark Warehouse	0	0	0	0	0	0	0	0	0	0	0	0
Pipeline Totals	0	0	0	0	7	0	0	0	0	0	11	0

SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

APPENDIX

EXISTING PEAK HOUR
LEVEL OF SERVICE

Intersection	
Int Delay, s/veh	5.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	224	83	53	184	12	35	27	70	11	31	6
Future Vol, veh/h	4	224	83	53	184	12	35	27	70	11	31	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	1	4	5	4	3	1	1	1	1	1	1	1
Mvmt Flow	5	287	106	68	236	15	45	35	90	14	40	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	251	0	0	394	0	0	742	738	340	694	783	244
Stage 1	-	-	-	-	-	-	351	351	-	379	379	-
Stage 2	-	-	-	-	-	-	392	387	-	315	404	-
Critical Hdwy	4.11	-	-	4.14	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.236	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1320	-	-	1154	-	-	333	347	704	358	326	798
Stage 1	-	-	-	-	-	-	668	634	-	645	616	-
Stage 2	-	-	-	-	-	-	635	611	-	698	601	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1320	-	-	1154	-	-	268	321	704	261	303	798
Mov Cap-2 Maneuver	-	-	-	-	-	-	268	321	-	261	303	-
Stage 1	-	-	-	-	-	-	665	631	-	600	574	-
Stage 2	-	-	-	-	-	-	545	569	-	573	598	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.1	1.77	19.22	19.16
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	420	22	-	-	378	-	-	315
HCM Lane V/C Ratio	0.403	0.004	-	-	0.059	-	-	0.195
HCM Control Delay (s/veh)	19.2	7.7	0	-	8.3	0	-	19.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.9	0	-	-	0.2	-	-	0.7

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	293	20	92	240	14	173
Future Vol, veh/h	293	20	92	240	14	173
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	95	-	75	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	15	1	3	7	2
Mvmt Flow	322	22	101	264	15	190

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	344	0	799	333
Stage 1	-	-	-	-	333	-
Stage 2	-	-	-	-	466	-
Critical Hdwy	-	-	4.11	-	6.47	6.22
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.209	-	3.563	3.318
Pot Cap-1 Maneuver	-	-	1221	-	348	709
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	621	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1221	-	319	709
Mov Cap-2 Maneuver	-	-	-	-	319	-
Stage 1	-	-	-	-	715	-
Stage 2	-	-	-	-	570	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	2.28	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	319	709	-	-	1221	-
HCM Lane V/C Ratio	0.048	0.268	-	-	0.083	-
HCM Control Delay (s/veh)	16.9	11.9	-	-	8.2	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	1.1	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	497	329	0	7	11
Future Vol, veh/h	1	497	329	0	7	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	540	358	0	8	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	358	0	-	0	900	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	542	-
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	1201	-	-	-	309	687
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	583	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1201	-	-	-	309	687
Mov Cap-2 Maneuver	-	-	-	-	309	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	583	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.02	0	13.08
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1201	-	-	-	465
HCM Lane V/C Ratio	0.001	-	-	-	0.042
HCM Control Delay (s/veh)	8	-	-	-	13.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	8	496	324	2	4	5
Future Vol, veh/h	8	496	324	2	4	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	90	90	90	90	90	90
Heavy Vehicles, %	1	2	2	50	1	20
Mvmt Flow	9	551	360	2	4	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	362	0	-	0	930	361
Stage 1	-	-	-	-	361	-
Stage 2	-	-	-	-	569	-
Critical Hdwy	4.11	-	-	-	6.41	6.4
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.48
Pot Cap-1 Maneuver	1202	-	-	-	298	645
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1202	-	-	-	295	645
Mov Cap-2 Maneuver	-	-	-	-	295	-
Stage 1	-	-	-	-	700	-
Stage 2	-	-	-	-	568	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.13	0	13.74
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	29	-	-	-	422
HCM Lane V/C Ratio	0.007	-	-	-	0.024
HCM Control Delay (s/veh)	8	0	-	-	13.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	18	469	309	4	9	5
Future Vol, veh/h	18	469	309	4	9	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	85	85	85	85	85	85
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	21	552	364	5	11	6

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	960	366
Stage 1	-	-	-	-	366	-
Stage 2	-	-	-	-	594	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1196	-	-	-	286	682
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1196	-	-	-	279	682
Mov Cap-2 Maneuver	-	-	-	-	279	-
Stage 1	-	-	-	-	686	-
Stage 2	-	-	-	-	553	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	15.69
HCM LOS			C

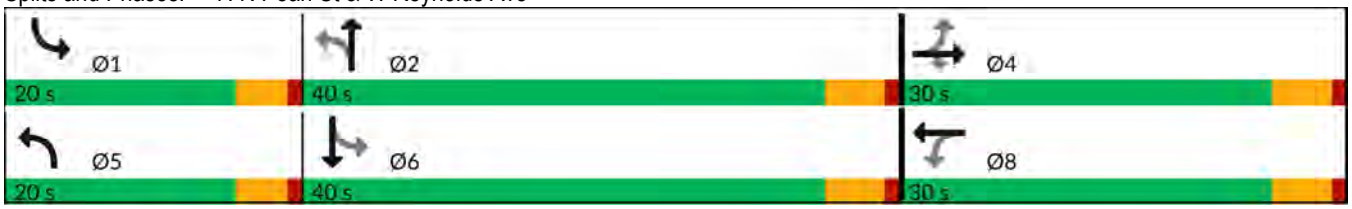
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	67	-	-	-	353
HCM Lane V/C Ratio	0.018	-	-	-	0.047
HCM Control Delay (s/veh)	8.1	0	-	-	15.7
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

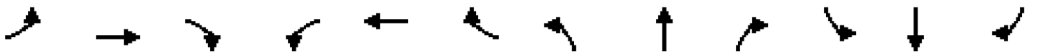
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	257	20	208	10	8	2	138	213	4	0	212	170
Future Volume (vph)	257	20	208	10	8	2	138	213	4	0	212	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		115	0		0	175		0	125		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			250			275		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99	0.96		0.99		1.00	1.00			0.99	
Frt			0.850		0.988			0.997			0.933	
Flt Protected		0.956			0.976		0.950					
Satd. Flow (prot)	0	1766	1599	0	1732	0	1787	1804	0	1881	1676	0
Flt Permitted		0.726			0.840		0.227					
Satd. Flow (perm)	0	1329	1542	0	1487	0	426	1804	0	1881	1676	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232		2			1			52	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		447			297			547			348	
Travel Time (s)		8.7			8.1			10.7			6.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	3%	1%	1%	1%	1%	50%	1%	5%	1%	1%	6%	2%
Adj. Flow (vph)	292	23	236	11	9	2	157	242	5	0	241	193
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	236	0	22	0	157	247	0	0	434	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	28.0	28.0		10.0	29.5		9.5	32.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		20.0	40.0		20.0	40.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		22.2%	44.4%		22.2%	44.4%	
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0		15.5	35.0		15.5	35.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		5.0	5.0		5.0		4.5	5.0		4.5	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0						7.0	
Flash Dont Walk (s)	17.0	17.0	17.0	16.0	16.0						20.0	
Pedestrian Calls (#/hr)	5	5	5	5	5						5	
Act Effct Green (s)		21.1	21.1		21.1		37.4	36.9			21.1	
Actuated g/C Ratio		0.31	0.31		0.31		0.55	0.54			0.31	
v/c Ratio		0.77	0.37		0.05		0.35	0.25			0.79	
Control Delay (s/veh)		38.5	5.6		19.4		10.1	9.3			31.0	
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	
Total Delay (s/veh)		38.5	5.6		19.4		10.1	9.3			31.0	
LOS		D	A		B		B	A			C	
Approach Delay (s/veh)		24.4			19.4			9.6			31.0	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 68.5			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.79			
Intersection Signal Delay (s/veh): 22.1		Intersection LOS: C	
Intersection Capacity Utilization 63.6%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 7: N Pearl St & W Reynolds Ave





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	499	28	189	461	96	96	62	172	140	45	12
Future Volume (vph)	15	499	28	189	461	96	96	62	172	140	45	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	1.00		0.99	0.99			0.99			1.00	
Frt		0.992			0.974			0.930			0.991	
Flt Protected	0.950			0.950				0.986			0.966	
Satd. Flow (prot)	1787	3436	0	1787	3316	0	0	1683	0	0	1761	0
Flt Permitted	0.950			0.950				0.986			0.966	
Satd. Flow (perm)	1777	3436	0	1777	3316	0	0	1681	0	0	1756	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			24			43			3	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		917			595			1276			1018	
Travel Time (s)		20.8			13.5			34.8			27.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	4%	4%	1%	5%	7%	1%	2%	3%	4%	1%	1%
Adj. Flow (vph)	16	520	29	197	480	100	100	65	179	146	47	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	16	549	0	197	580	0	0	344	0	0	206	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	12.0	37.0		18.0	47.0		28.0	28.0		25.0	25.0	
Total Split (s)	15.0	37.0		25.0	47.0		28.0	28.0		25.0	25.0	
Total Split (%)	13.0%	32.2%		21.7%	40.9%		24.3%	24.3%		21.7%	21.7%	
Maximum Green (s)	11.0	32.5		21.0	42.5		24.0	24.0		21.0	21.0	
Yellow Time (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
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	
Total Lost Time (s)	4.0	4.5		4.0	4.5			4.0			4.0	
Lead/Lag	Lead	Lead		Lag	Lag							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	20.0	20.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	10.0	10.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			16.0		19.0	19.0		17.0	17.0	
Pedestrian Calls (#/hr)		5			5		5	5		5	5	
Act Effct Green (s)	6.6	38.0		17.6	54.9			25.3			17.6	
Actuated g/C Ratio	0.06	0.33		0.15	0.48			0.22			0.15	
v/c Ratio	0.16	0.48		0.72	0.36			0.85			0.76	
Control Delay (s/veh)	54.3	34.3		50.5	17.3			57.8			63.3	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	54.3	34.3		50.5	17.3			57.8			63.3	
LOS	D	C		D	B			E			E	
Approach Delay (s/veh)		34.9			25.7			57.8			63.3	
Approach LOS		C			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 106 (92%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay (s/veh): 38.4		Intersection LOS: D	
Intersection Capacity Utilization 63.5%		ICU Level of Service B	
Analysis Period (min) 15			

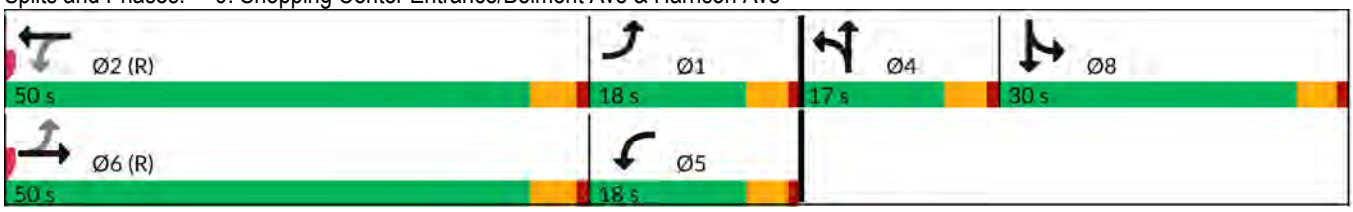
Splits and Phases: 8: Johnson Rd & Harrison Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	677	21	105	723	264	9	29	101	264	56	22
Future Volume (vph)	53	677	21	105	723	264	9	29	101	264	56	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	345		0	40		0	175		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			70			40			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00	0.99		0.99	0.97		0.99	0.99	
Frt		0.995			0.960			0.883			0.981	
Flt Protected	0.950			0.950			0.950			0.950	0.974	
Satd. Flow (prot)	1787	3453	0	1787	3313	0	1787	1615	0	1698	1697	0
Flt Permitted	0.200			0.312			0.950			0.950	0.974	
Satd. Flow (perm)	376	3453	0	585	3313	0	1777	1615	0	1688	1692	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			53			105			6	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			627			328			306	
Travel Time (s)		13.5			14.3			8.9			8.3	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	4%	1%	1%	4%	2%	1%	1%	1%	1%	2%	1%
Adj. Flow (vph)	55	705	22	109	753	275	9	30	105	275	58	23
Shared Lane Traffic (%)										35%		
Lane Group Flow (vph)	55	727	0	109	1028	0	9	135	0	179	177	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	12.0		5.0	12.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	39.0		9.5	22.5		29.5	29.5		29.5	29.5	
Total Split (s)	18.0	50.0		18.0	50.0		17.0	17.0		30.0	30.0	
Total Split (%)	15.7%	43.5%		15.7%	43.5%		14.8%	14.8%		26.1%	26.1%	
Maximum Green (s)	13.5	45.0		13.5	45.0		12.5	12.5		25.5	25.5	
Yellow Time (s)	3.5	4.0		3.5	4.0		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	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Lead/Lag	Lag	Lead		Lag	Lead							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		Min	Min	
Walk Time (s)		7.0			7.0					7.0	7.0	
Flash Dont Walk (s)		27.0			10.0					18.0	18.0	
Pedestrian Calls (#/hr)		3			3					3	3	
Act Effct Green (s)	64.8	58.4		75.3	66.4		8.5	8.5		17.6	17.6	
Actuated g/C Ratio	0.56	0.51		0.65	0.58		0.07	0.07		0.15	0.15	
v/c Ratio	0.19	0.41		0.21	0.53		0.07	0.62		0.69	0.67	
Control Delay (s/veh)	13.2	19.2		9.8	15.3		48.0	27.8		59.1	56.0	
Queue Delay	0.0	0.0		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	13.2	19.2		9.8	15.4		48.0	27.8		59.1	56.0	
LOS	B	B		A	B		D	C		E	E	
Approach Delay (s/veh)		18.8			14.9			29.1			57.5	
Approach LOS		B			B			C			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 7 (6%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay (s/veh): 23.3		Intersection LOS: C	
Intersection Capacity Utilization 69.0%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 9: Shopping Center Entrance/Belmont Ave & Harrison Ave



Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1032	10	288	1092	0	218
Future Vol, veh/h	1032	10	288	1092	0	218
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	4	1	1	4	1	1
Mvmt Flow	1075	10	300	1138	0	227

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1085	0	-	543
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.21	-	-	3.31
Pot Cap-1 Maneuver	-	-	644	-	0	487
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	644	-	-	487
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	3.21	18.7
HCM LOS			C

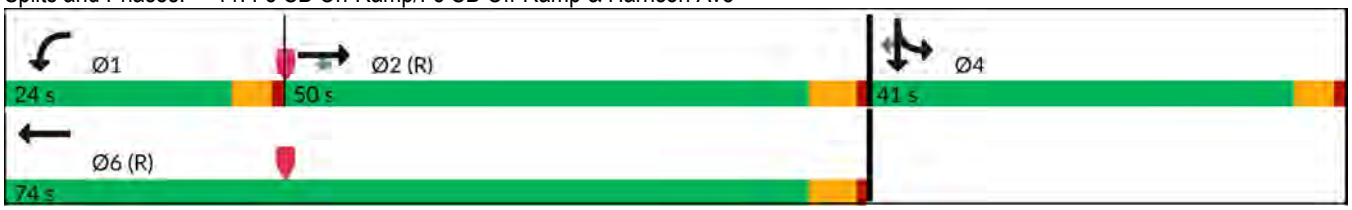
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	487	-	-	644	-
HCM Lane V/C Ratio	0.467	-	-	0.466	-
HCM Control Delay (s/veh)	18.7	-	-	15.4	-
HCM Lane LOS	C	-	-	C	-
HCM 95th %tile Q(veh)	2.4	-	-	2.5	-

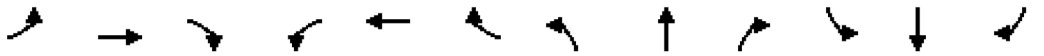
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	719	653	174	1139	0	0	0	0	375	127	307
Future Volume (vph)	0	719	653	174	1139	0	0	0	0	375	127	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		275	150		0	0		0	0		450
Storage Lanes	0		1	2		0	0		0	1		2
Taper Length (ft)	25			65			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.976	
Satd. Flow (prot)	0	3539	1568	3467	3539	0	0	0	0	1698	1736	2707
Flt Permitted				0.950						0.950	0.976	
Satd. Flow (perm)	0	3539	1568	3467	3539	0	0	0	0	1698	1736	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			515									142
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		627			547			755			897	
Travel Time (s)		14.3			12.4			17.2			20.4	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	1%	2%	3%	1%	2%	1%	1%	1%	1%	1%	2%	5%
Adj. Flow (vph)	0	741	673	179	1174	0	0	0	0	387	131	316
Shared Lane Traffic (%)										34%		
Lane Group Flow (vph)	0	741	673	179	1174	0	0	0	0	255	263	316
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type		NA	Perm	Prot	NA					Split	NA	Perm
Protected Phases		2		1	6					4	4	
Permitted Phases			2									4
Detector Phase		2	2	1	6					4	4	4
Switch Phase												
Minimum Initial (s)		12.0	12.0	5.0	12.0					10.0	10.0	10.0
Minimum Split (s)		33.0	33.0	9.5	36.0					40.5	40.5	40.5
Total Split (s)		50.0	50.0	24.0	74.0					41.0	41.0	41.0
Total Split (%)		43.5%	43.5%	20.9%	64.3%					35.7%	35.7%	35.7%
Maximum Green (s)		45.0	45.0	19.5	69.0					36.5	36.5	36.5
Yellow Time (s)		4.0	4.0	3.5	4.0					3.5	3.5	3.5
All-Red Time (s)		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
Total Lost Time (s)		5.0	5.0	4.5	5.0					4.5	4.5	4.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.5	3.5	3.0	3.5					3.5	3.5	3.5
Minimum Gap (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)		20.0	20.0	0.0	20.0					0.0	0.0	0.0
Time To Reduce (s)		10.0	10.0	0.0	10.0					0.0	0.0	0.0
Recall Mode		C-Min	C-Min	None	C-Min					None	None	None
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		21.0	21.0		24.0					29.0	29.0	29.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		63.4	63.4	11.3	79.1					26.4	26.4	26.4
Actuated g/C Ratio		0.55	0.55	0.10	0.69					0.23	0.23	0.23
v/c Ratio		0.38	0.61	0.53	0.48					0.66	0.66	0.43
Control Delay (s/veh)		7.3	4.9	39.1	15.1					47.4	47.4	20.9
Queue Delay		0.0	0.2	0.0	0.7					0.1	0.1	0.0
Total Delay (s/veh)		7.3	5.2	39.1	15.8					47.5	47.5	20.9
LOS		A	A	D	B					D	D	C
Approach Delay (s/veh)		6.3			18.9						37.4	
Approach LOS		A			B						D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 109 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.66			
Intersection Signal Delay (s/veh): 18.2		Intersection LOS: B	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 11: I-5 SB On-Ramp/I-5 SB Off-Ramp & Harrison Ave



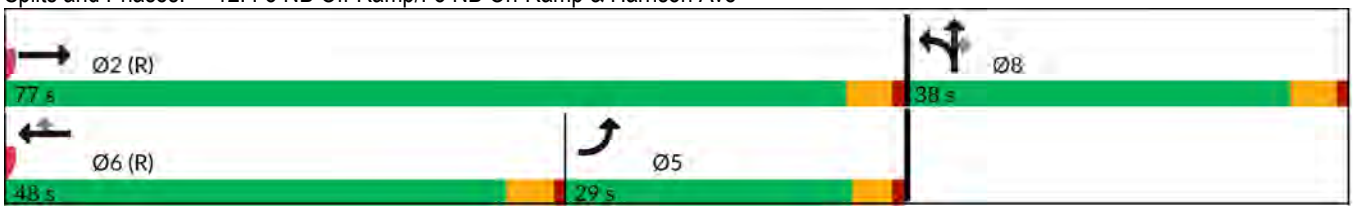


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	293	1055	0	0	680	242	559	149	167	0	0	0
Future Volume (vph)	293	1055	0	0	680	242	559	149	167	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		275	315		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Taper Length (ft)	50			25			155			25		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3335	3539	0	0	3574	1583	3367	1881	1599	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3335	3539	0	0	3574	1583	3367	1881	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						278			83			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		547			705			724			996	
Travel Time (s)		12.4			16.0			16.5			22.6	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Heavy Vehicles (%)	5%	2%	1%	1%	1%	2%	4%	1%	1%	1%	1%	1%
Adj. Flow (vph)	337	1213	0	0	782	278	643	171	192	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	337	1213	0	0	782	278	643	171	192	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	12.0			12.0	12.0	5.0	5.0	5.0			
Minimum Split (s)	9.5	33.0			32.0	32.0	38.0	38.0	38.0			
Total Split (s)	29.0	77.0			48.0	48.0	38.0	38.0	38.0			
Total Split (%)	25.2%	67.0%			41.7%	41.7%	33.0%	33.0%	33.0%			
Maximum Green (s)	24.5	72.0			43.0	43.0	33.0	33.0	33.0			
Yellow Time (s)	3.5	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	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			
Total Lost Time (s)	4.5	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.5			3.5	3.5	3.0	3.0	3.0			
Minimum Gap (s)	3.0	3.0			3.0	3.0	2.5	2.5	2.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	20.0			20.0	20.0	20.0	20.0	20.0			
Time To Reduce (s)	0.0	10.0			10.0	10.0	5.0	5.0	5.0			
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		21.0			20.0	20.0	26.0	26.0	26.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	16.9	75.5			54.1	54.1	29.5	29.5	29.5			
Actuated g/C Ratio	0.15	0.66			0.47	0.47	0.26	0.26	0.26			
v/c Ratio	0.69	0.52			0.46	0.31	0.74	0.35	0.41			
Control Delay (s/veh)	56.4	14.3			23.4	3.8	44.5	35.9	21.2			
Queue Delay	0.0	0.7			0.0	0.0	0.0	0.0	0.0			
Total Delay (s/veh)	56.4	15.0			23.4	3.8	44.5	35.9	21.2			
LOS	E	B			C	A	D	D	C			
Approach Delay (s/veh)		24.0			18.2			38.6				
Approach LOS		C			B			D				

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 56 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 26.4		Intersection LOS: C	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 12: I-5 NB Off-Ramp/I-5 NB On-Ramp & Harrison Ave



13: Belmont Ave & Haviland St Performance by approach

Approach	EB	WB	NB	SB	All
Denied Del/Veh (s)	0.1	0.2	0.0	0.1	0.1
Total Del/Veh (s)	5.6	7.6	1.7	5.1	4.3

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	489	3	4	324	1	2
Future Vol, veh/h	489	3	4	324	1	2
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	89	89	89	89	89	89
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	549	3	4	364	1	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	553	0	924	551
Stage 1	-	-	-	-	551	-
Stage 2	-	-	-	-	373	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1022	-	300	536
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1022	-	299	536
Mov Cap-2 Maneuver	-	-	-	-	299	-
Stage 1	-	-	-	-	579	-
Stage 2	-	-	-	-	695	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.1	13.57
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	424	-	-	22	-
HCM Lane V/C Ratio	0.008	-	-	0.004	-
HCM Control Delay (s/veh)	13.6	-	-	8.5	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	491	0	0	328	0	1
Future Vol, veh/h	491	0	0	328	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	558	0	0	373	0	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	558	0	931	558
Stage 1	-	-	-	-	558	-
Stage 2	-	-	-	-	373	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	1018	-	298	531
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	699	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1018	-	298	531
Mov Cap-2 Maneuver	-	-	-	-	298	-
Stage 1	-	-	-	-	575	-
Stage 2	-	-	-	-	699	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	11.79
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	531	-	-	1018	-
HCM Lane V/C Ratio	0.002	-	-	-	-
HCM Control Delay (s/veh)	11.8	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

APPENDIX

FORECAST 2028 PEAK HOUR WITHOUT PROJECT
LEVEL OF SERVICE

Intersection	
Int Delay, s/veh	6.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	4	258	92	59	210	13	39	30	77	12	34	7
Future Vol, veh/h	4	258	92	59	210	13	39	30	77	12	34	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	1	4	5	4	3	1	1	1	1	1	1	1
Mvmt Flow	5	331	118	76	269	17	50	38	99	15	44	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	286	0	0	449	0	0	842	837	390	789	888	278
Stage 1	-	-	-	-	-	-	400	400	-	429	429	-
Stage 2	-	-	-	-	-	-	442	437	-	360	459	-
Critical Hdwy	4.11	-	-	4.14	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.236	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1282	-	-	1101	-	-	285	304	661	309	284	764
Stage 1	-	-	-	-	-	-	628	603	-	606	586	-
Stage 2	-	-	-	-	-	-	596	581	-	660	568	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1282	-	-	1101	-	-	217	277	661	210	259	764
Mov Cap-2 Maneuver	-	-	-	-	-	-	217	277	-	210	259	-
Stage 1	-	-	-	-	-	-	625	600	-	557	538	-
Stage 2	-	-	-	-	-	-	497	533	-	523	565	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.09	1.78	25.21	22.91
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	361	19	-	-	372	-	-	268
HCM Lane V/C Ratio	0.518	0.004	-	-	0.069	-	-	0.253
HCM Control Delay (s/veh)	25.2	7.8	0	-	8.5	0	-	22.9
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	2.9	0	-	-	0.2	-	-	1

Intersection	
Int Delay, s/veh	3.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	334	22	102	272	15	191
Future Vol, veh/h	334	22	102	272	15	191
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	95	-	75	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	3	15	1	3	7	2
Mvmt Flow	367	24	112	299	16	210

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	391	0	902	379
Stage 1	-	-	-	-	379	-
Stage 2	-	-	-	-	523	-
Critical Hdwy	-	-	4.11	-	6.47	6.22
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.209	-	3.563	3.318
Pot Cap-1 Maneuver	-	-	1173	-	302	668
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	585	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1173	-	273	668
Mov Cap-2 Maneuver	-	-	-	-	273	-
Stage 1	-	-	-	-	681	-
Stage 2	-	-	-	-	529	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	2.29	13.29
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	273	668	-	-	1173	-
HCM Lane V/C Ratio	0.06	0.314	-	-	0.096	-
HCM Control Delay (s/veh)	19	12.8	-	-	8.4	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	1.3	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	560	370	0	8	12
Future Vol, veh/h	1	560	370	0	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1	609	402	0	9	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	402	0	-	0	1013	402
Stage 1	-	-	-	-	402	-
Stage 2	-	-	-	-	611	-
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	1156	-	-	-	265	648
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	542	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1156	-	-	-	264	648
Mov Cap-2 Maneuver	-	-	-	-	264	-
Stage 1	-	-	-	-	675	-
Stage 2	-	-	-	-	542	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.01	0	14.27
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1156	-	-	-	410
HCM Lane V/C Ratio	0.001	-	-	-	0.053
HCM Control Delay (s/veh)	8.1	-	-	-	14.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	559	365	2	4	6
Future Vol, veh/h	9	559	365	2	4	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	90	90	90	90	90	90
Heavy Vehicles, %	1	2	2	50	1	20
Mvmt Flow	10	621	406	2	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	408	0	-	0	1048	407
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	641	-
Critical Hdwy	4.11	-	-	-	6.41	6.4
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.48
Pot Cap-1 Maneuver	1156	-	-	-	253	607
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	526	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1156	-	-	-	250	607
Mov Cap-2 Maneuver	-	-	-	-	250	-
Stage 1	-	-	-	-	666	-
Stage 2	-	-	-	-	526	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.13	0	14.59
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	29	-	-	-	387
HCM Lane V/C Ratio	0.009	-	-	-	0.029
HCM Control Delay (s/veh)	8.1	0	-	-	14.6
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	529	348	4	10	6
Future Vol, veh/h	20	529	348	4	10	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	85	85	85	85	85	85
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	24	622	409	5	12	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	414	0	-	0	1081	412
Stage 1	-	-	-	-	412	-
Stage 2	-	-	-	-	669	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1150	-	-	-	242	642
Stage 1	-	-	-	-	671	-
Stage 2	-	-	-	-	511	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1150	-	-	-	235	642
Mov Cap-2 Maneuver	-	-	-	-	235	-
Stage 1	-	-	-	-	650	-
Stage 2	-	-	-	-	511	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.3	0	17.46
HCM LOS			C

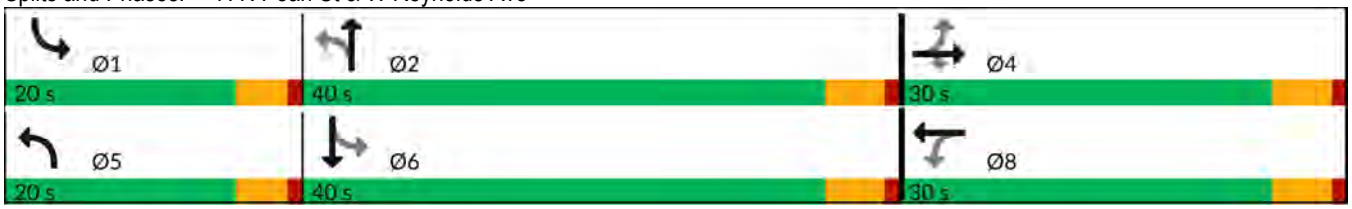
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	66	-	-	-	308
HCM Lane V/C Ratio	0.02	-	-	-	0.061
HCM Control Delay (s/veh)	8.2	0	-	-	17.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	22	235	11	9	2	155	235	4	0	234	192
Future Volume (vph)	290	22	235	11	9	2	155	235	4	0	234	192
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		115	0		0	175		0	125		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			250			275		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99	0.96		0.99		1.00	1.00			0.99	
Frt			0.850		0.988			0.997			0.932	
Flt Protected		0.956			0.976		0.950					
Satd. Flow (prot)	0	1673	1515	0	1641	0	1693	1709	0	1782	1586	0
Flt Permitted		0.725			0.843		0.236					
Satd. Flow (perm)	0	1258	1461	0	1413	0	419	1709	0	1782	1586	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			234		2			1			54	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		447			297			547			348	
Travel Time (s)		8.7			8.1			10.7			6.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	1%	1%	1%	50%	1%	5%	1%	1%	6%	2%
Adj. Flow (vph)	290	22	235	11	9	2	155	235	4	0	234	192
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	312	235	0	22	0	155	239	0	0	426	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	28.0	28.0		10.0	29.5		9.5	32.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		20.0	40.0		20.0	40.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		22.2%	44.4%		22.2%	44.4%	
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0		15.5	35.0		15.5	35.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		5.0	5.0		5.0		4.5	5.0		4.5	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0						7.0	
Flash Dont Walk (s)	17.0	17.0	17.0	16.0	16.0						20.0	
Pedestrian Calls (#/hr)	5	5	5	5	5						5	
Act Effct Green (s)		22.3	22.3		22.3		38.5	37.9			21.9	
Actuated g/C Ratio		0.32	0.32		0.32		0.54	0.54			0.31	
v/c Ratio		0.79	0.38		0.05		0.36	0.26			0.81	
Control Delay (s/veh)		41.1	5.6		20.0		10.5	9.5			32.8	
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	
Total Delay (s/veh)		41.1	5.6		20.0		10.5	9.5			32.8	
LOS		D	A		B		B	A			C	
Approach Delay (s/veh)		25.9			20.0			9.9			32.8	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 70.7			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay (s/veh): 23.4		Intersection LOS: C	
Intersection Capacity Utilization 71.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 7: N Pearl St & W Reynolds Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	587	31	209	530	108	106	68	190	155	50	13
Future Volume (vph)	17	587	31	209	530	108	106	68	190	155	50	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	0.99			0.99			1.00	
Frt		0.993			0.975			0.929			0.992	
Flt Protected	0.950			0.950				0.986			0.966	
Satd. Flow (prot)	1787	3440	0	1787	3320	0	0	1681	0	0	1763	0
Flt Permitted	0.950			0.950				0.986			0.966	
Satd. Flow (perm)	1778	3440	0	1778	3320	0	0	1679	0	0	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			24			43			3	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		917			595			1276			1018	
Travel Time (s)		20.8			13.5			34.8			27.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	4%	4%	1%	5%	7%	1%	2%	3%	4%	1%	1%
Adj. Flow (vph)	18	611	32	218	552	113	110	71	198	161	52	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	643	0	218	665	0	0	379	0	0	227	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	12.0	37.0		18.0	47.0		28.0	28.0		25.0	25.0	
Total Split (s)	15.0	37.0		25.0	47.0		28.0	28.0		25.0	25.0	
Total Split (%)	13.0%	32.2%		21.7%	40.9%		24.3%	24.3%		21.7%	21.7%	
Maximum Green (s)	11.0	32.5		21.0	42.5		24.0	24.0		21.0	21.0	
Yellow Time (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
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	
Total Lost Time (s)	4.0	4.5		4.0	4.5			4.0			4.0	
Lead/Lag	Lead	Lead		Lag	Lag							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	20.0	20.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	10.0	10.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			16.0		19.0	19.0		17.0	17.0	
Pedestrian Calls (#/hr)		5			5		5	5		5	5	
Act Effct Green (s)	6.7	34.4		18.2	51.8			27.4			18.6	
Actuated g/C Ratio	0.06	0.30		0.16	0.45			0.24			0.16	
v/c Ratio	0.17	0.62		0.77	0.44			0.88			0.79	
Control Delay (s/veh)	54.6	38.6		59.8	24.6			60.0			65.1	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	54.6	38.6		59.8	24.6			60.0			65.1	
LOS	D	D		E	C			E			E	
Approach Delay (s/veh)		39.1			33.3			60.0			65.1	
Approach LOS		D			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 106 (92%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.88			
Intersection Signal Delay (s/veh): 43.1		Intersection LOS: D	
Intersection Capacity Utilization 67.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 8: Johnson Rd & Harrison Ave

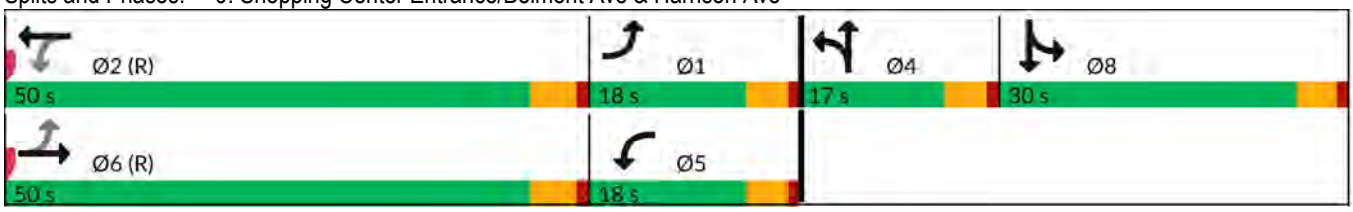
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	783	23	116	819	291	10	32	112	291	62	24
Future Volume (vph)	59	783	23	116	819	291	10	32	112	291	62	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	345		0	40		0	175		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			70			40			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00	0.99		0.99	0.97		0.99	0.99	
Frt		0.996			0.961			0.883			0.981	
Flt Protected	0.950			0.950			0.950			0.950	0.974	
Satd. Flow (prot)	1787	3457	0	1787	3316	0	1787	1615	0	1698	1697	0
Flt Permitted	0.151			0.257			0.950			0.950	0.974	
Satd. Flow (perm)	284	3457	0	483	3316	0	1778	1615	0	1688	1692	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			51			117			6	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			627			328			613	
Travel Time (s)		13.5			14.3			8.9			16.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	4%	1%	1%	4%	2%	1%	1%	1%	1%	2%	1%
Adj. Flow (vph)	61	816	24	121	853	303	10	33	117	303	65	25
Shared Lane Traffic (%)										35%		
Lane Group Flow (vph)	61	840	0	121	1156	0	10	150	0	197	196	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	12.0		5.0	12.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	39.0		9.5	22.5		29.5	29.5		29.5	29.5	
Total Split (s)	18.0	50.0		18.0	50.0		17.0	17.0		30.0	30.0	
Total Split (%)	15.7%	43.5%		15.7%	43.5%		14.8%	14.8%		26.1%	26.1%	
Maximum Green (s)	13.5	45.0		13.5	45.0		12.5	12.5		25.5	25.5	
Yellow Time (s)	3.5	4.0		3.5	4.0		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	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Lead/Lag	Lag	Lead		Lag	Lead							

9: Shopping Center Entrance/Belmont Ave & Harrison Ave

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		Min	Min	
Walk Time (s)		7.0			7.0					7.0	7.0	
Flash Dont Walk (s)		27.0			10.0					18.0	18.0	
Pedestrian Calls (#/hr)		3			3					3	3	
Act Effct Green (s)	63.5	56.6		73.2	64.3		8.8	8.8		19.0	19.0	
Actuated g/C Ratio	0.55	0.49		0.64	0.56		0.08	0.08		0.17	0.17	
v/c Ratio	0.26	0.49		0.27	0.62		0.07	0.65		0.70	0.69	
Control Delay (s/veh)	18.6	20.5		12.9	17.8		47.7	27.8		58.1	55.6	
Queue Delay	0.0	0.0		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	18.6	20.5		12.9	17.8		47.7	27.8		58.1	55.6	
LOS	B	C		B	B		D	C		E	E	
Approach Delay (s/veh)		20.4			17.4			29.1			56.9	
Approach LOS		C			B			C			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 7 (6%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay (s/veh): 24.7		Intersection LOS: C	
Intersection Capacity Utilization 72.7%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 9: Shopping Center Entrance/Belmont Ave & Harrison Ave



Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1175	11	318	1226	0	241
Future Vol, veh/h	1175	11	318	1226	0	241
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	4	1	1	4	1	1
Mvmt Flow	1224	11	331	1277	0	251

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1235	0	-	618
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.21	-	-	3.31
Pot Cap-1 Maneuver	-	-	565	-	0	435
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	565	-	-	435
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	4.12	23.99
HCM LOS			C

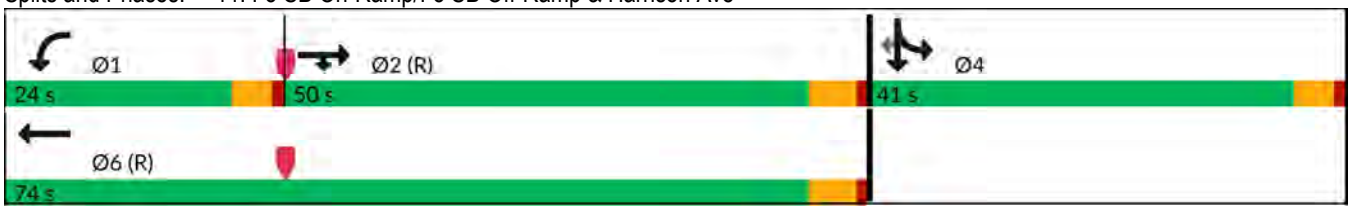
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	435	-	-	565	-
HCM Lane V/C Ratio	0.577	-	-	0.586	-
HCM Control Delay (s/veh)	24	-	-	20	-
HCM Lane LOS	C	-	-	C	-
HCM 95th %tile Q(veh)	3.5	-	-	3.8	-

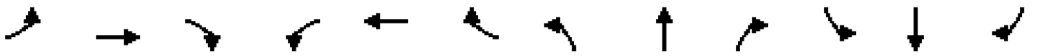
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	806	745	192	1273	0	0	0	0	414	140	345
Future Volume (vph)	0	806	745	192	1273	0	0	0	0	414	140	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		275	150		0	0		0	0		450
Storage Lanes	0		1	2		0	0		0	1		2
Taper Length (ft)	25			65			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.976	
Satd. Flow (prot)	0	3539	1568	3467	3539	0	0	0	0	1698	1736	2707
Flt Permitted				0.950						0.950	0.976	
Satd. Flow (perm)	0	3539	1568	3467	3539	0	0	0	0	1698	1736	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			491									113
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		627			547			755			897	
Travel Time (s)		14.3			12.4			17.2			20.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	2%	3%	1%	2%	1%	1%	1%	1%	1%	2%	5%
Adj. Flow (vph)	0	806	745	192	1273	0	0	0	0	414	140	345
Shared Lane Traffic (%)										34%		
Lane Group Flow (vph)	0	806	745	192	1273	0	0	0	0	273	281	345
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type		NA	Prot	Prot	NA					Split	NA	Perm
Protected Phases		2	2	1	6					4	4	
Permitted Phases												4
Detector Phase		2	2	1	6					4	4	4
Switch Phase												
Minimum Initial (s)		12.0	12.0	5.0	12.0					10.0	10.0	10.0
Minimum Split (s)		33.0	33.0	9.5	36.0					40.5	40.5	40.5
Total Split (s)		50.0	50.0	24.0	74.0					41.0	41.0	41.0
Total Split (%)		43.5%	43.5%	20.9%	64.3%					35.7%	35.7%	35.7%
Maximum Green (s)		45.0	45.0	19.5	69.0					36.5	36.5	36.5
Yellow Time (s)		4.0	4.0	3.5	4.0					3.5	3.5	3.5
All-Red Time (s)		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
Total Lost Time (s)		5.0	5.0	4.5	5.0					4.5	4.5	4.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.5	3.5	3.0	3.5					3.5	3.5	3.5
Minimum Gap (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)		20.0	20.0	0.0	20.0					0.0	0.0	0.0
Time To Reduce (s)		10.0	10.0	0.0	10.0					0.0	0.0	0.0
Recall Mode		C-Min	C-Min	None	C-Min					None	None	None
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		21.0	21.0		24.0					29.0	29.0	29.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		61.8	61.8	11.7	78.0					27.5	27.5	27.5
Actuated g/C Ratio		0.54	0.54	0.10	0.68					0.24	0.24	0.24
v/c Ratio		0.42	0.70	0.55	0.53					0.67	0.68	0.47
Control Delay (s/veh)		9.5	8.6	43.5	15.7					47.1	47.1	25.6
Queue Delay		0.0	0.4	0.0	0.6					0.3	0.3	0.0
Total Delay (s/veh)		9.5	9.0	43.5	16.2					47.4	47.4	25.6
LOS		A	A	D	B					D	D	C
Approach Delay (s/veh)		9.2			19.8						39.1	
Approach LOS		A			B						D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 109 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay (s/veh): 20.0		Intersection LOS: C	
Intersection Capacity Utilization 78.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 11: I-5 SB On-Ramp/I-5 SB Off-Ramp & Harrison Ave



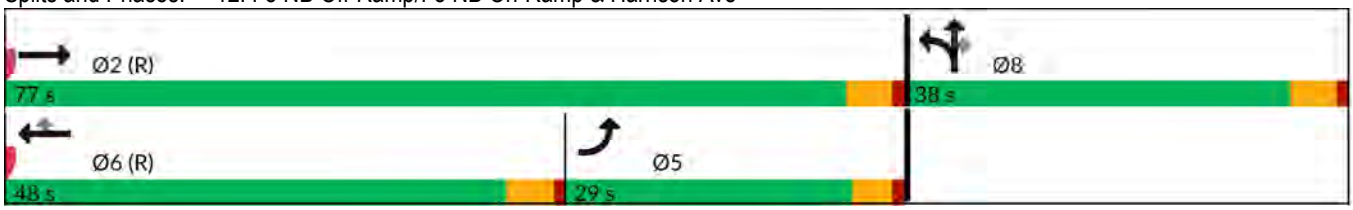


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	334	1166	0	0	752	267	631	165	184	0	0	0
Future Volume (vph)	334	1166	0	0	752	267	631	165	184	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		275	315		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Taper Length (ft)	50			25			155			25		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3335	3539	0	0	3574	1583	3367	1881	1599	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3335	3539	0	0	3574	1583	3367	1881	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						267			92			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		547			705			724			996	
Travel Time (s)		12.4			16.0			16.5			22.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	5%	2%	1%	1%	1%	2%	4%	1%	1%	1%	1%	1%
Adj. Flow (vph)	334	1166	0	0	752	267	631	165	184	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	334	1166	0	0	752	267	631	165	184	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	12.0			12.0	12.0	5.0	5.0	5.0			
Minimum Split (s)	9.5	33.0			32.0	32.0	38.0	38.0	38.0			
Total Split (s)	29.0	77.0			48.0	48.0	38.0	38.0	38.0			
Total Split (%)	25.2%	67.0%			41.7%	41.7%	33.0%	33.0%	33.0%			
Maximum Green (s)	24.5	72.0			43.0	43.0	33.0	33.0	33.0			
Yellow Time (s)	3.5	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	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			
Total Lost Time (s)	4.5	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.5			3.5	3.5	3.0	3.0	3.0			
Minimum Gap (s)	3.0	3.0			3.0	3.0	2.5	2.5	2.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	20.0			20.0	20.0	20.0	20.0	20.0			
Time To Reduce (s)	0.0	10.0			10.0	10.0	5.0	5.0	5.0			
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		21.0			20.0	20.0	26.0	26.0	26.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	16.8	75.7			54.5	54.5	29.3	29.3	29.3			
Actuated g/C Ratio	0.15	0.66			0.47	0.47	0.25	0.25	0.25			
v/c Ratio	0.69	0.50			0.44	0.30	0.74	0.35	0.39			
Control Delay (s/veh)	59.9	15.8			22.9	3.8	44.3	35.8	18.6			
Queue Delay	0.0	0.7			0.0	0.0	0.0	0.0	0.0			
Total Delay (s/veh)	59.9	16.5			22.9	3.8	44.3	35.8	18.6			
LOS	E	B			C	A	D	D	B			
Approach Delay (s/veh)		26.2			17.9			38.1				
Approach LOS		C			B			D				

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 56 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 27.1		Intersection LOS: C	
Intersection Capacity Utilization 78.4%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 12: I-5 NB Off-Ramp/I-5 NB On-Ramp & Harrison Ave



13: Belmont Ave & Haviland St Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.1
Total Del/Veh (s)	5.5	8.8	2.3	6.1	5.0

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	551	3	4	365	1	2
Future Vol, veh/h	551	3	4	365	1	2
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	89	89	89	89	89	89
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	619	3	4	410	1	2

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	622	0	1040	621
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	419	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	963	-	256	489
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	963	-	255	489
Mov Cap-2 Maneuver	-	-	-	-	255	-
Stage 1	-	-	-	-	538	-
Stage 2	-	-	-	-	662	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.09	14.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	374	-	-	20	-
HCM Lane V/C Ratio	0.009	-	-	0.005	-
HCM Control Delay (s/veh)	14.7	-	-	8.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	553	0	0	369	0	1
Future Vol, veh/h	553	0	0	369	0	1
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	2	1	1	2	1	1
Mvmt Flow	628	0	0	419	0	1

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	628	0	1048	628
Stage 1	-	-	-	-	628	-
Stage 2	-	-	-	-	419	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	958	-	253	484
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	666	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	958	-	253	484
Mov Cap-2 Maneuver	-	-	-	-	253	-
Stage 1	-	-	-	-	534	-
Stage 2	-	-	-	-	666	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0	12.45
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	484	-	-	958	-
HCM Lane V/C Ratio	0.002	-	-	-	-
HCM Control Delay (s/veh)	12.4	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

FORECAST 2028 PEAK HOUR WITH PROJECT LEVEL OF SERVICE

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	4	264	92	75	222	13	39	30	90	12	34	7
Future Vol, veh/h	4	264	92	75	222	13	39	30	90	12	34	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	78	78	78	78	78	78	78	78	78	78	78	78
Heavy Vehicles, %	1	4	5	20	3	1	1	1	15	1	1	1
Mvmt Flow	5	338	118	96	285	17	50	38	115	15	44	9

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	301	0	0	456	0	0	906	901	397	853	952	293
Stage 1	-	-	-	-	-	-	408	408	-	485	485	-
Stage 2	-	-	-	-	-	-	499	494	-	368	467	-
Critical Hdwy	4.11	-	-	4.3	-	-	7.11	6.51	6.35	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.38	-	-	3.509	4.009	3.435	3.509	4.009	3.309
Pot Cap-1 Maneuver	1265	-	-	1016	-	-	258	279	625	280	260	749
Stage 1	-	-	-	-	-	-	622	599	-	565	553	-
Stage 2	-	-	-	-	-	-	556	548	-	654	564	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1265	-	-	1016	-	-	186	246	625	173	229	749
Mov Cap-2 Maneuver	-	-	-	-	-	-	186	246	-	173	229	-
Stage 1	-	-	-	-	-	-	619	595	-	501	490	-
Stage 2	-	-	-	-	-	-	443	486	-	496	561	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0.09	2.16	31.25	26.61
HCM LOS			D	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	334	19	-	-	431	-	-	234
HCM Lane V/C Ratio	0.61	0.004	-	-	0.095	-	-	0.291
HCM Control Delay (s/veh)	31.3	7.9	0	-	8.9	0	-	26.6
HCM Lane LOS	D	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	3.8	0	-	-	0.3	-	-	1.2

Intersection	
Int Delay, s/veh	4.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	359	22	135	312	15	207
Future Vol, veh/h	359	22	135	312	15	207
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	95	-	75	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	7	15	1	7	7	2
Mvmt Flow	395	24	148	343	16	227

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	419	0	1046	407
Stage 1	-	-	-	-	407	-
Stage 2	-	-	-	-	640	-
Critical Hdwy	-	-	4.11	-	6.47	6.22
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.209	-	3.563	3.318
Pot Cap-1 Maneuver	-	-	1146	-	247	644
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	516	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1146	-	215	644
Mov Cap-2 Maneuver	-	-	-	-	215	-
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	449	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	2.6	14.24
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	215	644	-	-	1146	-
HCM Lane V/C Ratio	0.077	0.353	-	-	0.129	-
HCM Control Delay (s/veh)	23.1	13.6	-	-	8.6	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.2	1.6	-	-	0.4	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	1	601	443	0	8	12
Future Vol, veh/h	1	601	443	0	8	12
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	7	7	2	2	2
Mvmt Flow	1	653	482	0	9	13

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	482	0	-	0	1137	482
Stage 1	-	-	-	-	482	-
Stage 2	-	-	-	-	655	-
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	1081	-	-	-	223	585
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	517	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1081	-	-	-	223	585
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	621	-
Stage 2	-	-	-	-	517	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.01	0	15.82
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1081	-	-	-	355
HCM Lane V/C Ratio	0.001	-	-	-	0.061
HCM Control Delay (s/veh)	8.3	-	-	-	15.8
HCM Lane LOS	A	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	9	600	438	2	4	6
Future Vol, veh/h	9	600	438	2	4	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	90	90	90	90	90	90
Heavy Vehicles, %	1	7	7	50	1	20
Mvmt Flow	10	667	487	2	4	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	489	0	-	0	1174	488
Stage 1	-	-	-	-	488	-
Stage 2	-	-	-	-	687	-
Critical Hdwy	4.11	-	-	-	6.41	6.4
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.48
Pot Cap-1 Maneuver	1079	-	-	-	213	545
Stage 1	-	-	-	-	619	-
Stage 2	-	-	-	-	501	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1079	-	-	-	210	545
Mov Cap-2 Maneuver	-	-	-	-	210	-
Stage 1	-	-	-	-	610	-
Stage 2	-	-	-	-	501	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.12	0	16.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	27	-	-	-	332
HCM Lane V/C Ratio	0.009	-	-	-	0.033
HCM Control Delay (s/veh)	8.4	0	-	-	16.2
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.1

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	20	550	358	4	10	6
Future Vol, veh/h	20	550	358	4	10	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	85	85	85	85	85	85
Heavy Vehicles, %	1	2	2	1	1	1
Mvmt Flow	24	647	421	5	12	7

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	426	0	-	0	1118	424
Stage 1	-	-	-	-	424	-
Stage 2	-	-	-	-	694	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1139	-	-	-	230	633
Stage 1	-	-	-	-	663	-
Stage 2	-	-	-	-	497	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1139	-	-	-	223	633
Mov Cap-2 Maneuver	-	-	-	-	223	-
Stage 1	-	-	-	-	641	-
Stage 2	-	-	-	-	497	-

Approach	EB	WB	SB
HCM Control Delay, s/v	0.29	0	18.07
HCM LOS			C

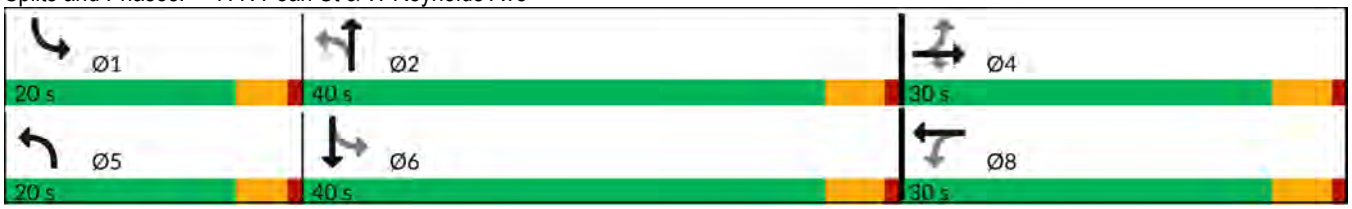
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	63	-	-	-	294
HCM Lane V/C Ratio	0.021	-	-	-	0.064
HCM Control Delay (s/veh)	8.2	0	-	-	18.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

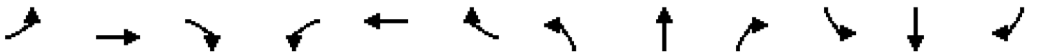
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	303	22	243	11	9	2	159	235	4	0	234	198
Future Volume (vph)	303	22	243	11	9	2	159	235	4	0	234	198
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (ft)	0		115	0		0	175		0	125		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			250			275		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor		0.99	0.96		0.99		1.00	1.00			0.98	
Frt			0.850		0.988			0.997			0.931	
Flt Protected		0.955			0.976		0.950					
Satd. Flow (prot)	0	1671	1515	0	1641	0	1693	1709	0	1782	1585	0
Flt Permitted		0.724			0.843		0.225					
Satd. Flow (perm)	0	1256	1461	0	1414	0	400	1709	0	1782	1585	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			232		2			1			55	
Link Speed (mph)		35			25			35			35	
Link Distance (ft)		447			297			547			348	
Travel Time (s)		8.7			8.1			10.7			6.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	3%	1%	1%	1%	1%	50%	1%	5%	1%	1%	6%	2%
Adj. Flow (vph)	303	22	243	11	9	2	159	235	4	0	234	198
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	325	243	0	22	0	159	239	0	0	432	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	30.0	30.0	30.0	28.0	28.0		10.0	29.5		9.5	32.0	
Total Split (s)	30.0	30.0	30.0	30.0	30.0		20.0	40.0		20.0	40.0	
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%		22.2%	44.4%		22.2%	44.4%	
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0		15.5	35.0		15.5	35.0	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	4.0		3.5	4.0	
All-Red Time (s)	1.0	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	
Total Lost Time (s)		5.0	5.0		5.0		4.5	5.0		4.5	5.0	
Lead/Lag							Lead	Lag		Lead	Lag	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		None	Min		None	Min	
Walk Time (s)	7.0	7.0	7.0	7.0	7.0						7.0	
Flash Dont Walk (s)	17.0	17.0	17.0	16.0	16.0						20.0	
Pedestrian Calls (#/hr)	5	5	5	5	5						5	
Act Effct Green (s)		23.5	23.5		23.5		39.0	38.5			22.3	
Actuated g/C Ratio		0.32	0.32		0.32		0.54	0.53			0.31	
v/c Ratio		0.80	0.39		0.05		0.38	0.26			0.82	
Control Delay (s/veh)		41.9	6.2		20.2		10.9	9.7			34.1	
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	
Total Delay (s/veh)		41.9	6.2		20.2		10.9	9.7			34.1	
LOS		D	A		C		B	A			C	
Approach Delay (s/veh)		26.6			20.2			10.2			34.1	
Approach LOS		C			C			B			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 72.4			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay (s/veh): 24.2		Intersection LOS: C	
Intersection Capacity Utilization 73.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 7: N Pearl St & W Reynolds Ave



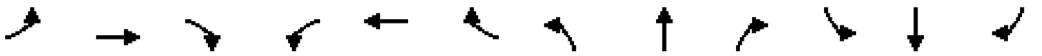


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	587	31	209	530	120	106	69	190	167	54	13
Future Volume (vph)	17	587	31	209	530	120	106	69	190	167	54	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00		0.99	0.99			0.99			1.00	
Frt		0.993			0.972			0.930			0.992	
Flt Protected	0.950			0.950				0.986			0.966	
Satd. Flow (prot)	1787	3440	0	1787	3234	0	0	1683	0	0	1638	0
Flt Permitted	0.950			0.950				0.986			0.966	
Satd. Flow (perm)	1778	3440	0	1778	3234	0	0	1681	0	0	1634	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		5			27			43			2	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		917			595			1276			1018	
Travel Time (s)		20.8			13.5			34.8			27.8	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	4%	4%	1%	5%	20%	1%	2%	3%	15%	1%	1%
Adj. Flow (vph)	18	611	32	218	552	125	110	72	198	174	56	14
Shared Lane Traffic (%)												
Lane Group Flow (vph)	18	643	0	218	677	0	0	380	0	0	244	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Prot	NA		Split	NA		Split	NA	
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	12.0	37.0		18.0	47.0		28.0	28.0		25.0	25.0	
Total Split (s)	15.0	37.0		25.0	47.0		28.0	28.0		25.0	25.0	
Total Split (%)	13.0%	32.2%		21.7%	40.9%		24.3%	24.3%		21.7%	21.7%	
Maximum Green (s)	11.0	32.5		21.0	42.5		24.0	24.0		21.0	21.0	
Yellow Time (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
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	
Total Lost Time (s)	4.0	4.5		4.0	4.5			4.0			4.0	
Lead/Lag	Lead	Lead		Lag	Lag							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	20.0	20.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	10.0	10.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		None	None	
Walk Time (s)		7.0			7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)		16.0			16.0		19.0	19.0		17.0	17.0	
Pedestrian Calls (#/hr)		5			5		5	5		5	5	
Act Effct Green (s)	6.7	33.3		18.2	50.7			26.8			20.3	
Actuated g/C Ratio	0.06	0.29		0.16	0.44			0.23			0.18	
v/c Ratio	0.17	0.64		0.77	0.47			0.90			0.84	
Control Delay (s/veh)	54.6	39.7		59.8	26.8			63.1			70.2	
Queue Delay	0.0	0.0		0.0	0.0			0.0			0.0	
Total Delay (s/veh)	54.6	39.7		59.8	26.8			63.1			70.2	
LOS	D	D		E	C			E			E	
Approach Delay (s/veh)		40.1			34.8			63.1			70.2	
Approach LOS		D			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 106 (92%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.90			
Intersection Signal Delay (s/veh): 45.3		Intersection LOS: D	
Intersection Capacity Utilization 69.2%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 8: Johnson Rd & Harrison Ave

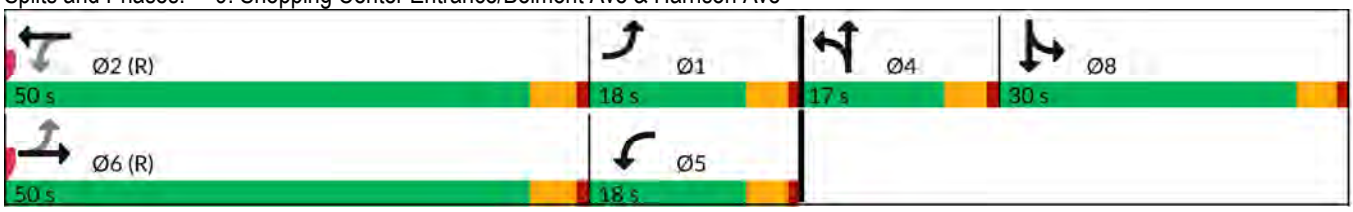


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	59	795	23	116	831	313	10	32	112	336	62	24
Future Volume (vph)	59	795	23	116	831	313	10	32	112	336	62	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		0	345		0	40		0	175		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	60			70			40			50		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	0.95	0.95	1.00
Ped Bike Factor		1.00		1.00	0.99		0.99	0.97		0.99	0.99	
Frt		0.996			0.959			0.883			0.983	
Flt Protected	0.950			0.950			0.950			0.950	0.971	
Satd. Flow (prot)	1787	3393	0	1787	3263	0	1787	1615	0	1698	1696	0
Flt Permitted	0.132			0.243			0.950			0.950	0.971	
Satd. Flow (perm)	248	3393	0	456	3263	0	1778	1615	0	1688	1691	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		3			56			117			5	
Link Speed (mph)		30			30			25			25	
Link Distance (ft)		595			627			328			613	
Travel Time (s)		13.5			14.3			8.9			16.7	
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)			5			5			5			5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	1%	6%	1%	1%	6%	2%	1%	1%	1%	1%	2%	1%
Adj. Flow (vph)	61	828	24	121	866	326	10	33	117	350	65	25
Shared Lane Traffic (%)										37%		
Lane Group Flow (vph)	61	852	0	121	1192	0	10	150	0	220	220	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2								
Detector Phase	1	6		5	2		4	4		8	8	
Switch Phase												
Minimum Initial (s)	5.0	12.0		5.0	12.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	9.5	39.0		9.5	22.5		29.5	29.5		29.5	29.5	
Total Split (s)	18.0	50.0		18.0	50.0		17.0	17.0		30.0	30.0	
Total Split (%)	15.7%	43.5%		15.7%	43.5%		14.8%	14.8%		26.1%	26.1%	
Maximum Green (s)	13.5	45.0		13.5	45.0		12.5	12.5		25.5	25.5	
Yellow Time (s)	3.5	4.0		3.5	4.0		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	5.0		4.5	5.0		4.5	4.5		4.5	4.5	
Lead/Lag	Lag	Lead		Lag	Lead							

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lead-Lag Optimize?	Yes	Yes		Yes	Yes							
Vehicle Extension (s)	3.0	3.5		3.0	3.5		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	20.0		0.0	20.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	10.0		0.0	10.0		0.0	0.0		0.0	0.0	
Recall Mode	None	C-Min		None	C-Min		None	None		Min	Min	
Walk Time (s)		7.0			7.0					7.0	7.0	
Flash Dont Walk (s)		27.0			10.0					18.0	18.0	
Pedestrian Calls (#/hr)		3			3					3	3	
Act Effct Green (s)	60.8	53.9		71.3	62.7		8.8	8.8		20.6	20.6	
Actuated g/C Ratio	0.53	0.47		0.62	0.55		0.08	0.08		0.18	0.18	
v/c Ratio	0.28	0.54		0.28	0.66		0.07	0.65		0.72	0.71	
Control Delay (s/veh)	22.5	24.0		14.7	20.0		47.7	27.8		57.5	55.7	
Queue Delay	0.0	0.0		0.0	0.1		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	22.5	24.0		14.7	20.1		47.7	27.8		57.5	55.7	
LOS	C	C		B	C		D	C		E	E	
Approach Delay (s/veh)		23.9			19.6			29.1			56.6	
Approach LOS		C			B			C			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 7 (6%), Referenced to phase 2:WBTL and 6:EBTL, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay (s/veh): 27.3		Intersection LOS: C	
Intersection Capacity Utilization 74.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 9: Shopping Center Entrance/Belmont Ave & Harrison Ave



Intersection	
Int Delay, s/veh	4.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	1232	11	318	1260	0	241
Future Vol, veh/h	1232	11	318	1260	0	241
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	200	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	5	1	1	5	1	1
Mvmt Flow	1283	11	331	1313	0	251

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1295	0	-	647
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	4.12	-	-	6.92
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	2.21	-	-	3.31
Pot Cap-1 Maneuver	-	-	537	-	0	416
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	537	-	-	416
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	4.42	26
HCM LOS			D

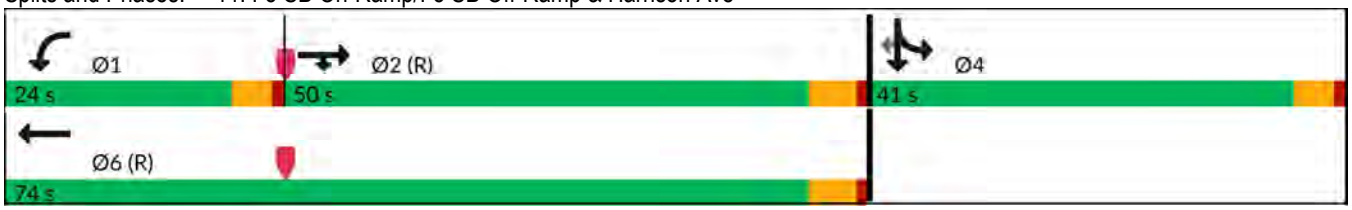
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	416	-	-	537	-
HCM Lane V/C Ratio	0.604	-	-	0.617	-
HCM Control Delay (s/veh)	26	-	-	21.9	-
HCM Lane LOS	D	-	-	C	-
HCM 95th %tile Q(veh)	3.9	-	-	4.2	-

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	837	771	192	1293	0	0	0	0	414	140	359
Future Volume (vph)	0	837	771	192	1293	0	0	0	0	414	140	359
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		275	150		0	0		0	0		450
Storage Lanes	0		1	2		0	0		0	1		2
Taper Length (ft)	25			65			25			25		
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	0.95	0.95	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950	0.976	
Satd. Flow (prot)	0	3505	1524	3467	3505	0	0	0	0	1698	1736	2682
Flt Permitted				0.950						0.950	0.976	
Satd. Flow (perm)	0	3505	1524	3467	3505	0	0	0	0	1698	1736	2682
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			491									108
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		627			547			755			897	
Travel Time (s)		14.3			12.4			17.2			20.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	3%	6%	1%	3%	1%	1%	1%	1%	1%	2%	6%
Adj. Flow (vph)	0	837	771	192	1293	0	0	0	0	414	140	359
Shared Lane Traffic (%)										34%		
Lane Group Flow (vph)	0	837	771	192	1293	0	0	0	0	273	281	359
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type		NA	Prot	Prot	NA					Split	NA	Perm
Protected Phases		2	2	1	6					4	4	
Permitted Phases												4
Detector Phase		2	2	1	6					4	4	4
Switch Phase												
Minimum Initial (s)		12.0	12.0	5.0	12.0					10.0	10.0	10.0
Minimum Split (s)		33.0	33.0	9.5	36.0					40.5	40.5	40.5
Total Split (s)		50.0	50.0	24.0	74.0					41.0	41.0	41.0
Total Split (%)		43.5%	43.5%	20.9%	64.3%					35.7%	35.7%	35.7%
Maximum Green (s)		45.0	45.0	19.5	69.0					36.5	36.5	36.5
Yellow Time (s)		4.0	4.0	3.5	4.0					3.5	3.5	3.5
All-Red Time (s)		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
Total Lost Time (s)		5.0	5.0	4.5	5.0					4.5	4.5	4.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?		Yes	Yes	Yes								
Vehicle Extension (s)		3.5	3.5	3.0	3.5					3.5	3.5	3.5
Minimum Gap (s)		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)		20.0	20.0	0.0	20.0					0.0	0.0	0.0
Time To Reduce (s)		10.0	10.0	0.0	10.0					0.0	0.0	0.0
Recall Mode		C-Min	C-Min	None	C-Min					None	None	None
Walk Time (s)		7.0	7.0		7.0					7.0	7.0	7.0
Flash Dont Walk (s)		21.0	21.0		24.0					29.0	29.0	29.0
Pedestrian Calls (#/hr)		0	0		0					0	0	0
Act Effct Green (s)		61.5	61.5	11.7	77.7					27.8	27.8	27.8
Actuated g/C Ratio		0.53	0.53	0.10	0.68					0.24	0.24	0.24
v/c Ratio		0.45	0.74	0.55	0.55					0.67	0.67	0.49
Control Delay (s/veh)		10.5	10.4	43.2	16.6					46.5	46.5	26.9
Queue Delay		0.0	0.6	0.0	0.5					0.2	0.2	0.0
Total Delay (s/veh)		10.5	11.0	43.2	17.0					46.7	46.7	26.9
LOS		B	B	D	B					D	D	C
Approach Delay (s/veh)		10.7			20.4						38.9	
Approach LOS		B			C						D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 109 (95%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 85			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay (s/veh): 20.7		Intersection LOS: C	
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 11: I-5 SB On-Ramp/I-5 SB Off-Ramp & Harrison Ave

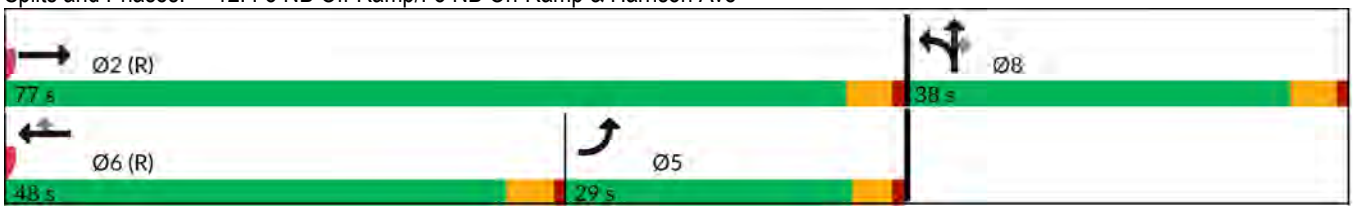


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	357	1174	0	0	756	267	647	165	184	0	0	0
Future Volume (vph)	357	1174	0	0	756	267	647	165	184	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	0		275	315		0	0		0
Storage Lanes	2		0	0		1	2		1	0		0
Taper Length (ft)	50			25			155			25		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3303	3539	0	0	3574	1583	3335	1881	1599	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3303	3539	0	0	3574	1583	3335	1881	1599	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						267			90			
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		547			705			724			996	
Travel Time (s)		12.4			16.0			16.5			22.6	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	6%	2%	1%	1%	1%	2%	5%	1%	1%	1%	1%	1%
Adj. Flow (vph)	357	1174	0	0	756	267	647	165	184	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	357	1174	0	0	756	267	647	165	184	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA			NA	Perm	Split	NA	Perm			
Protected Phases	5	2			6		8	8				
Permitted Phases						6			8			
Detector Phase	5	2			6	6	8	8	8			
Switch Phase												
Minimum Initial (s)	5.0	12.0			12.0	12.0	5.0	5.0	5.0			
Minimum Split (s)	9.5	33.0			32.0	32.0	38.0	38.0	38.0			
Total Split (s)	29.0	77.0			48.0	48.0	38.0	38.0	38.0			
Total Split (%)	25.2%	67.0%			41.7%	41.7%	33.0%	33.0%	33.0%			
Maximum Green (s)	24.5	72.0			43.0	43.0	33.0	33.0	33.0			
Yellow Time (s)	3.5	4.0			4.0	4.0	4.0	4.0	4.0			
All-Red Time (s)	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			
Total Lost Time (s)	4.5	5.0			5.0	5.0	5.0	5.0	5.0			
Lead/Lag	Lag				Lead	Lead						
Lead-Lag Optimize?	Yes				Yes	Yes						
Vehicle Extension (s)	3.0	3.5			3.5	3.5	3.0	3.0	3.0			
Minimum Gap (s)	3.0	3.0			3.0	3.0	2.5	2.5	2.5			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Time Before Reduce (s)	0.0	20.0			20.0	20.0	20.0	20.0	20.0			
Time To Reduce (s)	0.0	10.0			10.0	10.0	5.0	5.0	5.0			
Recall Mode	None	C-Min			C-Min	C-Min	None	None	None			
Walk Time (s)		7.0			7.0	7.0	7.0	7.0	7.0			
Flash Dont Walk (s)		21.0			20.0	20.0	26.0	26.0	26.0			
Pedestrian Calls (#/hr)		0			0	0	0	0	0			
Act Effct Green (s)	17.6	75.3			53.1	53.1	29.7	29.7	29.7			
Actuated g/C Ratio	0.15	0.65			0.46	0.46	0.26	0.26	0.26			
v/c Ratio	0.71	0.51			0.46	0.31	0.75	0.34	0.38			
Control Delay (s/veh)	60.4	16.5			23.8	3.8	44.7	35.5	18.8			
Queue Delay	0.0	0.8			0.1	0.0	0.0	0.0	0.0			
Total Delay (s/veh)	60.4	17.3			23.9	3.8	44.7	35.5	18.8			
LOS	E	B			C	A	D	D	B			
Approach Delay (s/veh)		27.4			18.7			38.4				
Approach LOS		C			B			D				

Intersection Summary			
Area Type:	Other		
Cycle Length: 115			
Actuated Cycle Length: 115			
Offset: 56 (49%), Referenced to phase 2:EBT and 6:WBT, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay (s/veh): 28.0		Intersection LOS: C	
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 12: I-5 NB Off-Ramp/I-5 NB On-Ramp & Harrison Ave



13: Belmont Ave & Haviland St Performance by lane

Lane	EB	WB	NB	SB	All
Movements Served	LTR	LTR	LTR	LTR	
Denied Del/Veh (s)					0.3
Total Del/Veh (s)	9.5	13.9	2.4	6.6	7.5

Intersection	
Int Delay, s/veh	0.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	579	13	2	408	30	8
Future Vol, veh/h	579	13	2	408	30	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	92	92	92	92	92	92
Heavy Vehicles, %	5	65	1	5	30	1
Mvmt Flow	629	14	2	443	33	9

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	643	0	1084	636
Stage 1	-	-	-	-	636	-
Stage 2	-	-	-	-	448	-
Critical Hdwy	-	-	4.11	-	6.7	6.21
Critical Hdwy Stg 1	-	-	-	-	5.7	-
Critical Hdwy Stg 2	-	-	-	-	5.7	-
Follow-up Hdwy	-	-	2.209	-	3.77	3.309
Pot Cap-1 Maneuver	-	-	946	-	212	479
Stage 1	-	-	-	-	478	-
Stage 2	-	-	-	-	589	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	946	-	212	479
Mov Cap-2 Maneuver	-	-	-	-	212	-
Stage 1	-	-	-	-	478	-
Stage 2	-	-	-	-	587	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.04	23.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	240	-	-	9	-
HCM Lane V/C Ratio	0.172	-	-	0.002	-
HCM Control Delay (s/veh)	23.1	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0	-

Intersection	
Int Delay, s/veh	1.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	559	28	8	367	43	13
Future Vol, veh/h	559	28	8	367	43	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	15	1	2	10	1
Mvmt Flow	608	30	9	399	47	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	638	0	1039	623
Stage 1	-	-	-	-	623	-
Stage 2	-	-	-	-	416	-
Critical Hdwy	-	-	4.11	-	6.5	6.21
Critical Hdwy Stg 1	-	-	-	-	5.5	-
Critical Hdwy Stg 2	-	-	-	-	5.5	-
Follow-up Hdwy	-	-	2.209	-	3.59	3.309
Pot Cap-1 Maneuver	-	-	951	-	247	488
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	649	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	951	-	244	488
Mov Cap-2 Maneuver	-	-	-	-	244	-
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	641	-

Approach	EB	WB	NB
HCM Control Delay, s/v	0	0.19	21.71
HCM LOS			C

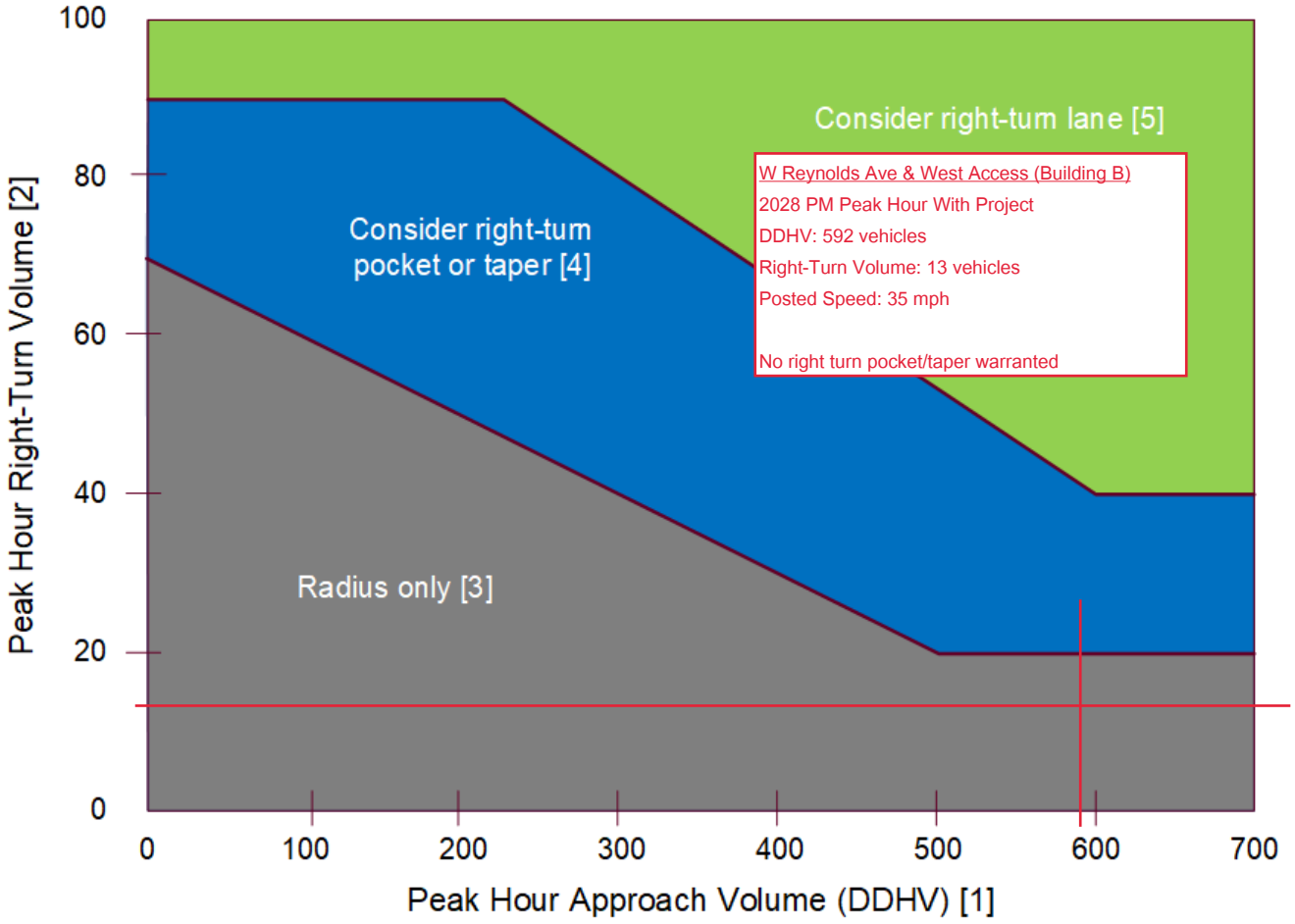
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	276	-	-	38	-
HCM Lane V/C Ratio	0.221	-	-	0.009	-
HCM Control Delay (s/veh)	21.7	-	-	8.8	0
HCM Lane LOS	C	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0	-

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

RIGHT TURN LANE WARRANTS

Exhibit 1310-19 Right-Turn Lane Guidelines



Notes:

[1] For two-lane highways, use the peak hour DDHV (through + right-turn). For multilane, highways (posted speed 45 mph or above), use the right-lane peak hour approach volume (through + right-turn).

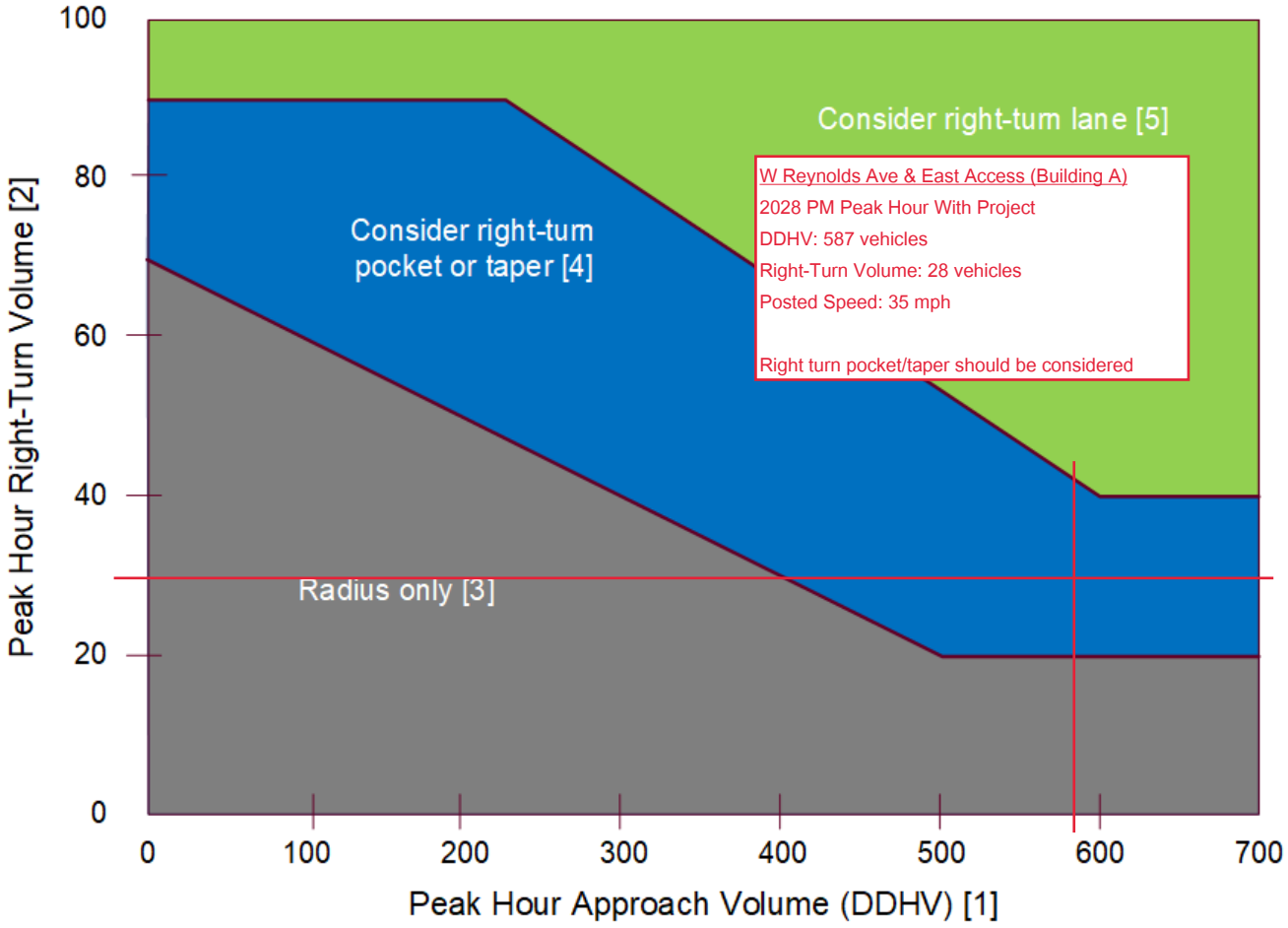
[2] When all three of the following conditions are met, reduce the right-turn DDHV by 20:
- The posted speed is 45 mph or below
- The right-turn volume is greater than 40 VPH
- The peak hour approach volume (DDHV) is less than 300 VPH

[3] For right-turn corner design, see Exhibit 1310-6.

[4] For right-turn pocket or taper design, see Exhibit 1310-20.

[5] For right-turn lane design, see Exhibit 1310-21.

Exhibit 1310-19 Right-Turn Lane Guidelines



Notes:

[1] For two-lane highways, use the peak hour DDHV (through + right-turn). For multilane, highways (posted speed 45 mph or above), use the right-lane peak hour approach volume (through + right-turn).

[2] When all three of the following conditions are met, reduce the right-turn DDHV by 20:
- The posted speed is 45 mph or below
- The right-turn volume is greater than 40 VPH
- The peak hour approach volume (DDHV) is less than 300 VPH

[3] For right-turn corner design, see Exhibit 1310-6.

[4] For right-turn pocket or taper design, see Exhibit 1310-20.

[5] For right-turn lane design, see Exhibit 1310-21.

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

LEFT TURN LANE WARRANTS

Exhibit 1310-7 Left-Turn Storage Guidelines: Two-Lane, Unsignalized

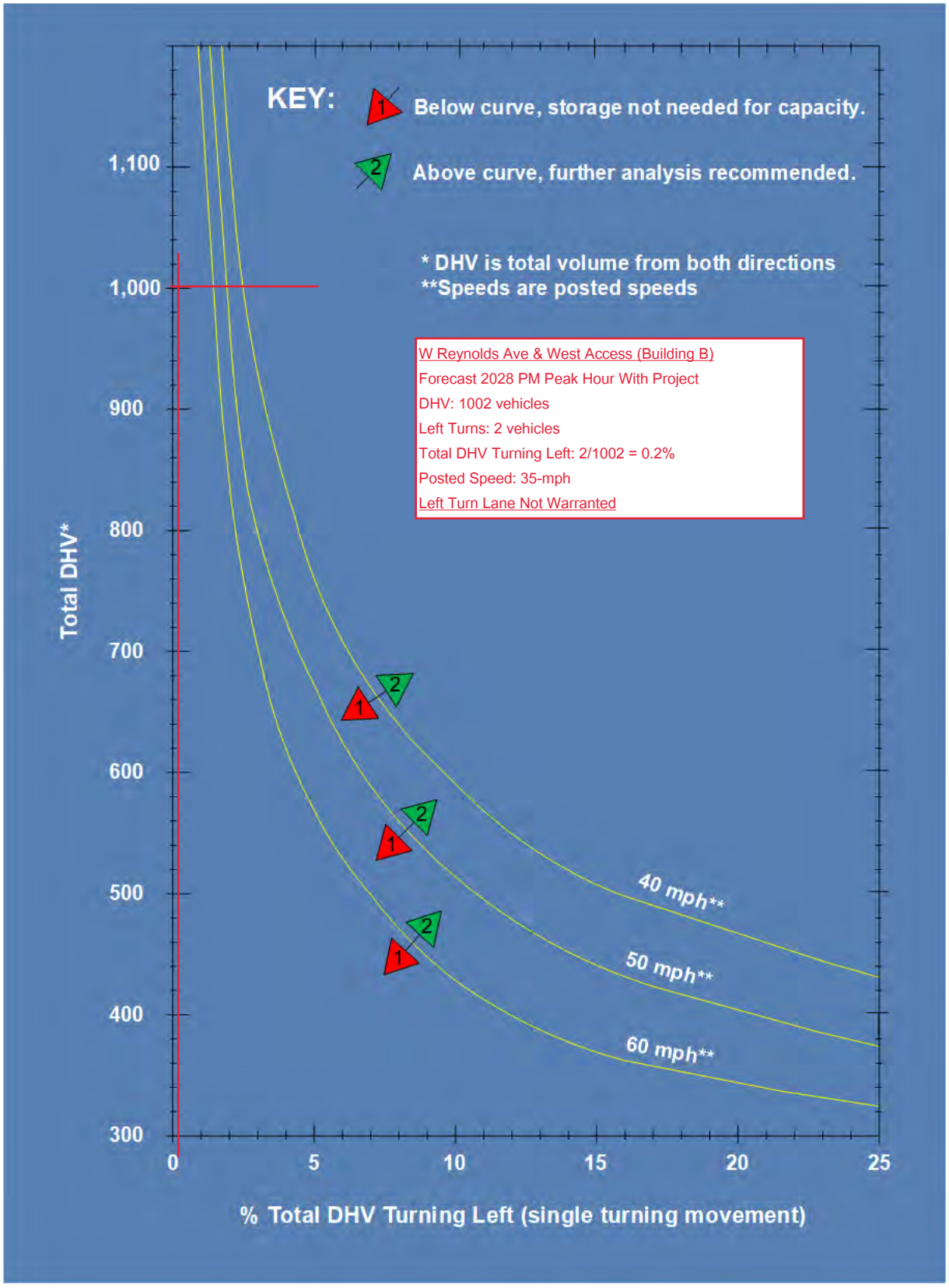
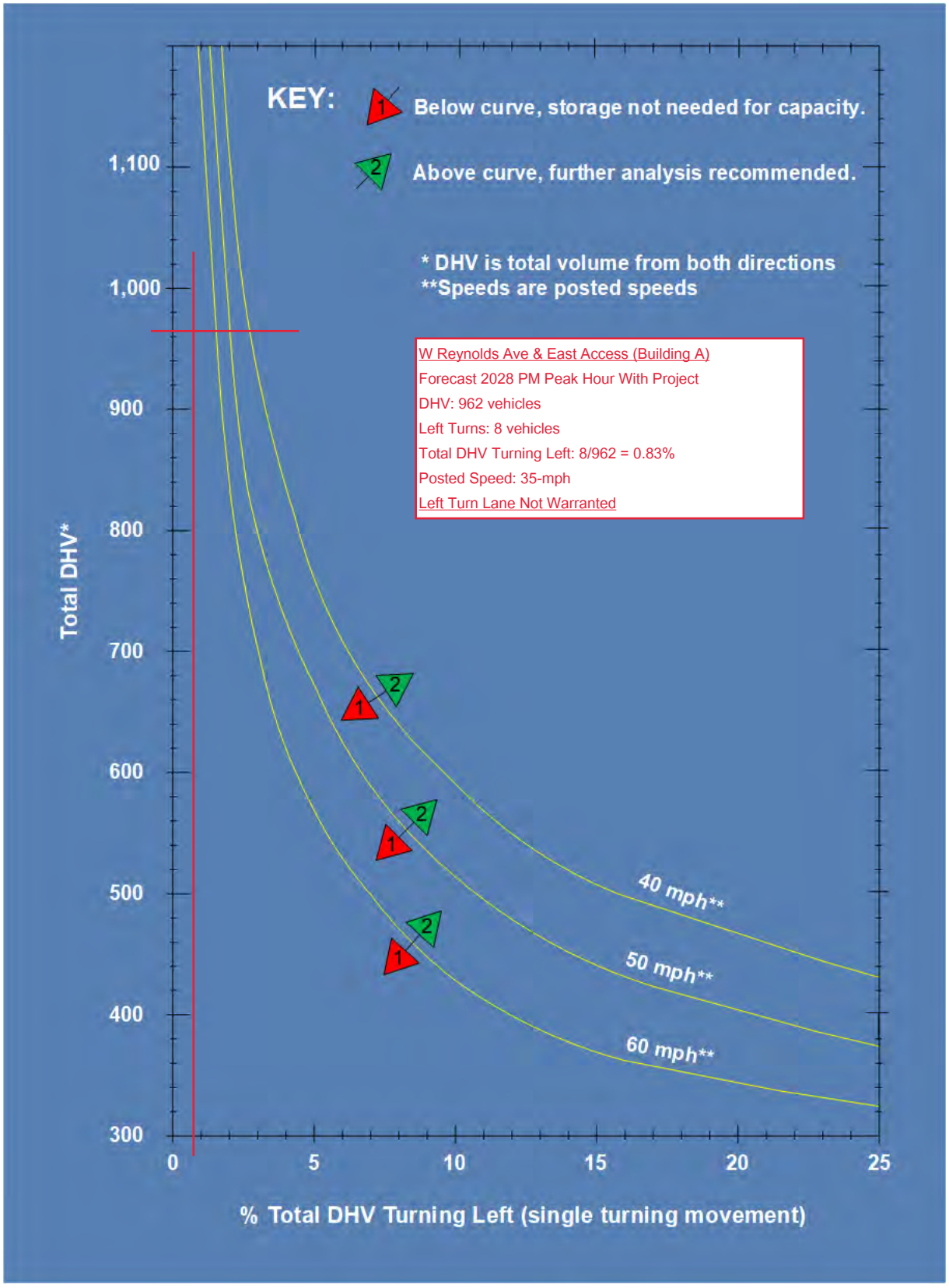


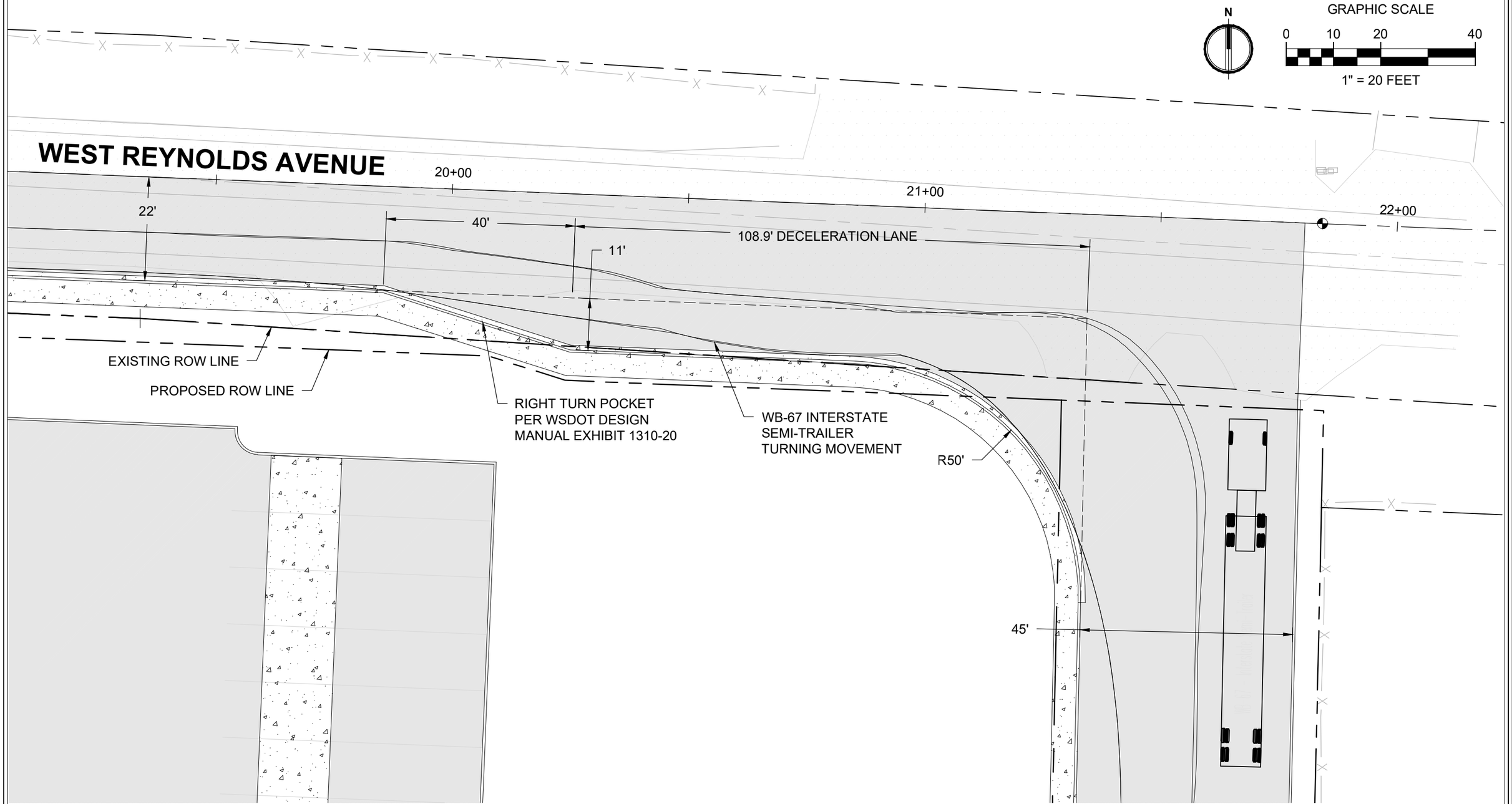
Exhibit 1310-7 Left-Turn Storage Guidelines: Two-Lane, Unsignalized



SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

AUTOTURN EXHIBITS



AHBL
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Civil Engineers
Structural Engineers
Landscape Architects
Community Planners
Land Surveyors
Neighbors

SKOOKUMCHUCK COMMERCE CENTER
PROJECT #2210649.10

TRUCK TURNING EXHIBIT
9/15/2023

EX-A

SKOOKUMCHUCK COMMERCE
TRAFFIC IMPACT ANALYSIS

APPENDIX

HSM PREDICTIVE METHOD
COLLISION HISTORY ANALYSIS

Predicted Average Crash Frequency (Utilizes HSM Provided Values)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	PWW	Roadway	SR 507
Agency or Company	Heath & Associates	Intersection	Reynolds Ave
Date Performed	09/01/23	Jurisdiction	Lewis County
		Analysis Year	2028

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	8,300
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	5,900
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2		--	Permissive
Type of left-turn signal phasing for Leg #3		--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			40
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	3
Number of bus stops within 300 m (1,000 ft) of the intersection		0	1
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.99	0.96	1.00	0.91	1.00	0.70

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	1.940	1.000	1.940	0.70	1.00	1.360
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	0.559	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.299	0.581	0.70	1.00	0.407
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	1.308	$(5)_{TOTAL}-(5)_{FI}$ = 0.701	1.359	0.70	1.00	0.953

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.407	1.000	0.953	1.360
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.183	0.483	0.460	0.644
Head-on collision	0.049	0.020	0.030	0.029	0.049
Angle collision	0.347	0.141	0.244	0.232	0.374
Sideswipe	0.099	0.040	0.032	0.030	0.071
Other multiple-vehicle collision	0.055	0.022	0.211	0.201	0.223

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.177	1.000	0.177	0.70	1.00	0.124
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.058	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.327	0.058	0.70	1.00	0.041
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.119	$(5)_{TOTAL}-(5)_{FI}$ = 0.673	0.119	0.70	1.00	0.084

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.041	1.000	0.084	0.124
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.000
Collision with fixed object	0.744	0.030	0.870	0.073	0.103
Collision with other object	0.072	0.003	0.070	0.006	0.009
Other single-vehicle collision	0.040	0.002	0.023	0.002	0.004
Single-vehicle noncollision	0.141	0.006	0.034	0.003	0.009

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.018	2.78	1.00	0.050
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.050

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	1.360	0.124	1.485	0.015	0.022
Fatal and injury (FI)	--	--	--	--	0.022

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	**Property damage only (PDO)**	**Total**
Collision type	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.183	0.460	0.644
Head-on collisions (from Worksheet 2D)	0.020	0.029	0.049
Angle collisions (from Worksheet 2D)	0.141	0.232	0.374
Sideswipe (from Worksheet 2D)	0.040	0.030	0.071
Other multiple-vehicle collision (from Worksheet 2D)	0.022	0.201	0.223
Subtotal	0.407	0.953	1.360
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.030	0.073	0.103
Collision with other object (from Worksheet 2F)	0.003	0.006	0.009
Other single-vehicle collision (from Worksheet 2F)	0.002	0.002	0.004
Single-vehicle noncollision (from Worksheet 2F)	0.006	0.003	0.009
Collision with pedestrian (from Worksheet 2G or 2I)	0.050	0.000	0.050
Collision with bicycle (from Worksheet 2J)	0.022	0.000	0.022
Subtotal	0.113	0.084	0.197
Total	0.520	1.036	1.557

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	1.56
Fatal and injury (FI)	0.52
Property damage only (PDO)	1.04

Expected Average Crash Frequency (Utilizes Locally Derived Data)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections					
General Information				**Location Information**	
Analyst	PWW			Roadway	SR 507
Agency or Company	Heath & Associates			Intersection	Reynolds Ave
Date Performed	09/01/23			Jurisdiction	Lewis County
				Analysis Year	2028
Input Data				**Base Conditions**	**Site Conditions**
Intersection type (3ST, 3SG, 4ST, 4SG)				--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ =	67,700	(veh/day)	--	8,300
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ =	33,400	(veh/day)	--	5,900
Intersection lighting (present/not present)				Not Present	Present
Calibration factor, C_i				1.00	1.00
Data for unsignalized intersections only:				--	--
Number of major-road approaches with left-turn lanes (0,1,2)				0	0
Number of major-road approaches with right-turn lanes (0,1,2)				0	0
Data for signalized intersections only:				--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]				0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]				0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]				--	2
Type of left-turn signal phasing for Leg #1				Permissive	Protected / Permissive
Type of left-turn signal phasing for Leg #2				--	Permissive
Type of left-turn signal phasing for Leg #3				--	Protected / Permissive
Type of left-turn signal phasing for Leg #4 (if applicable)				--	Permissive
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]				0	0
Intersection red light cameras (present/not present)				Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only					40
Maximum number of lanes crossed by a pedestrian (n_{lanesx})				--	3
Number of bus stops within 300 m (1,000 ft) of the intersection				0	1
Schools within 300 m (1,000 ft) of the intersection (present/not present)				Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection				0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections						
(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.99	0.96	1.00	0.88	1.00	0.68

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	1.940	1.000	1.940	0.68	1.00	1.314
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	0.559	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.299	0.581	0.68	1.00	0.394
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	1.308	$(5)_{TOTAL}-(5)_{FI}$ = 0.701	1.359	0.68	1.00	0.921

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	0.394	1.000	0.921	1.314
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.000	0.000	0.538	0.495	0.495
Head-on collision	0.000	0.000	0.000	0.000	0.000
Angle collision	0.250	0.098	0.154	0.142	0.240
Sideswipe	0.000	0.000	0.000	0.000	0.000
Other multiple-vehicle collision	0.750	0.295	0.308	0.284	0.579

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.177	1.000	0.177	0.68	1.00	0.120
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.058	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.327	0.058	0.68	1.00	0.039
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.119	$(5)_{TOTAL}-(5)_{FI}$ = 0.673	0.119	0.68	1.00	0.081

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	$(9)_{FI}$ from Worksheet 2E	from Table 12-13	$(9)_{PDO}$ from Worksheet 2E	$(9)_{PDO}$ from Worksheet 2E
Total	1.000	0.039	1.000	0.081	0.120
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Collision with parked vehicle	0.000	0.000	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000	0.000	0.000
Collision with fixed object	0.000	0.000	1.000	0.081	0.081
Collision with other object	0.000	0.000	0.000	0.000	0.000
Other single-vehicle collision	1.000	0.039	0.000	0.000	0.039
Single-vehicle noncollision	0.000	0.000	0.000	0.000	0.000

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.018	2.78	1.00	0.050
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.050

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	1.314	0.120	1.434	0.015	0.022
Fatal and injury (FI)	--	--	--	--	0.022

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.000	0.495	0.495
Head-on collisions (from Worksheet 2D)	0.000	0.000	0.000
Angle collisions (from Worksheet 2D)	0.098	0.142	0.240
Sideswipe (from Worksheet 2D)	0.000	0.000	0.000
Other multiple-vehicle collision (from Worksheet 2D)	0.295	0.284	0.579
Subtotal	0.394	0.921	1.314
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.000	0.081	0.081
Collision with other object (from Worksheet 2F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 2F)	0.039	0.000	0.039
Single-vehicle noncollision (from Worksheet 2F)	0.000	0.000	0.000
Collision with pedestrian (from Worksheet 2G or 2I)	0.050	0.000	0.050
Collision with bicycle (from Worksheet 2J)	0.022	0.000	0.022
Subtotal	0.111	0.081	0.192
Total	0.505	1.001	1.506

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	1.51
Fatal and injury (FI)	0.50
Property damage only (PDO)	1.00

Predicted Average Crash Frequency (Utilizes HSM Provided Values)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	PWW	Roadway	Harrison Ave
Agency or Company	Heath & Associates	Intersection	I-5 SB Ramps
Date Performed	09/01/23	Jurisdiction	Lewis County
		Analysis Year	2028

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	30,930
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,130
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2		--	Protected
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			160
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	1

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.87	0.96	1.00	0.91	1.00	0.62

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	8.764	1.000	8.764	0.62	1.00	5.429
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.906	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.343	3.010	0.62	1.00	1.865
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.556	$(5)_{TOTAL}-(5)_{FI}$ = 0.657	5.754	0.62	1.00	3.565

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.865	1.000	3.565	5.429
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.839	0.483	1.722	2.561
Head-on collision	0.049	0.091	0.030	0.107	0.198
Angle collision	0.347	0.647	0.244	0.870	1.517
Sideswipe	0.099	0.185	0.032	0.114	0.299
Other multiple-vehicle collision	0.055	0.103	0.211	0.752	0.855

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.488	1.000	0.488	0.62	1.00	0.302
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.115	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.238	0.116	0.62	1.00	0.072
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.370	$(5)_{TOTAL}-(5)_{FI}$ = 0.762	0.372	0.62	1.00	0.230

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.072	1.000	0.230	0.302
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.054	0.870	0.201	0.254
Collision with other object	0.072	0.005	0.070	0.016	0.021
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.008
Single-vehicle noncollision	0.141	0.010	0.034	0.008	0.018

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.00	1.12	1.12

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.044	1.12	1.00	0.049
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.049

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	5.429	0.302	5.732	0.015	0.086
Fatal and injury (FI)	--	--	--	--	0.086

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.839	1.722	2.561
Head-on collisions (from Worksheet 2D)	0.091	0.107	0.198
Angle collisions (from Worksheet 2D)	0.647	0.870	1.517
Sideswipe (from Worksheet 2D)	0.185	0.114	0.299
Other multiple-vehicle collision (from Worksheet 2D)	0.103	0.752	0.855
Subtotal	1.865	3.565	5.429
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.054	0.201	0.254
Collision with other object (from Worksheet 2F)	0.005	0.016	0.021
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.008
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.008	0.018
Collision with pedestrian (from Worksheet 2G or 2I)	0.049	0.000	0.049
Collision with bicycle (from Worksheet 2J)	0.086	0.000	0.086
Subtotal	0.207	0.230	0.438
Total	2.072	3.795	5.867

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	5.87
Fatal and injury (FI)	2.07
Property damage only (PDO)	3.80

Expected Average Crash Frequency (Utilizes Locally Derived Data)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	PWW	Roadway	Harrison Ave
Agency or Company	Heath & Associates	Intersection	I-5 SB Ramps
Date Performed	09/01/23	Jurisdiction	Lewis County
		Analysis Year	2028

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	30,930
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,130
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	1
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Protected
Type of left-turn signal phasing for Leg #2		--	Protected
Type of left-turn signal phasing for Leg #3		--	Not Applicable
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Not Applicable
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			160
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	0
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	1

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.87	0.96	1.00	0.86	1.00	0.59

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	8.764	1.000	8.764	0.59	1.00	5.146
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.906	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.343	3.010	0.59	1.00	1.767
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	5.556	$(5)_{TOTAL}-(5)_{FI}$ = 0.657	5.754	0.59	1.00	3.379

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.767	1.000	3.379	5.146
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.400	0.707	0.361	1.220	1.927
Head-on collision	0.000	0.000	0.000	0.000	0.000
Angle collision	0.400	0.707	0.361	1.220	1.927
Sideswipe	0.067	0.118	0.139	0.470	0.588
Other multiple-vehicle collision	0.130	0.230	0.139	0.470	0.699

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.488	1.000	0.488	0.59	1.00	0.287
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.115	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.238	0.116	0.59	1.00	0.068
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.370	$(5)_{TOTAL}-(5)_{FI}$ = 0.762	0.372	0.59	1.00	0.218

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.068	1.000	0.218	0.287
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.000	0.000	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000	0.000	0.000
Collision with fixed object	0.000	0.000	1.000	0.218	0.218
Collision with other object	0.000	0.000	0.000	0.000	0.000
Other single-vehicle collision	1.000	0.068	0.000	0.000	0.068
Single-vehicle noncollision	0.000	0.000	0.000	0.000	0.000

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
1.00	1.00	1.12	1.12

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.044	1.12	1.00	0.049
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.049

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	5.146	0.287	5.433	0.015	0.081
Fatal and injury (FI)	--	--	--	--	0.081

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.707	1.220	1.927
Head-on collisions (from Worksheet 2D)	0.000	0.000	0.000
Angle collisions (from Worksheet 2D)	0.707	1.220	1.927
Sideswipe (from Worksheet 2D)	0.118	0.470	0.588
Other multiple-vehicle collision (from Worksheet 2D)	0.230	0.470	0.699
Subtotal	1.762	3.379	5.141
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.000	0.218	0.218
Collision with other object (from Worksheet 2F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 2F)	0.068	0.000	0.068
Single-vehicle noncollision (from Worksheet 2F)	0.000	0.000	0.000
Collision with pedestrian (from Worksheet 2G or 2I)	0.049	0.000	0.049
Collision with bicycle (from Worksheet 2J)	0.081	0.000	0.081
Subtotal	0.199	0.218	0.417
Total	1.961	3.597	5.558

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	5.56
Fatal and injury (FI)	1.96
Property damage only (PDO)	3.60

Predicted Average Crash Frequency (Utilizes HSM Provided Values)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	PWW	Roadway	Harrison Ave
Agency or Company	Heath & Associates	Intersection	I-5 NB Ramps
Date Performed	09/01/23	Jurisdiction	Lewis County
		Analysis Year	2028

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	25,540
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,960
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Protected
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Protected
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			80
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	1
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.92	0.92	1.00	0.91	1.00	0.63

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.285	1.000	7.285	0.63	1.00	4.563
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.363	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.336	2.449	0.63	1.00	1.534
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.667	$(5)_{TOTAL}-(5)_{FI}$ = 0.664	4.836	0.63	1.00	3.029

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.534	1.000	3.029	4.563
		$(2)*(3)_{FI}$		$(4)*(5)_{PDO}$	(3)+(5)
Rear-end collision	0.450	0.690	0.483	1.463	2.153
Head-on collision	0.049	0.075	0.030	0.091	0.166
Angle collision	0.347	0.532	0.244	0.739	1.271
Sideswipe	0.099	0.152	0.032	0.097	0.249
Other multiple-vehicle collision	0.055	0.084	0.211	0.639	0.723

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.439	1.000	0.439	0.63	1.00	0.275
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.109	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.251	0.110	0.63	1.00	0.069
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.325	$(5)_{TOTAL}-(5)_{FI}$ = 0.749	0.329	0.63	1.00	0.206

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.069	1.000	0.206	0.275
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.001	0.000	0.001	0.000	0.000
Collision with animal	0.002	0.000	0.002	0.000	0.001
Collision with fixed object	0.744	0.051	0.870	0.179	0.230
Collision with other object	0.072	0.005	0.070	0.014	0.019
Other single-vehicle collision	0.040	0.003	0.023	0.005	0.007
Single-vehicle noncollision	0.141	0.010	0.034	0.007	0.017

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.033	2.78	1.00	0.092
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.092

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	4.563	0.275	4.838	0.015	0.073
Fatal and injury (FI)	--	--	--	--	0.073

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
	Fatal and injury (FI)	**Property damage only (PDO)**	**Total**
Collision type	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	0.690	1.463	2.153
Head-on collisions (from Worksheet 2D)	0.075	0.091	0.166
Angle collisions (from Worksheet 2D)	0.532	0.739	1.271
Sideswipe (from Worksheet 2D)	0.152	0.097	0.249
Other multiple-vehicle collision (from Worksheet 2D)	0.084	0.639	0.723
Subtotal	1.534	3.029	4.563
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.001
Collision with fixed object (from Worksheet 2F)	0.051	0.179	0.230
Collision with other object (from Worksheet 2F)	0.005	0.014	0.019
Other single-vehicle collision (from Worksheet 2F)	0.003	0.005	0.007
Single-vehicle noncollision (from Worksheet 2F)	0.010	0.007	0.017
Collision with pedestrian (from Worksheet 2G or 2I)	0.092	0.000	0.092
Collision with bicycle (from Worksheet 2J)	0.073	0.000	0.073
Subtotal	0.233	0.206	0.439
Total	1.767	3.235	5.002

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	5.00
Fatal and injury (FI)	1.77
Property damage only (PDO)	3.23

Expected Average Crash Frequency (Utilizes Locally Derived Data)

Urban and Suburban Arterial Predictive Method

Worksheet 2A -- General Information and Input Data for Urban and Suburban Arterial Intersections

General Information		Location Information	
Analyst	PWW	Roadway	Harrison Ave
Agency or Company	Heath & Associates	Intersection	I-5 NB Ramps
Date Performed	09/01/23	Jurisdiction	Lewis County
		Analysis Year	2028

Input Data		Base Conditions	Site Conditions
Intersection type (3ST, 3SG, 4ST, 4SG)		--	4SG
AADT $_{major}$ (veh/day)	$AADT_{MAX}$ = 67,700 (veh/day)	--	25,540
AADT $_{minor}$ (veh/day)	$AADT_{MAX}$ = 33,400 (veh/day)	--	9,960
Intersection lighting (present/not present)		Not Present	Present
Calibration factor, C_i		1.00	1.00
Data for unsignalized intersections only:		--	--
Number of major-road approaches with left-turn lanes (0,1,2)		0	0
Number of major-road approaches with right-turn lanes (0,1,2)		0	0
Data for signalized intersections only:		--	--
Number of approaches with left-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with right-turn lanes (0,1,2,3,4) [for 3SG, use maximum value of 3]		0	2
Number of approaches with left-turn signal phasing [for 3SG, use maximum value of 3]		--	2
Type of left-turn signal phasing for Leg #1		Permissive	Not Applicable
Type of left-turn signal phasing for Leg #2		--	Not Applicable
Type of left-turn signal phasing for Leg #3		--	Protected
Type of left-turn signal phasing for Leg #4 (if applicable)		--	Protected
Number of approaches with right-turn-on-red prohibited [for 3SG, use maximum value of 3]		0	0
Intersection red light cameras (present/not present)		Not Present	Not Present
Sum of all pedestrian crossing volumes (PedVol) -- Signalized intersections only			80
Maximum number of lanes crossed by a pedestrian (n_{lanesx})		--	5
Number of bus stops within 300 m (1,000 ft) of the intersection		0	1
Schools within 300 m (1,000 ft) of the intersection (present/not present)		Not Present	Not Present
Number of alcohol sales establishments within 300 m (1,000 ft) of the intersection		0	0

Worksheet 2B -- Crash Modification Factors for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)	(7)
CMF for Left-Turn Lanes	CMF for Left-Turn Signal Phasing	CMF for Right-Turn Lanes	CMF for Right Turn on Red	CMF for Lighting	CMF for Red Light Cameras	Combined CMF
CMF 1i	*CMF 2i*	*CMF 3i*	*CMF 4i*	*CMF 5i*	*CMF 6i*	*CMF $_{COMB}$*
from Table 12-24	from Table 12-25	from Table 12-26	from Equation 12-35	from Equation 12-36	from Equation 12-37	(1)*(2)*(3)*(4)*(5)*(6)
0.81	0.92	0.92	1.00	0.93	1.00	0.64

Worksheet 2C -- Multiple-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bimv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bimv}**
	from Table 12-10			from Table 12-10	from Equation 12-21		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.99	1.07	0.23	0.39	7.285	1.000	7.285	0.64	1.00	4.677
Fatal and Injury (FI)	-13.14	1.18	0.22	0.33	2.363	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.336	2.449	0.64	1.00	1.572
Property Damage Only (PDO)	-11.02	1.02	0.24	0.44	4.667	$(5)_{TOTAL}-(5)_{FI}$ = 0.664	4.836	0.64	1.00	3.105

Worksheet 2D -- Multiple-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bimv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bimv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bimv\ (TOTAL)}$ (crashes/year)**
	from Table 12-11	$(9)_{FI}$ from Worksheet 2C	from Table 12-11	$(9)_{PDO}$ from Worksheet 2C	$(9)_{PDO}$ from Worksheet 2C
Total	1.000	1.572	1.000	3.105	4.677
		(2)*$(3)_{FI}$		(4)*$(5)_{PDO}$	(3)+(5)
Rear-end collision	0.667	1.049	0.390	1.211	2.260
Head-on collision	0.000	0.000	0.000	0.000	0.000
Angle collision	0.250	0.393	0.290	0.900	1.293
Sideswipe	0.083	0.130	0.160	0.497	0.627
Other multiple-vehicle collision	0.000	0.000	0.160	0.497	0.497

Worksheet 2E -- Single-Vehicle Collisions by Severity Level for Urban and Suburban Arterial Intersections

(1)	(2)			(3)	(4)	(5)	(6)	(7)	(8)	(9)
Crash Severity Level	**SPF Coefficients**			**Overdispersion Parameter, k**	**Initial N_{bisv}**	**Proportion of Total Crashes**	**Adjusted N_{bimv}**	**Combined CMFs**	**Calibration Factor, C_i**	**Predicted N_{bisv}**
	from Table 12-12			from Table 12-12	from Eqn. 12-24; (FI) from Eqn. 12-24 or 12-27		$(4)_{TOTAL}$*(5)	(7) from Worksheet 2B		(6)*(7)*(8)
	a	b	c							
Total	-10.21	0.68	0.27	0.36	0.439	1.000	0.439	0.64	1.00	0.282
Fatal and Injury (FI)	-9.25	0.43	0.29	0.09	0.109	$(4)_{FI}/((4)_{FI}+(4)_{PDO})$ = 0.251	0.110	0.64	1.00	0.071
Property Damage Only (PDO)	-11.34	0.78	0.25	0.44	0.325	$(5)_{TOTAL}-(5)_{FI}$ = 0.749	0.329	0.64	1.00	0.211

Worksheet 2F -- Single-Vehicle Collisions by Collision Type for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(6)
Collision Type	**Proportion of Collision Type$_{(FI)}$**	**Predicted N $_{bisv\ (FI)}$ (crashes/year)**	**Proportion of Collision Type $_{(PDO)}$**	**Predicted N $_{bisv\ (PDO)}$ (crashes/year)**	**Predicted N $_{bisv\ (TOTAL)}$ (crashes/year)**
	from Table 12-13	(9)$_{FI}$ from Worksheet 2E	from Table 12-13	(9)$_{PDO}$ from Worksheet 2E	(9)$_{PDO}$ from Worksheet 2E
Total	1.000	0.071	1.000	0.211	0.282
		(2)*(3)$_{FI}$		(4)*(5)$_{PDO}$	(3)+(5)
Collision with parked vehicle	0.000	0.000	0.000	0.000	0.000
Collision with animal	0.000	0.000	0.000	0.000	0.000
Collision with fixed object	0.000	0.000	1.000	0.211	0.211
Collision with other object	0.000	0.000	0.000	0.000	0.000
Other single-vehicle collision	0.000	0.000	0.000	0.000	0.000
Single-vehicle noncollision	0.000	0.000	0.000	0.000	0.000

Worksheet 2G -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Stop-Controlled Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{pedi}**	**Predicted N_{pedi}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-16	(4)*(5)
Total	--	--	--	--	--
Fatal and injury (FI)	--	--	--	--	--

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-30

Worksheet 2H -- Crash Modification Factors for Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)	(3)	(4)
CMF for Bus Stops	CMF for Schools	CMF for Alcohol Sales Establishments	Combined CMF
CMF_{1p}	CMF_{2p}	CMF_{3p}	
from Table 12-28	from Table 12-29	from Table 12-30	(1)*(2)*(3)
2.78	1.00	1.00	2.78

Worksheet 2I -- Vehicle-Pedestrian Collisions for Urban and Suburban Arterial Signalized Intersections

(1)	(2)					(3)	(4)	(5)	(6)	(7)
Crash Severity Level	**SPF Coefficients**					**Overdispersion Parameter, k**	**$N_{pedbase}$**	**Combined CMF**	**Calibration factor, C_i**	**Predicted N_{pedi}**
	from Table 12-14						from Equation 12-29	(4) from Worksheet 2H		(4)*(5)*(6)
	a	b	c	d	e					
Total	-9.53	0.40	0.26	0.45	0.04	0.24	0.033	2.78	1.00	0.092
Fatal and Injury (FI)	--	--	--	--	--	--	--	--	1.00	0.092

Worksheet 2J -- Vehicle-Bicycle Collisions for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)	(5)	(7)*
Crash Severity Level	**Predicted N_{bimv}**	**Predicted N_{bisv}**	**Predicted N_{bi}**	**f_{bikei}**	**Predicted N_{bikei}**
	(9) from Worksheet 2C	(9) from Worksheet 2E	(2) + (3)	from Table 12-17	(4)*(5)
Total	4.677	0.282	4.959	0.015	0.074
Fatal and injury (FI)	--	--	--	--	0.074

* Column 6 has been removed due to redundant application of calibration factors and inconsistency with HSM Equation 12-31

Worksheet 2K -- Crash Severity Distribution for Urban and Suburban Arterial Intersections

(1)	(2)	(3)	(4)
Collision type	**Fatal and injury (FI)**	**Property damage only (PDO)**	**Total**
	(3) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J	(5) from Worksheet 2D and 2F	(6) from Worksheet 2D and 2F; (7) from 2G or 2I and 2J
MULTIPLE-VEHICLE			
Rear-end collisions (from Worksheet 2D)	1.049	1.211	2.260
Head-on collisions (from Worksheet 2D)	0.000	0.000	0.000
Angle collisions (from Worksheet 2D)	0.393	0.900	1.293
Sideswipe (from Worksheet 2D)	0.130	0.497	0.627
Other multiple-vehicle collision (from Worksheet 2D)	0.000	0.497	0.497
Subtotal	1.572	3.105	4.677
SINGLE-VEHICLE			
Collision with parked vehicle (from Worksheet 2F)	0.000	0.000	0.000
Collision with animal (from Worksheet 2F)	0.000	0.000	0.000
Collision with fixed object (from Worksheet 2F)	0.000	0.211	0.211
Collision with other object (from Worksheet 2F)	0.000	0.000	0.000
Other single-vehicle collision (from Worksheet 2F)	0.000	0.000	0.000
Single-vehicle noncollision (from Worksheet 2F)	0.000	0.000	0.000
Collision with pedestrian (from Worksheet 2G or 2I)	0.092	0.000	0.092
Collision with bicycle (from Worksheet 2J)	0.074	0.000	0.074
Subtotal	0.166	0.211	0.377
Total	1.738	3.316	5.054

Worksheet 2L -- Summary Results for Urban and Suburban Arterial Intersections

(1)	(2)
Crash severity level	**Predicted average crash frequency, $N_{predicted\ int}$ (crashes/year)**
	(Total) from Worksheet 2K
Total	5.05
Fatal and injury (FI)	1.74
Property damage only (PDO)	3.32

SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

APPENDIX

CONCEPTUAL SITE PLAN

DESIGN MEMORANDUM

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

To:	**Mr. Darren Peugh**	Date:	**May 5, 2023 rv February 10, 2025**
	Panattoni Development Company	Project Number:	**T-8613**
From:	**Michael Xenos, E.I.T./Carolyn S. Decker, P.E.**	Project Name:	**Skookumchuck Commerce Center**
Subject:	**Groundwater Monitoring**		**Lewis County, Washington**

Darren:

As requested, we have completed the winter groundwater monitoring program at the Skookumchuck Commerce Center project in Lewis County, Washington.

On November 1, 2022, we began monitoring the groundwater in eight monitoring wells installed at the site. These monitoring wells are designated at Test Pits TP-201 through TP-208 and were installed approximately 10 feet below current site grades. We stopped monitoring on May 1, 2023. The results of our seasonal monitoring are shown in the table below.

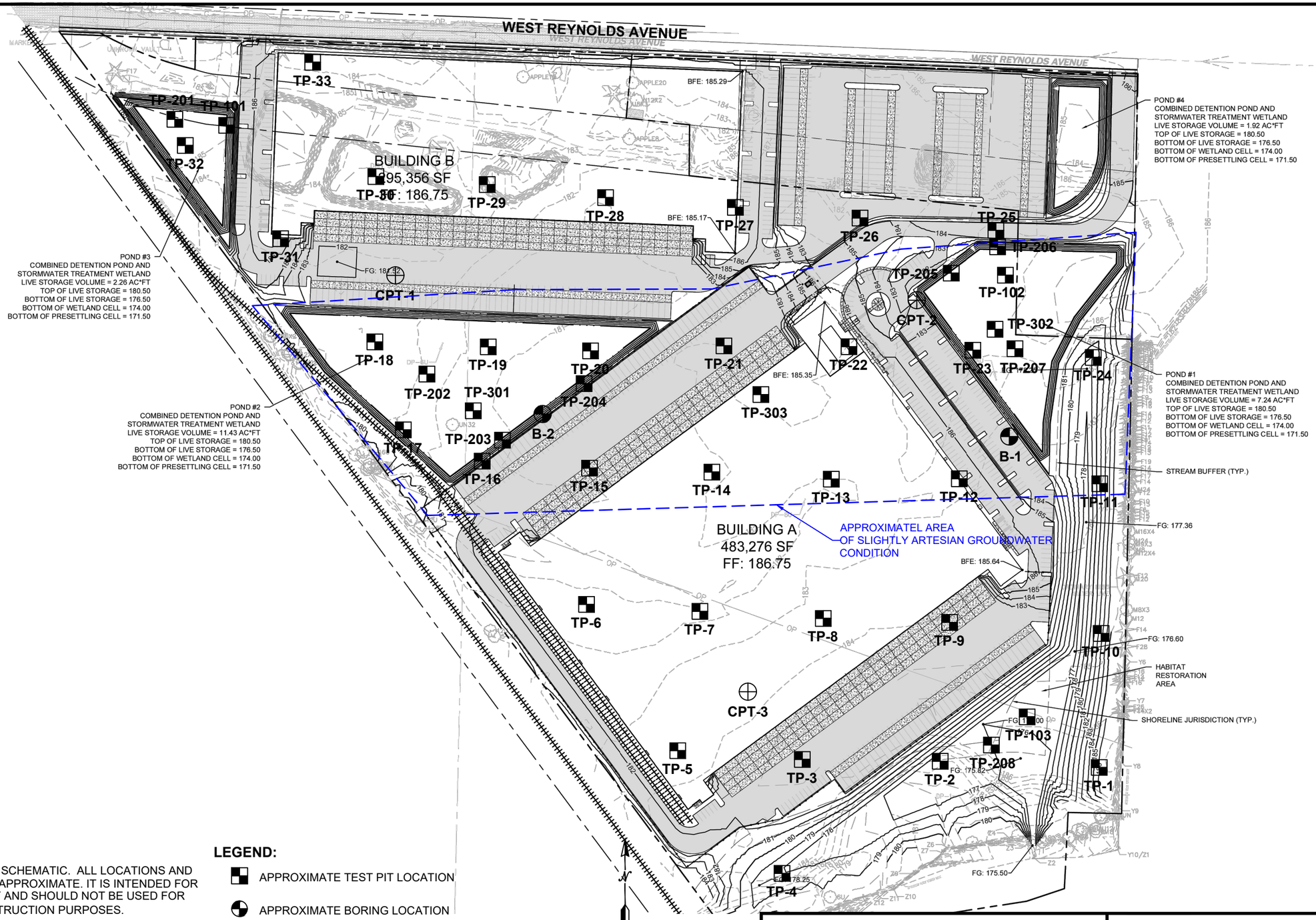
Test Pit Number	Seasonal High Groundwater (Depth below Grade, feet)
201	7.62 feet below grade
202	0.78 feet below grade
203	0.00 feet below grade
204	0.12 feet below grade
205	0.85 feet below grade
206	0.22 feet below grade
207	0.40 feet below grade
208	8.44 feet below grade

Based on the results of our study, the site should be designed using an assumed seasonal high groundwater depth of 7.5 feet below grade at the location of Test Pit TP-201, 0.00 feet below grade at the locations of Test Pits TP-202 through TP-204, 0.20 feet below grade at the locations of Test Pits TP-205 through TP-207, and 8.3 feet below grade at the location of Test Pit TP-208. The approximate location of the test pits is attached to this memo. Graphs showing the changes in groundwater over the 2022 – 2023 season are attached.

The project proposes to manage stormwater using four detention ponds located primarily in the northern portion of the site. Based on the seasonal data and test pits we have an artesian condition that will affect three of the proposed ponds. The only pond not affected is in the northwest corner of the site.

In order to allow the ponds to maintain their current design we propose that a drain should be installed around the entire pond perimeter that extends to a minimum of one foot below the bottom of the pond. The drain should be a minimum of 18 inches wide with a 6-inch pipe at the base. This should direct the groundwater away from the ponds. In addition to the drain, we recommend lining the ponds up to elevation 175 feet in the west and 181 feet in the east with a bentonite liner. This will further protect the ponds from the artesian conditions.

We trust the information presented in this memo is sufficient for your current needs. If you have any questions or require additional information, please call.



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

SITE PLAN PROVIDED BY AHBL

LEGEND:

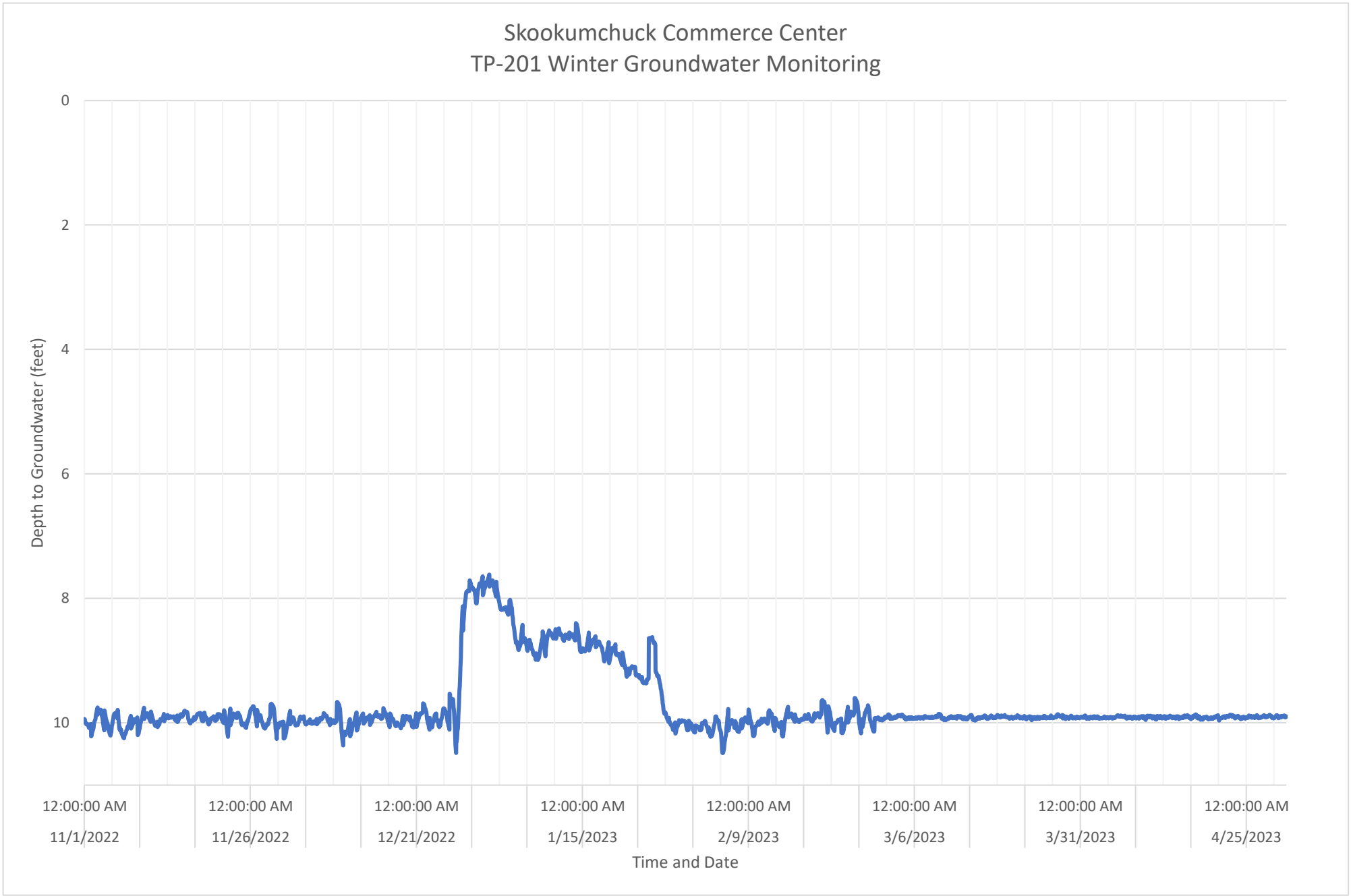
- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE BORING LOCATION
- APPROXIMATE CPT LOCATION

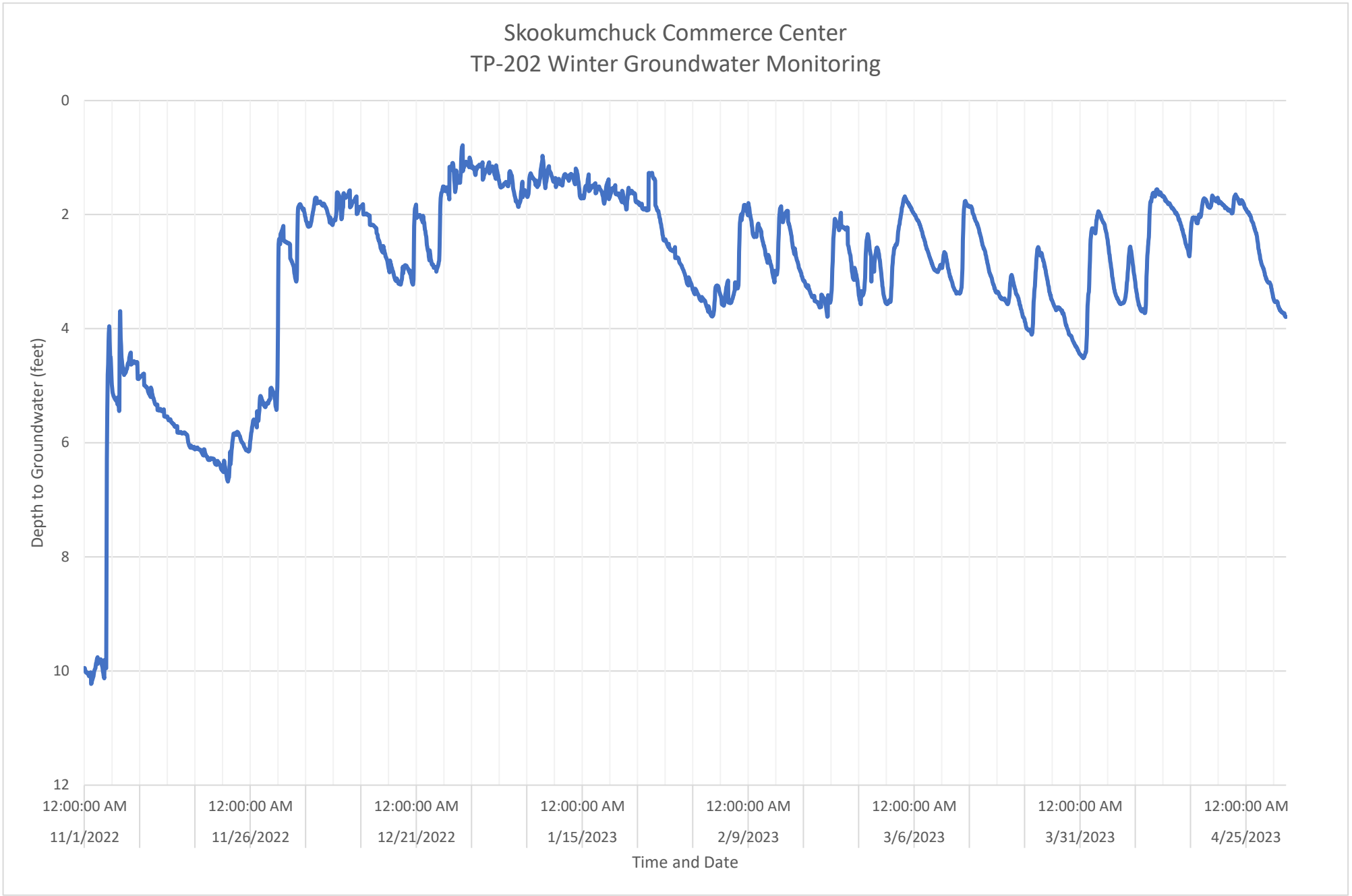
Terra Associates, Inc.

Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

EXPLORATION LOCATION PLAN
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj. No.T-8613	Date FEB 2025	Figure 1


Skookumchuck Commerce Center
TP-201 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
2
4
6
8
10
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
12:00:00 AM
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
4/25/2023
Time and Date


Skookumchuck Commerce Center
TP-202 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
2
4
6
8
10
12
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
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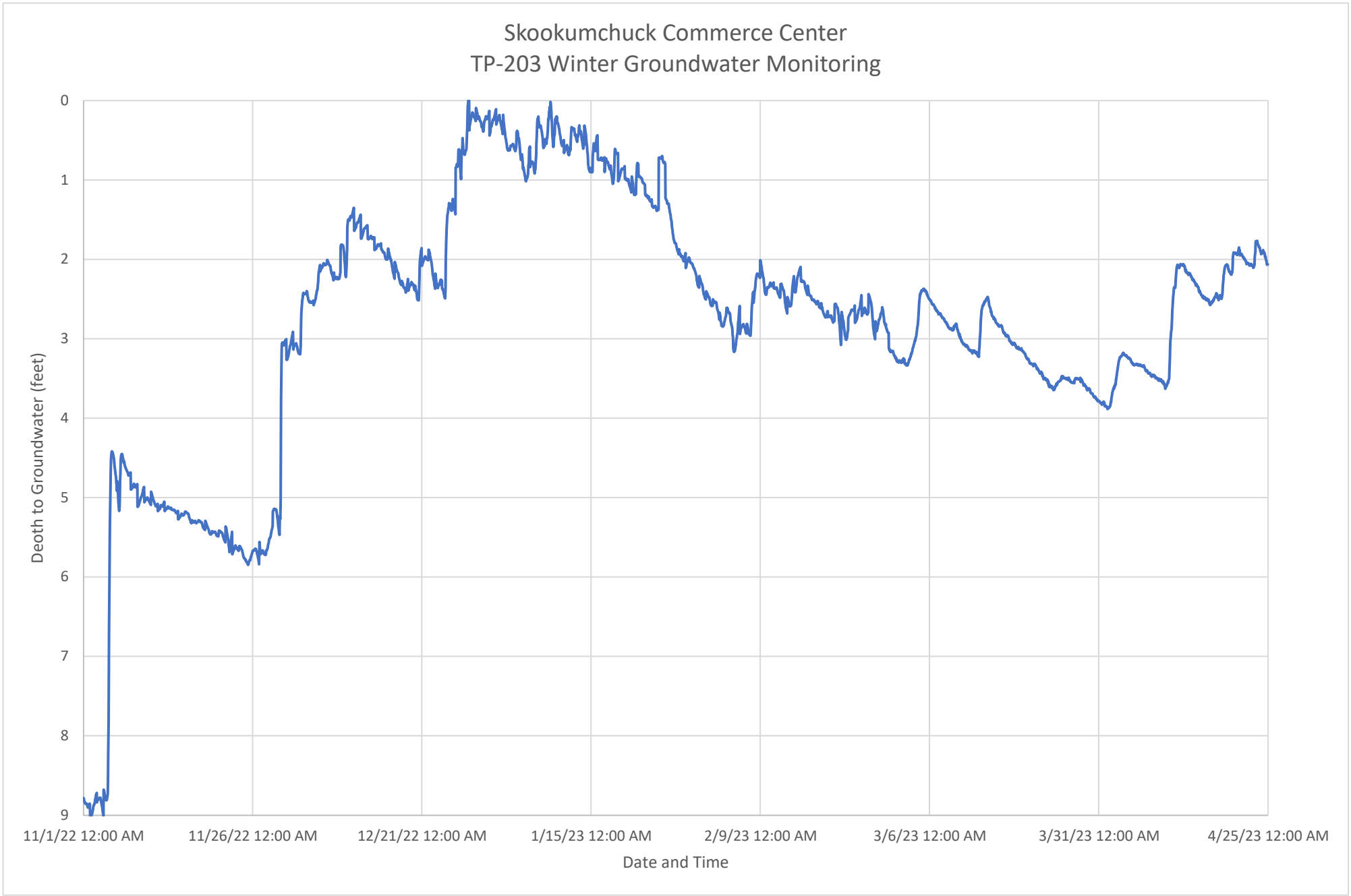
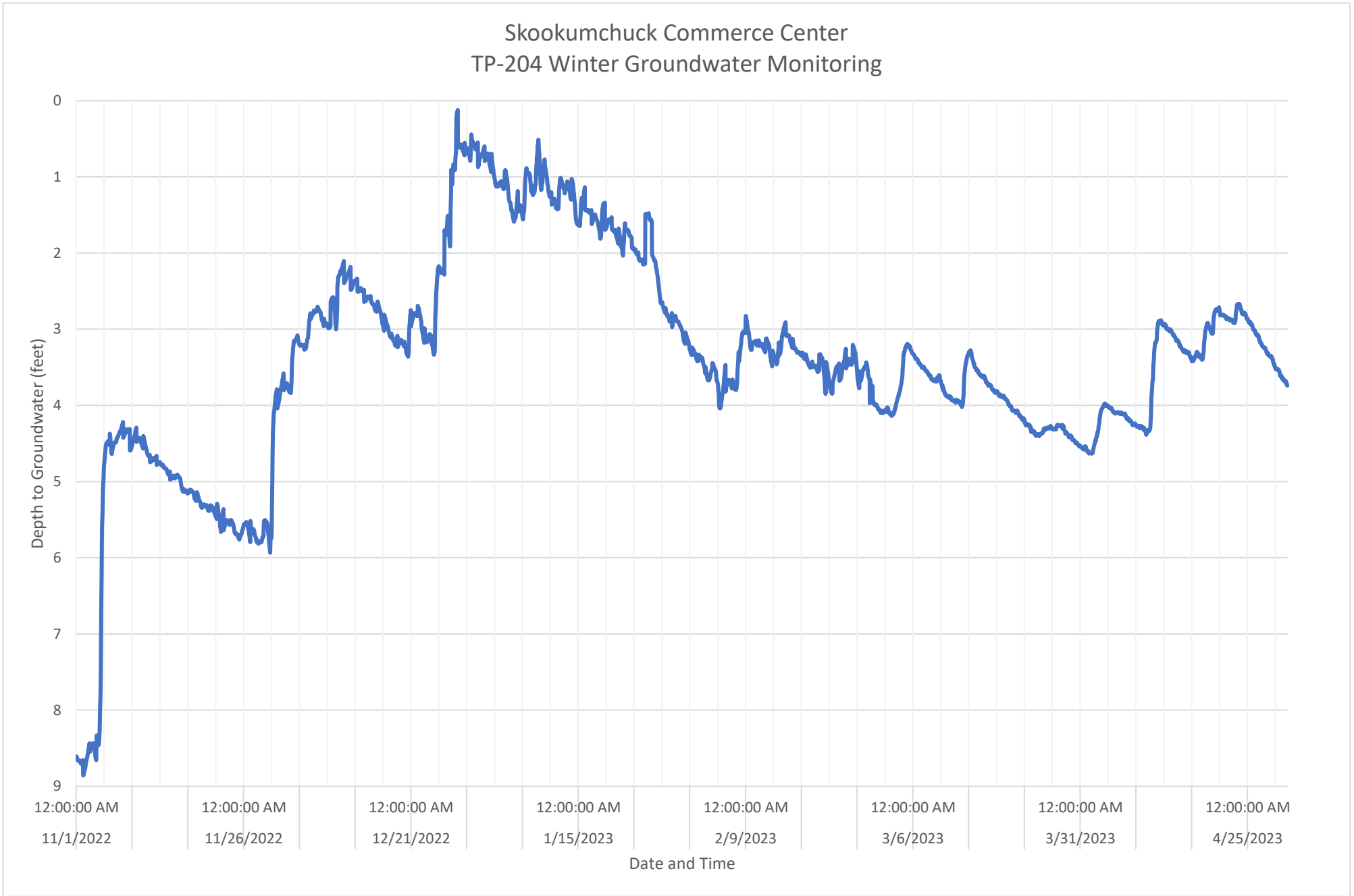
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
4/25/2023
Time and Date


Skookumchuck Commerce Center
TP-203 Winter Groundwater Monitoring
Deoth to Groundwater (feet)
0
1
2
3
4
5
6
7
8
9
11/1/22 12:00 AM
11/26/22 12:00 AM
12/21/22 12:00 AM
1/15/23 12:00 AM
2/9/23 12:00 AM
3/6/23 12:00 AM
3/31/23 12:00 AM
4/25/23 12:00 AM
Date and Time


Skookumchuck Commerce Center
TP-204 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
1
2
3
4
5
6
7
8
9
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
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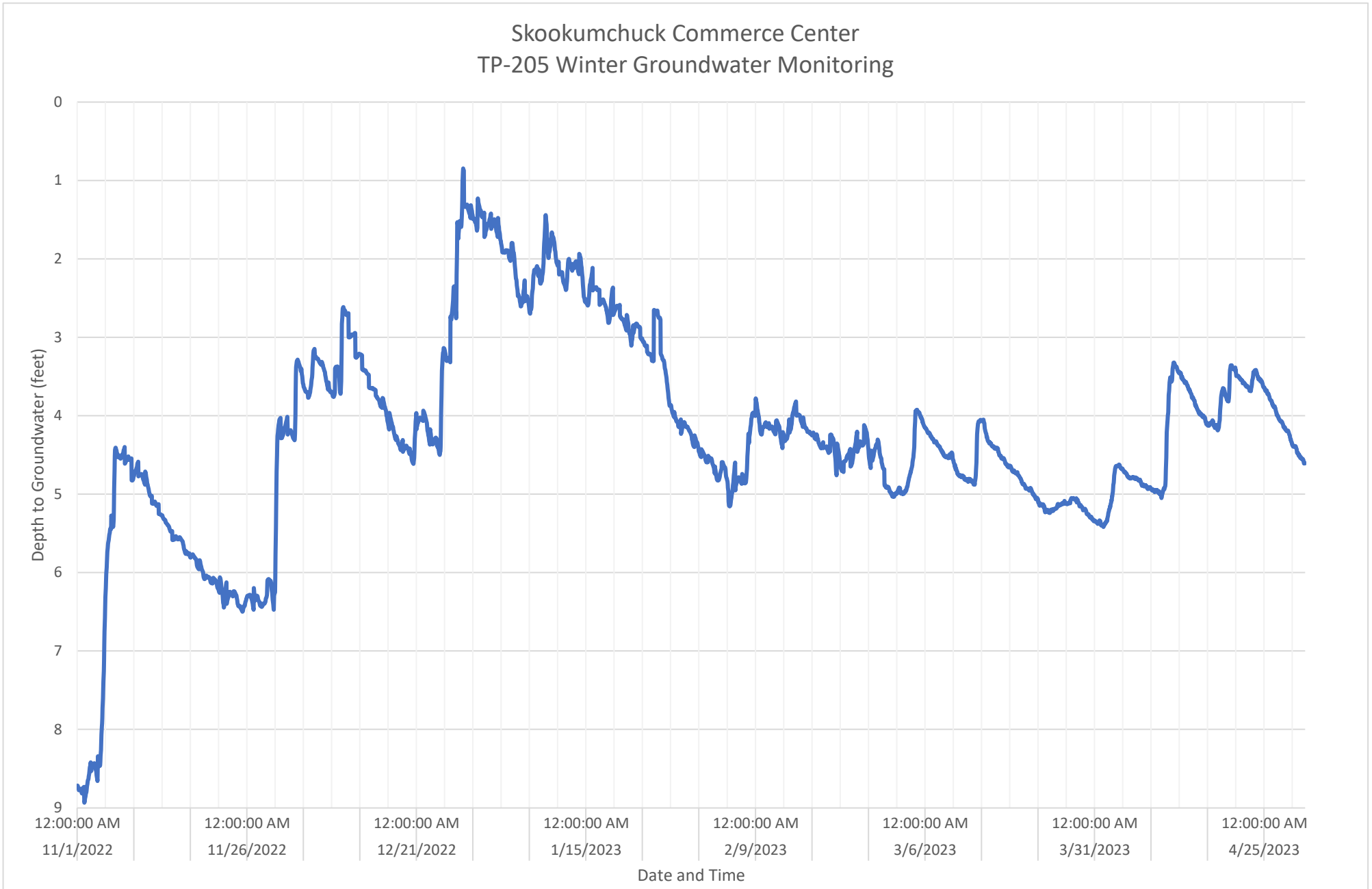
4/25/2023
Date and Time


Skookumchuck Commerce Center
TP-205 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
1
2
3
4
5
6
7
8
9
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
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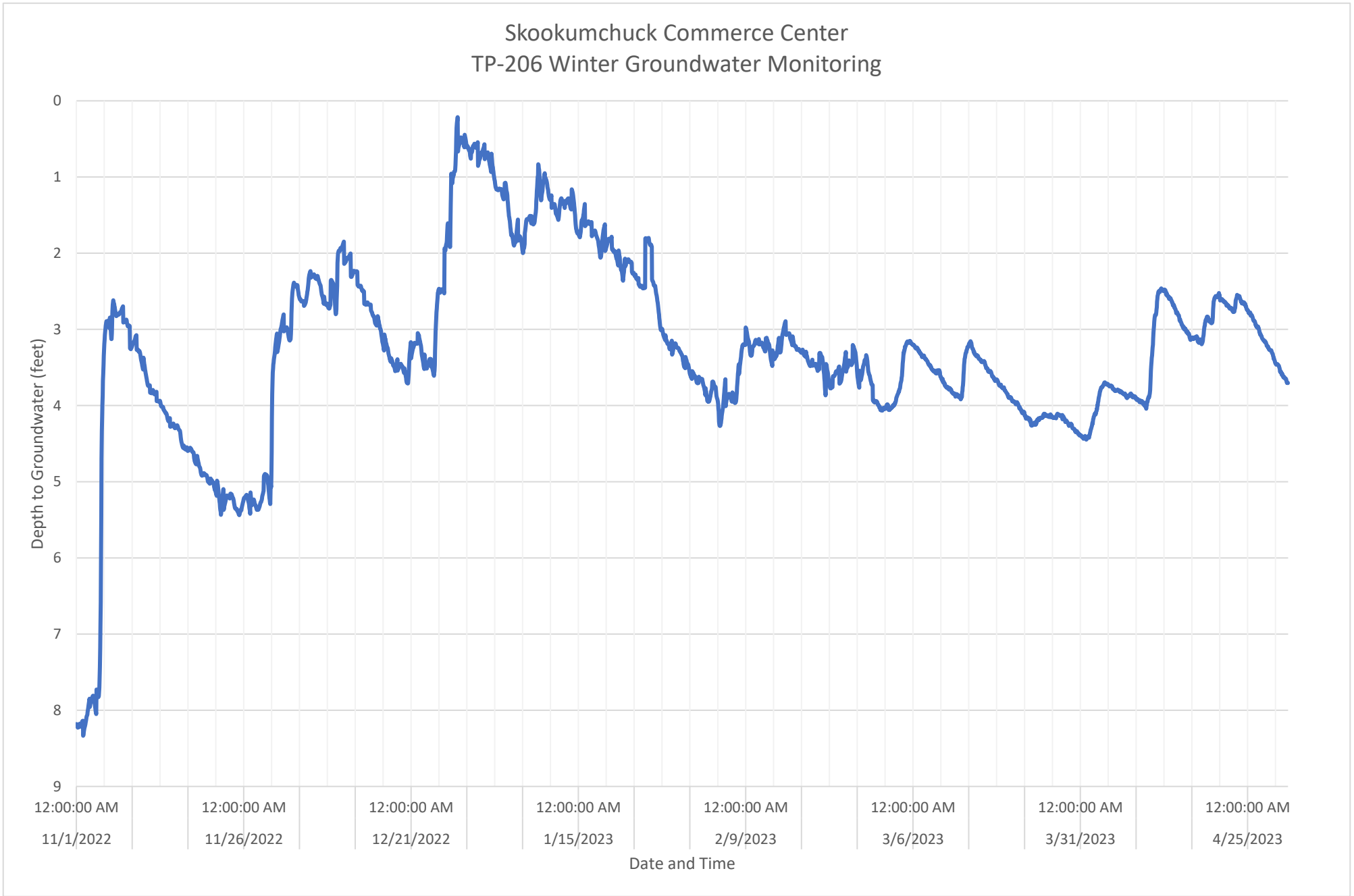
4/25/2023
Date and Time


Skookumchuck Commerce Center
TP-206 Winter Groundwater Monitoring
Depth to Groundwater (feet)
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1
2
3
4
5
6
7
8
9
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
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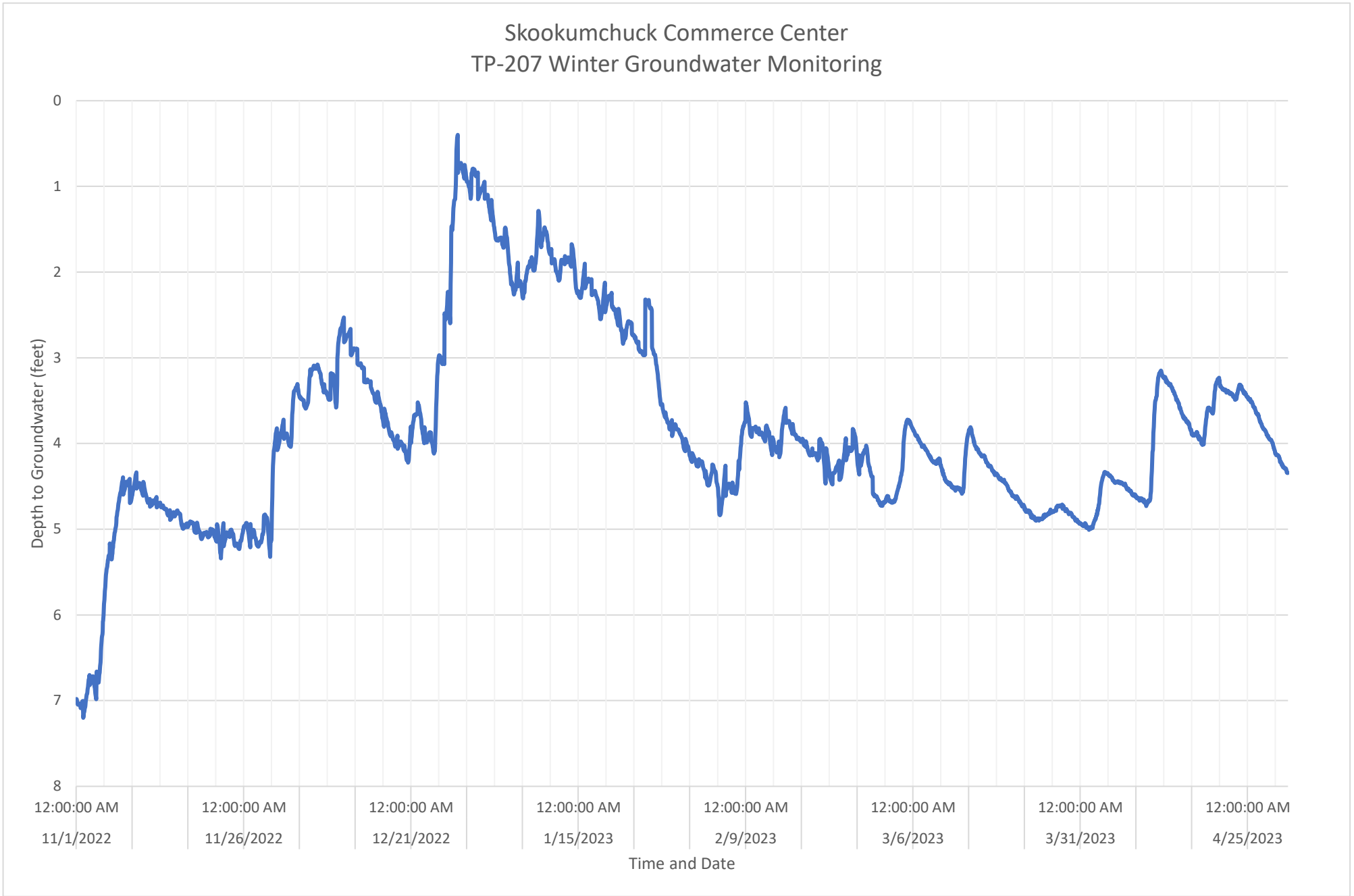
4/25/2023
Date and Time


Skookumchuck Commerce Center
TP-207 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
1
2
3
4
5
6
7
8
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
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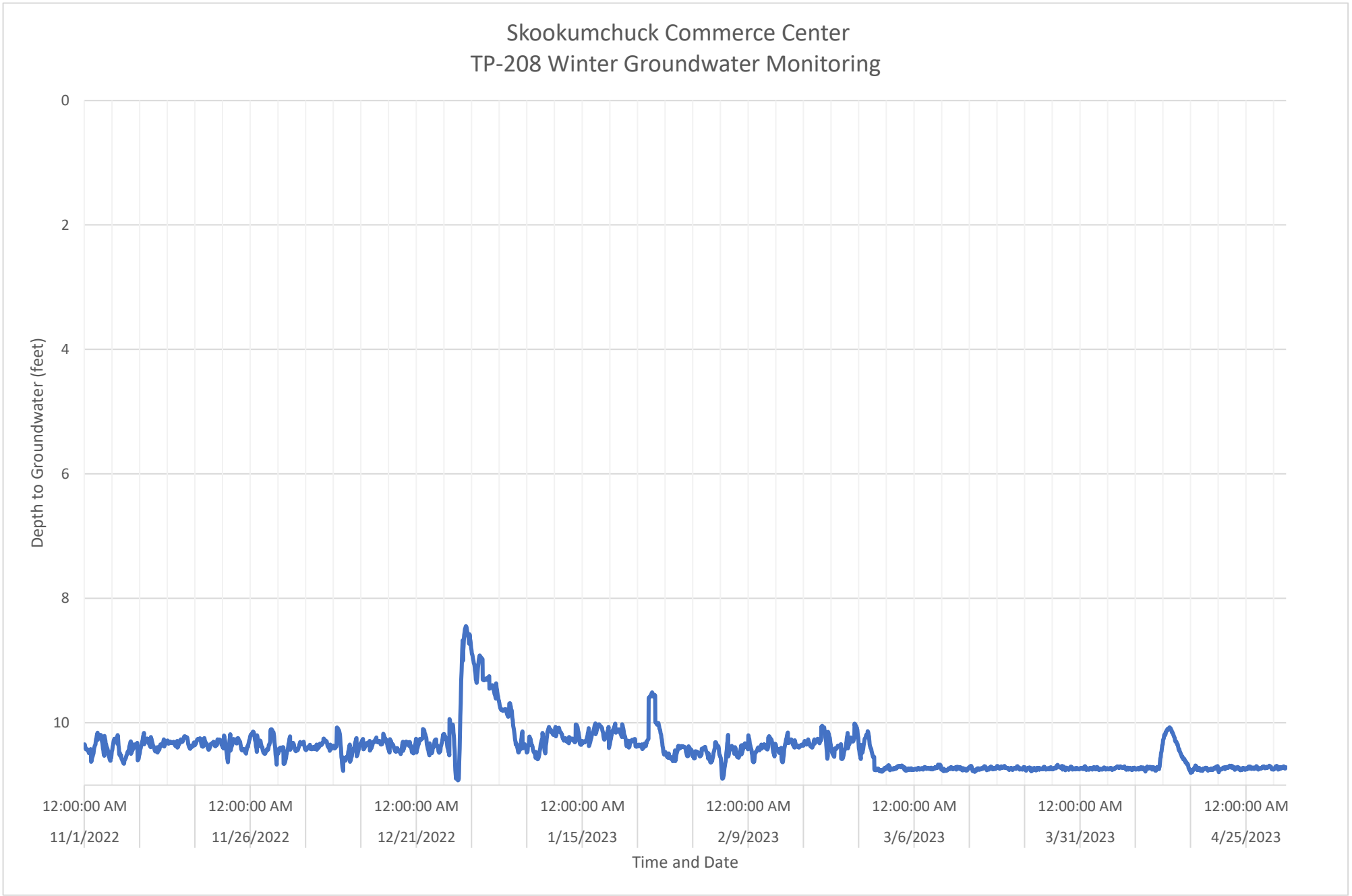
12:00:00 AM
4/25/2023
Time and Date


Skookumchuck Commerce Center
TP-208 Winter Groundwater Monitoring
Depth to Groundwater (feet)
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2
4
6
8
10
12:00:00 AM
11/1/2022
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12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
12:00:00 AM
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
4/25/2023
Time and Date

Hillary Hoke

From: R5 Planning (DFW) <R5.Planning@dfw.wa.gov>
Sent: Tuesday, July 16, 2024 4:50 PM
To: Hillary Hoke
Cc: Smith, Amaia A (DFW); Johnson, Elliot (DFW)
Subject: [External]RE: City of Centralia - MDNS - Skookumchuck Commerce Center
Attachments: WDFW Re Skookumchuck Commerce Ctr (1).pdf

Caution: Think before you click! This email is from an outside organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hello Hillary,

Thank you for the opportunity to comment on the Skookumchuck Commerce Center. Previous WDFW Habitat biologist Karen Adams commented on this proposal on June 12,2023. We have attached the letter to ensure our initial concerns are considered.

After reviewing the current No Net Loss and Habitat Restoration Plan, we believe efforts have been made in addressing our initial concerns regarding the proposed project. After careful review, we'd like confirmation that the following conditions are met:

- **Shoreline Buffer**: The project must strictly adhere to staying out of the shoreline buffer area. This is crucial for preserving the natural habitat and preventing erosion.
- **Stormwater Pond Location**: I understand that the stormwater pond will be situated upland from potential flooding areas. This precautionary measure is essential to prevent any adverse impact on nearby ecosystems.
- **Buffer Restoration:** The commitment to restore the buffer with native plants and trees is commendable. This restoration effort will enhance biodiversity and contribute to the overall health of the ecosystem.
- **Flood Control Ponds:** The proposal's inclusion of flood control ponds that also serve as habitat is a positive step. These dual-purpose features align with our goal of achieving no net loss of ecological value.

In summary, I believe this proposal meets our criteria for responsible development. However, I kindly request that these conditions be clearly documented and enforced throughout the project's lifecycle. Should any deviations occur, I trust that appropriate corrective measures will be taken promptly.

Please contact Lewis County Habitat Biologist Elliot Johnson for assistance or to discuss these recommendations further.

Thank you,

Brittney Salter
Environmental Planner 3
Region 5 Land Use Lead
WDFW Habitat Program
(360)-764-6665 *****

CC: Amaia Smith, WDFW Assistant Regional Habitat Program Manager
Elliot Johnson, Lewis County Habitat Biologist

Hillary Hoke

From: Williams, Daron (DFW) <Daron.Williams@dfw.wa.gov>
Sent: Monday, February 10, 2025 4:06 PM
To: Hillary Hoke
Cc: R5 Planning (DFW)
Subject: RE: City of Centralia - SEPA MDNS #2023 0242
Attachments: WDFW email 7-16-2024.pdf; WDFW Re Skookumchuck Commerce Ctr.pdf

Hello Hillary,

Thank you for the opportunity to comment on the Skookumchuck Commerce Center. WDFW's Region 5 Land Use Lead, Brittany Salter and Previous WDFW Habitat Biologist Karen Adams previously commented on this proposal on July 16th, 2024, and June 12th, 2023. We have attached a copy of the previous comments to ensure our initial concerns are considered.

After reviewing the current No Net Loss and Habitat Restoration Plan, it does look like our initial concerns are being addressed. However, after a careful review with one of our habitat engineers, we do have concerns over the long-term sustainability of the proposed flood retention structure.

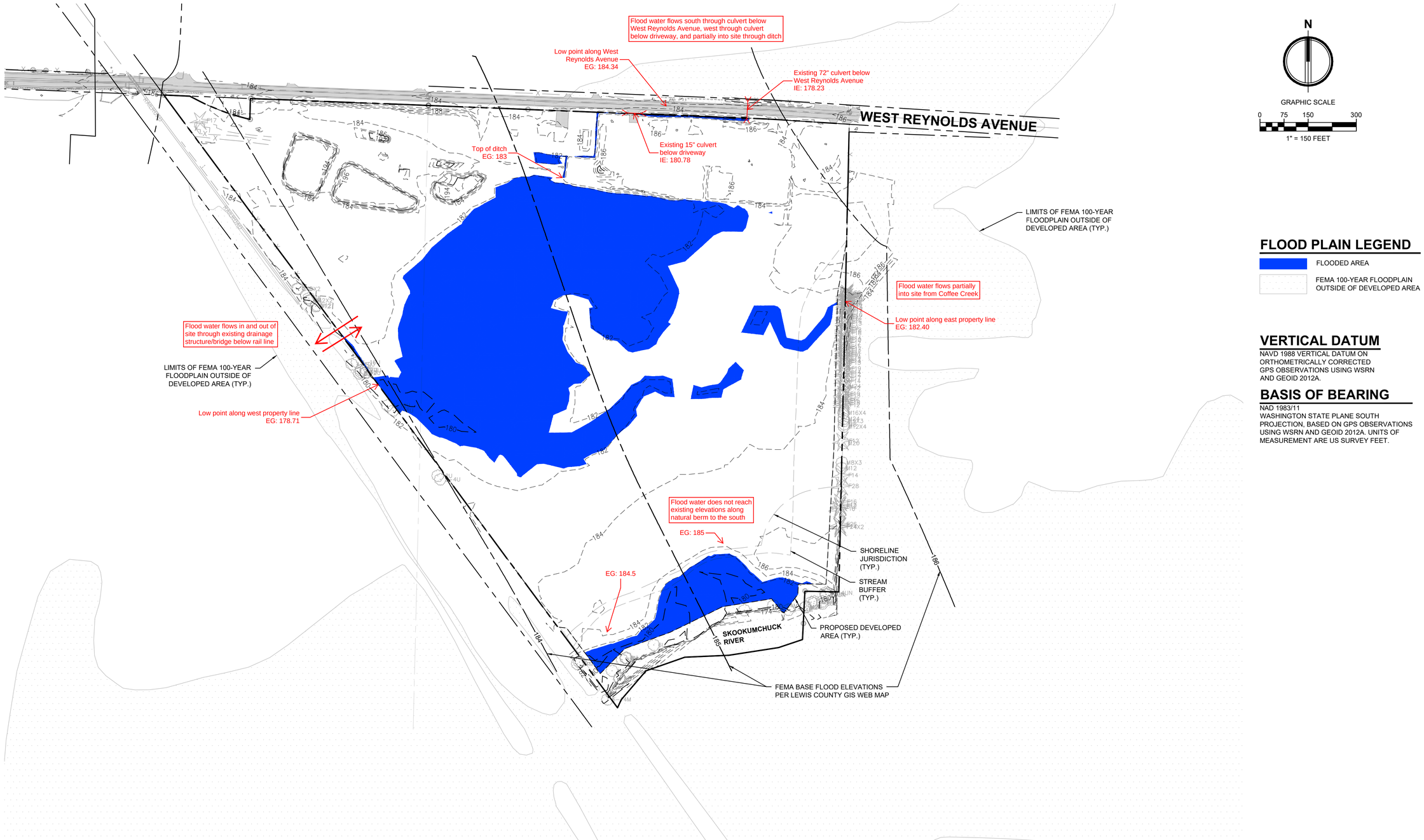
Going off the provided materials, we were unable to determine if the outside berms of the flood retention structure could withstand high flows and flood events. Erosion or failure of the flood control structure could result in the stranding of fish and potentially Coffee Creek or the Skookumchuck River shifting closer to the proposed commerce center. This would result in a decrease in the riparian buffer and could threaten the proposed commerce center.

If this project moves forward, these concerns will need to be addressed during the Hydraulic Project Approval (HPA) process, we are happy to provide additional technical assistance upon request to ensure this project achieves no net loss of ecological function and to determine HPA requirements.

Thank you,

Daron Williams (he/him)
Habitat Biologist, Western Lewis County / Chehalis Basin ASRP
Washington Department of Fish and Wildlife
daron.williams@dfw.wa.gov
253-303-3504

Exhibit J



FLOOD PLAIN LEGEND

- FLOODED AREA
- FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

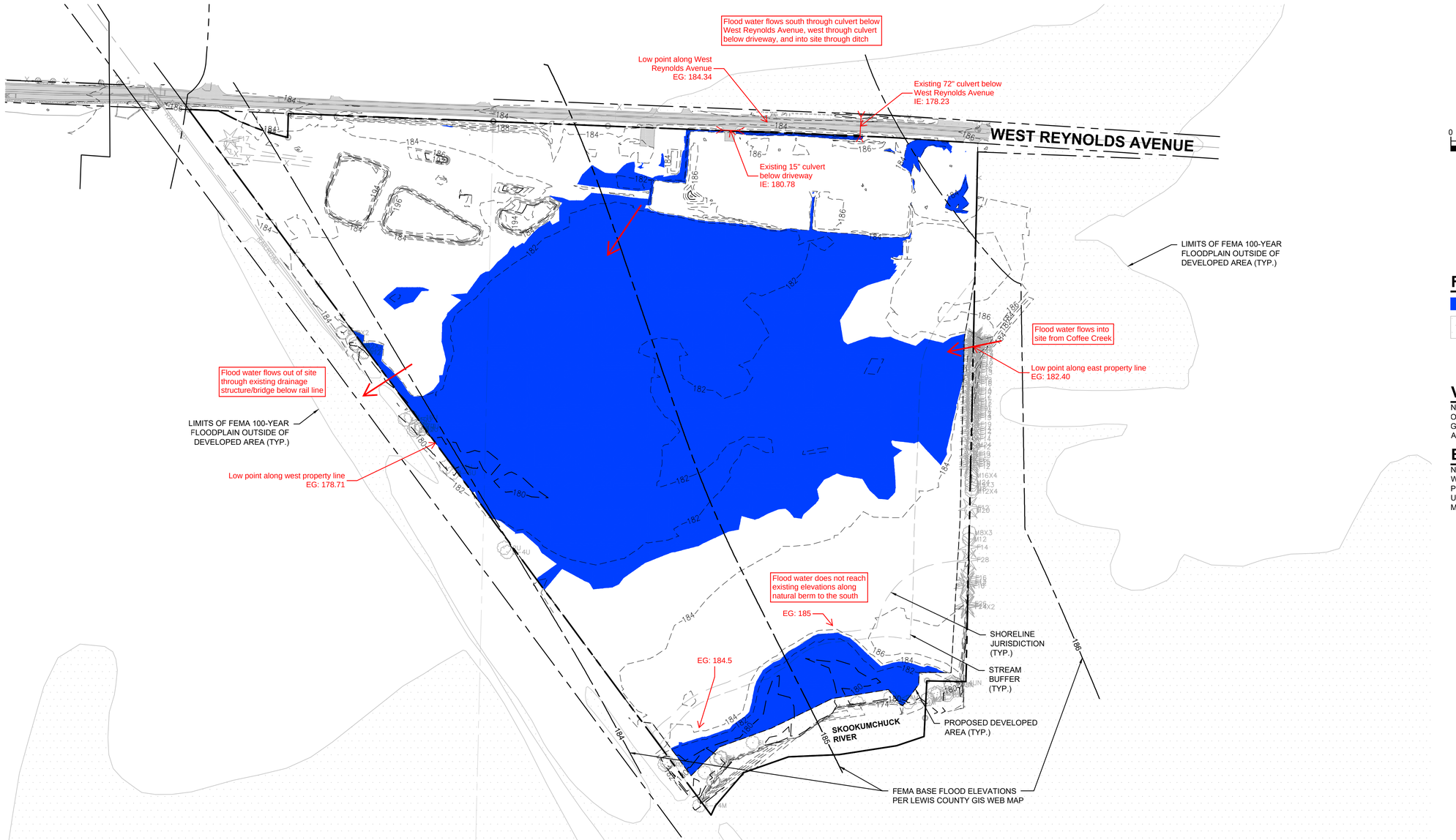
NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

AHBL
2215 North 30th Street,
Suite 300,
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

SKOOKUMCHUCK COMMERCE CENTER

EXISTING FLOOD VOLUME
3' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10
DATE: 6/23/2025
EX-1



N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

FLOODED AREA

FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

AHBL

2215 North 30th Street,
Suite 300,
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

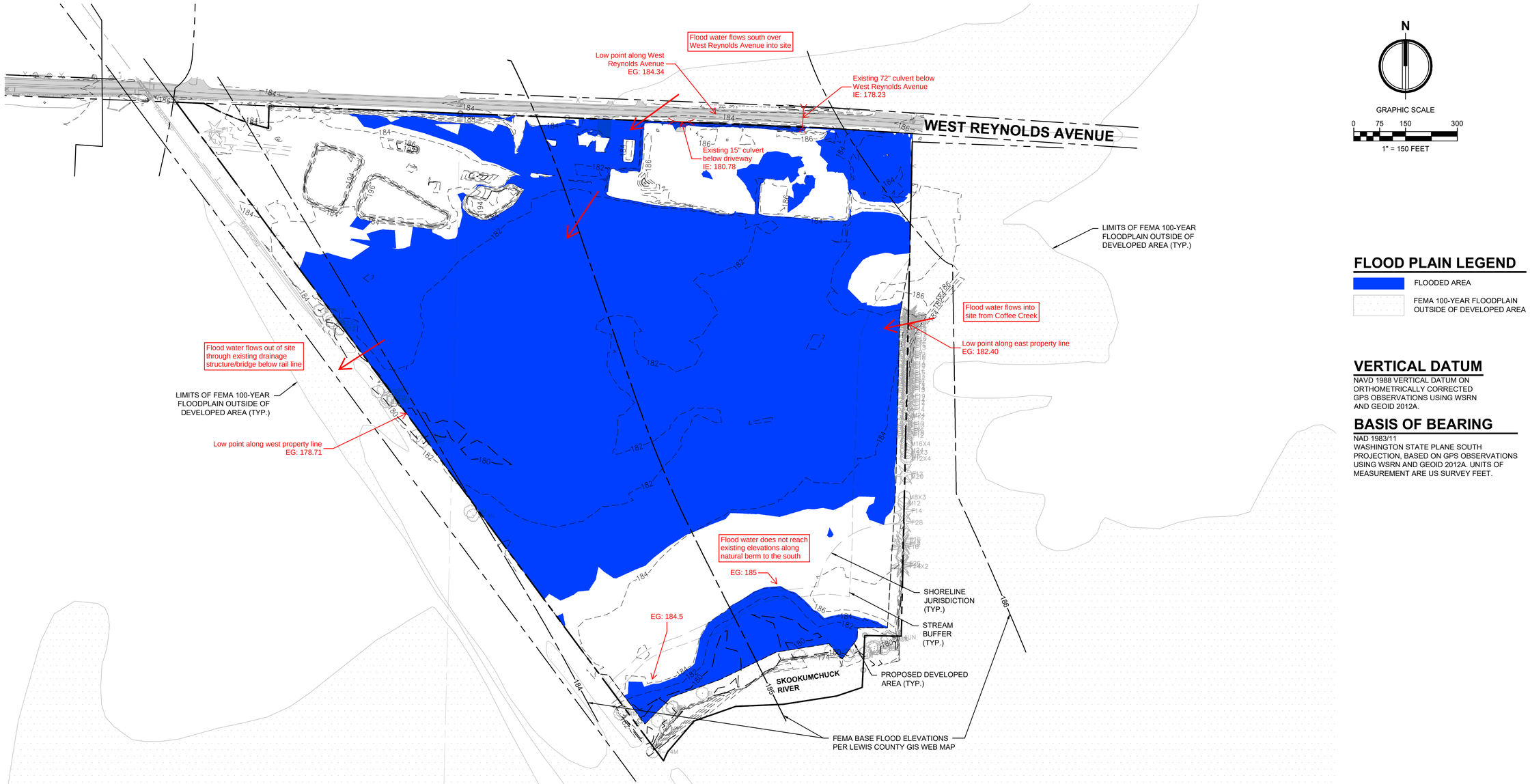
SKOOKUMCHUCK COMMERCE CENTER

EXISTING FLOOD VOLUME
2' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-2



N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

FLOODED AREA

FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

AHBL
2215 North 30th Street,
Suite 300,
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

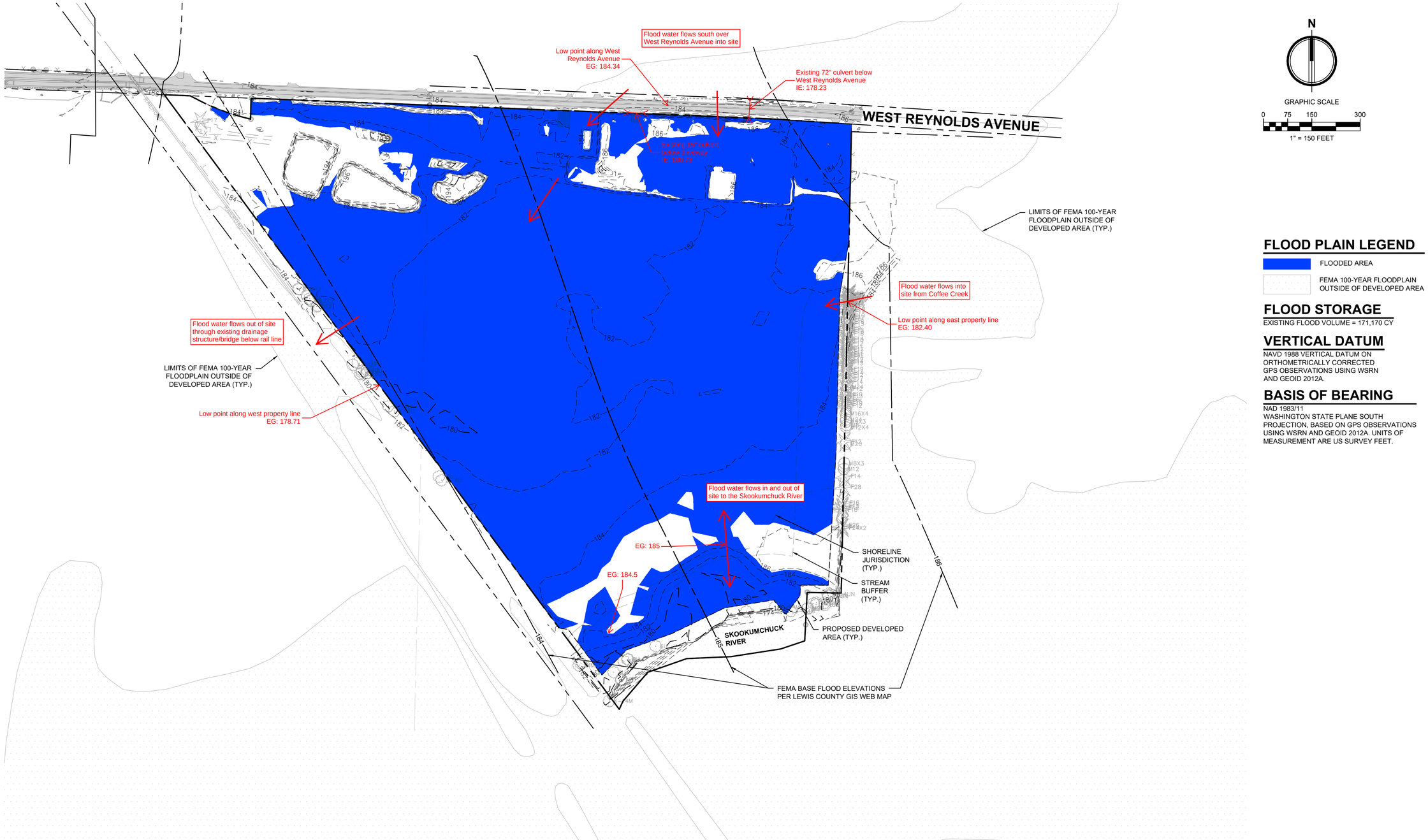
SKOOKUMCHUCK COMMERCE CENTER

EXISTING FLOOD VOLUME
1' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-3



N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

FLOODED AREA

FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

FLOOD STORAGE

EXISTING FLOOD VOLUME = 171,170 CY

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

AHBL
2215 North 30th Street,
Suite 300,
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

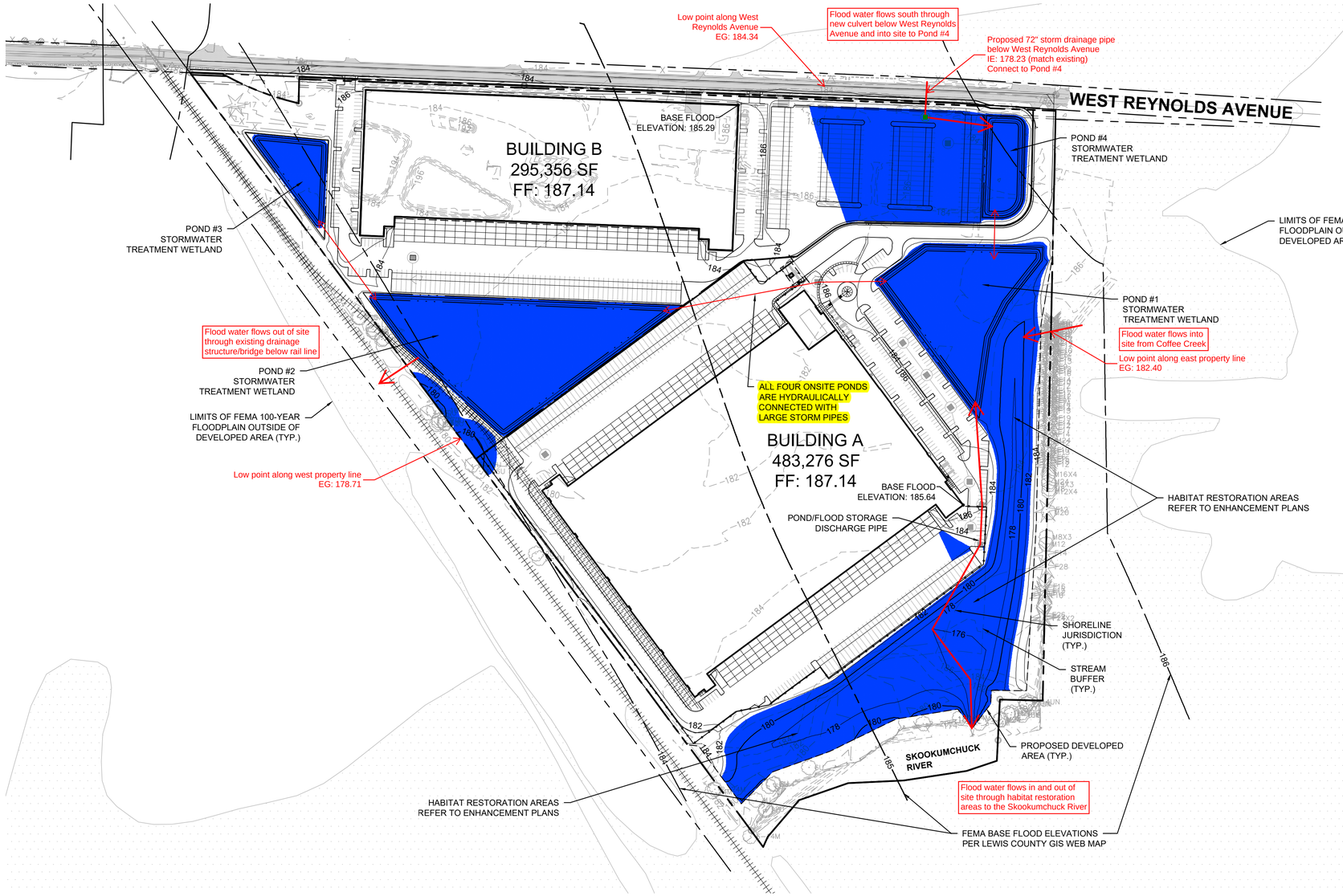
SKOOKUMCHUCK COMMERCE CENTER

EXISTING FLOOD VOLUME BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-4



N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

- FLOODED AREA
- FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

VERTICAL DATUM

NAVD 1988 VERTICAL DATUM ON ORTHOMETRICALLY CORRECTED GPS OBSERVATIONS USING WSRN AND GEOID 2012A.

BASIS OF BEARING

NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

AHBL
2215 North 30th Street,
Suite 300,
Tacoma, WA 98403
253.383.2422 TEL
253.383.2572 FAX

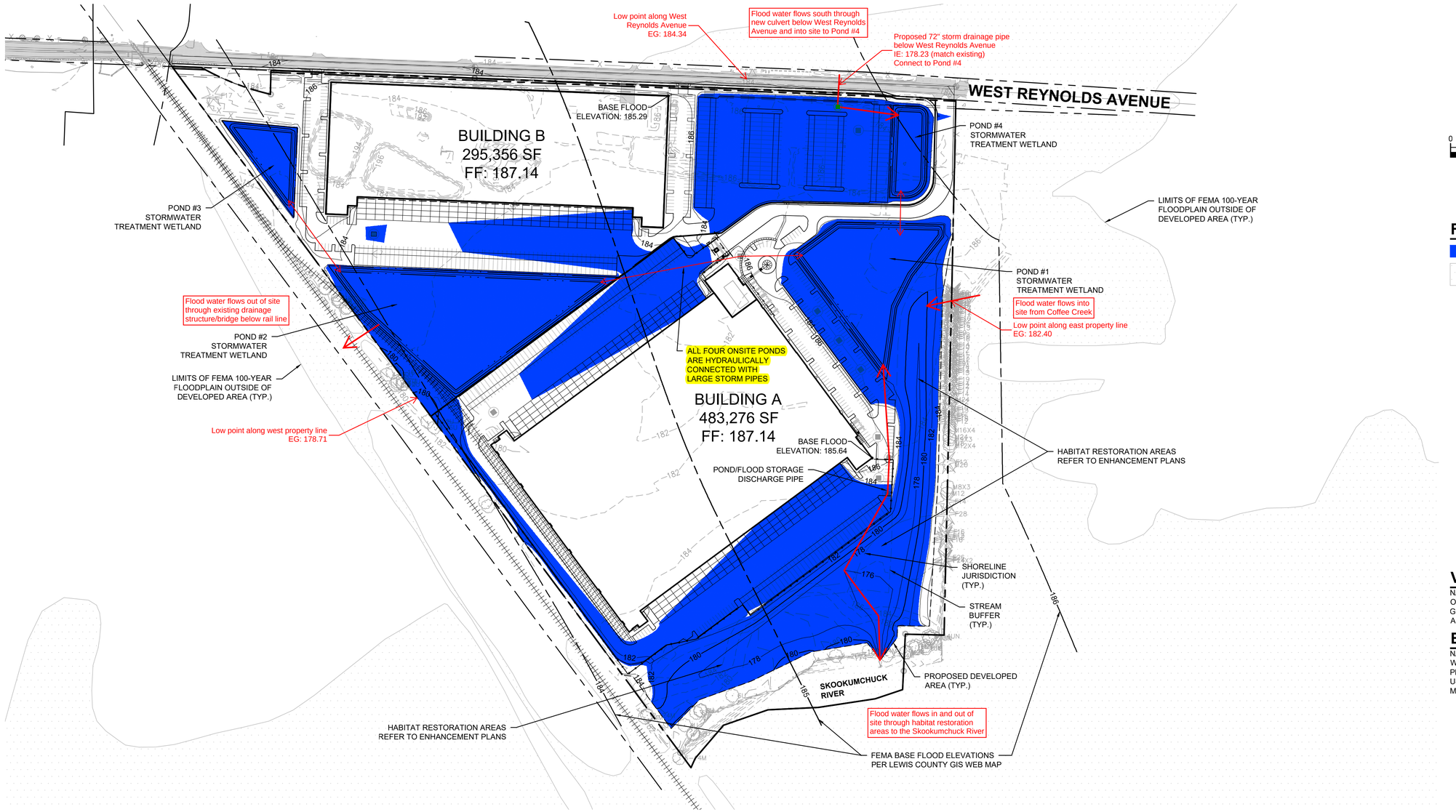
SKOOKUMCHUCK COMMERCE CENTER

PROPOSED FLOOD VOLUME
3' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-5



N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

- FLOODED AREA
- FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

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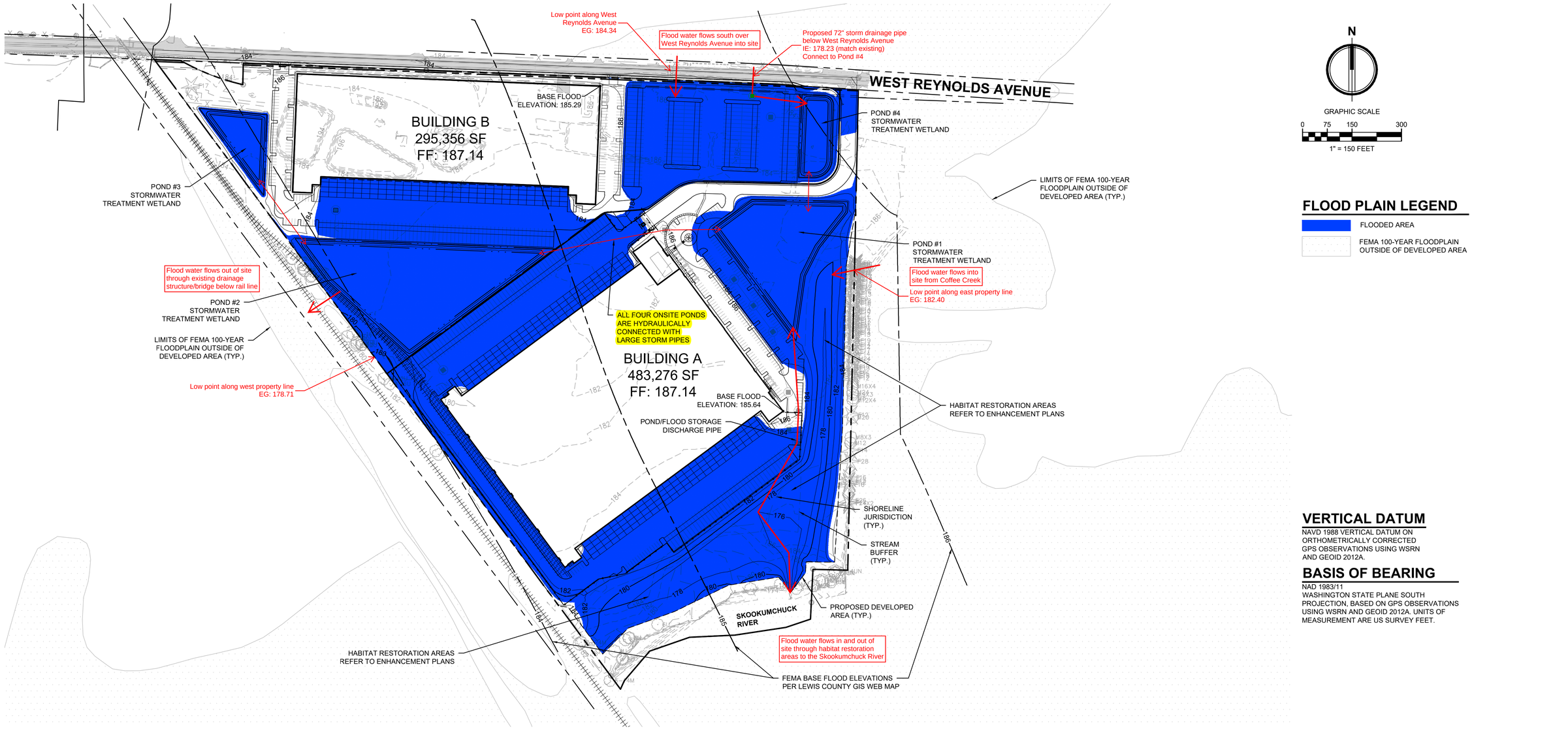
PROPOSED FLOOD VOLUME
2' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-6



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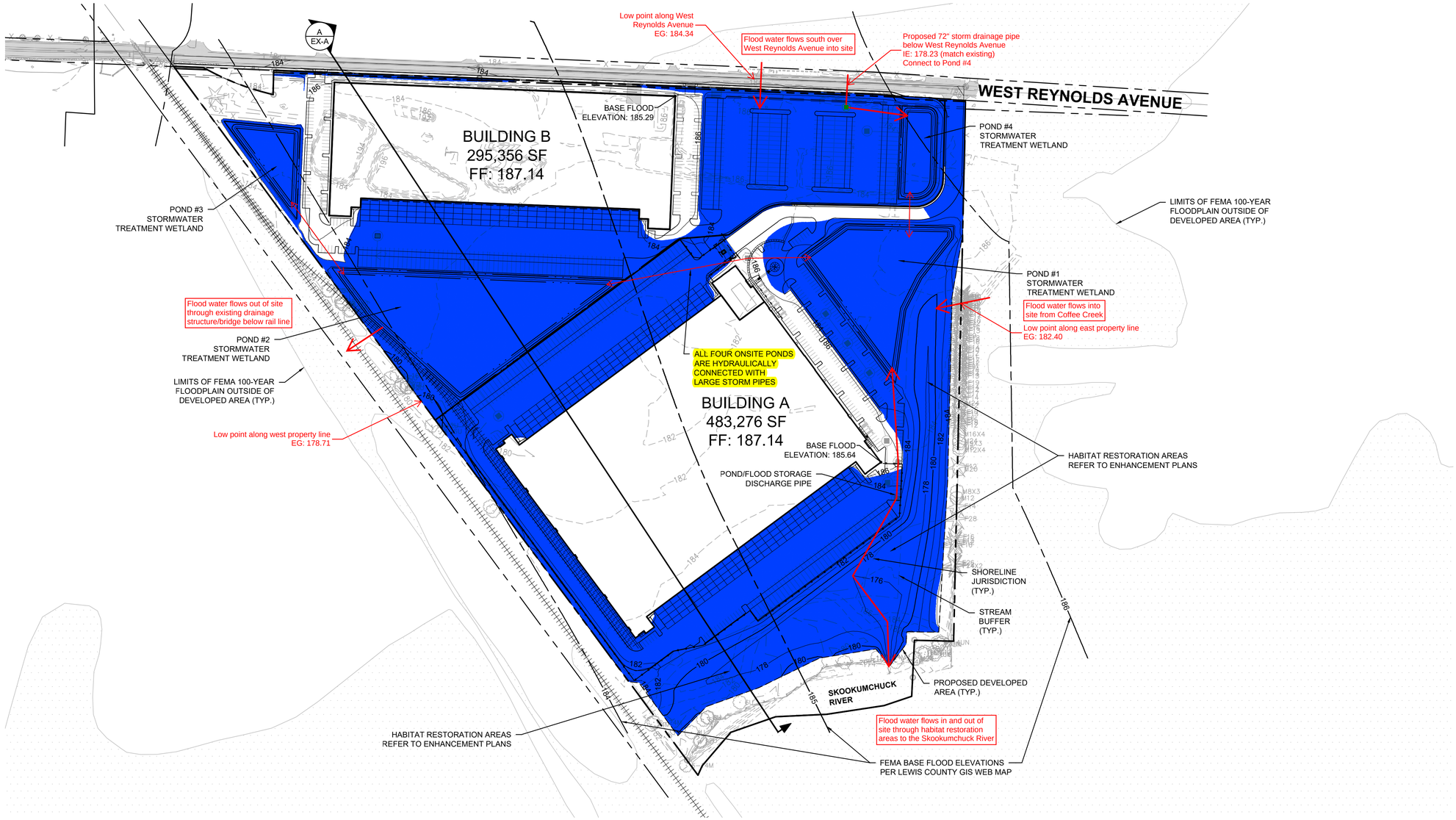
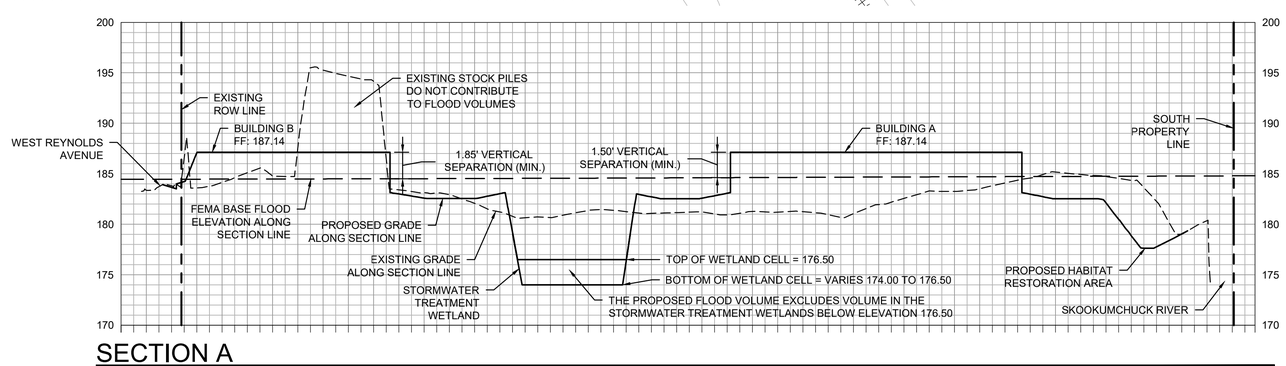
SKOOKUMCHUCK COMMERCE CENTER

PROPOSED FLOOD VOLUME
1' BELOW BASE FLOOD ELEVATION

JOB NO. 2210649.10
DATE: 6/23/2025

EX-7





SECTION A

SCALE: H:1"=150', V:1"=7.5'

N

GRAPHIC SCALE

0 75 150 300

1" = 150 FEET

FLOOD PLAIN LEGEND

FLOODED AREA

FEMA 100-YEAR FLOODPLAIN OUTSIDE OF DEVELOPED AREA

FLOOD STORAGE

EXISTING FLOOD VOLUME = 171,170 CY
*PROPOSED FLOOD VOLUME = 204,490 CY
*THE PROPOSED FLOOD VOLUME EXCLUDES VOLUME IN THE STORMWATER TREATMENT WETLANDS BELOW ELEVATION 176.50.

EARTHWORK QUANTITIES

OVERALL EARTHWORK QUANTITIES
CUT = 158,000 CUBIC YARDS
FILL = 153,000 CUBIC YARDS
NET = 5,000 CUBIC YARDS (EXPORT)

EARTHWORK QUANTITIES BELOW BFE
CUT = 126,400 CUBIC YARDS
FILL = 93,080 CUBIC YARDS
NET = 33,320 CUBIC YARDS (EXPORT)

NOTES:
THE ABOVE QUANTITIES ARE ESTIMATES ONLY INTENDED FOR THE PERMITTING PROCESS. DO NOT USE FOR BID PURPOSES. THE QUANTITIES DO NOT HAVE STRIPPING, COMPACTION, OR CUT AND FILL ADJUSTMENT FACTORS APPLIED TO THEM NOR DO THEY ACCOUNT FOR PAVEMENT, SIDEWALK OR BUILDING SECTIONS.

VERTICAL DATUM

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SKOOKUMCHUCK COMMERCE CENTER

PROPOSED FLOOD VOLUME BASE FLOOD ELEVATION

JOB NO. 2210649.10

DATE: 6/23/2025

EX-8

Preliminary Storm Drainage Report

PREPARED FOR:

Panattoni Development Company
1821 Dock Street, Suite 100
Tacoma, WA 98402

PROJECT:

Skookumchuck Commerce Center
Centralia, Washington
2210649.10

PREPARED BY:

Tyler Watkins, PE
Project Manager

REVIEWED BY:

Bart Brynestad, PE
Principal

DATE

October 2023
Revised June 2025

Preliminary Storm Drainage Report

PREPARED FOR:

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1821 Dock Street, Suite 100
Tacoma, WA 98402

PROJECT:

Skookumchuck Commerce Center
Centralia, Washington
2210649.10

PREPARED BY:

Tyler Watkins, PE
Project Manager

REVIEWED BY:

Bart Brynestad, PE
Principal

DATE

October 2023
Revised June 2025

06/26/2025

I hereby state that this Preliminary Storm Drainage Report for the Skookumchuck Commerce Center project has been prepared by me or under my supervision and meets the standard of care and expertise that is usual and customary in this community for professional engineers. I understand that City of Centralia does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities prepared by me.

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Appendix A

Exhibits

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A-6 .....Flow Chart for Determining Requirements for New Development
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A-8 .....Flow Control Exempt Receiving Waters

Appendix B

Exhibits

B-1 .....Predeveloped Basin Map
B-2 .....Developed Basin Map
B-3 .....Water Quality Calculations
B-4 .....Water Quality WWHM Report

Appendix C

Geotechnical Report
Terra Associates, Inc.
September 7, 2023

Appendix D

Shoreline, Wetland, and Fish and Wildlife Habitat Assessment Report
Soundview Consultants LLC
March 21, 2023

1.0 Project Overview

This Preliminary Storm Drainage Report accompanies the conceptual civil engineering plans submitted for the Skookumchuck Commerce Center project located at West Reynolds Avenue, Centralia, Washington (Parcel Nos. 021041000000, 021039000000, 021060000000, 021037000000, 021059000000, 021045000000, 021044002000, 021044003000, 021044004000, 021043002000, 021043003000, and 021043001000). The total area of the project parcels is approximately 56.38 acres. Refer to Appendix A-1 for a Vicinity Map.

This Preliminary Storm Drainage Report describes the stormwater facilities designed for this project. The plans and report have been prepared to satisfy all requirements of the 2019 Department of Ecology *Stormwater Management Manual for Western Washington (SWMMWW)* and the 2022 City of Centralia Design and Development Guidelines.

1.1 Proposed Project Description

The proposed Skookumchuck Commerce Center project proposes to construct a 483,276-square foot warehouse/distribution facility and a 295,356-square foot warehouse/distribution facility. The project will be accessed from West Reynolds Avenue. Site improvements include parking areas for passenger cars and trailers, truck docks, maneuvering areas, concrete aprons, storm drainage improvements, water and sanitary sewer connections, fire protection, and landscaping.

2.0 Summary of Minimum Requirements

This project is a new development that will result in greater than 5,000 square feet of new plus replaced hard surface area. Therefore, the project shall comply with Minimum Requirements #1 through #9 for the new and replaced hard surfaces and the converted vegetation areas. Refer to Appendix A-6 for the Flowchart for Determining Requirements for New Development.

2.1 MR 1 – Preparation of Stormwater Site Plans

This report and the project plans represent the Stormwater Site Plan for this project and satisfy MR 1.

2.2 MR 2 - Construction Stormwater Pollution Prevention Plan (SWPPP)

A Construction Stormwater Pollution Prevention Plan (CSWPPP) will be submitted with final engineering.

2.3 MR 3 – Source Control of Pollution

Source controls are required for preventative maintenance, spill prevention and cleanup, vehicle washing and maintenance, building and equipment washing, maintenance of stormwater drainage and treatment systems, parking and storage of vehicles, landscaping and irrigation, and railroad maintenance.

The applicable Source Control BMPs in the *SWMMWW* are listed below:

S410, S453, S454, S455, S456, S457, S458, S431, S434, S441, S415, S417, S421, S430, S408, S411, S425, S435, S450, S412, S426, S414, S422, S424, S442, S443, S447, S451

The applicable Operational and Structural Source Control BMPs are described below:

- Engine degreasing or washing of internal engine components is not permitted onsite. A commercial car wash must be used.

- All oils, antifreeze, solvents, batteries, and household hazardous waste must be recycled at local parts stores, gas stations, and the Household Hazardous Waste facility. Never dump used fluid onto the ground. Label and separate wastes into separate containers.
- Compost piles shall not be located on paved areas or areas that may pond during storms.
- Do not apply pesticides, herbicides, or fungicides when it is windy or when rain is expected.
- Never dispose of grass clippings in or near storm drains, rivers, streams, or lakes.
- All pollutants, including waste materials and demolition debris created onsite during construction, shall be handled and disposed of in a manner that does not cause contamination of surface water.
- Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste).
- Maintenance and repair of heavy equipment and vehicles that may result in discharge or spillage of pollutants to the ground or into surface water runoff must be conducted using spill prevention measures such as drip pans.
- Inspect and clean treatment BMPs, conveyance systems, and catch basins as needed.
- Promptly repair and deterioration threatening the structural integrity of stormwater facilities.
- If a parking lot must be washed, collect wash-water for off-site disposal.
- Clean up vehicle and equipment fluid drips and spills immediately.
- Place drip pans below leaking vehicles (including inoperative vehicles and equipment) in a manner that catches leaks or spills, including employee vehicles.
- Irrigate with the minimum amount of water needed. Never water at rates that exceed the infiltration rate of the soil.
- Maintain all irrigation systems so that irrigation water is applied evenly and where it is needed.
- Repair broken or leaking sprinkler nozzles as soon as possible.
- Do not irrigate plants during or immediately after fertilizer or pesticide application.
- A significant amount of debris can accumulate at outside, uncovered loading/unloading areas. Sweep these surfaces regularly to remove loose material that could contaminate stormwater.
- Handle wastes generated from large-scale equipment cleaning, such as locomotive, track equipment, or axle cleaning operations, properly to avoid harming the environment and to comply with state and federal environmental regulations.
- Select cost-effective rail/flange lubricant that provides safe and effective rail operation while considering adverse environmental impact. Consider both the chemical composition of the lubricant and the likelihood of transfer off of the rail during rain events.

2.4 MR 4 – Preservation of Natural Drainage Systems and Outfalls

In the existing conditions the majority of stormwater runoff discharges to the Skookumchuck River located on the southern boundary of the site. A small amount of stormwater runoff ponds and slowly infiltrates at a low point near the center of the site. This natural drainage system and outfall location will be maintained in the developed conditions.

During flood events, flood water flows onto the site from the Skookumchuck River to the south. As flood waters recede, flood water flows back into the river until water levels are at the elevations of the existing grade. The existing rail line to the southwest of the project has a drainage structure/bridge that allows some flood waters to enter and exit the site. This drainage path for flood water only will be maintained by the project. Refer to the separate Hydraulics and Hydrology Report for additional information on site conditions during flood events.

2.5 MR 5 – On-Site Stormwater Management

Projects qualifying as Flow Control exempt in accordance shall either use the LID BMPs from List #3 for all surfaces within each type of surface in List #3 or use any Flow Control BMP(s) desired to achieve the LID Performance Standard. The project developer chose to use the list approach to provide On-Site Stormwater Management. See below for an evaluation of the feasibility of each BMP in List #3 from Table I-3.2 in the *SWMMWW*. Refer to Appendix C for the Geotechnical Report containing additional information on the site soils.

Lawn and Landscaped Areas

1. BMP T5.13: Post-Construction Soil Quality and Depth will be implemented for all lawn and landscaped areas within the project.

Roofs

1. BMP T5.10A: Downspout Full Infiltration is not feasible due to the low hydraulic conductivity of the fine-grained alluvial soils. Additionally, groundwater is relatively high in the site area and has potential for seasonal fluctuations.

2. BMP T5.10B: Downspout Dispersion Systems are not feasible because there is not enough area available within the site to provide at least 10 feet of trench length per 700 square feet of roof area.

3. BMP T5.10C: Perforated Stub-out Connections are not feasible because there is not enough area available within the site to provide at least 10 feet of perforated pipe per 5,000 square feet of roof area. Additionally, groundwater is relatively high in the site area and has potential for seasonal fluctuations.

Other Hard Surfaces

1. BMP T5.12: Sheet Flow Dispersion is not feasible because there is not enough area available within the site to provide a 10-foot-wide vegetated buffer for every 20 feet of width of impervious surface. Additionally, the use of sheet flow dispersion would disperse untreated stormwater into the Skookumchuck River.

2. BMP T5.11: Concentrated Flow Dispersion is not feasible because there is not enough area available within the site to provide a 25-foot vegetated flow path for every 700 square feet of impervious surface. Additionally, the use of concentrated flow dispersion would disperse untreated stormwater into the Skookumchuck River.

2.6 MR 6 – Runoff Treatment

More than 5,000 square feet of pollution-generating hard surfaces (PGHS) will be added to the project threshold discharge area (TDA). The natural discharge point for the project is the Skookumchuck River, which has an existing aquatic life use. Therefore, enhanced runoff treatment is required for this site. Enhanced treatment will be provided for stormwater runoff from all PGHS using stormwater treatment wetlands per BMP T10.30 in the *SWMMWW*, which have been sized to provide the Water Quality Design Volume calculated using the Western Washington Hydrology Model (WWHM). WWHM is an approved continuous runoff model in the state of Washington. Refer to Appendix B-3 for the Water Quality Calculations.

Oil control is required for all on-site areas subject to parking, storage, or maintenance of 25 or more vehicles that are more than 10 tons gross weight. Oil control will be provided for stormwater runoff from all truck courts and trailer parking areas using several coalescing plate (CP) separators per BMP T11.11 in the *SWMMWW* prior to discharging into the stormwater treatment wetlands. Oil Control Calculations will be provided in the Storm Report during final design.

2.7 MR 7 – Flow Control

The project will discharge into the Skookumchuck River to maintain the natural drainage system for the site. The Skookumchuck River (1 mile upstream of Bucoda at SR 507 milepost 11.0) is listed on the Flow Control Exempt Receiving Waters in the *SWMMWW*. The proposed discharge for all stormwater from the site consists of a large diameter pipe with the outlet placed outside the shoreline jurisdiction and stream buffer. The outlet of the discharge pipe will include outlet protection and a fish screen to prevent fish from entering the onsite stormwater system during flood events. Stormwater runoff that discharges through this pipe will continue flowing south as sheet flow through the proposed manmade habitat restoration areas until it reaches the existing low point located at the ordinary high water mark (OHWM) along the Skookumchuck River. The conveyance system between the stormwater treatment wetlands and the Skookumchuck River has sufficient hydraulic capacity to convey discharges from future build-out conditions from contributing areas of the site, and the existing conditions from contributing offsite areas. All erodible elements of the manmade conveyance system will be adequately stabilized to prevent erosion.

The project meets the five bulleted requirements for flow control exemption per I-3.4.7 of the *SWMMWW*.

- Direct discharge to the exempt receiving water does not result in the diversion of drainage from any perennial stream classified as Types 1, 2, 3, or 4 in the State of Washington Interim Water Typing System, or Types “S”, “F”, or “Np” in the Permanent Water Typing System, or from any Category I, II, or III wetland.

- No flow splitter is proposed, so the flow splitter diversion requirements are met.

- The TDA is drained by a conveyance system that is comprised entirely of manmade conveyance elements (e.g., pipes, ditches, outfall protection) and extends to the OHWM of the exempt receiving water.

- The conveyance system between the TDA and the exempt receiving water has sufficient hydraulic capacity to convey discharges from future build-out conditions (under current zoning) from contributing areas of the site, and the existing condition from contributing offsite areas. Refer to Section 9.3 for conveyance information.

- All erodible elements of the manmade conveyance system will be adequately stabilized to prevent erosion under the conditions noted above.

Therefore, Flow Control is not required for the project TDA. Refer to Appendix A-8 for the Flow Control Exempt Receiving Waters list from the *SWMMWW.*

2.8 MR 8 – Wetlands Protection

There is a small wetland located 65 feet offsite to the west of the property, west of one of the railroad tracks. Due to its offsite location, this wetland was not formally delineated. The project does not propose to discharge stormwater to this wetland. Refer to Appendix D for the Shoreline, Wetland, and Fish and Wildlife Habitat Assessment Report by Soundview Consultants LLC.

2.9 MR 9 – Operation and Maintenance

An Operations and Maintenance Manual will be submitted with final engineering.

3.0 Existing Site Conditions

The site is currently developed as single-family residential with a large portion of pasture. The site is bounded to the north by West Reynolds Avenue, to the east by Coffee Creek, to the south by the Skookumchuck River, and to the west by a BNSF railroad.

3.1 Environmentally Sensitive Areas

The Skookumchuck River is located along the south border of the proposed development and is considered an environmentally sensitive area. A 200-foot shoreline Management Zone buffer is located within the southern portion of the site and is measured from the Skookumchuck River's OHWM, flood course, and floodway. A 175-foot stream buffer from the Skookumchuck River OHWM is also located near the southern property line. A 150-foot Stream Buffer from the Coffee Creek OHWM is located near the eastern portion of the property. A wetland is located 65 feet offsite to the west of the property, west of one of the railroad tracks. No development is proposed within any of the environmentally sensitive areas. The project is located within the City of Centralia Critical Aquifer Recharge Area. A hydrogeological assessment will be submitted with final engineering, if deemed necessary by the permitting jurisdiction. To our knowledge there are no additional environmentally sensitive areas located on or down gradient of the property. Refer to Appendix D for the Shoreline, Wetland, and Fish and Wildlife Habitat Assessment Report by Soundview Consultants LLC.

3.2 Stormwater Drainage Patterns

In the existing conditions the majority of stormwater runoff discharges to the Skookumchuck River located on the southern boundary of the site. A small amount of stormwater runoff ponds and slowly infiltrates at a low point near the center of the site. There are no drainage paths from adjacent properties to the project area. The majority of West Reynolds Avenue consists of a paved two-lane road with gravel shoulders and open drainage to ditches on both sides of the road, but there is a small area near the northwest property corner that includes curb and gutter. Coffee Creek flows south along the east property line, and the Skookumchuck River flows west along the south property line. The project does not propose any development or grading within the Coffee Creek or Skookumchuck River OHWMs, so the hydraulic capacity of these will be unaffected by the project. To our knowledge, there are no specific requirements included in a basin plan for the area other than the general requirements of the 2019 *SWMMWW.*

3.3 Historical Drainage Problems

To our knowledge, there are no stormwater drainage problems within the site during typical rainfall events. However, the site is known to have historical drainage problems during flood events. During flood events, flood water flows onto the site from the Skookumchuck River to the south. As flood waters recede, flood water flows back into the river until water levels are at the elevations of the existing grade. The existing rail line to the southwest of the project has a drainage structure/bridge that allows some flood waters to enter and exit the site.

The closest river gaging site to the project is the Skookumchuck River at Centralia (USGS 12026600) located at the Pearl Street Bridge approximately 0.73 mile upstream from the closest part of the project. NOAA maintains a list of the historic crests for this gage, available below.

Historic Crests:

(1) 191.03 ft on 02/08/1996
(2) 190.86 ft on 01/10/1990
(3) 190.34 ft on 01/08/2009
(4) 190.18 ft on 01/07/2022 (P)
(5) 187.57 ft on 01/06/2015 (P)
(P): Preliminary values subject to further review.

Flood Categories (in feet):

Major Flood Stage:	191
Moderate Flood Stage:	190
Flood Stage:	189
Action Stage:	187

The most recent flooding event was on January 7, 2022, when the river crested at an elevation of 190.18 at the gage. This was the fourth largest flood event for the history of this gage site. This equates to a Moderate Flood Stage per the NOAA Flood Categories for this gage. Below is the NOAA description of flood impacts at that stage.

At Stage 190:

The Skookumchuck River will cause moderate flooding in Centralia and the surrounding area. The river will flood many roads and residential areas and cover much of the farmland in the Skookumchuck River valley. This stage corresponds roughly to a Phase 2 flood in the Lewis County flood warning system.

Refer to Section 8.0 below as well as the separate Hydraulics and Hydrology Report for additional information on site conditions during flood events.

4.0 Soils Reports

The majority of the site area is mapped by the Natural Resources Conservation Service (NRCS) as “Maytown-Chehalis-Rennie complex.” This soil is a Hydrologic Soil Group C soil with low potential for erosion and low capacity for infiltration. There is a small area in the northwestern corner of the site mapped as “Spanaway gravelly sandy loam,” and a small area near the southern property line mapped as “Scatter-Fordprairie-Roundtree complex.” Refer to the NRCS Soil Map attached as Appendix A-4.

A Geotechnical Report prepared by Terra Associates, Inc., dated September 7, 2023, identifies onsite soils as medium dense, dry to moist, alluvial silt, fine sandy silt, and silty fine sand overlaying glacial outwash deposits comprised predominantly of medium dense to very dense, silty gravel with sand to silty sand with gravel, and sand and gravel with varying proportions of silt. Moderate to heavy groundwater seepage was observed in several test pits located in the northern and southeastern portions of the site below depths of about 5 to 9 feet. Groundwater was encountered below depths ranging from about 7 to 15 feet below existing grades in the test borings. Mottling and iron-oxide-stained inclusions were observed in some of the alluvial deposits, indicating perched groundwater near the existing grades in the vicinity of the proposed Pond #1, Pond #2, and the parking areas/drive aisle between the two ponds located in the central portion of the site. A rise in groundwater levels was observed in the test pits in this area which indicates a slight artesian condition in the sand and gravel layer.

The report discusses the groundwater elevation in relation to the proposed stormwater treatment wetlands and recommends installing interceptor trenches around the perimeters of Pond #1 and Pond #2. The report also recommends the installation of continuous footing drains and shallow sub-surface drains to prevent impacts to the pavement subgrade and groundwater flooding. These geotechnical recommendations will be implemented during final design.

Refer to the Geotechnical Report attached as Appendix C.

5.0 Wells and Septic Systems

To our knowledge there are no existing wells within the site. There is an existing septic tank and drain field located within the site near the center of the northern property line. All existing wells and septic systems located within the site shall be decommissioned per the Department of Ecology and Lewis County Health Department standards.

6.0 Fuel Tanks

To our knowledge there is one existing fuel tank located within the site near the center of the northern property line. All fuel tanks located within the site shall be decommissioned per the Department of Ecology and Lewis County Health Department standards.

7.0 Sub-Basin Description

The developed site will consist of one TDA that includes two sub-basins: the On-Site sub-basin and the Habitat Restoration Area sub-basin. See below for a description of each sub-basin.

The On-Site sub-basin includes the drive aisles, parking areas, truck courts, building roofs, stormwater treatment wetlands, and landscape areas. The landscape areas were modeled as C Lawn in WWHM. Stormwater runoff from this sub-basin will flow through the proposed oil water separators and stormwater treatment wetlands before discharging into the habitat restoration area and sheet flowing south into the Skookumchuck River. This sub-basin consists of 43.62 acres of impervious area and 4.88 acres of pervious area for a total area of 48.50 acres.

The Habitat Restoration Area sub-basin includes the areas along the south and east property lines within the stream buffers and shoreline jurisdiction that border the Skookumchuck River and Coffee Creek. Stormwater runoff from this sub-basin will continue to sheet flow south into the Skookumchuck River. This sub-basin is not tributary to the proposed oil control or treatment facilities, so it was not included in the Water Quality Calculations. This sub-basin consists of 5.93 acres of total area that is entirely pervious and does not contain any pollution-generating surfaces.

See Table 1 below for a summary of the developed sub-basin areas. Refer to Appendix B-2 for the Developed Basin Map.

Table 1 - Developed Sub-Basin Areas

Sub-Basin Name	Impervious Area (ac)	Pervious Area (ac)	Total Area (ac)
On-Site	43.62	4.88	48.50
Habitat Restoration Area	0.00	5.93	5.93
Total Site	43.62	10.81	54.43

8.0 Analysis of the 100-Year Flood

The project is located directly adjacent to the Skookumchuck River and Coffee Creek. The site is currently mapped as Zones AE and X (shaded and unshaded), per the effective FEMA Map 5301020043C dated July 17, 2006. Portions of the floodway are also within the parcel boundary, but those floodways are located outside the limits of the proposed development. The project is not located within any of the City's Zero Rise Floodplain Overlay areas.

The project proposes to fill some areas of the floodplain to support the development. The fill is required to establish the finished floor of the buildings at least 1.5 feet above the BFE and to elevate the areas of the site adjacent to the building.

Because the BFE varies across the site, the BFE for each building will be the highest mapped BFE within the building footprint. The BFE for Building A is 185.64 and the BFE for Building B is 185.29. Both buildings will have a finished floor elevation of 187.14. Therefore, both buildings are elevated at least 1.5 feet above the BFE.

To compensate for all areas of fill, the project will provide compensatory storage, as required in CMC 16.21.170.F. All compensatory storage will be provided at an equivalent elevation to the elevations being displaced; all proposed storage will be available at or below the elevation of the existing storage. To determine the amount of proposed flood storage on the site, a 3D CAD model was used to calculate the flood volume below the varied BFE across the site. The proposed condition includes 204,490 CY of compensatory flood storage, which is greater than the required/existing flood volume of 171,170 CY. Therefore, the provided volumes sufficiently compensate for the volumes being displaced by fill.

Areas of the developed site available for flood storage include access aisles, parking areas, storm ponds, and habitat areas near the Skookumchuck River and Coffee Creek.

The proposed storm ponds are designed as stormwater treatment wetlands. They are intended to provide enhanced treatment for all runoff from the site, but they do not provide any detention because the project is exempt from flow control requirements. The stormwater treatment wetlands are designed to remain full of water at all times below the elevation of 176.50. Therefore, the proposed flood volume excludes volume in the stormwater treatment wetlands below this elevation. The storm ponds are all connected with large diameter pipes that can flow in either direction. The storm pond outlet pipe will have an invert elevation placed at 176.50 and will allow flood waters to flow freely in either direction, but will not impact the ability to provide stormwater treatment.

Flood storage is also provided within shoreline and stream buffers at the south and east edges of the project. These areas are being enhanced for habitat restoration and will also provide additional flood storage for the project. These areas are directly connected to the river by a natural low point along the river.

All onsite flood storage areas will be hydraulically connected. As flood water levels rise within the river, the shoreline and buffer restoration areas will be flooded and water will flow through the pipes back into the storm ponds. Once water levels reach the pavement elevations on the site, flood waters will flow over the surface to all flood storage areas on the site.

As flood waters recede, the opposite will occur. Flood water will flow back to the river over the surface until water levels are at the pavement elevations. After this, all flood waters will flow through the ponds, pipes, and shoreline and buffer restoration areas before being discharged back to the river.

The existing rail line to the southwest of the project has a drainage structure/bridge that will allow some surface waters to enter and exit the site. This drainage path will be maintained by the project. The new rail spur adjacent will also include a culvert, so that is an area that can still be used to provide a surface flow route for flood waters.

Also of note, the city owns and maintains a flood control structure on the second rail line southwest of the project. The city has noted that this structure is to remain closed and is consistent with the FEMA flood map. The project does not propose any changes to this structure.

Refer to Appendix A-5 for the City of Centralia Zero Rise Floodplain Overlay Map. Refer to the separate Hydraulics and Hydrology Report for additional information on the compensatory storage and site conditions during flood events.

9.0 Facility Sizing and Downstream Analysis

9.1 Quality Control Facility Sizing

More than 5,000 square feet of PGHS will be added to the project TDA. The natural discharge point for the project is the Skookumchuck River, which has an existing aquatic life use. Therefore, enhanced runoff treatment is required for this site. Enhanced treatment will be provided for stormwater runoff from all PGHS using stormwater treatment wetlands per BMP T10.30 in the 2019 DOE *SWMMWW*, which have been sized to provide the Water Quality Design Volume calculated using the WWHM. WWHM is an approved continuous runoff model in the state of Washington. Refer to Appendix B-3 for the Water Quality Calculations.

Oil control is required for all on-site areas subject to parking, storage, or maintenance of 25 or more vehicles that are more than 10 tons gross weight. Oil control will be provided for stormwater runoff from all truck courts and trailer parking areas using several CP separators per BMP T11.11 in the 2019 DOE *SWMMWW* prior to discharging into the stormwater treatment wetlands. Oil Control Calculations will be provided in the Storm Report during final design.

9.2 Quantity Control Facility Sizing

The project will discharge into the Skookumchuck River to maintain the natural drainage system for the site. The Skookumchuck River (1 mile upstream of Bucoda at SR 507 milepost 11.0) is listed on the Flow Control Exempt Receiving Waters in the *SWMMWW*. The proposed discharge for all stormwater from the site consists of a large diameter pipe with the outlet placed outside the shoreline jurisdiction and stream buffer. The outlet of the discharge pipe will include outlet protection and a fish screen to prevent fish from entering the on-site stormwater system during flood events. Stormwater runoff that discharges through this pipe will continue flowing south as sheet flow through the proposed habitat restoration areas until it reaches the existing low point located at the Skookumchuck River OHWM. The conveyance system between the stormwater treatment wetlands and the Skookumchuck River has sufficient hydraulic capacity to convey discharges from future build-out conditions from contributing areas of the site, and the existing conditions from contributing off-site areas. All erodible elements of the manmade conveyance

system will be adequately stabilized to prevent erosion. Therefore, Flow Control is not required for the project TDA. Refer to Appendix A-8 for the Flow Control Exempt Receiving Waters list from the *SWMMWW.*

9.3 Conveyance System Calculations

A conveyance system analysis will be provided in the Storm Report during final design.

9.4 Downstream Drainage Analysis

A downstream drainage analysis will be provided in the Storm Report during final design.

10.0 Conclusion

The proposed Skookumchuck Commerce Center project proposes to construct a 483,276-square foot warehouse/distribution facility and a 295,356-square foot warehouse/distribution facility. The project will be accessed from West Reynolds Avenue. Site improvements include parking areas for passenger cars and trailers, truck docks, maneuvering areas, concrete aprons, storm drainage improvements, water and sanitary sewer connections, fire protection, and landscaping. If constructed per plan, the stormwater system will manage anticipated runoff volumes based on the design criteria of the 2019 Department of Ecology *Stormwater Management Manual for Western Washington (SWMMWW)* and the 2022 City of Centralia Design and Development Guidelines.

This analysis is based on data and records either supplied to or obtained by AHBL. These documents are referenced within the text of the analysis. The analysis has been prepared using procedures and practices within the standard accepted practices of the industry. We conclude that this project, as proposed, will not create any new problems within the existing downstream drainage system. This project will not noticeably aggravate any existing downstream problems due to either water quality or quantity.

AHBL, Inc.

Tyler Watkins, PE
Project Manager

TDW/jms/lsk

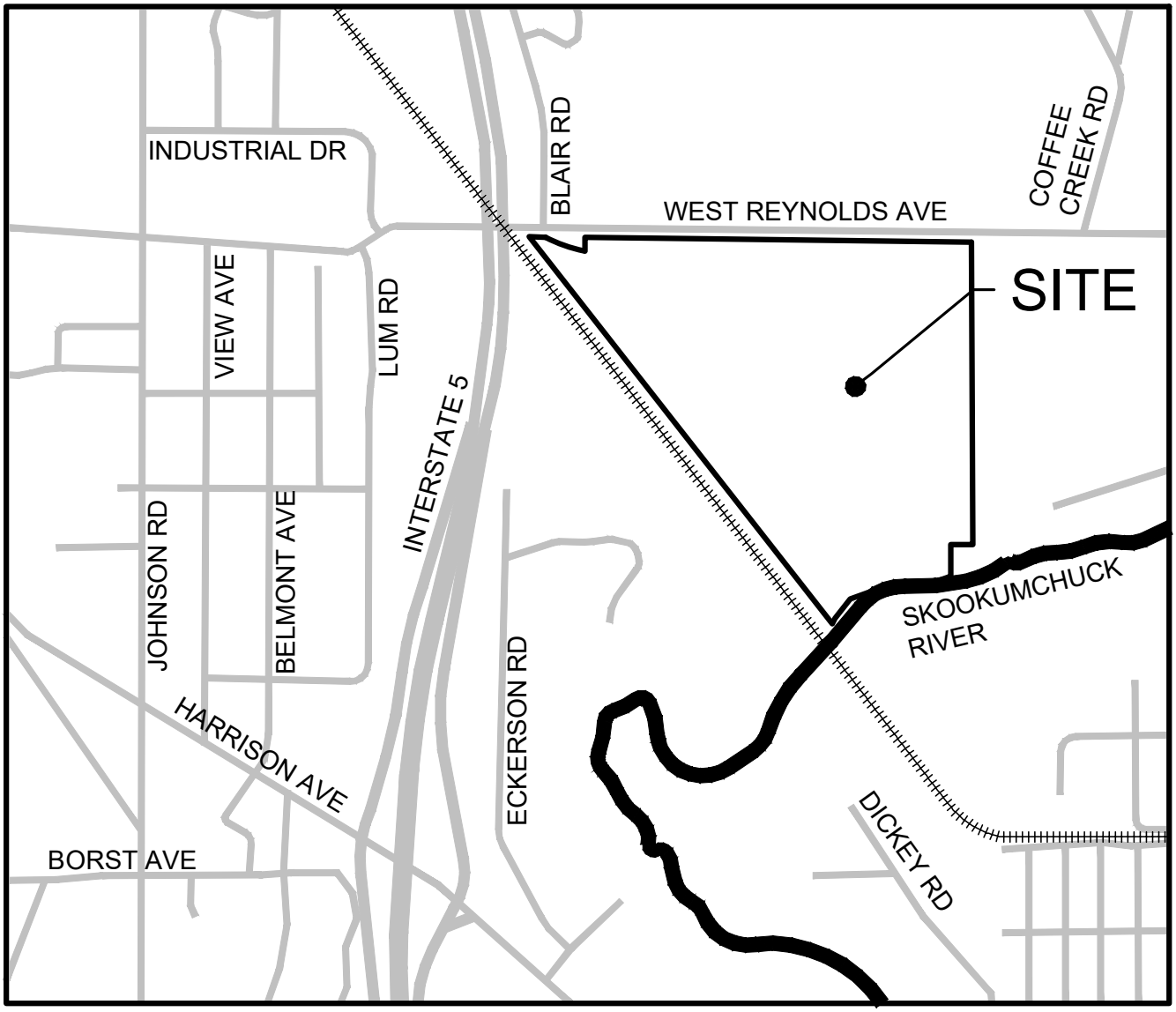
October 2023
Revised June 2025

Q:\2021\2210649\WORDPROC\Reports\20250626 Rpt (Prelim Storm Report) 2210649.10.docx

Appendix A

Exhibits

A-1.....Vicinity Map
A-2.....Existing Conditions Map
A-3.....Developed Conditions Map
A-4.....NRCS Soil Map
A-5.....City of Centralia Zero Rise Floodplain Overlay Map
A-6.....Flow Chart for Determining Requirements for New Development
A-7.....General Stormwater Review Worksheet
A-8.....Flow Control Exempt Receiving Waters



NOT TO SCALE

AHBL

1200 6th Avenue,
Suite 1620,
Seattle, WA 98101
206.267.2425 TEL
206.267.2429 FA

Skookumchuck Commerce Center

VICINITY MAP

A-1

SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC. 6 TWN. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.

PARCEL NUMBERS

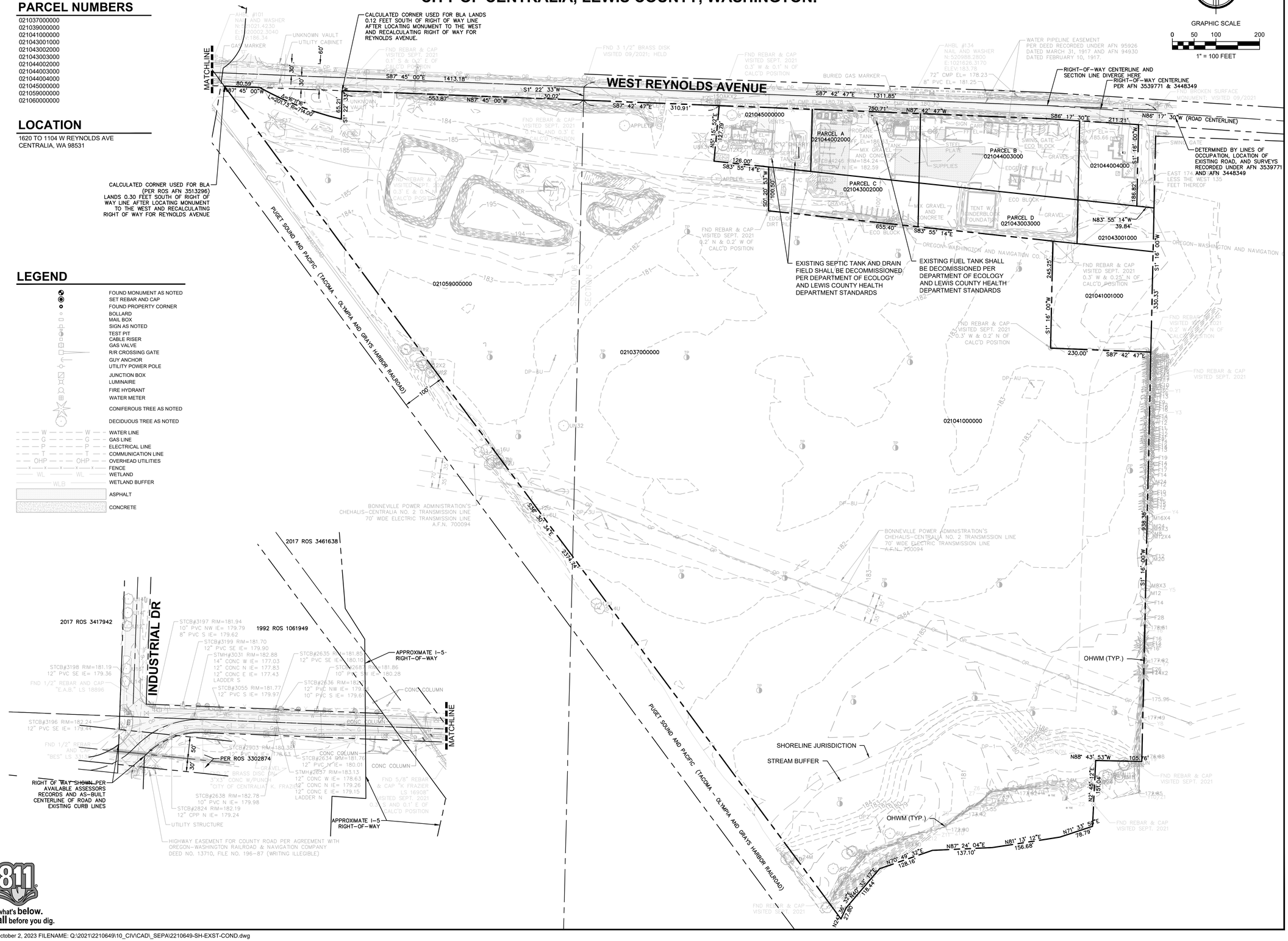
021037000000
021039000000
021041000000
021043001000
021043002000
021043003000
021044002000
021044003000
021044004000
021045000000
021059000000
021060000000

LOCATION

1620 TO 1104 W REYNOLDS AVE
CENTRALIA, WA 98531

LEGEND

- FOUND MONUMENT AS NOTED
- SET REBAR AND CAP
- FOUND PROPERTY CORNER
- BOLLARD
- MAIL BOX
- SIGN AS NOTED
- TEST PIT
- CABLE RISER
- GAS VALVE
- R/R CROSSING GATE
- GUY ANCHOR
- UTILITY POWER POLE
- JUNCTION BOX
- LUMINAIRE
- FIRE HYDRANT
- WATER METER
- CONIFEROUS TREE AS NOTED
- DECIDUOUS TREE AS NOTED
- WATER LINE
- GAS LINE
- ELECTRICAL LINE
- COMMUNICATION LINE
- OVERHEAD UTILITIES
- FENCE
- WETLAND
- WETLAND BUFFER
- ASPHALT
- CONCRETE



Know what's **below.** **Call** before you dig.

DATE: October 2, 2023 FILENAME: Q:\2021\2210649\10_CIV\CAD_SEPA\2210649-SH-EXST-COND.dwg

AHBL
TACOMA · SEATTLE · SPOKANE · TRI-CITIES
2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

Project Title:

SKOOKUMCHUCK COMMERCE CENTER

Client:

PANATTONI DEVELOPMENT COMPANY, LLC

1821 DOCK STREET, SUITE 100
TACOMA, WA 98402

Project No.

2210649.10

Issue Set & Date:

SEPA AND SITE PLAN REVIEW

10/2/2023

BARTON EDWARD BRYNESTAD
STATE OF WASHINGTON
24242
REGISTERED
PROFESSIONAL ENGINEER

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A
B
C
1

Revisions:

Sheet Title:

Existing Conditions Map

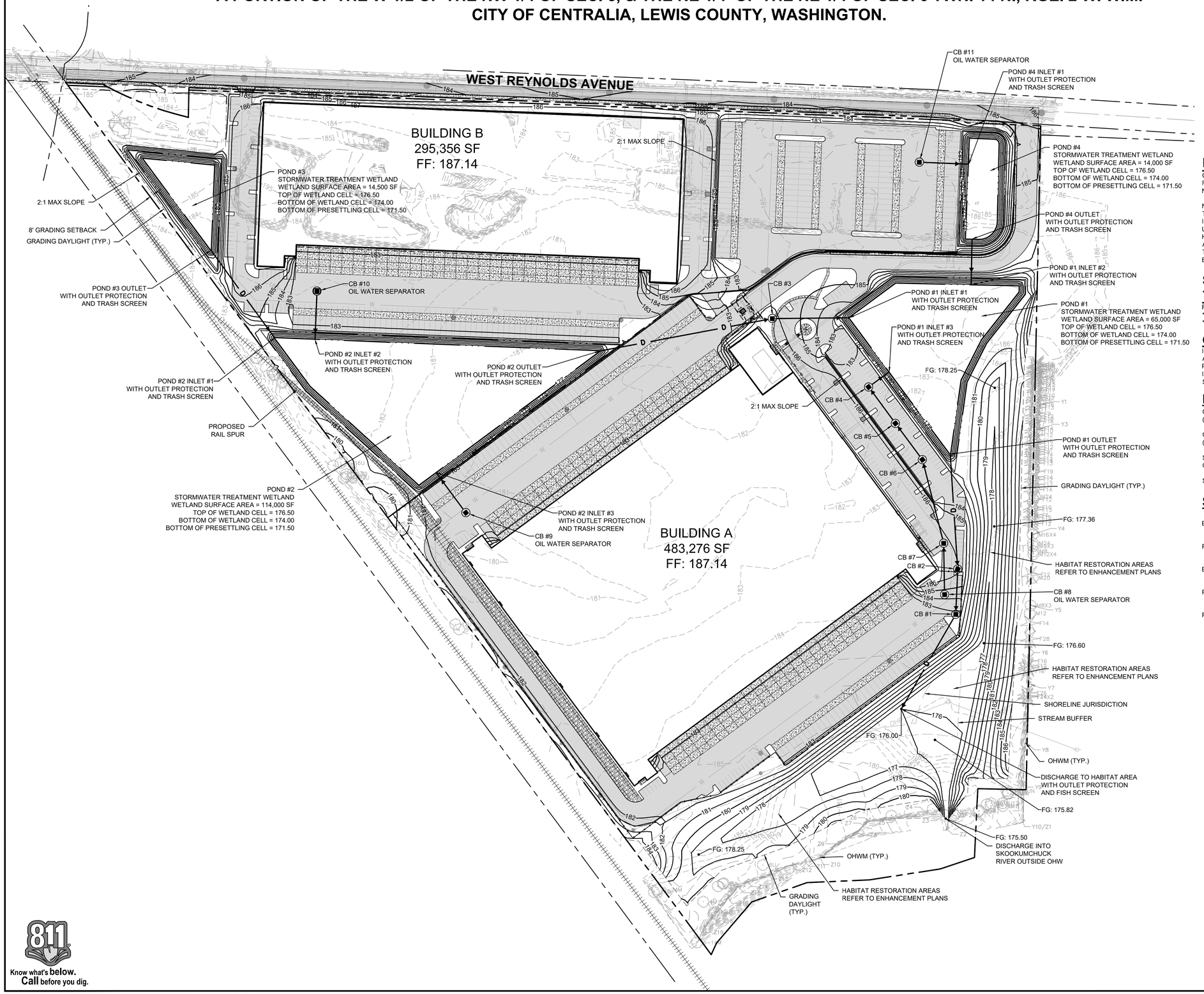
Designed by:	Drawn by:	Checked by:
TDW	TDW	BEB

Sheet No.

Appendix A-2

SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC 6 TWN. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.



N

GRAPHIC SCALE
0 50 100 200
1" = 100 FEET

EARTHWORK QUANTITIES

CUT = 158,000 CUBIC YARDS
FILL = 153,000 CUBIC YARDS
NET = 5,000 CUBIC YARDS (EXPORT)

NOTES:
THE ABOVE QUANTITIES ARE ESTIMATES ONLY INTENDED FOR THE PERMITTING PROCESS. DO NOT USE FOR BID PURPOSES. THE QUANTITIES DO NOT HAVE STRIPPING, COMPACTION, OR CUT AND FILL ADJUSTMENT FACTORS APPLIED TO THEM NOR DO THEY ACCOUNT FOR PAVEMENT, SIDEWALK OR BUILDING SECTIONS.

STORMWATER TREATMENT WETLANDS

REQUIRED WETLAND SURFACE AREA = 84,507 SF
*PROPOSED WETLAND SURFACE AREA = 207,500 SF
*INCLUDES SURFACE AREA IN ALL FOUR PONDS

GEOTECH NOTE

INTERCEPTOR TRENCHES SHALL BE INSTALLED AROUND THE PERIMETERS OF POND #1 AND POND #2. THE TRENCHES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS STATED IN THE GEOTECHNICAL REPORT.

LEGEND

CATCH BASIN TYPE 1 (UNLESS NOTED AS TYPE 1L)
CATCH BASIN TYPE 2 (UNLESS NOTED OTHERWISE)
STORM/ROOF DRAIN CLEANOUT
STORM DRAINAGE PIPE — D —

SURFACING LEGEND

EXISTING CONCRETE
PROPOSED CONCRETE
EXISTING ASPHALT
PROPOSED ASPHALT
PROPOSED GRAVEL

Know what's below. Call before you dig.

DATE: October 2, 2023 FILENAME: Q:\2021\2210649\10_CIV\CAD_SEPA\2210649-SH-GRAD.dwg

AHBL
TACOMA · SEATTLE · SPOKANE · TRI-CITIES
2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

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TACOMA, WA 98402

Project No.
2210649.10

Issue Set & Date:
SEPA AND SITE PLAN REVIEW
10/2/2023

BARTON EDWARD BRYNESTAD
STATE OF WASHINGTON
24242
REGISTERED
PROFESSIONAL ENGINEER

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Revisions:
4
3
2
1

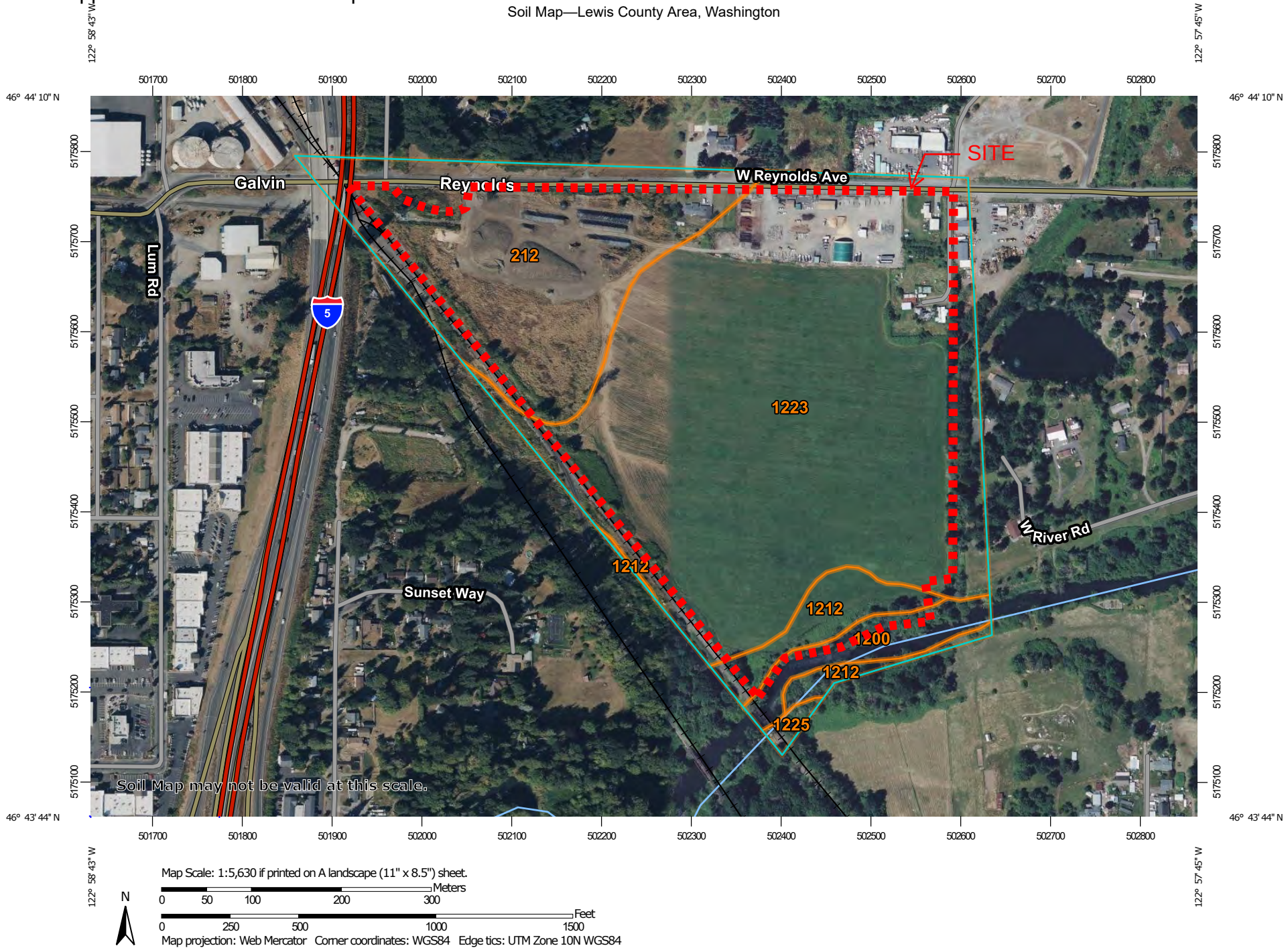
Sheet Title:
Developed Conditions Map

Designed by:	Drawn by:	Checked by:
TDW	TDW	BEB

Sheet No.
Appendix A-3

Appendix A-4 - NRCS Soil Map

Soil Map—Lewis County Area, Washington



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lewis County Area, Washington
Survey Area Data: Version 22, Sep 8, 2022

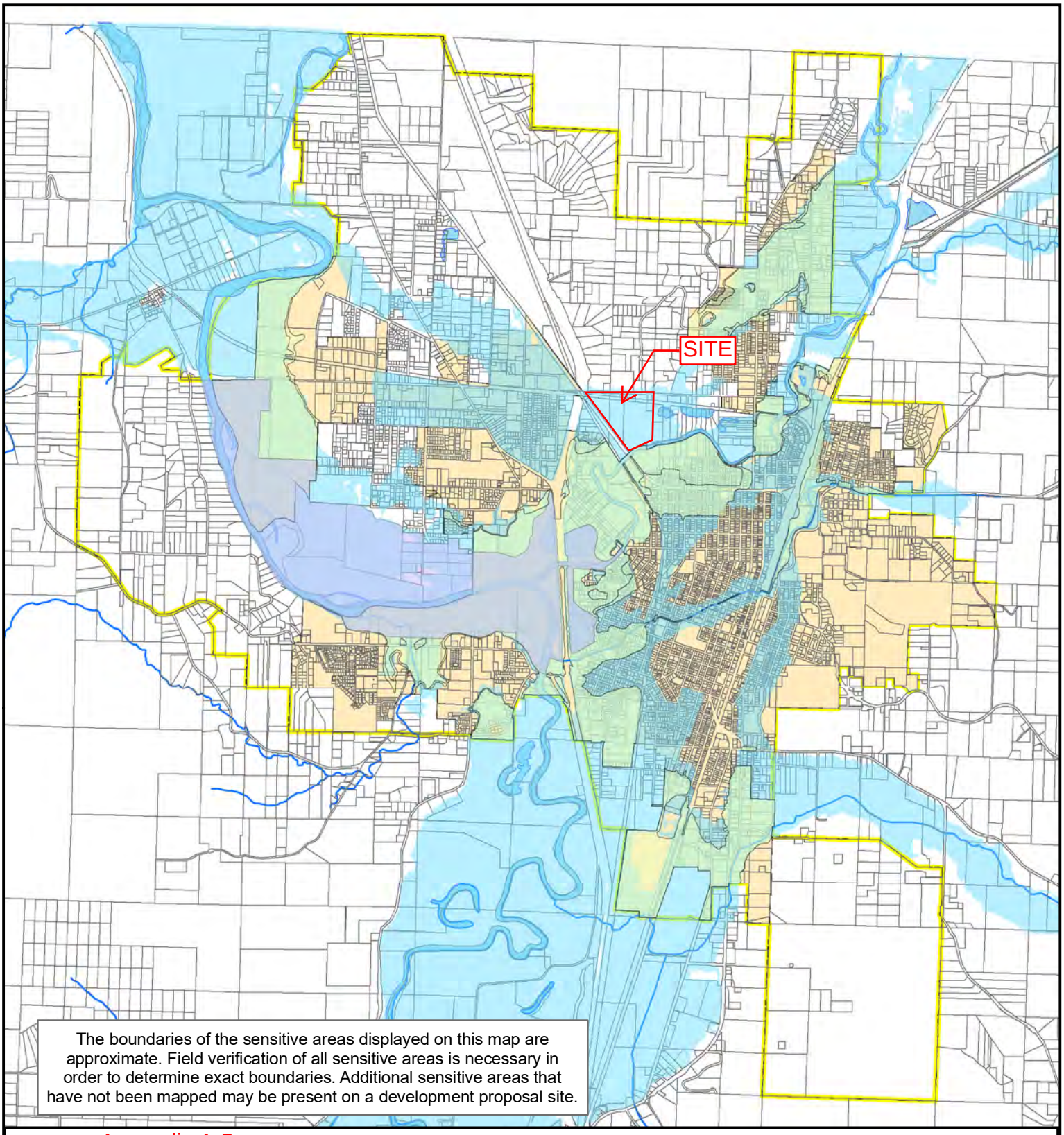
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 21, 2021—Sep 25, 2022

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
212	Spanaway gravelly sandy loam	19.3	26.0%
1200	Water-Riverwash complex, 0 to 5 percent slopes	2.8	3.8%
1212	Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes	3.7	4.9%
1223	Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes	47.9	64.7%
1225	Eld-Fordprairie complex, 0 to 12 percent slopes	0.4	0.5%
Totals for Area of Interest		**74.1**	**100.0%**



The boundaries of the sensitive areas displayed on this map are approximate. Field verification of all sensitive areas is necessary in order to determine exact boundaries. Additional sensitive areas that have not been mapped may be present on a development proposal site.

Appendix A-5

City of Centralia Zero Rise Floodplain Overlay Map

4

0 0.2 0.4 0.8 1.2 Miles

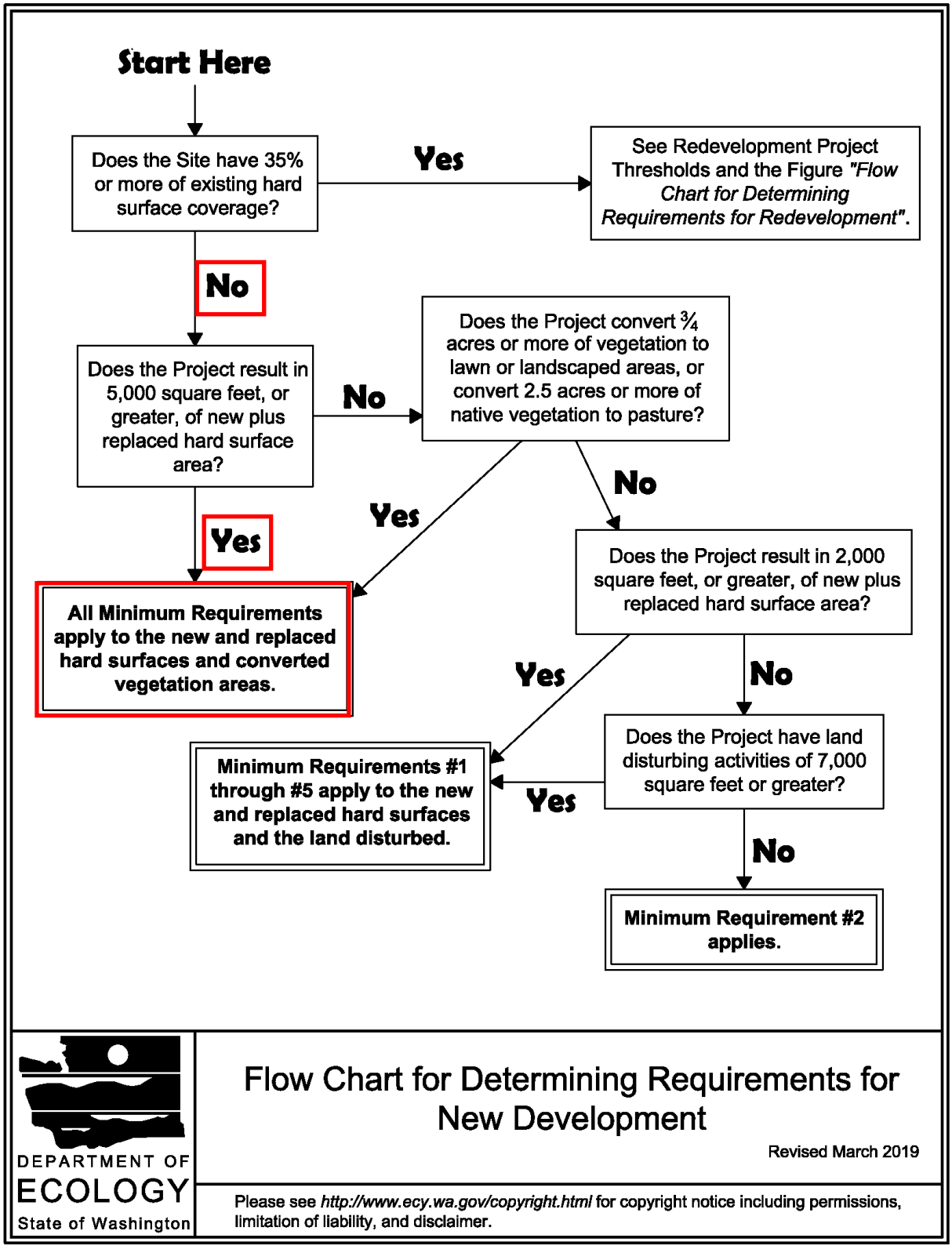
CENTRALIA
Community Development

- Zero Rise Floodplain Overlay
- 1982 FEMA Floodplain
- 100 year Flood Plain
- Lakes and Rivers
- City Limits
- UGA Boundary

Created on January 14, 2009

Appendix A-6

Figure I-3.1: Flow Chart for Determining Requirements for New Development



GENERAL
STORMWATER REVIEW WORKSHEET

This worksheet will help you determine what on-site stormwater management and/or erosion control measures are required for your project.

Applicant Name: Tyler Watkins, PE
Site Address: 3010 HARRISON AVE
2917 FORON RD

Applicant Phone: 253-383-2422
Parcel #: PARCEL #0237650010000
PARCEL #02376200000

Applicant E-mail: TWatkins@ahbl.com
Engineer of Record: Bart Brynestad, PE

Section 1: General Site Information

1. Total Disturbed Area: 2,351,064 sq. ft. (show on site plan)
   Total disturbed area includes areas disturbed for installation of utlities, structures, lawn, landscaping, walkways, driveways, clearing, grading, etc.
2. Total Impervious Surface Area (new and/or replaced): 1,900,087 sq. ft.
   Impervious surface area includes all structures, walkways, patios, driveways, covered decks
3. Zoning Designation: M-1, Light Industrial
   Call Community Development at (360) 330-7662 if you don't know your zoning designation.
4. Does your property have any of the following (check all that apply):
   - ☐ Waterfront Lot:
     - ☐ Low Bank (gentle slope, less than 8-foot drop to water)
     - ☐ Moderate or High Bank (gentle or steep slope, 8-foot drop to water or more)
   - ☐ Slopes greater than 15% (about a 5-foot drop across 33 feet of ground horizontally)
   - ☐ Slopes greater than 30% (about a 10-foot drop across 33 feet of ground horizontally)
   - ☐ Wet areas or depressions, ponding water, wetlands or seasonal standing water
   - ☒ Stream, creek or ravine with running water at least part of the year
5. Will construction or land-disturbing activity include cutting trees within 200 feet of any of the features noted in question 4?
   ☐ YES ☒ NO

Section 2: Thresholds for Review

Stormwater management falls into one of three categories for review.

1. General Stormwater Plan Review (Projects over 5,000 sq. ft. new/replaced impervious)
2. Small Site Stormwater Plan Review (2,000 to 4,999 sq. ft. new/replaced impervious)
3. Minor Project Construction Stormwater Review (less than 2,000 sq. ft. new/replaced impervious)

If you **DID NOT** check any boxes in #4 and checked **NO** for #5 above **AND** your answer to #1 is less than 7,000 sq. ft. **AND** your answer to #2 is less than 2,000 sq. ft. **STOP HERE**. This form is complete. Basic erosion and sediment control measures must still be implemented during construction.

If you check one **or** more boxes above in #4 **or** #5 **or** your answer to #1 is equal to **or** greater than 7,000 sq. ft. **or** your answer to #2 is equal to **or** greater than 2,000 sq. ft., ***continue to pg. 2.***

Does your project meet one of the following?

- [x] Add 5,000 sq. ft. or more of new and/or replaced impervious surface area
- [ ] Convert 3/4 acre or more of pasture to lawn or landscaping
- [ ] Convert 2.5 acres or more of native vegetation to pasture

If **NONE** of the boxes above are checked, do not continue. Go to form Small Site Stormwater Plan Review

Section 3: Minimum Requirements

All projects that result in 5,000 sq. ft. or more of new plus replaced impervious surface **OR** convert 3/4 acre of vegetation to lawn or landscape areas **OR** convert 2.5 acres or more of native vegetation to pasture must comply with Minimum Requirements #1 through #9 of the Stormwater Management Manual for Western Washington. Those requirements and guidance are listed below.

1. Minimum Requirement #1 - Stormwater Site Plan
   Submit a site plan that shows all proposed structures, driveways, walkways, patios, landscape areas and permanent stormwater control Best Management Practices (BMPs) used on-site. See SWMMWW Volume 1 Section 2.5.1 for requirements. BMPs will be determined under #5 below.
2. Minimum Requirement #2 - Stormwater Pollution Prevention Plan (SWPPP)
   All development and redevelopment projects that have 2,000 sq. ft. or more of impervious surface or disturb 7,000 sq. ft. or more of land must prepare a SWPPP that must be adhered to during construction. (See SWMMWW Volume 1 Section 2.5.2 for requirements)
3. Minimum Requirement #3 - Source Control of Pollution
   All known, available and reasonable source control BMPs must be applied to all projects. The intent of source control BMPs is to prevent stormwater from coming in contact with pollutants. They are cost-effective means of reducing pollutants in stormwater, and should be a first consideration in all projects.

   Source Control BMPs (See SWMMWW Volume IV and Volume II Chapter 4)

   Structural source control BMPs should be identified in the stormwater site plan/narrative and shown on all applicable plans submitted for review and approval.
4. Minimum Requirement #4 - Preservation of Natural Drainage Systems and Outfalls
   Natural drainage patterns shall be maintained, and any discharges from the project site shall occur at the natural location, to the maximum extent possible. Stormwater runoff discharged from the project site must not cause an adverse impact to downstream receiving waters, adjacent properties or the adjacent right of way. Any proposed discharge of stormwater must be pre-approved.
5. Minimum Requirement #5 - On-site Stormwater Management
   All projects shall employ on-site stormwater management BMPs as required in the SWMMWW to infiltrate, disperse, and retain stormwater runoff on-site to the extent feasible without causing flooding or erosion impacts. The BMPs you will use need to be shown on your Stormwater Site Plan (Minimum Requirement #1), in your Stormwater Report narrative and shown on all plans submitted for review and approval.

Minimum Requirement #5 (continued from pg. 2)

On-site Stormwater Management BMPs apply to the following areas:

Lawn and Landscape Areas

Roofs

Other Hard Surfaces (roadways, patios, walkways, driveways, etc.)

On-Site Stormwater Management BMP Selection

Projects triggering Minimum Requirements #1 through #9, must meet one of the requirements below: (Please check which option you will be using).

List 3 shall be used for Flow Control Exempt projects per Section 9-02.5 in the 2022 Centralia Development Guidelines.

Low Impact Development Performance Standard

If you chose this option, the following requirements must be met and shown in detail within your Stormwater Report narrative and design elements shown on all plans submitted for review and approval:

- ☐ Developed stormwater discharge durations match pre-developed durations from 8% of the 2-year peak flow to 50% of the 2-year peak flow.
- ☐ Meet Requirement #7, Flow Control, for durations between 8% of the 2-year flow through the full 50-year flow.
- ☐ BMP T5.13, Post-Construction Soil Quality and Depth

On-site Stormwater Management BMPs from List #2 SWMMWW

If you chose this option, for each surface type, consider the BMPs in the order listed for that type of surface. Only one selection is required per surface type. Use the first BMP that is considered feasible. Feasibility shall be determined by evaluation against:

Site Limitations

Infeasibility criteria identified for each specific BMP in the SWMMWW

Lawn and Landscape Areas:

- ☐ Post-Construction Soil Quality and Depth (BMP T5.13)

Roofs:

- ☐ Full Dispersion (BMP T5.30) or Downspout Full Infiltration System (BMP T5.10A)
- ☐ Bioretention (Volume V Chapter 7)
- ☐ Downspout Dispersion Systems (BMP T5.10B)
- ☐ Perforated Stub-out Connections (BMP T5.10C)

Other Hard Surfaces:

- ☐ Full Dispersion (BMP T5.30)
- ☐ Permeable Pavement (BMP T5.15)
- ☐ Bioretention (Volume V Chapter 7)
- ☐ Sheet Flow Dispersion (BMP T5.12) or Concentrated Flow Dispersion (BMP T5.11)

6. Minimum Requirement #6: Runoff Treatment

Direct discharge of untreated stormwater from pollution-generating hard surfaces to ground water is prohibited. On-site Stormwater Management BMPs (Volume V Chapter 5 and Chapter 7) or infiltration through soils meeting the soil suitability criteria (Volume III Chapter 3) is required.

Treatment Facility Sizing

Stormwater treatment facilities must be sized for entire area draining to them, even if some areas are non-pullution generating.

Water Quality Design Storm Volume

Volume of runoff predicted from a 24-hour storm with a 6-month return frequency designed in accordance with Chapter 2 of Volume III of the Stormwater Management Manual.

Water Quality Design Flow Rate

The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated.

Treatment Facility Selection, Design and Maintenance

Stormwater Treatment Facilities Shall Be:

1. Selected in accordance with the process identified in Chapter 4 of Volume 1 and Chapter 2 of Volume V of the Stormwater Management Manual.
2. Designed in accordance with the design criteria in Volume.
3. Maintained in accordance with the maintenance schedule in Volume V and as indicated in the site-specific Stormwater Maintenance Agreement.

7. Minimum Requirement #7: Flow Control

Projects must provide flow control to reduce impacts of stormwater runoff from hard surfaces and land cover conversions. This requirement applies to projects that discharge stormwater directly, or indirectly through a conveyance system, into a fresh waterbody.

1. Stormwater discharges shall match developed discharge durations to the pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow.
2. The pre-developed condition to be matched shall be forested land cover unless:
   a. Reasonable historic information indicated the site was prairie prior to settlement.
   b. The drainage area downstream has at least 40% total impervious area since 1985.
3. Flow Control BMPs shall be selected, designed and maintained in accordance with Volume III of the Stormwater Management Manual.

8. Minimum Requirement #8: Wetlands Protection

This requirement only applies to projects whose stormwater discharges into a wetland either directly, or indirectly through a conveyance system.

Stormwater treatment and flow control facilities may not be built within a wetland buffer unless otherwise approved by the City Engineer.

9. Minimum Requirement #9 - Operation and Maintenance

   A Stormwater Maintenance Agreement must be completed and signed by the Owner of the property before construction approval is given. The agreement template may be obtained from the Public Works Department.

   Appendix B of the Stormwater Maintenance Agreement shall be an operation and maintenance manual that is site-specific to ensure the facility continues to function as designed.

Stormwater Report Requirements

Your complete stormwater report shall be submitted for review and approval. The report must show how all the above requirements are met on your project. Geotechnical reports, stormwater modeling reports, calculations and other information used to design your stormwater system shall be included as well.

Appendix I-A: Flow Control Exempt Receiving Waters

See I-3.4.7 MR7: Flow Control for the criteria required for a TDA to be exempt from the Flow Control requirement.

Table I-A.1: Flow Control Exempt Receiving Waters

Water Body	Upstream Point/Reach for Exemption (if applicable)
All Salt Waterbodies	
Alder Lake	
Baker Lake	
Baker River	Baker River/Baker Lake downstream of the confluence with Noisy Creek
Bogachiel River	0.4 miles downstream of Dowans Creek
Calawah River	Downstream of confluence with South Fork Calawah River
Capital Lake / Deschutes River	Downstream of Tumwater Falls
Carbon River	Downstream of confluence with South Prairie Creek
Cascade River	Downstream of Found Creek
Cedar River	Downstream of confluence with Taylor Creek
Chehalis River	1,500 feet downstream of confluence with Stowe Creek
Chehalis River, South Fork	1,000 feet upstream of confluence with Lake Creek
Cispus River	Downstream of confluence with Cat Creek
Clearwater River	Downstream of confluence with Christmas Creek
Coal Creek Slough	Boundary of Consolidated Diking and Irrigation District #1 to confluence with the Columbia River.
Columbia River	Downstream of Canadian border
Consolidated Diking and Improvement District #1 (Cowlitz County)	Waters that lie within the area bounded by the Columbia River on the south, the Cowlitz River on the east, Ditch No. 10 to the west, and Ditch No. 6 to the north.
Consolidated Diking and Improvement District #3 (Cowlitz County)	Ditches served by these pump stations: Tam O'Shanter #1 and #2, Coweeman, Baker Way, Elk's
Coweman River	Downstream of confluence with Gobble Creek
Cowlitz River	Downstream of confluence of Ohanapecosh River and Clear Fork Cowlitz

Table I-A.1: Flow Control Exempt Receiving Waters (continued)

Water Body	Upstream Point/Reach for Exemption (if applicable)
	River
Crescent Lake	
Dickey River	Downstream of confluence with Coal Creek
Dosewallips River	Downstream of confluence with Rocky Brook
Dungeness River	Downstream of confluence with Gray Wolf River
Duwamish / Green River	Downstream River Mile 6 (S. Boeing Access Road)
Elwha River	Downstream of confluence with Goldie River
Erdahl Ditch in Fife	Downstream of pump station
First Creek in Tacoma	
Grays River	Downstream of confluence with Hull Creek
Green River (WRIA 26 - Cowl-itz)	3.5 miles upstream of Devils Creek
Hoh River	1.2 miles downstream of Jackson Creek
Humptulips River	Downstream of confluence with West and East Forks
Johns Creek	Downstream of Interstate-405 East Right-of-way
Kalama River	2.0 miles downstream of Jacks Creek
Lacamas Lake	
Lake Cushman	
Lake Quinault	
Lake River (Clark County)	
Lake Shannon	
Lake Sammamish	
Lake Union & Union Bay	King County
Lake Washington, Montlake Cut, Ship Canal, & Salmon Bay	
Lake Whatcom	
Lewis River	Downstream of confluence with Quartz Creek
Lewis River, East Fork	Downstream of confluence with Big Tree Creek
Lightning Creek	Downstream of confluence with Three Fools Creek
Little White Salmon River	Downstream of confluence with Lava Creek
Mayfield Lake	

Table I-A.1: Flow Control Exempt Receiving Waters (continued)

Water Body	Upstream Point/Reach for Exemption (if applicable)
Mercer Slough	
Muddy River	Downstream of confluence with Clear Creek
Naselle River	Downstream of confluence with Johnson Creek
Newaukum River	Downstream of confluence with South Fork Newaukum River
Nisqually River	Downstream of confluence with Big Creek
Nooksack River	Downstream of confluence of North Fork and Middle Forks
Nooksack River, North Fork	Downstream of confluence with Glacier Creek, at USGS gauge 12205000
Nooksack River, South Fork	0.1 miles upstream of confluence with Skookum Creek
North River	Downstream of confluence with Vesta Creek
Ohanapecosh River	Downstream of confluence with Summit Creek
Puyallup River	Half-mile downstream of confluence with Kellog Creek
Queets River	Downstream of confluence with Tshletshy Creek
Quillayute River	Downstream of Bogachiel River
Quinault River	Downstream of confluence with North Fork Quinault River
Riffe Lake	
Round Lake	
Ruby Creek	Ruby Creek at SR-20 crossing downstream of Granite and Canyon Creeks
Sammamish River	Downstream of Lake Sammamish
Satsop River	Downstream of confluence of Middle and East Forks
Satsop River, East Fork	Downstream of confluence with Decker Creek
Sauk River	Downstream of confluence of South Fork and North Fork
Sauk River, North Fork	North Fork Sauk River at Bedal Campground
Silver Lake	Cowlitz County
Skagit River	Downstream of Canadian Border
Skokomish River	Downstream of confluence of North and South Fork
Skokomish River, South Fork	Downstream of confluence with Vance Creek
Skokomish River, North Fork	Downstream of confluence with McTaggert Creek
Skookumchuck River	1 mile upstream of Bucoda at SR 507 mile post 11.0
Skykomish River	Downstream of South Fork
Skykomish River, South Fork	Downstream of confluence of Tye and Foss Rivers

Table I-A.1: Flow Control Exempt Receiving Waters (continued)

Water Body	Upstream Point/Reach for Exemption (if applicable)
Snohomish River	Downstream of confluence of Snoqualmie and Skykomish Rivers
Snohomish River Estuary	
Snoqualmie River	Downstream of confluence of the Middle Fork
Snoqualmie River, Middle Fork	Downstream of confluence with Rainy Creek
Sol Duc River	Downstream of confluence of North and South Fork Sol Duc River
Stillaguamish River	Downstream of confluence of North and South Fork
Stillaguamish River, North Fork	7.7 highway miles west of Darrington on SR 530, downstream of confluence with French Creek
Stillaguamish River, South Fork	Downstream of confluence of Cranberry Creek and South Fork
Suiattle River	Downstream of confluence with Milk Creek
Sultan River	0.4 miles upstream of SR 2
Swift Creek Reservoir	
Thunder Creek	Downstream of the confluence with Neve Creek
Tilton River	Downstream of confluence with North Fork Tilton River
Toutle River	North and South Fork confluence
Toutle River, North Fork	Downstream of confluence with Hoffstadt Creek
Toutle River, South Fork	Downstream of confluence with Thirteen Creek
Union Bay	
Vancouver Lake	
White River	Downstream of confluence with Huckleberry Creek
Willapa River	Downstream of confluence with Mill Creek
Wind River	Downstream of confluence with Cold Creek
Wynochee Lake	
Wynochee River	Downstream of confluence with Schafer Creek

How Did Ecology Determine Which Receiving Waters Are Flow Control Exempt?

Ecology based its decisions for which receiving waters are Flow Control exempt on the analysis presented in *Discharge of Stormwater to High Order Streams – Determining Exempt Reaches* (WSDOT, 2004). The stream reaches that qualify for this exemption must be sufficiently large watercourses to accept a limited amount of un-detained stormwater discharge without sustaining significant environmental damage. The one-time analysis will not be repeated in the near future.

The analysis referenced above considered the following factors:

- Water bodies with at least 100-square miles of drainage area. The study found that most, but not all, river segments that drain more than 100 square miles qualify as exempt reaches.
- Modeling of flows at maximum build-out scenarios for impervious area and forest conversions based on local Comprehensive Plans, zoning, upstream land uses and ownership.
- Land cover criterion equations developed to predict stream stability.
- Presence of unconfined receiving channels.

In addition to stream size and future land cover conditions, the study identified methods for determining proximity requirements to limit the exemption area in order to protect small streams from excessive diversion. The two methods identified included:

1. within a specified distance from the ordinary high water of a stream or other water body, and
2. a more complex analysis to determine potential impacts on adjacent land uses and smaller water bodies in the floodplain.

How Can Local Governments Add Receiving Waters to This List?

Local Governments may request additional receiving waters, including streams with a low gradient and stream reaches with tidal or backwater conditions, as further detailed below, be added to Table I-A.1: Flow Control Exempt Receiving Waters. Local governments seeking exemptions for additional receiving waters may refer to (WSDOT, 2004) for methodologies to use. A study to satisfy the criteria for the Flow Control exempt reaches require the services of a qualified hydrogeologist or hydrologic engineer. The local study must demonstrate how the proposed water body meets the study objectives using the factors above, and how the stormwater discharge meets the proximity requirements outlined in the study. Proponents are encouraged to contact their regional permit specialist to explore this option before undertaking such an analysis.

Ecology will review all exemption analyses and approve any qualifying receiving waters for addition to Table I-A.1: Flow Control Exempt Receiving Waters. Table I-A.1: Flow Control Exempt Receiving Waters will then be updated as the SWMMWW is revised.

Flow Control Exemptions for Streams with a Low Gradient

Local governments may designate waters as Flow Control Exempt based upon a very flat stream gradient. Because prevention of stream erosion is part of the intent of the Flow Control standard, to obtain an exemption the local government must demonstrate that a stream with a very flat gradient will not be destabilized by flows produced when the drainage area is fully developed.

A professional hydrogeologist must estimate the maximum possible velocity in the channel (based upon build-out conditions in the drainage area) versus the likely velocity necessary to initiate significant bed load movement. Streams that have qualified as Flow Control Exempt have typically been located in a broad, lowland floodplain of a large river and have rather cemented banks that do not show signs of recent destabilization (e.g., downed trees). (WSDOT, 2004) provides an example of such an analysis.

Exemptions should not extend to discharges into the upper reaches of such creeks that may have higher gradients and different bed and bank material.

Flow Control Exemptions for Stream Reaches with Tidal or Backwater Conditions

Discharges to stream reaches heavily influenced by tides or backwater conditions can also be candidates for a Flow Control exemption. In some tidally influenced reaches with low gradients, increases in discharge may not have a significant effect on the processes that control channel morphology. The combination of a low gradient and the possible effects of tidal backwater may dominate the channel forming processes to a far greater extent than potential stormwater discharges.

A local government can establish the Flow Control exemption by conducting hydrogeologic studies using hydrologic data and stream geometry to numerically model the discharge thresholds to demonstrate that the effects would be negligible. However, stream channels periodically exposed to higher velocities under some hydrologic conditions (e.g. low tide), probably do not warrant an exemption. Also, discharges are still subject to I-3.4.4 MR4: Preservation of Natural Drainage Systems and Outfalls, which requires energy dissipation at the outfall site. An example of an analysis for a tidal prism is included in (WSDOT, 2004). Local governments interested in exploring this approach should contact their regional permit specialist prior to beginning such a study.

Appendix B

Exhibits

B-1.....Predeveloped Basin Map
B-2.....Developed Basin Map
B-3.....Water Quality Calculations
B-4.....Water Quality WWHM Report

SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC. 6 TWN. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.

PARCEL NUMBERS

021037000000
021039000000
021041000000
021043001000
021043002000
021043003000
021044002000
021044003000
021044004000
021045000000
021059000000
021060000000

LOCATION

1620 TO 1104 W REYNOLDS AVE
CENTRALIA, WA 98531

LEGEND

- FOUND MONUMENT AS NOTED
- SET REBAR AND CAP
- FOUND PROPERTY CORNER
- BOLLARD
- MAIL BOX
- SIGN AS NOTED
- TEST PIT
- CABLE RISER
- GAS VALVE
- R/R CROSSING GATE
- GUY ANCHOR
- UTILITY POWER POLE
- JUNCTION BOX
- LUMINAIRE
- FIRE HYDRANT
- WATER METER
- CONIFEROUS TREE AS NOTED
- DECIDUOUS TREE AS NOTED
- WATER LINE
- GAS LINE
- ELECTRICAL LINE
- COMMUNICATION LINE
- OVERHEAD UTILITIES
- FENCE
- WETLAND
- WETLAND BUFFER
- ASPHALT
- CONCRETE

N

GRAPHIC SCALE
0 50 100 200
1" = 100 FEET

MATCHLINE

CALCULATED CORNER USED FOR BLA LANDS 0.12 FEET SOUTH OF RIGHT OF WAY LINE AFTER LOCATING MONUMENT TO THE WEST AND RECALCULATING RIGHT OF WAY FOR REYNOLDS AVENUE.

CALCULATED CORNER USED FOR BLA (PER ROS AFN 3513296) LANDS 0.30 FEET SOUTH OF RIGHT OF WAY LINE AFTER LOCATING MONUMENT TO THE WEST AND RECALCULATING RIGHT OF WAY FOR REYNOLDS AVENUE

WEST REYNOLDS AVENUE

ON-SITE SUB-BASIN
AREA = 48.50 ac

RIGHT-OF-WAY CENTERLINE AND SECTION LINE DIVERGE HERE

RIGHT-OF-WAY CENTERLINE PER AFN 3539771 & 3448349

DETERMINED BY LINES OF OCCUPATION, LOCATION OF EXISTING ROAD, AND SURVEYS RECORDED UNDER AFN 3539771 AND AFN 3448349

EXISTING SEPTIC TANK AND DRAIN FIELD SHALL BE DECOMMISSIONED PER DEPARTMENT OF ECOLOGY AND LEWIS COUNTY HEALTH DEPARTMENT STANDARDS

EXISTING FUEL TANK SHALL BE DECOMMISSIONED PER DEPARTMENT OF ECOLOGY AND LEWIS COUNTY HEALTH DEPARTMENT STANDARDS

PUGET SOUND AND PACIFIC (TACOMA - OLYMPIA AND GRAYS HARBOR RAILROAD)

BONNEVILLE POWER ADMINISTRATION'S CHEHALIS–CENTRALIA NO. 2 TRANSMISSION LINE 70' WIDE ELECTRIC TRANSMISSION LINE A.F.N. 700094

2017 ROS 3461638
2017 ROS 3417942
1992 ROS 1061949

INDUSTRIAL DR

APPROXIMATE I–5 RIGHT–OF–WAY

PER ROS 3302874

RIGHT OF WAY SHOWN PER AVAILABLE ASSESSORS RECORDS AND AS–BUILT CENTERLINE OF ROAD AND EXISTING CURB LINES

HIGHWAY EASEMENT FOR COUNTY ROAD PER AGREEMENT WITH OREGON–WASHINGTON RAILROAD & NAVIGATION COMPANY DEED NO. 13710, FILE NO. 196–87 (WRITING ILLEGIBLE)

SHORELINE JURISDICTION
STREAM BUFFER

HABITAT AREA

OHWM (TYP.)

HABITAT RESTORATION AREA SUB-BASIN
AREA = 5.93 ac

Know what's below. Call before you dig.

DATE: October 2, 2023 FILENAME: Q:\2021\2210649\10_CIV\CAD_SEPA\2210649-SH-EXST-COND.dwg

AHBL
TACOMA · SEATTLE · SPOKANE · TRI-CITIES
2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

Project Title:

SKOOKUMCHUCK COMMERCE CENTER

Client:

PANATTONI DEVELOPMENT COMPANY, LLC

1821 DOCK STREET, SUITE 100
TACOMA, WA 98402

Project No.

2210649.10

Issue Set & Date:

SEPA AND SITE PLAN REVIEW

10/2/2023

BRANDON EDWARD BRYNESTAD
STATE OF WASHINGTON
24242
REGISTERED
PROFESSIONAL ENGINEER

NOTICE
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Revisions:

Sheet Title:

Existing Basin Map

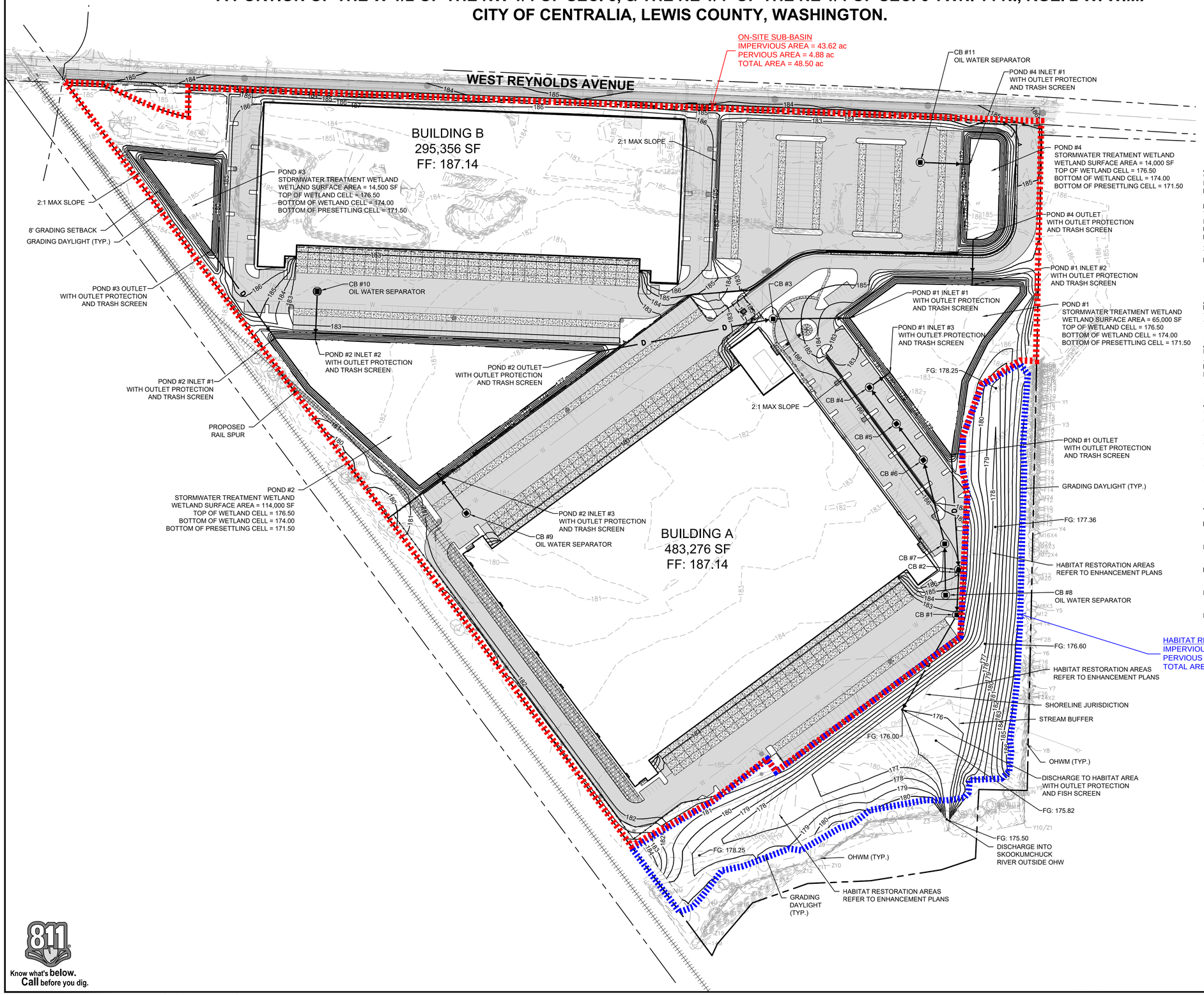
Designed by:	Drawn by:	Checked by:
TDW	TDW	BEB

Sheet No.

Appendix B-1

SKOOKUMCHUCK COMMERCE CENTER

A PORTION OF THE W 1/2 OF THE NW 1/4 OF SEC. 5, & THE NE 1/4 OF THE NE 1/4 OF SEC. 6 TWN. 14 N., RGE. 2 W. W.M.
CITY OF CENTRALIA, LEWIS COUNTY, WASHINGTON.



N

GRAPHIC SCALE
0 50 100 200
1" = 100 FEET

EARTHWORK QUANTITIES

CUT = 158,000 CUBIC YARDS
FILL = 153,000 CUBIC YARDS
NET = 5,000 CUBIC YARDS (EXPORT)

NOTES:
THE ABOVE QUANTITIES ARE ESTIMATES ONLY INTENDED FOR THE PERMITTING PROCESS. DO NOT USE FOR BID PURPOSES. THE QUANTITIES DO NOT HAVE STRIPPING, COMPACTION, OR CUT AND FILL ADJUSTMENT FACTORS APPLIED TO THEM NOR DO THEY ACCOUNT FOR PAVEMENT, SIDEWALK OR BUILDING SECTIONS.

STORMWATER TREATMENT WETLANDS

REQUIRED WETLAND SURFACE AREA = 84,507 SF
*PROPOSED WETLAND SURFACE AREA = 207,500 SF
*INCLUDES SURFACE AREA IN ALL FOUR PONDS

GEOTECH NOTE

INTERCEPTOR TRENCHES SHALL BE INSTALLED AROUND THE PERIMETERS OF POND #1 AND POND #2. THE TRENCHES SHALL BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS STATED IN THE GEOTECHNICAL REPORT.

LEGEND

CATCH BASIN TYPE 1 (UNLESS NOTED AS TYPE 1L) ■
CATCH BASIN TYPE 2 (UNLESS NOTED OTHERWISE) ◉
STORM/ROOF DRAIN CLEANOUT •
STORM DRAINAGE PIPE —— D ——

SURFACING LEGEND

EXISTING CONCRETE
PROPOSED CONCRETE
EXISTING ASPHALT
PROPOSED ASPHALT
PROPOSED GRAVEL

Know what's below. Call before you dig.

DATE: October 2, 2023 FILENAME: Q:\2021\2210649\10_CIV\CAD_SEPA\2210649-SH-GRAD.dwg

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2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

Project Title:

SKOOKUMCHUCK COMMERCE CENTER

Client:
PANATTONI DEVELOPMENT COMPANY, LLC

1821 DOCK STREET, SUITE 100
TACOMA, WA 98402

Project No.
2210649.10

Issue Set & Date:
SEPA AND SITE PLAN REVIEW
10/2/2023

BARTON EDWARD BRYNESTAD
STATE OF WASHINGTON
24242
REGISTERED
PROFESSIONAL ENGINEER

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Revisions:
3
2
1

Sheet Title:
Developed Basin Map

Designed by:	Drawn by:	Checked by:
TDW	TDW	BEB

Sheet No.
Appendix B-2

The proposed stormwater treatment wetlands have been sized to provide the Water Quality Design Volume calculated using the Western Washington Hydrology Model (WWHM).The sizing procedure for BMP T10.30 in the 2019 *SWMMWW* was followed to ensure that the proposed stormwater treatment wetlands are designed to provide treatment for the On-Site Sub-Basin.

WWHM Sub-Basin Area Inputs

Pervious Land Use	acre
C, Lawn, Flat	4.88
Pervious Total	4.88
Impervious Land Use	acre
ROADS FLAT	43.62
Impervious Total	43.62
Basin Total	48.5

WWHM Water Quality Design Volume Output

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	5.8202 acre-feet
On-line facility target flow:	6.4615 cfs.
Adjusted for 15 min:	6.4615 cfs.
Off-line facility target flow:	3.664 cfs.
Adjusted for 15 min:	3.664 cfs.

Sizing Procedure

Design Volume = 5.8202 acre*feet = 253,527.9 cubic feet

Required Wetland Surface Area = (253,527.9 CF) / (3 ft average water depth) = 84,509 SF

***Proposed Wetland Surface Area** = 207,500 SF
*Includes surface area in all four ponds because they will be hydraulically connected with large diameter storm drainage pipes.

Additional Design Criteria

During final design additional information will be added to these water quality calculations to ensure that the proposed stormwater treatment wetlands meet the criteria listed below:

- Each stormwater treatment wetland will consist of two cells, a presettling cell and a wetland cell.
- The presettling cells will contain approximately 33 percent of the provided wetpool volume.
- The depth of the presettling cells will be 4 feet, excluding 1 foot of sediment storage.
- The wetland cells will have an average depth of about 1.5 feet.
- The dividing berms separating the two cells will be shaped such that their downstream sides gradually slope to form the shallow wetland cells. The top of the dividing berms will be at the Water Quality design water surface, and the berm side slopes will be no steeper than 3H:1V.
- The wetland cells will be planted with emergent wetland plants following the recommendations given in Table V-8.1 of the *SWMMWW* or the recommendations of a wetland specialist.
- The stormwater treatment wetlands will include liners as recommended by the geotechnical engineer to ensure that the wetland cell retains water for at least 10 months of the year, and the presettling cell retains at least 3 feet of water year-round taking into account a complete precipitation record including evapotranspiration and infiltration losses.
- Access and maintenance roads will be provided and designed according to the requirements for detention ponds.

WWHM2012

PROJECT REPORT

General Model Information

Project Name:	Prelim Storm - SEPA
Site Name:	skookumchuck - SEPA
Site Address:	
City:	
Report Date:	3/28/2023
Gage:	Olympia
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.800
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

ONSITE - EXISTING

Bypass: No

GroundWater: No

Pervious Land Use	acre
C, Forest, Flat	48.5
Pervious Total	48.5

Impervious Land Use	acre
Impervious Total	0
Basin Total	48.5

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

ONSITE POND

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
C, Lawn, Flat	4.88
Pervious Total	4.88

Impervious Land Use	acre
ROADS FLAT	43.62
Impervious Total	43.62
Basin Total	48.5

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length: 808.03 ft.
Bottom Width: 269.34 ft.
Depth: 5 ft.
Volume at riser head: 21.5016 acre-feet.
Side slope 1: 3 To 1
Side slope 2: 3 To 1
Side slope 3: 3 To 1
Side slope 4: 3 To 1
Discharge Structure
Riser Height: 4 ft.
Riser Diameter: 18 in.
Notch Type: Rectangular
Notch Width: 0.160 ft.
Notch Height: 1.243 ft.
Orifice 1 Diameter: 4.093 in. Elevation:0 ft.
Element Flows To:
Outlet 1 Outlet 2

Pond Hydraulic Table

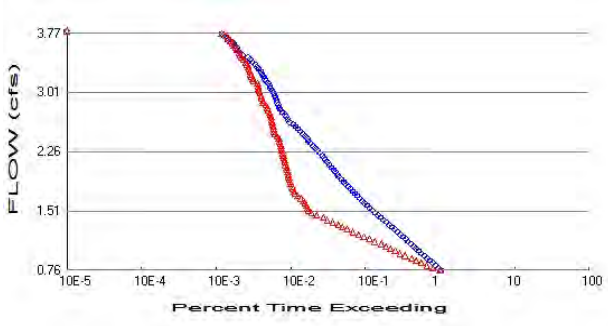
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	4.996	0.000	0.000	0.000
0.0556	5.004	0.277	0.107	0.000
0.1111	5.012	0.556	0.151	0.000
0.1667	5.021	0.834	0.185	0.000
0.2222	5.029	1.114	0.214	0.000
0.2778	5.037	1.393	0.239	0.000
0.3333	5.045	1.673	0.262	0.000
0.3889	5.054	1.954	0.283	0.000
0.4444	5.062	2.235	0.303	0.000
0.5000	5.070	2.516	0.321	0.000
0.5556	5.079	2.798	0.338	0.000
0.6111	5.087	3.081	0.355	0.000
0.6667	5.095	3.363	0.371	0.000
0.7222	5.103	3.647	0.386	0.000
0.7778	5.112	3.931	0.400	0.000
0.8333	5.120	4.215	0.415	0.000
0.8889	5.128	4.500	0.428	0.000
0.9444	5.137	4.785	0.441	0.000
1.0000	5.145	5.070	0.454	0.000
1.0556	5.153	5.356	0.467	0.000
1.1111	5.162	5.643	0.479	0.000
1.1667	5.170	5.930	0.491	0.000
1.2222	5.178	6.217	0.502	0.000
1.2778	5.187	6.505	0.513	0.000
1.3333	5.195	6.794	0.524	0.000
1.3889	5.204	7.083	0.535	0.000
1.4444	5.212	7.372	0.546	0.000
1.5000	5.220	7.662	0.556	0.000
1.5556	5.229	7.952	0.567	0.000
1.6111	5.237	8.243	0.577	0.000
1.6667	5.245	8.534	0.586	0.000
1.7222	5.254	8.826	0.596	0.000

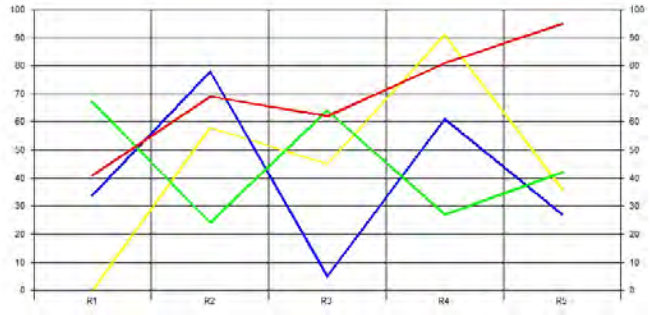
1.7778	5.262	9.118	0.606	0.000
1.8333	5.271	9.411	0.615	0.000
1.8889	5.279	9.704	0.624	0.000
1.9444	5.288	9.997	0.633	0.000
2.0000	5.296	10.29	0.642	0.000
2.0556	5.304	10.58	0.651	0.000
2.1111	5.313	10.88	0.660	0.000
2.1667	5.321	11.17	0.669	0.000
2.2222	5.330	11.47	0.677	0.000
2.2778	5.338	11.76	0.686	0.000
2.3333	5.347	12.06	0.694	0.000
2.3889	5.355	12.36	0.702	0.000
2.4444	5.364	12.66	0.710	0.000
2.5000	5.372	12.95	0.718	0.000
2.5556	5.380	13.25	0.726	0.000
2.6111	5.389	13.55	0.734	0.000
2.6667	5.397	13.85	0.742	0.000
2.7222	5.406	14.15	0.750	0.000
2.7778	5.414	14.45	0.759	0.000
2.8333	5.423	14.75	0.776	0.000
2.8889	5.431	15.06	0.797	0.000
2.9444	5.440	15.36	0.821	0.000
3.0000	5.448	15.66	0.848	0.000
3.0556	5.457	15.96	0.876	0.000
3.1111	5.466	16.27	0.906	0.000
3.1667	5.474	16.57	0.937	0.000
3.2222	5.483	16.87	0.969	0.000
3.2778	5.491	17.18	1.002	0.000
3.3333	5.500	17.48	1.036	0.000
3.3889	5.508	17.79	1.071	0.000
3.4444	5.517	18.10	1.106	0.000
3.5000	5.525	18.40	1.141	0.000
3.5556	5.534	18.71	1.177	0.000
3.6111	5.543	19.02	1.213	0.000
3.6667	5.551	19.33	1.249	0.000
3.7222	5.560	19.64	1.285	0.000
3.7778	5.568	19.94	1.323	0.000
3.8333	5.577	20.25	1.366	0.000
3.8889	5.585	20.56	1.410	0.000
3.9444	5.594	20.87	1.455	0.000
4.0000	5.603	21.19	1.500	0.000
4.0556	5.611	21.50	1.715	0.000
4.1111	5.620	21.81	2.101	0.000
4.1667	5.629	22.12	2.593	0.000
4.2222	5.637	22.43	3.162	0.000
4.2778	5.646	22.75	3.780	0.000
4.3333	5.654	23.06	4.420	0.000
4.3889	5.663	23.38	5.053	0.000
4.4444	5.672	23.69	5.653	0.000
4.5000	5.680	24.01	6.195	0.000
4.5556	5.689	24.32	6.659	0.000
4.6111	5.698	24.64	7.036	0.000
4.6667	5.706	24.96	7.328	0.000
4.7222	5.715	25.27	7.554	0.000
4.7778	5.724	25.59	7.835	0.000
4.8333	5.732	25.91	8.060	0.000
4.8889	5.741	26.23	8.278	0.000
4.9444	5.750	26.55	8.489	0.000

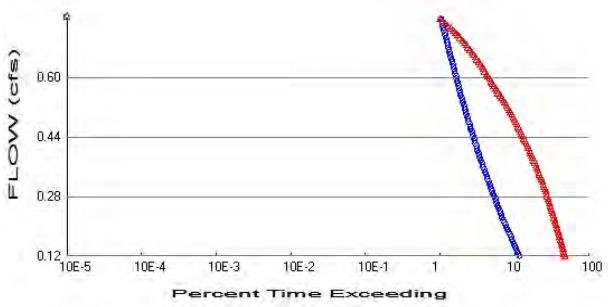
5.0000	5.759	26.87	8.694	0.000
5.0556	5.767	27.19	8.894	0.000

Analysis Results

POC 1







\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 48.5
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 4.88
Total Impervious Area: 43.62

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.517323
5 year	2.320931
10 year	2.813468
25 year	3.381801
50 year	3.766404
100 year	4.119964

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.851545
5 year	1.289319
10 year	1.653258
25 year	2.209877
50 year	2.703327
100 year	3.271998

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	Predeveloped	Mitigated
1956	1.853	1.013
1957	2.539	0.732
1958	0.854	0.566
1959	1.094	0.792
1960	2.029	1.452
1961	1.529	0.937
1962	0.509	0.591
1963	2.151	1.254
1964	1.583	0.859
1965	1.310	0.698
1966	0.843	0.660
1967	1.706	0.862
1968	1.243	0.629
1969	0.657	0.638
1970	1.408	0.976
1971	1.774	1.044
1972	2.627	1.843
1973	1.428	1.174
1974	1.036	0.830
1975	2.407	0.628
1976	1.938	1.021
1977	0.352	0.486
1978	1.511	1.186
1979	1.943	0.587
1980	1.410	0.918
1981	1.996	0.768
1982	1.318	0.838
1983	2.135	0.728
1984	1.711	0.662
1985	0.583	0.625
1986	2.670	0.857
1987	3.008	1.249
1988	0.865	0.747
1989	1.108	0.567
1990	3.138	1.095
1991	3.946	2.480
1992	0.907	0.708
1993	0.632	0.530
1994	0.608	0.522
1995	1.736	0.869
1996	2.780	0.877
1997	1.575	1.226
1998	1.372	0.616
1999	1.917	1.386
2000	1.954	1.038
2001	0.300	0.471
2002	1.958	1.717
2003	0.836	0.620
2004	1.229	1.118
2005	1.416	0.609
2006	2.077	0.994
2007	1.663	4.007
2008	3.994	3.781

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	Predeveloped	Mitigated
1	3.9943	4.0067
2	3.9459	3.7808
3	3.1378	2.4795
4	3.0077	1.8426
5	2.7799	1.7171
6	2.6702	1.4522
7	2.6270	1.3861
8	2.5387	1.2539
9	2.4067	1.2491
10	2.1514	1.2258
11	2.1349	1.1865
12	2.0775	1.1745
13	2.0288	1.1184
14	1.9962	1.0954
15	1.9583	1.0439
16	1.9537	1.0376
17	1.9429	1.0205
18	1.9382	1.0131
19	1.9170	0.9936
20	1.8528	0.9763
21	1.7740	0.9372
22	1.7363	0.9185
23	1.7114	0.8771
24	1.7056	0.8692
25	1.6628	0.8621
26	1.5826	0.8591
27	1.5753	0.8572
28	1.5289	0.8378
29	1.5113	0.8300
30	1.4275	0.7917
31	1.4157	0.7677
32	1.4100	0.7466
33	1.4084	0.7317
34	1.3715	0.7278
35	1.3184	0.7079
36	1.3097	0.6985
37	1.2432	0.6616
38	1.2292	0.6596
39	1.1083	0.6379
40	1.0935	0.6290
41	1.0357	0.6281
42	0.9068	0.6248
43	0.8648	0.6198
44	0.8543	0.6158
45	0.8432	0.6089
46	0.8358	0.5910
47	0.6570	0.5874
48	0.6321	0.5673
49	0.6078	0.5656
50	0.5833	0.5300
51	0.5087	0.5220
52	0.3523	0.4862
53	0.3001	0.4708

LID Duration Flows

The Development Failed :duration increase for more than 0% of the flows.

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1214	217069	874407	402	Fail
0.1278	209635	858796	409	Fail
0.1343	201643	841327	417	Fail
0.1407	195139	827388	423	Fail
0.1471	187705	812149	432	Fail
0.1536	181888	798396	438	Fail
0.1600	175458	780741	444	Fail
0.1664	170180	765873	450	Fail
0.1729	165087	751563	455	Fail
0.1793	159419	735394	461	Fail
0.1858	154699	722385	466	Fail
0.1922	149309	704915	472	Fail
0.1986	144904	690605	476	Fail
0.2051	139905	674251	481	Fail
0.2115	135854	660870	486	Fail
0.2179	132025	647675	490	Fail
0.2244	127695	632064	494	Fail
0.2308	124127	618869	498	Fail
0.2373	120187	604187	502	Fail
0.2437	116935	590620	505	Fail
0.2501	113348	575009	507	Fail
0.2566	110393	562371	509	Fail
0.2630	107048	548433	512	Fail
0.2694	104278	536167	514	Fail
0.2759	101584	524087	515	Fail
0.2823	98480	510892	518	Fail
0.2888	95878	499555	521	Fail
0.2952	92998	486732	523	Fail
0.3016	90600	476138	525	Fail
0.3081	87998	463315	526	Fail
0.3145	85768	451793	526	Fail
0.3209	83538	440270	527	Fail
0.3274	81066	427447	527	Fail
0.3338	79003	416296	526	Fail
0.3402	76680	403658	526	Fail
0.3467	74822	392879	525	Fail
0.3531	72722	380428	523	Fail
0.3596	70956	369834	521	Fail
0.3660	69284	359613	519	Fail
0.3724	67462	348090	515	Fail
0.3789	65845	338055	513	Fail
0.3853	64024	326904	510	Fail
0.3917	62556	317240	507	Fail
0.3982	60939	306089	502	Fail
0.4046	59638	296797	497	Fail
0.4111	58114	285460	491	Fail
0.4175	56813	276539	486	Fail
0.4239	55568	267805	481	Fail
0.4304	54137	257397	475	Fail
0.4368	53003	248662	469	Fail
0.4432	51740	239370	462	Fail
0.4497	50625	231565	457	Fail
0.4561	49435	222458	450	Fail

0.4626	48394	215210	444	Fail
0.4690	47354	208148	439	Fail
0.4754	46201	200157	433	Fail
0.4819	45254	192723	425	Fail
0.4883	44157	184471	417	Fail
0.4947	43265	178115	411	Fail
0.5012	42224	170570	403	Fail
0.5076	41332	164140	397	Fail
0.5141	40329	156743	388	Fail
0.5205	39511	150182	380	Fail
0.5269	38730	144050	371	Fail
0.5334	37764	137229	363	Fail
0.5398	37021	131412	354	Fail
0.5462	36129	124480	344	Fail
0.5527	35441	118737	335	Fail
0.5591	34660	112586	324	Fail
0.5655	34028	107586	316	Fail
0.5720	33415	102977	308	Fail
0.5784	32728	98015	299	Fail
0.5849	32133	93908	292	Fail
0.5913	31501	89262	283	Fail
0.5977	30962	85471	276	Fail
0.6042	30349	81475	268	Fail
0.6106	29773	78018	262	Fail
0.6170	29178	74394	254	Fail
0.6235	28639	71105	248	Fail
0.6299	28119	68150	242	Fail
0.6364	27561	64767	234	Fail
0.6428	27041	61645	227	Fail
0.6492	26483	58133	219	Fail
0.6557	26000	55271	212	Fail
0.6621	25461	52241	205	Fail
0.6685	25015	49807	199	Fail
0.6750	24606	47205	191	Fail
0.6814	24086	44306	183	Fail
0.6879	23677	41853	176	Fail
0.6943	23175	39158	168	Fail
0.7007	22766	36909	162	Fail
0.7072	22283	34419	154	Fail
0.7136	21911	32337	147	Fail
0.7200	21484	29977	139	Fail
0.7265	21094	28044	132	Fail
0.7329	20722	26037	125	Fail
0.7394	20332	23844	117	Fail
0.7458	19997	21911	109	Fail
0.7522	19570	20034	102	Fail
0.7587	19235	18640	96	Pass

The development has an increase in flow durations from 1/2 Predeveloped 2 year flow to the 2 year flow or more than a 10% increase from the 2 year to the 50 year flow.
The development has an increase in flow durations for more than 50% of the flows for the range of the duration analysis.

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.7587	19235	18640	96	Pass
0.7890	17693	14994	84	Pass
0.8194	16180	12446	76	Pass
0.8498	14892	10498	70	Pass
0.8802	13639	8930	65	Pass
0.9106	12522	7705	61	Pass
0.9409	11496	6393	55	Pass
0.9713	10467	5442	51	Pass
1.0017	9603	4685	48	Pass
1.0321	8859	4020	45	Pass
1.0625	8172	3490	42	Pass
1.0929	7545	3039	40	Pass
1.1232	6941	2475	35	Pass
1.1536	6410	2102	32	Pass
1.1840	5927	1771	29	Pass
1.2144	5453	1518	27	Pass
1.2448	5012	1276	25	Pass
1.2751	4555	1052	23	Pass
1.3055	4198	911	21	Pass
1.3359	3875	811	20	Pass
1.3663	3574	679	18	Pass
1.3967	3265	577	17	Pass
1.4270	2972	508	17	Pass
1.4574	2732	412	15	Pass
1.4878	2511	354	14	Pass
1.5182	2308	324	14	Pass
1.5486	2119	310	14	Pass
1.5790	1959	300	15	Pass
1.6093	1802	287	15	Pass
1.6397	1674	276	16	Pass
1.6701	1558	254	16	Pass
1.7005	1450	228	15	Pass
1.7309	1349	212	15	Pass
1.7612	1258	205	16	Pass
1.7916	1170	200	17	Pass
1.8220	1096	195	17	Pass
1.8524	1013	186	18	Pass
1.8828	952	183	19	Pass
1.9131	886	178	20	Pass
1.9435	824	175	21	Pass
1.9739	786	173	22	Pass
2.0043	738	170	23	Pass
2.0347	695	165	23	Pass
2.0651	653	163	24	Pass
2.0954	610	158	25	Pass
2.1258	577	155	26	Pass
2.1562	544	154	28	Pass
2.1866	519	150	28	Pass
2.2170	492	148	30	Pass
2.2473	453	146	32	Pass
2.2777	422	143	33	Pass
2.3081	395	139	35	Pass
2.3385	367	137	37	Pass

2.3689	347	134	38	Pass
2.3992	324	132	40	Pass
2.4296	309	128	41	Pass
2.4600	289	121	41	Pass
2.4904	270	113	41	Pass
2.5208	252	112	44	Pass
2.5512	231	110	47	Pass
2.5815	215	109	50	Pass
2.6119	201	106	52	Pass
2.6423	179	105	58	Pass
2.6727	170	102	60	Pass
2.7031	160	102	63	Pass
2.7334	154	99	64	Pass
2.7638	142	96	67	Pass
2.7942	135	93	68	Pass
2.8246	132	90	68	Pass
2.8550	127	86	67	Pass
2.8853	122	78	63	Pass
2.9157	120	78	65	Pass
2.9461	116	75	64	Pass
2.9765	113	75	66	Pass
3.0069	109	72	66	Pass
3.0373	104	70	67	Pass
3.0676	100	68	68	Pass
3.0980	97	68	70	Pass
3.1284	92	67	72	Pass
3.1588	87	59	67	Pass
3.1892	84	58	69	Pass
3.2195	81	55	67	Pass
3.2499	77	54	70	Pass
3.2803	74	53	71	Pass
3.3107	69	51	73	Pass
3.3411	66	50	75	Pass
3.3714	62	49	79	Pass
3.4018	57	46	80	Pass
3.4322	53	43	81	Pass
3.4626	50	40	80	Pass
3.4930	42	39	92	Pass
3.5234	39	38	97	Pass
3.5537	36	35	97	Pass
3.5841	35	34	97	Pass
3.6145	33	32	96	Pass
3.6449	32	31	96	Pass
3.6753	27	29	107	Pass
3.7056	26	27	103	Pass
3.7360	23	25	108	Pass
3.7664	22	22	100	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	5.8202 acre-feet
On-line facility target flow:	6.4615 cfs.
Adjusted for 15 min:	6.4615 cfs.
Off-line facility target flow:	3.664 cfs.
Adjusted for 15 min:	3.664 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Total Volume Infiltrated		0.00	0.00	0.00		0.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

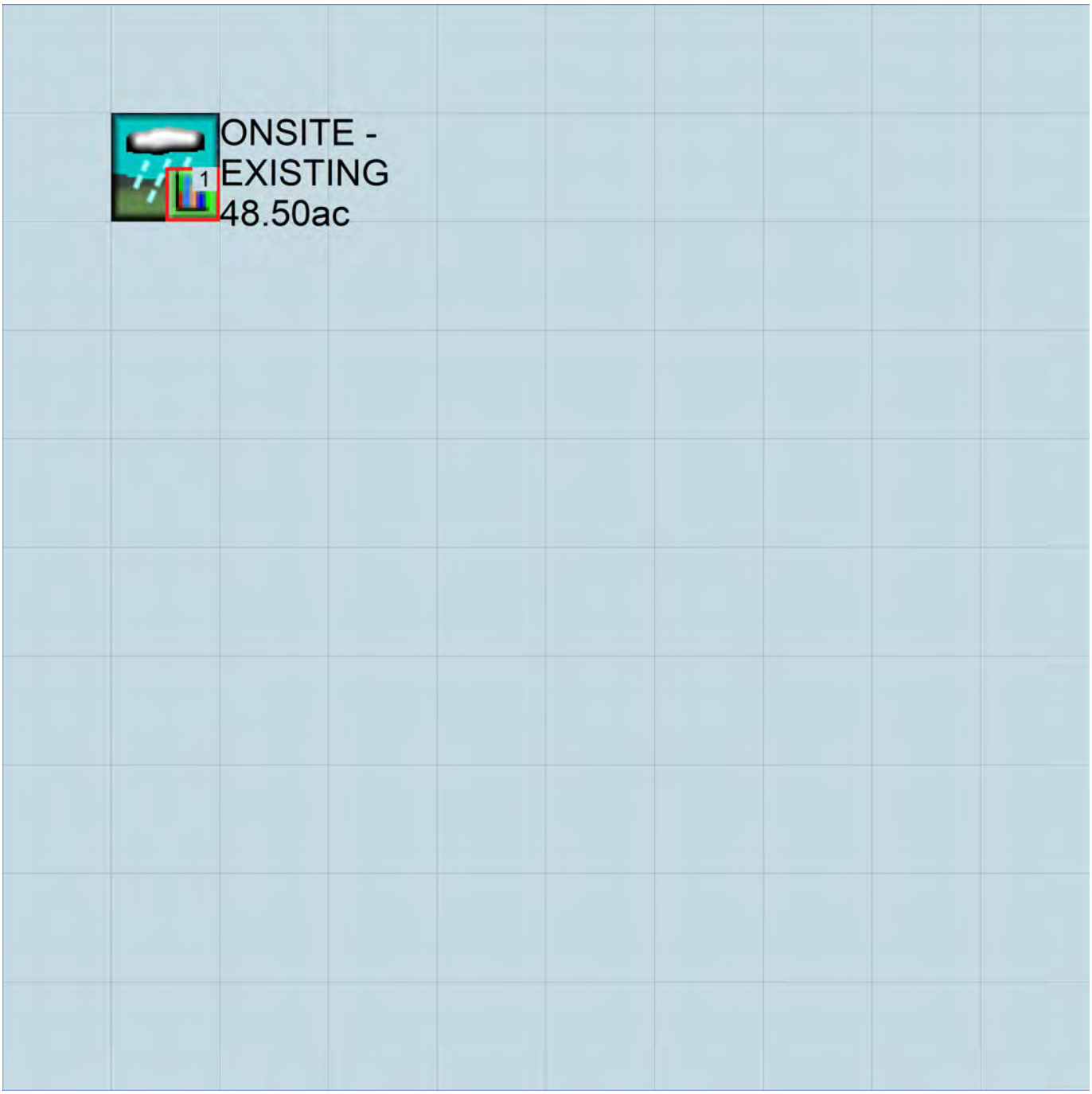
No PERLND changes have been made.

IMPLND Changes

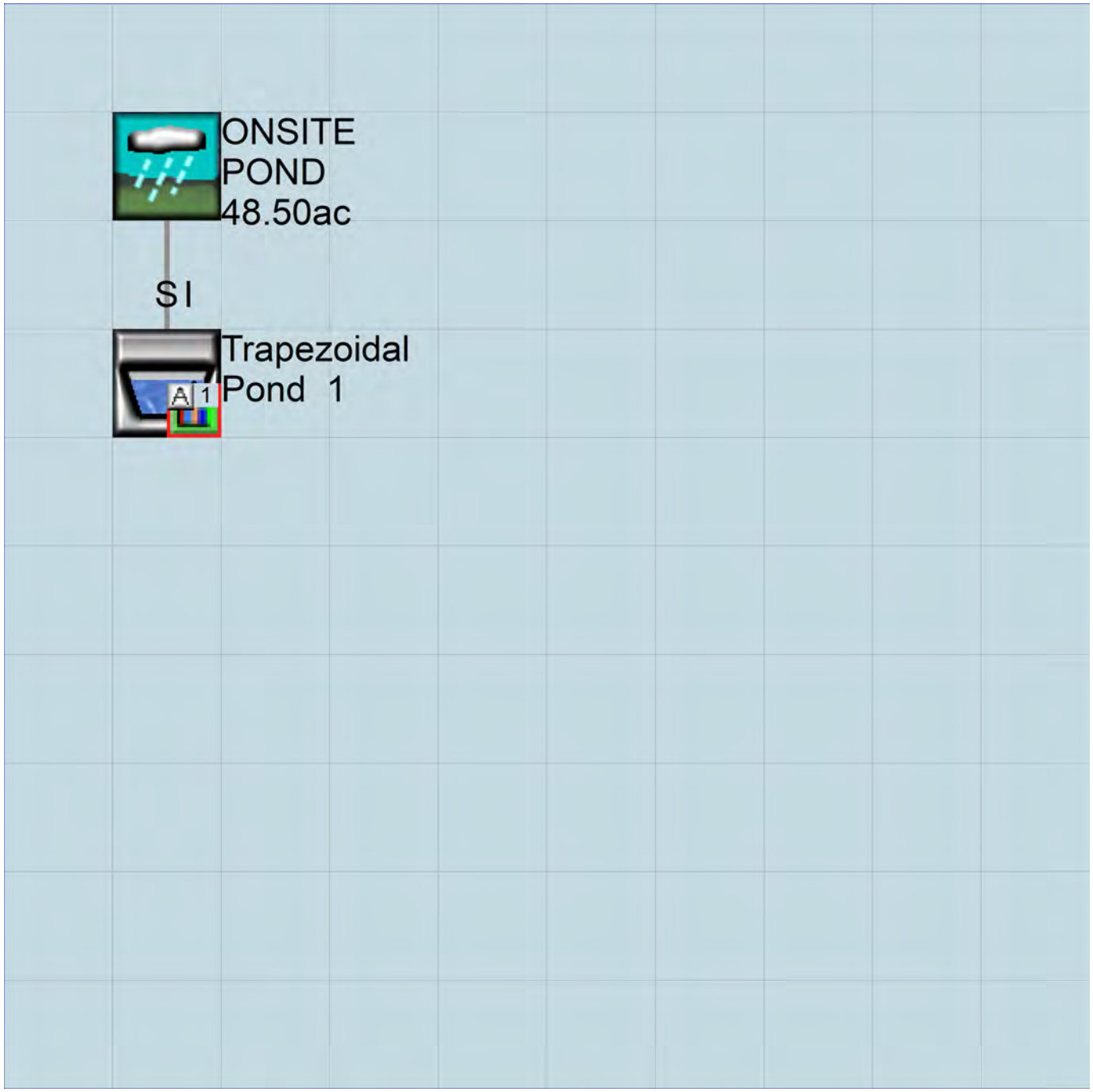
No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

Predeveloped HSPF Message File

Mitigated HSPF Message File

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Local (360)943-0304

www.clearcreeksolutions.com

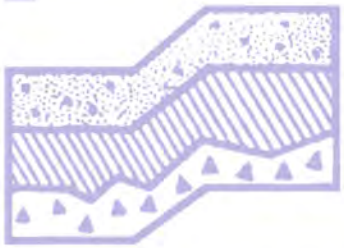
Appendix C

Geotechnical Report
Terra Associates, Inc.
September 7, 2023

GEOTECHNICAL REPORT

Skookumchuck Commerce Center
1620 West Reynolds Avenue
Centralia, Washington

Project No. T-8613



Terra Associates, Inc.

Prepared for:

Panattoni Development Company
Tacoma, Washington

September 7, 2023

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

September 7, 2023
Project No. T-8613

Mr. Darren Peugh
Panattoni Development Company, Inc.
1821 – Dock Street., Suite 100
Tacoma, Washington 98402

Subject: Geotechnical Report
Skookumchuck Commerce Center
1620 West Reynolds Avenue
Centralia, Washington

Dear Mr. Peugh:

As requested, we conducted a geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

The native soils observed in our subsurface explorations generally consist of medium dense, dry to moist, alluvial silt, fine sandy silt, and silty fine sand overlying glacial outwash deposits comprised predominantly of medium dense to very dense, silty gravel with sand to silty sand with gravel, and sand and gravel with varying minor proportions of silt. We observed moderate to heavy groundwater seepage in several test pits located in the northern and southeastern portions of the site. Groundwater was encountered below depths of about 5.5 feet to 15 feet in test borings.

In our opinion, there are no geotechnical conditions that would preclude the planned development. The structure can be supported by conventional spread footings bearing on competent native soils underlying the surface organic soils and existing fill, or on structural fill placed on a competent native soil subgrade. Floor slabs and pavements can be similarly supported. The native silt soils are extremely moisture sensitive and will require careful control of moisture during construction to facilitate adequate compaction, and measures to protect finished subgrades from disturbance during periods of wet weather.

Detailed recommendations addressing these issues and other geotechnical design considerations are presented in the attached report. We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Michael J. Xenos, E.I.T.
Staff Engineer

John C. Sadler, L.E.G., L.H.G.
Senior Engineering Geologist

Carolyn S. Decker, P.E.
President

9-7-2023

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Geotechnical Report
Skookumchuck Commerce Center
1620 West Reynolds Avenue
Centralia, Washington

1.0 PROJECT DESCRIPTION

The project consists of developing the property with two industrial buildings, stormwater ponds, and associated infrastructure improvements. Based on the *Preliminary Grading and Drainage Plan* prepared by AHBL, dated March 31, 2023, the southern Building A will be approximately 480,000 square feet with dock-high loading located along north and south sides of the building and the northern Building B with be approximately 295,000 square feet with dock-high loading along the south side of the building. Based on existing site topography, cuts and fills ranging from one to five feet will be required to achieve final building and parking lot elevations.

Site stormwater will be collected and directed to one of four stormwater detention ponds. Pond 4 is located in the northeast corner of the site and Pond 1 is in the northeast corner of the site just south of Pond 4. Pond 3 is located in the northwest corner of the site and Pond 2 is in the northwest corner of the site just southeast of Pond 3. The ponds will be formed by excavation below current site grades. The excavation required to achieve the pond floor elevation of 171.5 feet for all 4 ponds will extend 8.5 to 13.5 feet below current site grades.

We expect the building will be constructed using precast concrete tilt-up perimeter wall panels with interior columns supporting the roof structure. The floor slab will be constructed at grade with dock high loading on the west side of the structure. Structural loading is expected to be light, with isolated columns carrying loads of 50 to 150 kips and bearing walls carrying 4 to 8 kips per foot. Maximum product loading on the floors is not expected to exceed 350 pounds per square foot (psf).

The recommendations in this report are based on our understanding of the design features outlined above. We should review design drawings as they become available to verify that our recommendations have been properly interpreted and to supplement them, if required.

2.0 SCOPE OF WORK

On August 24, 2021, and August 25, 2021, we explored subsurface conditions at the site by observing soil conditions in 33 test pits excavated to maximum depths ranging between about 7 and 11 feet with a track-mounted excavator. On August 31, 2021, In-Situ Engineering, under subcontract with Terra Associates, Inc., performed 3 cone penetration tests (CPTs) to depths of approximately 3 to 13 feet below existing site grades. On September 1, 2021, we supplemented this data at two 41.5-foot-deep test borings drilled with a track-mounted drill rig using hollow-stem auger drilling methods. On December 1, 2021, we supplemented this data by excavating 3 test pits to a maximum depth of approximately 10 feet below existing site grades with a mini excavator. On October 6, 2022, we supplemented this data by excavating 8 test pits to a maximum depth of approximately 10 feet below existing site grades with a track-mounted excavator. On October 11, 2022, we supplemented this data at 4 test borings drilled to a maximum depth of approximately 20 feet below existing site grades. On February 27, 2023, we supplement this data by excavating three test pits to depths of nine feet below current site grades.

Using the results of our field study and laboratory testing, analyses were undertaken to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions.
- Seismic criteria per the current International Building Code (IBC).
- Geologic hazards per the Lewis County Code (LCC).
- Site preparation and grading.
- Excavations.
- Foundations.
- Slab-on-grade floors
- Lateral earth pressures for below-grade wall design.
- Stormwater Facilities.
- Infiltration Feasibility.
- Drainage
- Utilities.
- Pavements.

It should be noted, recommendations outlined in this report regarding drainage are associated with soil strength, design earth pressures, erosion, and stability. Design and performance issues with respect to moisture as it relates to the structure environment are beyond Terra Associates, Inc.'s purview. A building envelope specialist or contactor should be consulted to address these issues, as needed.

3.0 SITE CONDITIONS

3.1 Surface

The site is a 52.72-acre assemblage of 11 parcels located southeast of the intersection of West Reynolds Avenue and Blair Road in Centralia, Washington. The western, southern, and eastern site margins border a railroad right-of-way, the Skookumchuck River, and residential properties, respectively. The northern site margin borders West Reynolds Avenue. The approximate site location is shown on Figure 1.

Site topography is relatively flat. Elevation contours obtained from the Lewis County GIS Web Map (https://gis.lewiscountywa.gov/webmap/) shows surface elevations across the vast majority of the site ranging between about Elevation 182 and Elevation 186. Surface elevations at the southern site margin adjacent to the Skookumchuck River are generally about Elevation 176.

The vast majority of the site is vegetated with grasses with a few scattered deciduous trees. Much of the northwestern portion of the site is being used to stockpile topsoil and other landscaping soils and is generally unvegetated. Review of historical aerial photographs shows a log yard occupying the northwestern portion of the site between at least June 1990 and September 2009. The northeastern portion of the site is developed with two single-family homes and a top soil and gravel yard.

We did not observe any indications of persistently-wet surface conditions, surface water accumulation, or concentrated surface water flow at the site. However, desiccation cracks visible on the ground surface across much of the site indicate that the near-surface soils have been wet in the past.

3.2 Soils

The native soils observed in our subsurface explorations generally consist of about three and one-half feet to nine and one-half feet of medium dense, dry to moist, alluvial silt, fine sandy silt, and silty fine sand overlying glacial outwash deposits comprised predominantly of medium dense to very dense, moist to wet, sand and gravel soils with varying silt contents. Scattered to numerous cobbles and occasional one, to one and one-half-foot diameter boulders were typically encountered within the outwash deposits. The vast majority of the site is overlain with about two to nine inches of sod and topsoil.

The fine-grained alluvial deposits are generally non-plastic to low plasticity; however, higher plasticity clayey silt to silty clay layers were encountered in Test Pits TP-11, TP-17, TP-21, and Test Boring B-2. Fine-grained alluvial deposits are not present in Test Pits TP-28 through TP-33 in the northwestern portion of the site.

Fill soils or possible fill/disturbed soils were encountered in six of the test pits excavated in the northwestern portion of the site. The fill and possible fill/disturbed materials generally consist of medium dense to dense, dry to moist, silty gravel with sand and sandy silt with gravel, scattered to numerous cobbles, and scattered wood debris. Fill and possible fill/disturbed soil thickness range from about 1.5 feet at Test Pit TP-32 to about 5.5 feet at Test Pit TP-18. Fill soils and possible fill soils were also observed in the northeastern developed portions of the site in Test Borings B-101 through B-103, where approximately four to eight feet of medium stiff to very stiff mineral and highly organic silt soils typically containing trace inclusions of organic peat, gravel, and trash were observed.

The CPT data shows interbedded, fine-grained alluvial soils extending to the termination depths at all three test areas. The CPTs were terminated at depths ranging between about 3.8 and 13.4 feet due to cone refusal in the medium dense to very dense outwash gravel and sand, with three attempts to advance through the dense materials at each test area. Soil behavior types determined from the CPT data generally consist of medium dense to dense silt, silty sand, and sand to sand with gravel, and stiff to very stiff silt and clayey silt. The CPT plots are attached in Appendix A.

The *Geologic map of the Centralia 7.5-minute Quadrangle, Lewis County, Washington* by A.J. Sadowski et al. (2018) shows the central and northern portions of the site mapped as Vashon recessional outwash, gravel (Qgog) and the southern portion of the site mapped as alluvium (Qa). These geologic map units are consistent with the native soils encountered in our subsurface explorations.

Detailed descriptions of the subsurface conditions observed in our site explorations are presented on the Test Pit Logs, Test Boring Logs, and CPT Logs in Appendix A. The approximate test pit, test boring, and CPT locations are shown on Figure 2.

3.3 Groundwater

We observed groundwater seepage in several test pits located in the northern and southeastern portions of the site. The observed seepage was moderate to heavy and occurred within the medium dense to very dense outwash deposits below depths of about five to nine feet. Groundwater was encountered below depths ranging from about 7 to 15 feet below existing grades in the test borings.

We observed mottling and iron-oxide stained inclusions in some of the alluvial deposits, which can be an indication of periodic perched groundwater development within the soil. The development of perched groundwater will typically occur during the wet winter and early spring months and diminishes or completely disappears through the drier summer months. To evaluate the seasonal weather influence, PVC piezometers were installed in Test Pits TP-201 through TP-208. The piezometers were instrumented with automatic level loggers to allow for winter groundwater monitoring through the 2022-2023 wet season. Based on the results of the seasonal groundwater monitoring indicated that the groundwater in the vicinity of Ponds #1 and #2 along with the parking lot area between the two ponds was near the ground surface elevations while the groundwater to the north and south of this area was between seven and eight feet below current site grades.

The additional test pits excavated on February 27, 2023, were completed within the center of the project to determine the reason behind the high groundwater levels. Test Pits TP-301, TP-302, and TP-303 found a groundwater table within a gravel and sand layer approximately five and one half to seven- and one-half feet below current site grades. The test pits were left open for approximately two hours and when two hours were up, the groundwater was observed between three and six feet below site grades. The rise in groundwater levels indicates the sand and gravel layer is under a slight artesian condition and explains the elevated groundwater levels observed in the center of the site when the remainder of the site had seasonal high groundwater levels between seven and eight feet below grade. The approximate area of the slightly artesian condition has been outlined on the Exploration Location Plan, Figure 2.

4.0 GEOLOGIC HAZARDS

We evaluated site conditions for the presence of geologic hazards. Per Section 16.19.030 of the City of Centralia Municipal Code (CMC), geologically hazardous areas are defined as "…areas determined to be susceptible to erosion, sliding, earthquake, or other geological events. They pose a threat to the health and safety of citizens when incompatible development is sited in areas of significant hazard. Areas susceptible to one or more of the following types of hazards shall be designated as geologically hazardous areas:

A. Erosion hazard;

B. Landslide hazard;

C. Seismic hazard;

D. Volcanic hazard; and

E. Other geological events including mass wasting, debris flows, rock falls, and differential settlement."

4.1 Erosion Hazard Areas

CMC Section 16.19.035(A) defines erosion hazard areas as "…areas identified by the U.S. Department of Agriculture's Natural Resources Conservation Service as having a moderate to severe, severe, or very severe rill and inter-rill erosion hazard."

The soil units mapped at the site by the National Resources Conservation Service (NRCS) include *Spanaway gravelly sandy loam*, *Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes*, and *Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes*, which are described as having a slight or moderate erosion potential. Based on the NRCS soil mapping and the above defining criteria, erosion hazard areas do not exist onsite.

Although the site conditions do not meet the above criteria defining erosion hazard areas, the site soils will be susceptible to erosion when exposed during site development. In our opinion, proper implementation and maintenance of Best Management Practices (BMPs) for erosion prevention and sedimentation control would adequately mitigate any potential erosion hazard associated with the planned development. BMPs for erosion prevention and sedimentation control will need to be in place prior to and during any site development activities and should be maintained until permanent site stabilization is measures are in place. All BMPs for erosion prevention and sedimentation control should conform to City of Centralia requirements.

4.2 Landslide Hazard Areas

CMC Section 16.19.035(B) defines landslide hazard areas as "…areas potentially susceptible to landslides based on a combination of geologic, topographic, and hydrologic factors. They include areas susceptible to landslides because of any combination of bedrock, soil, slope (gradient), slope aspect, structure, hydrology, or other factors. Examples of these may include but are not limited to the following:

1. Those areas delineated by the U.S. Department of Agriculture's Natural Resources Conservation Service as having severe limitation for building site development.

2. Those areas mapped by the Department of Natural Resources (slope stability mapping) as unstable ("U" or class 3), unstable old slides ("UOS" or class 4), or unstable recent slides ("URS" or class 5).

3. Areas designated as quaternary slump, earth flows, mudflows, lahars, or landslides on maps published by the U.S. Geological Survey or Department of Natural Resources.

4. Areas with slopes steeper that fifteen percent and springs or groundwater seepage.

5. Areas that have shown movement during the Holocene epoch (from ten thousand years ago to present) or that are underlain or covered by mass wastage debris of that epoch.

6. Slopes that are parallel or subparallel to planes of weakness (such as bedding planes, joint systems, and fault planes) in subsurface materials.

7. Slopes having gradients steeper than eighty percent subject to rock fall during seismic shaking.

8. Areas potentially unstable because of rapid stream incision, stream bank erosion, and undercutting by wave action.

9. Areas located in a canyon or on an active alluvial fan, presently or potentially subject to inundation by debris flows or catastrophic flooding.

10. Any area with a slope of forty percent or steeper and with a vertical relief of ten or more feet except areas composed of consolidated rock. A slope is delineated by establishing its toe and top and measured by averaging the inclination over at least ten feet of vertical relief."

Based on our site observations, conditions meeting the above criteria do not exist at the site given the relatively flat topography that exists at the site.

4.3 Volcanic Hazard Areas

CMC Section 16.19.035(D) defines volcanic hazard areas as areas which "…are subject to pyroclastic flows, lava flows, debris avalanche, inundation by debris flows, lahars, mudflows, or related flooding resulting from volcanic activity."

Review of the United States Geological Survey (USGS) Cascades Volcano Observatory simplified volcano hazards maps (https://www.usgs.gov/observatories/cascades-volcano-observatory/volcano-hazards-cascade-range) indicates that the site is not located in an area that is susceptible to lahars and near volcano hazards resulting from geologic events or volcanic activity at Mount St. Helens, Mount Rainier, or Mount Adams.

4.4 Seismic Hazard Areas

CMC Section 16.19.035(C) defines seismic hazard areas as "…areas subject to severe risk of damage as a result of earthquake induced ground shaking, slope failure, settlement, soil liquefaction, lateral spreading, or surface faulting. Ground shaking is the primary cause of earthquake damage in Washington. The strength of ground shaking is primarily affected by:

1. The magnitude of the earthquake;

2. The distance from the source of an earthquake;

3. The type of thickness of geologic materials at the surface; and

4. The type of subsurface geologic structure."

Liquefaction is a phenomenon where there is a reduction or complete loss of soil strength due to an increase in water pressure induced by vibrations. Liquefaction mainly affects geologically recent deposits of fine grained sands underlying the groundwater table. Soils of this nature derive their strength from intergranular friction. The generated water pressure or pore pressure essentially separates the soil grains and eliminates this intergranular friction; thus, eliminating the soil's strength.

In our opinion, the medium dense to very dense, outwash gravel and sand deposits that were typically encountered in the subsurface explorations below depths of about three and one-half to nine and one-half feet are not susceptible to liquefaction. The loose to medium dense, alluvial silt deposits are not susceptible to liquefaction in their current state due to the absence of groundwater; however, the presence of mottling and iron-oxide staining in the silt deposits and desiccation cracks on the ground surface are indications of periodic soil saturation.

Due to this potential to become saturated, we completed a liquefaction analysis of the upper alluvial deposits using the computer program LiquefyPro published by CivilTech Corporation. The analysis was completed using a conservative, assumed groundwater level established at the ground surface and a site-modified peak ground acceleration (PGA_M) of 0.65g representing the peak horizontal acceleration for the maximum considered earthquake (MCE) having a 2 percent probability of exceedance in 50 years. The value was obtained for Latitude 46.733015°N and Longitude -122.969461°W using the Structural Engineers Association of California (SEAOC) U.S. Seismic Design Maps website (https://seismicmaps.org/) accessed on September 15, 2021.

The results of our analysis indicate that soil liquefaction does not occur for the modeled conditions during the design earthquake event. The results of the liquefaction analysis are presented in Appendix B. Based on our study, the site conditions are not susceptible to slope failure, settlement, or surface faulting. Therefore, seismic hazard areas as defined by the CMC do not exist at the site and design in accordance with local building codes for determining seismic forces would adequately mitigate impacts associated with ground shaking.

4.5 Seismic Site Class

Based on soil conditions observed in the test pits, and our knowledge of the area geology, per Chapter 16 of the 2018 International Building Code (IBC), Site Class "D" should be used in structural design.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 General

Based on our study, there are no geotechnical conditions that would preclude the planned development. The building can be supported on conventional spread footings bearing on competent native soils underlying existing fills and surficial organic soils or on structural fill placed that is placed on a competent native soil subgrade. Floor slabs and pavements can be similarly supported.

Shallow groundwater near Pond #1 and #2 will require raising site grades to keep truck loading docks above the seasonal-high groundwater. Design of stormwater facilities will also need to consider the relatively shallow groundwater table at the site. In addition, design, and construction of deeper structures such as manholes and vaults will need to include buoyancy effects and hydrostatic pressures acting on the vault structure. Temporary dewatering during construction of some of these structures will also be required.

The vast majority of the near-surface native soils consist of silt that is extremely moisture sensitive. Careful control of the soil moisture content will be necessary to adequately compact the silt soils as structural fill. As such, the ability to use soils from site excavations as structural fill will depend upon the natural soil moisture content, the prevailing weather conditions at the time of construction, and the ability of the contractor to properly moisture condition the soil. During the normally dry summer months, the contractor should be prepared to dry soils that are wet of optimum by aeration. Alternatively, stabilizing the moisture in the native soil with cement or lime can be considered. Our study indicates that the upper approximately two to four feet of the fine-grained alluvial deposits are currently dry of optimum. Moisture conditioning of soils that are dry of optimum would require the controlled addition of water to the soils and thoroughly blending of the material prior to compaction. If grading activities will take place during the winter season, the contractor should be prepared to import clean granular material for use as structural fill and backfill.

Undisturbed bearing surfaces composed of native soil or structural fill derived from the fine-grained native soils would provide suitable support for conventional spread footing foundations, floor slabs, and pavements; however, the alluvial silt soils will be easily disturbed by normal construction activity, particularly when wet. If disturbed, the soil will not be suitable for support and the affected material would need to be removed with the foundations lowered to obtain support on an undisturbed soil subgrade. Alternatively, the soils can be removed and grade restored with structural fill. To reduce the potential for subgrade disturbance, particularly during wet weather, consideration should be given to placing a six-inch layer of one- to two-inch sized crushed rock or a four-inch layer of lean concrete on completed subgrades to serve as a working surface.

The existing fill and possible fill soils observed in the northeastern borings composed of highly organic silt and containing inclusions of organic peat would not be suitable bearing surfaces for the support of building foundations, floor slabs, or pavements. These soils should be over-excavated to expose the underlying sand and gravel soils and restored to grade using new structural fill following the recommendations outlined in the section below.

Detailed recommendations regarding these issues and other geotechnical design considerations are provided in the following sections of this report. These recommendations should be incorporated into the final design drawings and construction specifications.

5.2 Site Preparation and Grading

To prepare the site for construction, all vegetation, organic surface soils, existing fill materials and other deleterious materials should be stripped and removed from the site. We expect surface stripping depths of about two to nine inches will be required to remove the surficial organic soils. Stripped vegetation debris should be removed from the site. Organic soils will not be suitable for use as structural fill but may be used for limited depths in nonstructural areas or for landscaping purposes.

Once clearing and stripping operations are complete, cut and fill operations can be initiated to establish desired grades. Prior to placing fill, all exposed bearing surfaces should be observed by a representative of Terra Associates, Inc. to verify soil conditions are as expected and suitable for support of new fill. Our representative may request a proofroll using heavy rubber-tired equipment to determine if any isolated soft and yielding areas are present. If excessively yielding areas are observed and they cannot be stabilized in place by compaction, the affected soils should be excavated and removed to firm bearing and grade restored with new structural fill.

If the depth of excavation to remove unstable soils beneath embankment fills and pavement subgrades is excessive, we recommend placing a geotextile fabric, such as Mirafi 500X or equivalent beneath the fill. Our experience has shown, in general, a minimum of 18 inches of a clean, granular structural fill placed and compacted over the geotextile fabric should establish a stable bearing surface.

The existing fill and possible fill soils observed in the northeastern borings composed of highly organic silt and containing inclusions of organic peat would not be suitable bearing surfaces for the support of building foundations, floor slabs, or pavements. These soils should be over-excavated to expose the underlying sand and gravel soils and restored to grade using new structural fill following the recommendations outlined below.

Our study indicates the near-surface native soils consist predominantly of silt and will be difficult to compact as structural fill when too wet or too dry. Accordingly, the ability to use these native soils from site excavations as structural fill will depend upon their moisture content and the prevailing weather conditions when site grading activities take place. Native soils that are too wet to properly compact could be dried by aeration during dry weather conditions or mixed with an additive such as lime or Portland cement to reduce and stabilize the soil's moisture content. If soil amendment products are used, additional Temporary Erosion and Sedimentation Control (TESC) BMPs will need to be implemented to mitigate potential impacts to stormwater runoff associated with possible elevated pH levels.

If grading activities are planned during the wet winter months, or if they extend into fall and winter, the owner should be prepared to import wet-weather structural fill. For this purpose, we recommend importing a granular soil that meets the following grading requirements:

U.S. Sieve Size	Percent Passing
6 inches	100
No. 4	75 maximum
No. 200	5 maximum*

*Based on the 3/4-inch fraction.

Prior to use, Terra Associates, Inc. should examine and test all materials planned to be imported to the site for use as structural fill.

Structural fill should be placed in uniform loose layers not exceeding 12 inches and compacted to a minimum of 95 percent of the soil's maximum dry density, as determined by American Society for Testing and Materials (ASTM) Test Designation D-698 (Standard Proctor). The moisture content of the soil at the time of compaction should be within two percent of its optimum, as determined by this ASTM standard. In nonstructural areas, the degree of compaction can be reduced to 90 percent.

5.3 Excavations

All excavations at the site associated with confined spaces, such as utility trenches, must be completed in accordance with local, state, and federal requirements. Based on the Washington State Safety and Health Administration (WSHA) regulations, the existing fill soils and the medium-dense native soils would typically be classified as Type C soils.

Accordingly, for temporary excavations of more than 4 feet and less than 20 feet in depth, the side slopes in Type C soils should be sloped at an inclination of 1.5:1 (Horizontal:Vertical) or flatter. If there is insufficient room to complete the excavations in this manner, using temporary shoring to support the excavations may need to be considered. A properly designed and installed shoring trench box can be used to support utility trench excavation sidewalls.

Based on our study, groundwater seepage with volumes and flow rates sufficient to require some level of dewatering should be anticipated within excavations in the northern and southeastern portions of the site that extend deeper than about six to nine feet during the normally-dry summer and early fall months. During the winter months groundwater is expected to be near the ground surface. Excavations that are relatively shallow and do not extend more than about two feet below the water table can likely be dewatered by conventional sump-pumping procedures, along with a system of collection trenches. Deeper excavations extending into the outwash gravel with sand deposits will likely require dewatering by well points or isolated deep-pump wells. The utility subcontractor should be prepared to implement excavation dewatering by well point or deep-pump wells, as needed. This will be an especially critical consideration for any deep utility excavation.

This information is provided solely for the benefit of the owner and other design consultants and should not be construed to imply that Terra Associates, Inc. assumes responsibility for job site safety. It is understood that job site safety is the sole responsibility of the project contractor.

5.4 Foundations

The structure may be supported on conventional spread footing foundations bearing on a competent native soil subgrade or on structural fill that is placed on a competent native soil subgrade. Foundation subgrades should be prepared as recommended in Section 5.2 of this report.

The upper fine-grained soils will be easily disturbed by normal construction activity particularly when wet. Care will need to be exercised during construction to avoid excessively disturbing the subgrade. If disturbed, the material should be removed, and footings lowered to undisturbed material or grade restored with structural fill. During wet-weather conditions, to avoid disturbance, consideration should be given to protecting the foundation subgrade with a four-inch layer of crushed rock or lean mix concrete.

Perimeter foundations exposed to the weather should bear at a minimum depth of one and one-half feet below final exterior grades for frost protection. Interior foundations can be constructed at any convenient depth below the floor slab. We recommend designing foundations for a net allowable bearing capacity of 2,000 pounds per square foot (psf). For short-term loads, such as wind and seismic, a one-third increase in this allowable capacity can be used in design. With the anticipated loads and this bearing stress applied, building settlements should be less than one inch total and one-half inch differential.

For designing foundations to resist lateral loads, a base friction coefficient of .30 can be used. Passive earth pressure acting on the sides of the footings may also be considered. We recommend calculating this lateral resistance using an equivalent fluid weight of 300 pounds per cubic foot (pcf). We recommend not including the upper 12 inches of soil in this computation because they can be affected by weather or disturbed by future grading activity. This value assumes the foundations will be constructed neat against competent native soil or the excavations are backfilled with structural fill as described in Section 5.2 of this report. The recommended passive and friction values include a safety factor of 1.5.

Because the medium dense alluvial silt soils range in thickness from less than three and one-half feet in the northern portion of the site to about six to nine feet in the southern portion of the site, a single large structure that spans the north-south dimension of the site would be subject to potentially unacceptable differential settlement. In our opinion, the potential for unacceptable differential settlement resulting from this condition could be mitigated by stiffening foundation elements. The potential for unacceptable differential settlement would be significantly reduced or eliminated if site development consists of two or more smaller buildings in the north-south dimension.

5.5 Slab-on-Grade Floors

Slab-on-grade floors may be supported on a subgrade prepared as recommended in Section 5.2 of this report. Immediately below the floor slab, we recommend placing a four-inch thick capillary break layer composed of clean, coarse sand or fine gravel that has less than five percent passing the No. 200 sieve. This material will reduce the potential for upward capillary movement of water through the underlying soil and subsequent wetting of the floor slab.

The capillary break layer will not prevent moisture intrusion through the slab caused by water vapor transmission. Where moisture by vapor transmission is undesirable, such as covered floor areas, a common practice is to place a durable plastic membrane on the capillary break layer and then cover the membrane with a layer of clean sand or fine gravel to protect it from damage during construction and aid in uniform curing of the concrete slab. It should be noted, if the sand or gravel layer overlying the membrane is saturated prior to pouring the slab, it will be ineffective in assisting uniform curing of the slab and can actually serve as a water supply for moisture seeping through the slab and affecting floor coverings. Therefore, in our opinion, covering the membrane with a layer of sand or gravel should be avoided if floor slab construction occurs during the wet winter months and the layer cannot be effectively drained.

For design of the floor slab to support product loading and machinery, a subgrade modulus (k_s) of 100 pounds per cubic inch (pci) can be used.

5.6 Lateral Earth Pressures for Below-Grade Walls

The magnitude of earth pressures developing on below-grade walls will depend upon the quality and compaction of the wall backfill. We recommend placing and compacting wall backfill as structural fill, as described in Section 5.2 of this report. To prevent overstressing the walls during backfilling, heavy construction machinery should not be operated within five feet of the wall. Wall backfill in this zone should be compacted with hand-operated equipment. To prevent hydrostatic pressure development, wall drainage must also be installed. A typical wall drainage detail is shown on Figure 3.

With wall backfill placed and compacted as recommended, and drainage properly installed, we recommend designing unrestrained walls for an active earth pressure equivalent to a fluid weighing 35 pounds per cubic foot (pcf). For restrained walls, an additional uniform load of 100 psf should be added to the 35 pcf. To account for typical traffic surcharge loading, the walls can be designed for an additional imaginary height of two feet (two-foot soil surcharge).

For evaluation of wall performance under seismic loading, a uniform pressure equivalent to 8H psf, where H is the height of the below-grade portion of the wall should be applied in addition to the static lateral earth pressure. These values assume a horizontal backfill condition and that no other surcharge loading, sloping embankments, or adjacent buildings will act on the wall. If such conditions exist, then the imposed loading must be included in the wall design. Friction at the base of foundations and passive earth pressure will provide resistance to these lateral loads. Values for these parameters are provided in Section 5.4 of this report.

5.7 Stormwater Facilities

Based on the SEPA and Site Plan Review plans prepared by AHBL four detention ponds are planned for the project. All four ponds have a bottom elevation of 171.5 feet and will be constructed by excavating below current site grades.

It is possible that pockets of sandy soils, as well as pockets of organic peat or wood waste, may be exposed within the pond area. Therefore, it may be necessary to line the dead storage portion of the pond for water quality purposes depending on the final grades and exposed soils.

The bottom elevation of detention ponds #1 and #2 will extend below the seasonal high groundwater level. In order to maintain the live storage for the ponds we recommend installing an interceptor trench around the entire pond. The drains should be installed with a maximum pipe invert equivalent to one foot below the lowest pond elevation. A recommended interceptor drain detail is attached as Figure 4. Cleanouts should be placed at 100-foot intervals and at bends in the pipe system.

Due to the exposure to fluctuating stored water levels and wave action, soils exposed on the interior side slopes of the ponds may be subject to some risk of periodic shallow instability or sloughing. Establishing interior slopes at a 3:1 gradient will significantly reduce or eliminate this potential. Exterior berm slopes and interior slopes above the maximum water surface should be graded to a finished inclination no steeper than 2:1. Finished slope faces should be thoroughly compacted and vegetated to guard against erosion.

We should review the stormwater plans when they are completed and revise our recommendations, if required.

5.8 Infiltration Feasibility

Due to the low hydraulic conductivity of the fine-grained alluvial soils and the potential for seasonal fluctuations of groundwater levels indicated by mottling and iron-oxide staining, it is our opinion that the use of onsite infiltration to manage site stormwater will not be feasible. Additionally, the native silt soils are not favorable for the use of low impact development (LID) natural drainage practices (NDPs).

5.9 Drainage

Surface

Final exterior grades should promote free and positive drainage away from the building area. We recommend providing a positive drainage gradient away from the building perimeter. If a positive gradient cannot be provided, provisions for collection and disposal of surface water adjacent to the structure should be made.

Surface water from developed areas must not be allowed to flow in an uncontrolled and concentrated manner over the crests of site slopes and embankments. Surface water should be directed away from the slope crests to a point of collection and controlled discharge. If site grades do not allow for directing surface water away from the slopes, then the water should be collected and tightlined to an approved point of controlled discharge.

Subsurface

We recommend installing a continuous drain along the outside lower edge of the perimeter building foundations. The drains can be laid to grade at an invert elevation equivalent to the bottom of footing grade. The drains can consist of four-inch diameter perforated PVC pipe that is enveloped in washed half- to three-quarter-inch gravel-sized drainage aggregate. The aggregate should extend six inches above and to the sides of the pipe.

The foundation drains and roof downspouts should be tightlined separately to an approved point of controlled discharge. All drains should be provided with cleanouts at easily accessible locations. These cleanouts should be serviced at least once each year.

Depending upon finish grades near Pond #1 and #2 where groundwater levels are highest, the seasonal-high groundwater table may require installation of a system of shallow subsurface drains to prevent impacts to the pavement subgrade and groundwater flooding. The drains should be installed with a maximum pipe invert equivalent to three feet below the lowest pavement elevation adjacent to the buildings. A recommended interceptor drain detail is attached as Figure 4. Cleanouts should be placed at 100-foot intervals and at bends in the pipe system.

5.10 Utilities

Utility pipes should be bedded and backfilled in accordance with American Public Works Association (APWA) or local jurisdictional requirements. At minimum, trench backfill should be placed and compacted as structural fill, as described in Section 5.2 of this report. As noted, the native soils are extremely moisture sensitive and will require careful control of moisture to facilitate proper compaction. If utility construction takes place during the winter or if it is not feasible to properly moisture condition the excavated soil at the time of construction, it may be necessary to import suitable wet-weather fill for utility trench backfilling.

5.11 Pavements

Pavements should be constructed on subgrades prepared as recommended in Section 5.2 of this report. Regardless of the degree of relative compaction achieved, the subgrade must be firm and relatively unyielding before paving. Proofrolling the subgrade with heavy construction equipment should be completed to verify this condition.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. We expect traffic at the facility will consist of cars and light trucks, along with heavy traffic in the form of tractor-trailer-rigs. For design considerations, we have assumed traffic in parking and in car/light truck access pavement areas can be represented by an 18-kip Equivalent Single Axle Loading (ESAL) of 50,000 over a 20-year design life. For heavy traffic pavement areas, we have assumed an ESAL of 300,000 would be representative of the expected loading. These ESALs represent loading approximately equivalent to 3 and 18, loaded (80,000-pound GVW) tractor-trailer rigs traversing the pavement daily in each area, respectively.

With a stable subgrade prepared as recommended for the design ESAL values, we recommend the following pavement sections:

Light Traffic/Car Access:

- two inches of hot mix asphalt (HMA) over six inches of crushed rock base (CRB).
- four inches full depth HMA.

Heavy Traffic/Truck Access:

- eight inches of HMA over six inches of CRB.
- six inches full depth HMA.

For exterior Portland cement concrete (PCC) pavement, we recommend the following:

- six inches of PCC over two inches of CRB.
    - 28-day compressive strength – 4,000 psi.
    - Control joints spaced at a maximum of 15 feet.

Soil cement stabilization or constructing a soil cement base for support of the pavement section can also be considered as an alternative to the above conventional pavement sections. Assuming a properly constructed soil cement base having a minimum thickness of 12 inches and a minimum 7-day compressive strength of 100 pounds per square inch (psi), the following pavement sections are recommended:

Light Traffic/Car Access:

- 2 inches of HMA over 12 inches of soil cement base (SCB).

Heavy Traffic/Truck Access:

- 3 inches of HMA over 12 inches of SCB.
- 6 inches of PCC over 12 inches of SCB.

The design of the soil cement base should be completed using samples of the subgrade exposed at the time of construction.

The paving materials used should conform to the Washington State Department of Transportation (WSDOT) specifications for ½-inch class HMA and CRB.

Long-term pavement performance will depend upon surface drainage. A poorly-drained pavement section will be subject to premature failure as a result of surface water infiltrating into the subgrade soils and reducing their supporting capability. For optimum pavement performance, we recommend surface drainage gradients of at least two percent. Some degree of longitudinal and transverse cracking of the pavement surface should be expected over time. Regular maintenance should be planned to seal cracks when they occur.

6.0 ADDITIONAL SERVICES

Terra Associates, Inc. should review the final designs and specifications in order to verify that earthwork and foundation recommendations have been properly interpreted and implemented in project design. We should also provide geotechnical services during construction in order to observe compliance with our design concepts, specifications, and recommendations. This will allow for design changes if subsurface conditions differ from those anticipated prior to the start of construction.

7.0 LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. This report is the copyrighted property of Terra Associates, Inc. and is intended for specific application to the Skookumchuck Commerce Center project in Lewis County, Washington. This report is for the exclusive use of Panattoni Development Company and their authorized representatives. No other warranty, expressed or implied, is made.

The analyses and recommendations presented in this report are based on data obtained from our on-site subsurface explorations. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

REFERENCE: WSDOT GEOPORTAL

NOT TO SCALE

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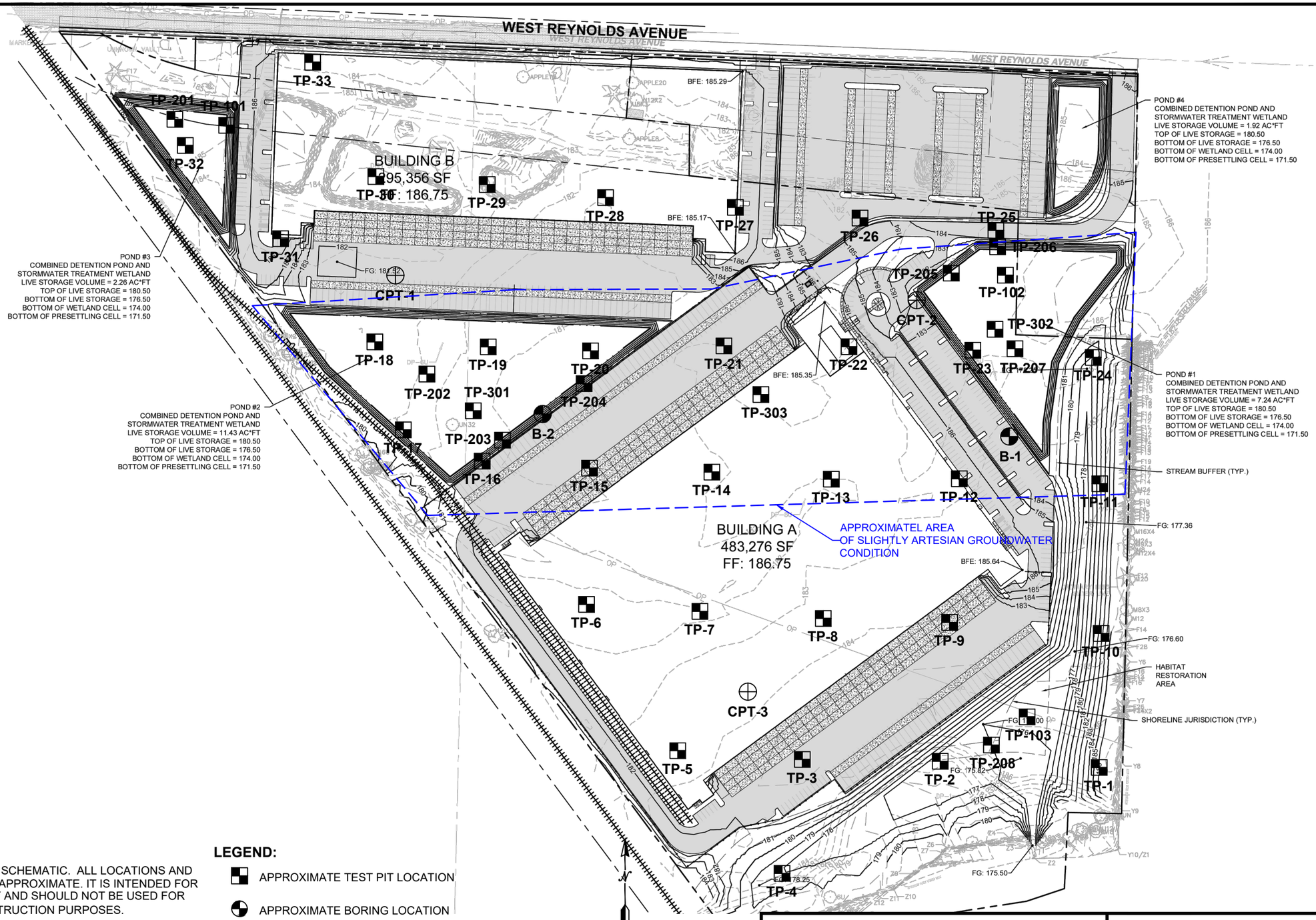
VICINITY MAP
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj. No.T-8613	Date SEPT 2023	Figure 1



NOTE:

THIS SITE PLAN IS SCHEMATIC. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE. IT IS INTENDED FOR REFERENCE ONLY AND SHOULD NOT BE USED FOR DESIGN OR CONSTRUCTION PURPOSES.

REFERENCE:

SITE PLAN PROVIDED BY AHBL

LEGEND:

- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE BORING LOCATION
- APPROXIMATE CPT LOCATION

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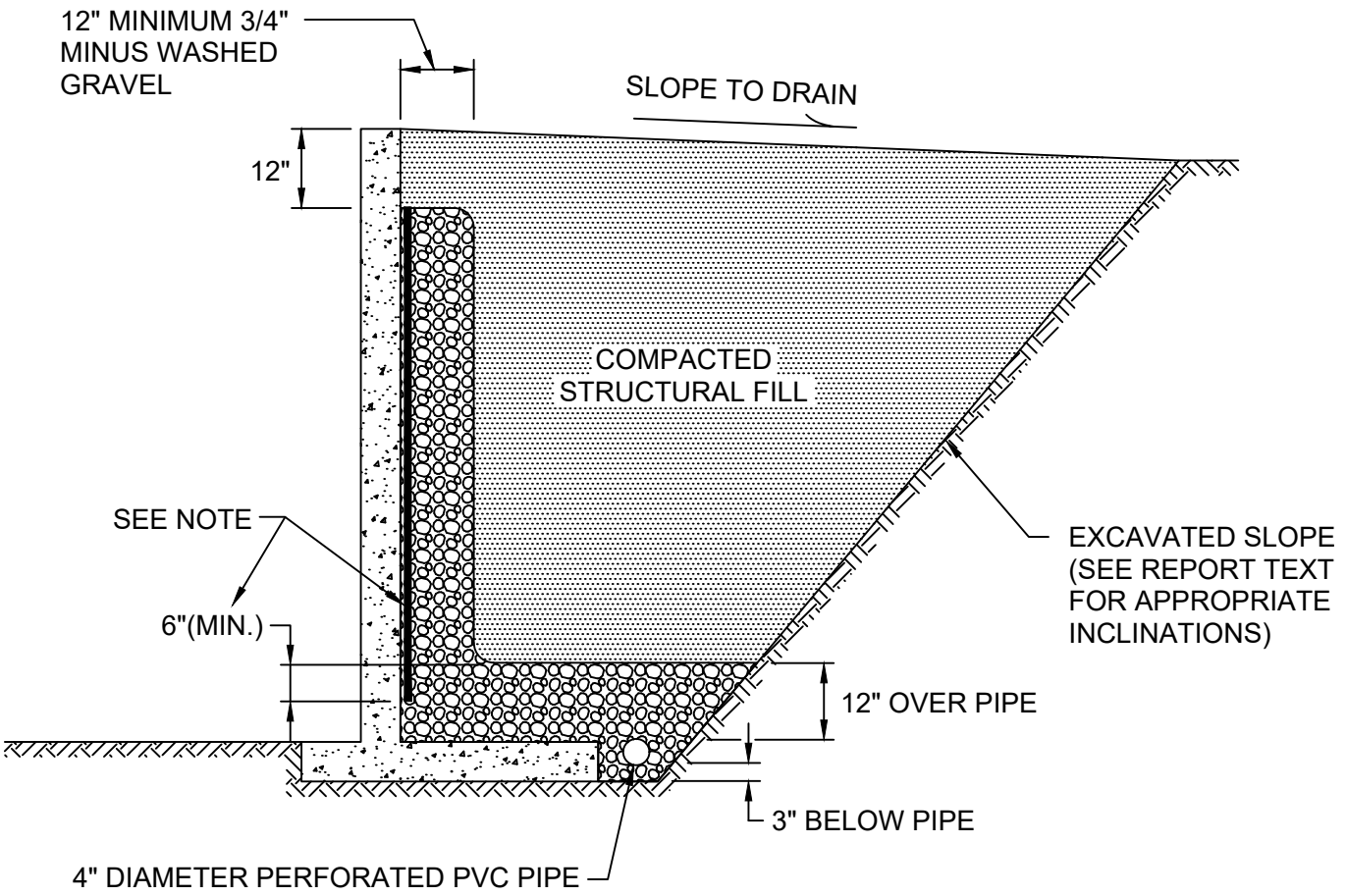
EXPLORATION LOCATION PLAN
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj. No.T-8613	Date SEPT 2023	Figure 2



NOT TO SCALE

NOTE:

MIRADRAIN G100N PREFABRICATED DRAINAGE PANELS OR SIMILAR PRODUCT CAN BE SUBSTITUTED FOR THE 12-INCH WIDE GRAVEL DRAIN BEHIND WALL. DRAINAGE PANELS SHOULD EXTEND A MINIMUM OF SIX INCHES INTO 12-INCH THICK DRAINAGE GRAVEL LAYER OVER PERFORATED DRAIN PIPE.

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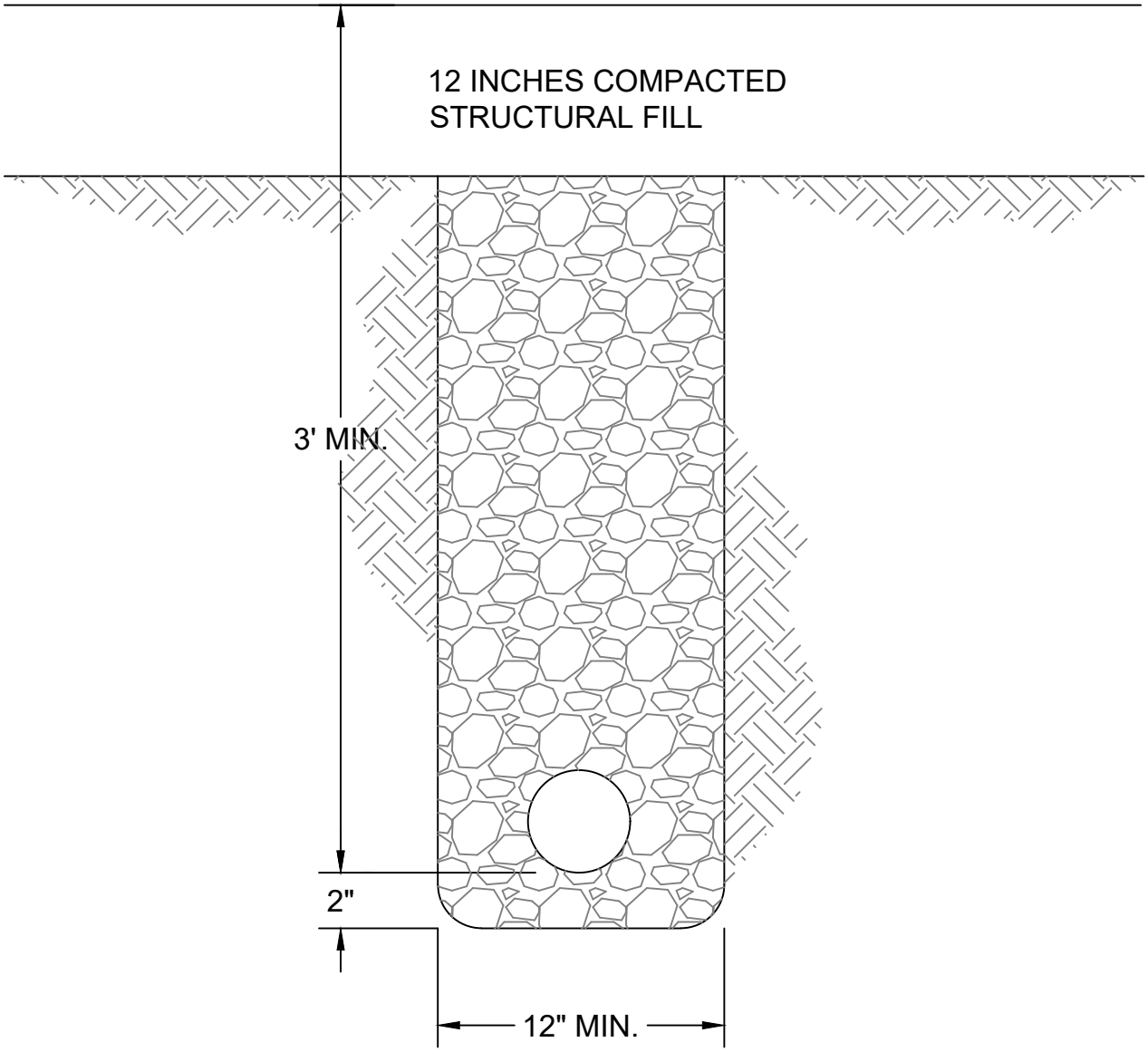
TYPICAL WALL DRAINAGE DETAIL
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj. No.T-8613	Date SEPT 2023	Figure 3



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TYPICAL INTERCEPTOR DRAIN DETAIL
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj.No. T-8613	Date:SEPT 2023	Figure 4

APPENDIX A
FIELD EXPLORATION AND LABORATORY TESTING

Skookumchuck Commerce Center
Centralia, Washington

On August 24, 2021, and August 25, 2021, we explored subsurface conditions at the site by observing soil conditions in 33 test pits excavated to maximum depths ranging between about 7 and 11 feet with a track-mounted excavator. On August 31, 2021, In-Situ Engineering, under subcontract with Terra Associates, Inc., performed 3 cone penetration tests (CPTs) to depths of approximately 3 to 13 feet below existing site grades. On September 1, 2021, we supplemented this data at two 41.5-foot-deep test borings drilled with a track-mounted drill rig using hollow-stem auger drilling methods. On December 1, 2021, we supplemented this data by excavating 3 test pits to a maximum depth of approximately 10 feet below existing site grades with a mini excavator. On October 6, 2022, we supplemented this data by excavating 8 test pits to a maximum depth of approximately 10 feet below existing site grades with a track-mounted excavator. On October 11, 2022, we supplemented this data at 4 test borings drilled to a maximum depth of approximately 20 feet below existing site grades. On February 27, 2023, we supplemented this data by excavating 3 test pits to depths of approximately 9 feet below current site grades. The subsurface exploration locations were determined in the field by sighting relative to existing surface features and the use of a hand-operated GPS unit. The subsurface exploration locations are shown on Figure 2. The Test Pit Logs and Test Boring Logs are attached as Figures A-2 through A-54.

A geologist and geotechnical engineer from our office conducted the field exploration. Our representatives classified the soil conditions encountered, maintained a log of each test pit and test boring, obtained representative soil samples, and recorded water levels observed during drilling. During drilling, soil samples were obtained in general accordance with ASTM Test Designation D-1586. Using this procedure, a 2-inch (outside diameter) split barrel sampler is driven into the ground 18 inches using a 140-pound hammer free falling from a height of 30 inches. The number of blows required to drive the sampler 12 inches after an initial 6-inch set is referred to as the Standard Penetration Resistance value or N value. This is an index related to the consistency of cohesive soils and relative density of cohesionless materials. N values obtained for each sampling interval are recorded on the Test Boring Logs, Figures A-49 through A-53. All soil samples were visually classified in accordance with the Unified Soil Classification System (USCS) described on Figure A-1.

Representative soil samples obtained from the test pits and borings were placed in sealed plastic bags and taken to our laboratory for further examination and testing. The moisture content of each sample was measured and is reported on the appropriate log. Grain size analysis were performed on eight soil samples. The test results are shown on Figures A-54 through A-60.

In Situ Engineering, under subcontract to Terra Associates, Inc., performed the CPTs at locations selected by Terra Associates, Inc. The CPT consists of pushing an instrumented, approximately one and one-half inch diameter cone into the ground at a constant rate. During advancement, continuous measurements are made of the resistance to penetration of the cone and the friction of the outer surface of a sleeve. The cone is also equipped with a porous filter and a pressure transducer for measuring the generated groundwater or pore water pressure. Measurements of tip and sleeve frictional resistance, pore pressure, and interpreted soil conditions are summarized in graphical form on the attached CPT Logs.

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS More than 50% material larger than No. 200 sieve size	**GRAVELS** More than 50% of coarse fraction is larger than No. 4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.
		Gravels with fines	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines.
	SANDS More than 50% of coarse fraction is smaller than No. 4 sieve	Clean Sands (less than 5% fines)	SW	Well-graded sands, sands with gravel, little or no fines.
			SP	Poorly-graded sands, sands with gravel, little or no fines.
		Sands with fines	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS More than 50% material smaller than No. 200 sieve size	**SILTS AND CLAYS** Liquid Limit is less than 50%		ML	Inorganic silts, rock flour, clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity. (Lean clay)
			OL	Organic silts and organic clays of low plasticity.
	SILTS AND CLAYS Liquid Limit is greater than 50%		MH	Inorganic silts, elastic.
			CH	Inorganic clays of high plasticity. (Fat clay)
			OH	Organic clays of high plasticity.
HIGHLY ORGANIC SOILS			PT	Peat.

DEFINITION OF TERMS AND SYMBOLS

COHESIONLESS

Density	Standard Penetration Resistance in Blows/Foot
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	>50

COHESIVE

Consistancy	Standard Penetration Resistance in Blows/Foot
Very Soft	0-2
Soft	2-4
Medium Stiff	4-8
Stiff	8-16
Very Stiff	16-32
Hard	>32

I	2" OUTSIDE DIAMETER SPILT SPOON SAMPLER
‖	2.4" INSIDE DIAMETER RING SAMPLER OR SHELBY TUBE SAMPLER
▼	WATER LEVEL (Date)
Tr	TORVANE READINGS, tsf
Pp	PENETROMETER READING, tsf
DD	DRY DENSITY, pounds per cubic foot
LL	LIQUID LIMIT, percent
PI	PLASTIC INDEX
N	STANDARD PENETRATION, blows per foot

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UNIFIED SOIL CLASSIFICATION SYSTEM
SKOOKUMCHUCK COMMERCE CENTER
LEWIS COUNTY, WASHINGTON

Proj. No.T-8613	Date SEPT 2023	Figure A-1

LOG OF TEST PIT NO. 1

FIGURE A-2

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** N A

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2 feet), numerous iron-oxide stained specks and pockets. (ML)		
2	1			20.7
3			Medium Dense	
4				
5				
6		Brown silty SAND with gravel to silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist, numerous cobbles. (SM/GM)		
7	2			10.8
8			Dense	
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 2

FIGURE A-3

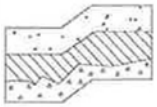
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2 feet), numerous iron-oxide stained specks and pockets. (ML)		
2			Medium Dense	
3				
4				
5	1			20.2
6		Brown SAND with silt to silty SAND, fine grained, moist. (SP-SM/SM)		
7			Medium Dense	
8				
9	2	Brown GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, moist to wet, scattered cobbles. (GW/GW-GM)	Dense	14.6
10	3			6.3
11		Test pit terminated at 10 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 3

FIGURE A-4

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2 feet), numerous iron-oxide stained specks and pockets. (ML)		
2			Medium Dense	
3				
4				
5		Brown sandy SILT with gravel to silty SAND with gravel, fine sand, fine to coarse gravel, moist to wet, numerous cobbles below 6 feet. (ML/SM)		
6				
7		Brown silty SAND with gravel to silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist to wet, numerous cobbles, decreasing silt content with depth. (SM/GM)	Dense	
8				
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 4

FIGURE A-5

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil		
1		Brown SILT to sandy SILT, fine sand, dry (moist below 2 feet). (ML)		
2				
3				
4			Medium Dense	
5				
6				
7				
8				
9				
10	1	Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, wet, numerous cobbles. (SM)	Dense	20.5
11		Test pit terminated at 10.5 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 5

FIGURE A-6

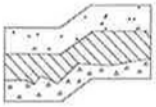
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown sandy SILT, fine sand, trace of fine to coarse gravel, dry (moist below 2 feet). (ML)		
2	1		Medium Dense	15.0
3				
4		Brown sandy SILT with gravel to silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, scattered cobbles. (ML/SM)		
5			Medium Dense to Dense	
6				
7		Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist (wet below 9 feet), scattered cobbles. (SM)		
8			Dense	
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 6

FIGURE A-7

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown to gray-brown SILT, dry (moist below 2 feet), mottled below 2 feet. (ML)		
2			Medium Dense	
3		Brown sandy SILT, fine sand, trace of fine to coarse gravel, moist. (ML)		
4				
5		Brown sandy SILT with gravel to silty SAND with gravel, fine sand, fine to coarse gravel, moist, scattered cobbles. (ML/SM)		
6	1			9.8
7		Brown silty SAND with gravel to SAND with silt and gravel, fine to coarse sand, fine to coarse gravel, moist, scattered cobbles. (SM/SP-SM)	Dense	
8				
9				
10		Test pit terminated at 9.5 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 7

FIGURE A-8

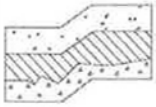
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown SILT with sand to sandy SILT, fine sand, scattered fine to coarse gravel, dry (moist below 3 feet). (ML)		
2			Medium Dense	
3				
4		Brown sandy SILT with gravel, fine sand, fine to coarse gravel, moist, scattered cobbles below 5 feet. (ML)		
5				
6		Brown silty SAND with gravel to silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, moist, weakly cemented, scattered cobbles. (SM/GM)	Dense	
7				
8		Test pit terminated at 8 feet. No groundwater seepage.		
9				
10				
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 8

FIGURE A-9

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT to sandy SILT, fine sand, dry (moist below 2 feet). (ML)		
2				
3			Medium Dense	
4				
5		Brown silty SAND, fine grained, moist. (SM)		
6	1	Brown silty SAND with gravel to silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist, scattered cobbles. (SM/GM)		16.1
7				
8		Brown SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist, scattered cobbles. (SP-SM)	Dense	
9	2			8.4
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 9

FIGURE A-10

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry. (ML)		
2		Brown sandy SILT to silty SAND, fine sand, trace of fine to coarse gravel, moist. (ML/SM)	Medium Dense	
3				
4				
5				
6	1	Brown silty SAND with gravel to SAND with silt and gravel, fine sand, fine to coarse gravel, moist, scattered cobbles. (SM/SP-SM)		21.0
7			Medium Dense to Dense	
8				
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 10

FIGURE A-11

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0	1	5 inches Sod and Topsoil. Brown SILT, dry (moist below 2 feet). (ML)	Medium Dense	29.9
5		Brown silty SAND with gravel, fine to medium sand (grades fine to coarse below 9 feet), fine to coarse gravel, moist (moist to wet below 8 feet), scattered cobbles. (SM)	Medium Dense to Dense	
10		Test pit terminated at 10 feet. No groundwater seepage.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 11

FIGURE A-12

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 3 feet), scattered mottling below 3 feet. (ML)		
2				
3			Medium Dense	
4				
5				
6				
7	1			38.3
8		Gray clayey SILT, moist. (ML) Pp=1.5 tons/sf	Stiff	
9	2			43.8
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 12

FIGURE A-13

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** 8 FT

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0–7		6 inches Sod and Topsoil. Brown to gray-brown SILT, dry (moist below 2 feet), numerous iron-oxide stained pockets below 2 feet. (ML)	Medium Dense	
8–9		Brown SAND with silt and gravel to GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist (localized wet pockets), scattered cobbles. (SP-SM/GP-GM)	Medium Dense to Dense	
10–12		Test pit terminated at 9.5 feet. No groundwater seepage. Minor caving below 8 feet.		

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 13

FIGURE A-14

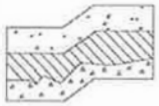
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2.5 feet), scattered iron-oxide stained pockets. (ML)		
2				
3			Medium Dense	
4				
5				
6				
7	1	Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, scattered cobbles. (SM)	Medium Dense to Dense	15.0
8				
9	2	Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, scattered cobbles. (SM)	Dense	12.3
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 14

FIGURE A-15

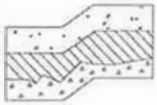
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 3.5 feet), numerous iron-oxide stained pockets. (ML)		
2				
3	1		Medium Dense	19.1
4				
5	2			35.2
6				
7		Brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist, scattered cobbles, 1-foot diameter boulder at 9 feet. (SM)	Dense	
8				
9				
10		Test pit terminated at 9.5 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 15

FIGURE A-16

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** N A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2.5 feet), numerous iron-oxide stained pockets. (ML)	Medium Dense	
7		Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist to wet, trace to scattered cobbles. (SM)	Medium Dense to Dense	
10		Test pit terminated at 9.5 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 16

FIGURE A-17

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 24, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2.5 feet), numerous iron-oxide stained pockets. (ML)		
2				
3			Medium Dense	
4				
5				
6				
7		Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist to wet, trace to scattered cobbles. (SM)		
8			Medium Dense to Dense	
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 17

FIGURE A-18

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Fill: Dark brown sandy SILT with gravel, fine to medium sand, fine to coarse gravel, moist, scattered cobbles. (ML)	Medium Dense	
2				
3	1	Dark gray to gray SILT to slightly clayey SILT, moist. (ML) Pp=4.5 tons/sf	Medium Dense / Very Stiff	36.0
4				
5				
6				
7				
8	2	Gray silty SAND, fine grained, moist. (SM)	Medium Dense	25.8
9				
10	3	Gray-brown SAND with silt and gravel to GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist, trace of cobbles. (SP-SM/GP-GM)	Medium Dense to Dense	20.3
11		Test pit terminated at 10.5 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 18

FIGURE A-19

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		2 inches Sod and Topsoil.		
1		Fill: Dark brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry. (GM)	Medium Dense	
2				
3		Fill: Gray SAND with gravel, fine to medium sand, fine to coarse gravel, moist. (SP)	Medium Dense to Dense	
4		Fill: Dark brown organic sandy SILT with gravel, fine sand, fine to coarse gravel, moist, scattered wood debris. (OL)		
5	1	Dark gray-brown sandy SILT with gravel, fine sand, fine to coarse gravel, moist. (ML) (Possible fill/disturbed)		24.4
6		Gray silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist, scattered iron-oxide stained pockets, trace of cobbles. (GM)	Dense	
7	2			17.2
8				
9				
10		Test pit terminated at 9.5 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 19

FIGURE A-20

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown to gray SILT, dry (moist below 2 feet), numerous iron-oxide stained pockets. (ML)		
2				
3				
4			Medium Dense	
5				
6				
7		Gray sandy SILT to silty SAND, fine grained, moist. (ML/SM)		
8				
9		Gray-brown GRAVEL with silt and sand to SAND with silt and gravel, fine to coarse gravel, fine to coarse sand, wet, numerous cobbles, trace of 1-foot diameter boulders. (GP-GM/SP-SM)	Dense	
10	1			12.9
11		Test pit terminated at 10 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 20

FIGURE A-21

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		8 inches Sod and Topsoil.		
1		Brown to gray-brown SILT, dry (moist below 2 feet), numerous iron-oxide stained pockets. (ML)		
2				
3				
4			Medium Dense	
5				
6				
7		Gray-brown to brown silty SAND to sandy SILT, fine grained, moist to wet, scattered fine- to medium-grained sand pockets. (SM/ML)		
8				
9		Gray-brown GRAVEL with silt and sand to SAND with silt and gravel, fine to coarse gravel, fine to coarse sand, wet, numerous cobbles, trace of 1-foot diameter boulders. (GP-GM/SP-SM)	Dense	
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 21

FIGURE A-22

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 8.5 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		8 inches Sod and Topsoil.		
1		Brown to gray-brown SILT, dry (moist below 2 feet), numerous iron-oxide stained pockets. (ML)		
2				
3			Medium Dense	
4				
5				
6		Gray clayey SILT to silty CLAY, moist, trace of fine to medium sand. (ML/CL) Pp= 3.5 tons/sf	Very Stiff	
7		Gray-brown GRAVEL with silt and sand to silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet, scattered cobbles. (GP-GM/GM)		
8 ▼			Medium Dense to Dense	
9				
10		Test pit terminated at 9.5 feet. Moderate groundwater seepage below 8.5 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 22

FIGURE A-23

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 8.5 ft **DEPTH TO CAVING:** N A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		7 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2.5 feet), numerous iron-oxide stained pockets. (ML)		
2	1			22.6
3				
4			Medium Dense	
5		- Grades to fine sandy silt below 4.5 feet.		
6				
7				
8		Brown silty SAND with gravel, fine sand, fine to coarse gravel, wet. (SM)		
▼		Brown GRAVEL with silt and sand to silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet, scattered cobbles. (GP-GM/GM)	Medium Dense to Dense	
9				
10		Test pit terminated at 9.5 feet. Moderate groundwater seepage below 8.5 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 23

FIGURE A-24

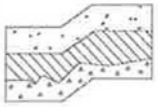
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** N A **DEPTH TO CAVING:** N A

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		5 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2 feet). (ML)		
2			Medium Dense	
3				
4				
5	1	Gray-brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist, scattered iron-oxide stained pockets, trace of cobbles. (GM)	Medium Dense to Dense	15.8
6				
7		Gray-brown SAND with silt and gravel, fine to medium sand, fine to coarse gravel, moist to wet. (SP-SM)	Medium Dense	
8				
9		Gray-brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet, scattered iron-oxide stained pockets, trace of cobbles. (GM)	Medium Dense to Dense	
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 24

FIGURE A-25

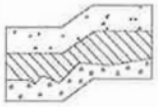
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Brown SILT, dry (moist below 2.5 feet), numerous iron-oxide stained pockets. (ML)	Medium Dense	
2				
3				
4		Gray-brown silty GRAVEL with sand, fine to coarse gravel, fine to medium sand, moist, numerous iron-oxide stained pockets, scattered cobbles. (GM)		
5	1		Dense	10.3
6				
7		Gray SILT, moist to wet, numerous iron-oxide stained pockets. (ML)		
	2			32.2
8		Brown SAND with silt and gravel, fine to coarse sand, fine to coarse gravel, moist to wet, scattered gray silt layers below 10 feet. (SP-SM)		
9	3		Medium Dense	30.3
10				
11		Test pit terminated at 11 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 25

FIGURE A-26

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 9 ft **DEPTH TO CAVING:** 9 ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		6 inches Sod and Topsoil.		
1		Dark brown sandy SILT with gravel, fine sand, fine to coarse gravel, dry. (ML)	Medium Dense	
2	1	Dark gray-brown to brown silty GRAVEL with sand, fine to coarse gravel, fine to medium sand, moist, numerous iron-oxide stained pockets. (GM)	Dense to Very Dense	14.6
5	2	Gray-brown silty SAND to SAND with silt, fine grained, moist (wet below 7 feet). (SM/SP-SM)	Medium Dense	28.2
▼ 9	3			41.3
11		Test pit terminated at 11 feet. Moderate groundwater seepage below 9 feet. Moderate caving below 9 feet.		
13				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 26

FIGURE A-27

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 6 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		2 inches Sod.		
1		Black SILT, dry. (ML)	Medium Dense	
2		Brown SILT, dry to moist. (ML)		
3				
4		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist (wet below 6 feet), numerous iron-oxide stained pockets, numerous cobbles. (GM)		
5	1		Dense	11.0
▼ 6				
7		Test pit terminated at 7 feet due to excavation difficulty in large cobbles. Moderate groundwater seepage below 6 feet.		
8				
9				
10				
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 27

FIGURE A-28

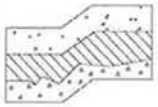
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 6.5ft **DEPTH TO CAVING:** 3.5ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		4 inches Sod.		
1		Dark brown SILT, dry. (ML)	Medium Dense	
2		Brown to gray-brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist (wet below 6 feet), numerous iron-oxide stained pockets, scattered cobbles. (GM)		
3				
4				
5			Dense to Very Dense	
6				
▼		- Numerous cobbles and trace of 1- to 1.5-foot diameter boulders below 6.5 feet.		
7				
8		Test pit terminated at 8 feet.		
		Heavy groundwater seepage below 6.5 feet.		
9		Minor caning below 3.5 feet.		
10				
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 28

FIGURE A-29

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** J C S

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** 6.5 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		2 inches Sod and Topsoil.		
1		Dark brown to gray-brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry to moist (wet below 6.5 feet), scattered cobbles, trace of 1-foot diameter boulders. (GM)		
2				
3				
4	1	- Numerous iron-oxide stained pockets below 3.5 feet,	Medium Dense to Dense	10.0
5				
6				
▼				
7				
8		Test pit terminated at 8 feet due to groundwater. Heavy groundwater seepage below 6.5 feet.		
9				
10				
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 29

FIGURE A-30

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Bare **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		Fill/Disturbed: Black silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry to moist, numerous cobbles, scattered wood debris. (GM)		
3		Brown silty GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, moist (wet below 8 feet), scattered cobbles. (GM/GW-GM)	Dense	
5	1			13.4
9		Test pit terminated at 9 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 30

FIGURE A-31

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Bare **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0	1	Black sandy SILT with gravel, fine sand, fine to coarse gravel, dry to moist. (ML) (Possible fill/disturbed)	Medium Dense to Dense	18.2
3	2	Gray-brown GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, moist, scattered cobbles. (GP/GP-GM)	Medium Dense	5.5
6		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist, numerous cobbles. (GM)	Dense	
9		Test pit terminated at 9 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 31

FIGURE A-32

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Bare **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		Dark brown silty GRAVEL with sand, fine to coarse gravel, fine to medium sand, dry, scattered cobbles. (GM)	Dense to Very Dense	
3		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry to moist, scattered cobbles. (GM)		
5		- Numerous cobbles and trace of 1- to 1.5-foot diameter boulders below 5 feet.	Dense	
7		- Wet below 7 feet.		
9	1			22.3
		Test pit terminated at 9 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 32

FIGURE A-33

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		8 inches Sod and Topsoil.		
1		Fill: Dark brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry, scattered organics. (GM)		
2		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry, numerous cobbles. (GM)	Medium Dense	
3				
4				
5		Brown GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, moist, numerous cobbles. (GP-GM)		
6				
7		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet, numerous cobbles. (GM)	Dense	
8				
9				
10		Test pit terminated at 10 feet. No groundwater seepage.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 33

FIGURE A-34

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** JCS

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Bare **APPROX. ELEV:** NA

DATE LOGGED: August 25, 2021 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, dry, numerous cobbles. (GM)		
4		Brown GRAVEL with silt and sand to GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist, numerous cobbles. (GP-GM/GP)	Dense	
6		Brown silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, moist (wet below 7 feet), numerous cobbles. (GM)		
9		Test pit terminated at 9 feet. No groundwater seepage.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 101

FIGURE A-35

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Exposed Soil **APPROX. ELEV:** NA

DATE LOGGED: December 1, 2021 **DEPTH TO GROUNDWATER:** 9 ft **DEPTH TO CAVING:** 5 to 9 ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		FILL: Gray and black silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist, trace cobbles. (GM)	dense	16.0
2				
3				4.8
4		Brown GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist to wet, scattered cobbles. (GP-GM)	medium dense	
5				
6				
7				9.6
8				
▼ 9				16.6
10		Brown SAND with silt and gravel, fine to coarse sand, fine to coarse gravel, wet, trace cobbles. (SP-SM)		13.5
11		Test Pit terminated at approximately 10 feet. Moderate groundwater seepage observed at approximately 9 feet. Minor caving observed from approximately 5 to 9 feet.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 102

FIGURE A-36

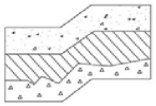
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: December 1, 2021 **DEPTH TO GROUNDWATER:** 5 ft, 9 ft **DEPTH TO CAVING:** 6 to 10 ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(7-inches organic TOPSOIL)		
1		Brown silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist to wet, mottled. (GM)		19.0
2				
3				
4				
5 ▼		Grayish-brown silty SAND with gravel, fine to medium sand, fine to coarse gravel, moist to wet, mottled. (SM)	medium dense	18.9
6				
7				
8				
9 ▼		Brownish-gray SAND, fine to medium sand, wet. (SP)		
10				32.4
		Test Pit terminated at approximately 10 feet. Moderate perched groundwater seepage observed at approximately 5 feet. Moderate groundwater seepage observed at approximately 9 feet. Minor caving observed below approximately 6 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 103

FIGURE A-37

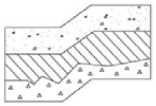
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: December 1, 2021 **DEPTH TO GROUNDWATER:** 9 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(8-inches organic TOPSOIL)		
1		Brown SILT, moist, occasional rootlet, occasional woody debris. (ML)		30.7
2				
3			medium stiff	
4				
5				
6				
7				23.3
		Brown silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, moist to wet, trace cobbles. (GM)		
8			medium dense	
▼ 9				
10				11.3
		Test Pit terminated at approximately 10 feet. Moderate groundwater seepage observed at approximately 9 feet. No caving observed.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 201

FIGURE A-38

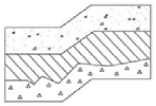
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Tall Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(6-inches organic TOPSOIL) Dark gray silty GRAVEL with sand, fine to medium sand, fine to coarse gravel, dry, scattered cobbles, scattered rootlets. (GM)		7.0
2				
3		Brown GRAVEL with sand, fine to coarse sand, fine to coarse gravel, moist, numerous cobbles. (GP)		3.8
4				
5			Medium Dense	
6		Brown GRAVEL, fine to coarse gravel, moist, numerous cobbles, trace sand. (GP)		5.5
7				
8				
9				
10		Brown silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet, numerous cobbles. (GM)		11.2
11		Test Pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 202

FIGURE A-39

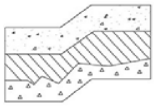
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Tall Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(6-inches organic TOPSOIL) Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, scattered cobbles, trace rootlets, occasional organic inclusion. (SM)	Medium Dense	15.9
2				
3				31.6
4		Brownish-gray SILT, moist, mottled, trace sand. (ML)	Stiff	
5				
6				34.7
7			Very Stiff	
8				
9				
10		Gray sandy SILT, fine to medium sand, moist to wet, mottled. (ML)	Stiff	33.2
11		Test Pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 203

FIGURE A-40

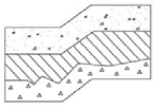
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(5-inches organic TOPOIL)		
1		Dark brown SILT, dry, trace rootlets. (ML)	Medium Stiff	22.5
2				32.2
		Brownish-gray SILT, moist, mottled, trace sand. (ML)		
3				
4				
5			Stiff	
6				
7				
8				8.1
		Brown GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist to wet, scattered cobbles. (GP-GM)		
9			Medium Dense	
10				11.4
		Test Pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 204

FIGURE A-41

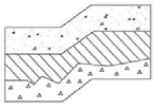
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(5-inches organic TOPSOIL)		
1		Dark brown SILT, dry, trace rootlets. (ML)	Medium Stiff	23.0
2				21.8
		Brownish-gray SILT, dry to moist, mottled, trace sand. (ML)		
3				
4			Stiff	
5				
6				
7				9.6
		Brown GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist to wet, trace cobbles. (GP-GM)		
8				
9			Medium Dense	
10				15.8
		Test Pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 205

FIGURE A-42

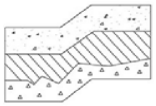
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** 7 ft **DEPTH TO CAVING:** 7 to 10 ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(8-inches organic TOPSOIL)		
1		Dark brown silty GRAVEL, fine to coarse gravel, dry, trace sand, trace rootlets. (GM)	Medium Dense	20.7
2				11.3
		Brown silty GRAVEL, fine to coarse gravel, dry to moist, scattered cobbles, trace sand. (GM)		
3				
4			Medium Dense to Dense	
5				
6				
7 ▼				35.9
		Brown silty SAND, fine sand, wet, interbedded silt layers. (SM)		
8				
9			Medium Dense	
10				32.4
		Test Pit terminated at approximately 10 feet. Light groundwater seepage observed at approximately 7 feet. Minor caving observed below approximately 7 feet. 2-inch diameter PVC piezometer installed to 10 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. 206

FIGURE A-43

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** 10 ft **DEPTH TO CAVING:** 8 to 10 ft

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(9-inches organic TOPSOIL)		
1		Brown silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, dry to moist, mottled, trace cobbles. (GM)		12.9
2				
3				
4			Medium Dense to Dense	
5				
6				
7				
8				33.2
		Brown silty SAND, fine sand, wet, interbedded silt layers. (SM)		
9			Medium Dense	
10				37.6
		Test Pit terminated at approximately 10 feet. Light groundwater seepage observed at approximately 10 feet. Minor caving observed below approximately 8 feet. 2-inch diameter PVC piezometer installed to 10 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 207

FIGURE A-44

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** 8 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1		(5-inches organic TOPSOIL) Dark brown SILT, dry, trace rootlets. (ML)	Medium Stiff	27.4
2				
3		Brownish-gray SILT, dry to moist, mottled, trace sand, trace rootlets. (ML)	Stiff	29.2
4		Gray GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, mosit to wet, mottled, numerous cobbles. (GP-GM)	Medium Dense	7.0
5				
6				
7				
8 ▼				
9				
10		Test Pit terminated at approximately 10 feet. Light groundwater seepage observed at approximately 8 feet. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		24.4
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. 208

FIGURE A-45

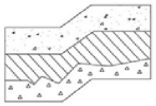
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MJX

LOCATION: Lewis County, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: October 6, 2022 **DEPTH TO GROUNDWATER:** NA **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
		(6-inches organic TOPSOIL)		
1		Brownish-gray SILT, dry to moist, mottled, trace sand, occasional rootlet. (ML)		24.6
2				
3				
4			Stiff	
5				
6				
7				
8				27.0
		Brown SAND with silt, fine to coarse sand, moist. (SP-SM)	Medium Dense	
9				
10				14.7
		Test Pit terminated at approximately 10 feet. No groundwater seepage observed. No caving observed. 2-inch diameter PVC piezometer installed to 10 feet.		
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. TP-301

FIGURE A-46

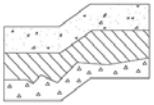
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MMH

LOCATION: Centralia, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: February 27, 2023 **DEPTH TO GROUNDWATER:** 3.5, 5, 6.5, 7.5 ft **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
1	1	(12-inches TOPSOIL)		37.0
		Brown to gray SILT with SAND, fine sand, moist to wet, oxidized, mottled. (ML)		
2	2			34.9
3				
4	3		Medium Stiff	37.3
5				
6				
7	4	* Trace gravel observed at approximately 7 feet.		35.6
8		Brown sandy GRAVEL with silt to gravelly sand with silt, fine to coarse sand, fine to coarse gravel, wet. (GP-GM to SP-SM)	Dense	
9	5			25.3
		Test Pit terminated at approximately 9 feet. Light groundwater observed at approximately 3.5 feet. Moderate groundwater observed at approximately 5 and 6.5 feet. Heavy groundwater observed at approximately 7.5 feet. No caving observed. Test pit was left open for approximately 2 hours. After 2 hours groundwater was observed at approximately 3 feet below grade.		
10				
11				
12				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF TEST PIT NO. TP-302

FIGURE A-47

PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MMH

LOCATION: Centralia, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: February 27, 2023 **DEPTH TO GROUNDWATER:** ~5.5 Feet **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
	1	(12-inches TOPSOIL)		38.2
1		Brown silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, moist, numerous cobbles. (GM)		
	2			29.2
2				
			Medium Dense	
3				
4	3			23.4
5				
▼	4			18.0
6		Brown SAND with gravel, fine to coarse sand, fine to coarse gravel, moist, trace silt. (SW)		
			Dense	
7				
8	5			20.6
		Test Pit terminated at approximately 8 feet. Light to moderate groundwater observed at approximately 5.5 feet. No caving observed. Test pit was left open for approximately 1.5 hours. After 1.5 hours groundwater was observed at approximately 6.5 feet below grade.		
9				
10				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.

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LOG OF TEST PIT NO. TP-303

FIGURE A-48

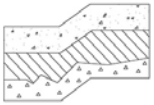
PROJECT NAME: Skookumchuck Commerce Center **PROJ. NO:** T-8613 **LOGGED BY:** MMH

LOCATION: Centralia, Washington **SURFACE CONDITIONS:** Grass **APPROX. ELEV:** NA

DATE LOGGED: February 27, 2023 **DEPTH TO GROUNDWATER:** ~5, 6, 7 Feet **DEPTH TO CAVING:** NA

Depth (ft)	Sample No.	Description	Consistency/ Relative Density	W (%)
0				
	1	(12-inches TOPSOIL)		
		Brown to gray SILT with sand, fine sand, moist, oxidized and mottled. (ML)		36.6
1				
	2			34.9
2				
3			Medium Stiff	
4	3			38.2
5 ▼				
6 ▼				
	4	Brown silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist to wet. (SM)	Medium Dense	27.8
7 ▼				
		Brown gravelly SAND with silt, fine to coarse sand, fine to coarse gravel, wet. (SP-SM)	Dense	
8	5			25.5
		Test Pit terminated at approximately 8 feet. Moderate groundwater observed at approximately 5 feet. Heavy groundwater observed at approximately 6 and 7 feet. No caving observed. Test pit was left open for approximately 1 hour. After 1 hour groundwater was observed at approximately 4 feet below grade.		
9				
10				

NOTE: This subsurface information pertains only to this test pit location and should not be interpreted as being indicative of other locations at the site.



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LOG OF BORING NO. 1

Figure No. A-49

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:**

Client: Panattoni Development Co **Driller:** Boretec **Logged By:** JCS

Location: Lewis County, Washington **Depth to Groundwater:** 15 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)		Moisture Content (%)
0						
5		Brown SILT, moist. (ML)	Loose		4	36.9
10		Gray-brown sandy SILT, fine sand, wet, mottled. (ML)			66	29.1
		Gray to brown silty GRAVEL with sand, fine to coarse gravel, fine to medium sand, moist to wet, scattered iron-oxide stained pockets. (GM)	Very Dense			13.4
15 ▼		Gray silty GRAVEL with sand to silty SAND with gravel, fine to coarse gravel, fine to coarse sand, wet. (GM/SM)	Medium Dense		13	21.8
20		Gray-brown to brown GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, wet. (GP/GP-GM)	Very Dense		51	15.1
25			Medium Dense		24	15.4
30		Gray-brown silty GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, wet. (GM/GP-GM)	Dense		45	10.4
35		Gray-brown to gray silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet. (GM)			40	15.1
40					32	23.4
		Boring terminated at 41.5 feet. Wet soils encountered below 15 feet.				
45						

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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Environmental Earth Sciences

LOG OF BORING NO. 2

Figure No. A-50

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:**

Client: Panattoni Development Co **Driller:** Boretec **Logged By:** JCS

Location: Lewis County, Washington **Depth to Groundwater:** 10.5 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot	Moisture Content (%)
0					
5		Gray-brown elastic SILT, moist, numerous iron-oxide stained pockets. (MH) Pp=2.5 tons/sf LL=54, PI=14	Stiff to Very Stiff	11	39.6
10				25	30.1
		Gray-brown to gray silty GRAVEL with sand to GRAVEL with silt and sand, fine to coarse gravel, fine to coarse sand, wet. (GM/GW-GM)	Medium Dense		11.9
15			Dense	43	14.5
20				38	11.3
25		Gray-brown SAND with gravel to GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet. (SP/GP)	Medium Dense	15	11.5
30		Gray SAND with silt and gravel to GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, wet. (SP-SM/GP-GM)	Very Dense	50/6"	13.1
35			Medium Dense	13	17.5
40		Gray silty GRAVEL with sand, fine to coarse gravel, fine to coarse sand, wet. (GM)	Very Dense	58	9.9
		Boring terminated at 41.5 feet. Wet soils encountered below 10.5 feet.			
45					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-101

Figure No. A-51

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:** October 11, 2022

Client: Panattoni Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Centralia, Washington **Depth to Groundwater:** 11 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		FILL: Brown organic SILT, moist, scattered organic peat inclusions, trace gravel. (OH)	Loose	9	33.6
5		FILL: Brownish-gray organic SILT, moist, scattered sandy silt inclusions, trace organic peat inclusions, trace gravel, occasional plastic trash. (OH)	Medium Dense	23	39.4
		Brownish-gray silty GRAVEL, fine to coarse gravel, moist, trace sand, trace sandy silt inclusions. (GM)		23	22.0
10				22	11.8
		Gray silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet. (GM)	Dense	37	27.0
15			Very Dense	82/11"	19.2
		Brownish-gray GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, wet. (GP-GM)	Dense	36	11.7
20		Test Boring terminated at approximately 20 feet. Groundwater seepage observed at approximately 11 feet.			
25					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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LOG OF BORING NO. B-102

Figure No. A-52

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:** October 11, 2022

Client: Panattoni Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Centralia, Washington **Depth to Groundwater:** 10 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		FILL?: Black organic SILT with gravel, fine to coarse gravel, moist, trace sand, trace organic peat inclusions. (OH)	Medium Stiff	5	28.5
5		Black organic clayey SILT, moist, scattered gravel. (OH) LL = 55 PL = 43	Stiff	9	52.4
			Very Stiff	26	34.8
		Brownish-gray GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, moist. (GP-GM)	Medium Dense		10.7
10 ▼				48	12.8
		Gray silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet. (GM)	Dense	34	11.8
15				65/10"	14.8
		Brownish-gray GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, wet. (GP-GM)	Very Dense		
20				86	11.0
		Test Boring terminated at approximately 20 feet. Groundwater seepage observed at approximately 10 feet.			
25					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

Terra Associates, Inc.
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Geology and
Environmental Earth Sciences

LOG OF BORING NO. B-103

Figure No. A-53

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:** October 11, 2022

Client: Panattoni Development Company **Driller:** BoreTec **Logged By:** MJX

Location: Centralia, Washington **Depth to Groundwater:** 9 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 / 30 / 50)	Moisture Content (%)
0		FILL: Gray SILT with sand and gravel, fine to medium sand, fine to coarse gravel, moist to wet, faint diesel odor. (ML)	Medium Stiff	7	21.8
5		FILL?: Gray SILT with sand to SILT with sand and gravel, fine to medium sand, fine to coarse gravel, moist to wet. (ML)		5	22.4
			Very Stiff	25	28.3
		Grayish-brown to gray silty SAND with gravel, fine to coarse sand, fine to coarse gravel, moist to wet. (SM)			16.4
10			Medium Dense	24	16.3
				50/6"	13.5
15		Gray silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet. (GM)	Very Dense	59	10.9
20			Medium Dense	25	28.2
		Test Boring terminated at approximately 20 feet. Groundwater seepage observed at approximately 9 feet.			
25					

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

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Geology and
Environmental Earth Sciences

LOG OF BORING NO. B-104

Figure No. A-54

Project: Skookumchuck Commerce Center **Project No:** T-8613 **Date Drilled:** October 11, 2022

Client: Panattoni Development Company **Driller:** BoreTec **Logged By:** MJX

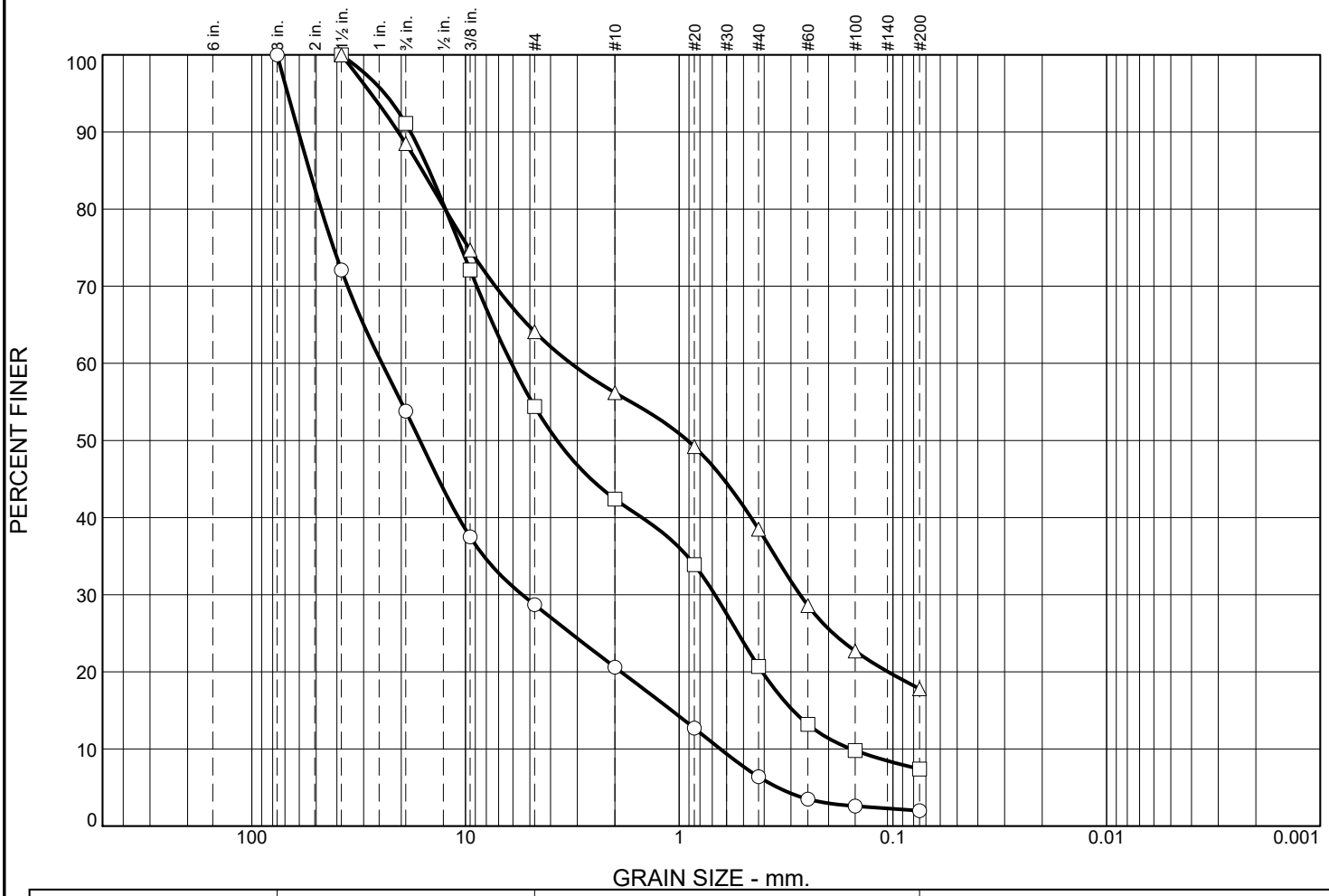
Location: Centralia, Washington **Depth to Groundwater:** 7 ft **Approx. Elev:** NA

Depth (ft)	Sample Interval	Soil Description	Consistency/ Relative Density	SPT (N) Blows / foot (10 30 50)		Moisture Content (%)
0		Brown to brownish-gray sandy SILT with gravel, fine to medium sand, fine to coarse gravel, moist to wet. (ML)	Medium Dense		10	10.1
5					17	20.3
▼		Gray silty SAND to silty SAND with gravel, fine to coarse sand, fine to coarse gravel, wet. (SM)	Dense		31	23.3
10			Very Dense		61	22.3
		Gray GRAVEL with silt and sand, fine to coarse sand, fine to coarse gravel, wet. (GP-GM)			44	11.5
15			Dense		50	10.0
		Gray silty GRAVEL with sand, fine to coarse sand, fine to coarse gravel, wet. (GM)	Medium Dense		20	26.9
20		Test Boring terminated at approximately 20 feet. Groundwater seepage observed at approximately 7 feet.				
25						

NOTE: This borehole log has been prepared for geotechnical purposes. This information pertains only to this boring location and should not be interpeted as being indicative of other areas of the site

Terra Associates, Inc.
Consultants in Geotechnical Engineering Geology and Environmental Earth Sciences

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	46.2	25.1	8.1	14.2	4.4	2.0	
□	0.0	8.9	36.7	12.0	21.7	13.3	7.4	
△	0.0	11.5	24.4	7.9	17.7	20.7	17.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			53.7649	24.6202	16.3642	5.4293	1.0846	0.6424	1.86	38.33
□			14.8034	6.0988	3.7298	0.6805	0.2936	0.1567	0.48	38.92
△			15.9299	3.2148	0.9141	0.2721				

Material Description	USCS	AASHTO
○ GRAVEL with sand	GW	
□ SAND with silt and gravel	SP-SM	
△ silty SAND with gravel	SM	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** TP-2 **Depth:** 10'

□ **Location:** TP-6 **Depth:** 6'

△ **Location:** TP-13 **Depth:** 6.5'

Terra Associates, Inc.

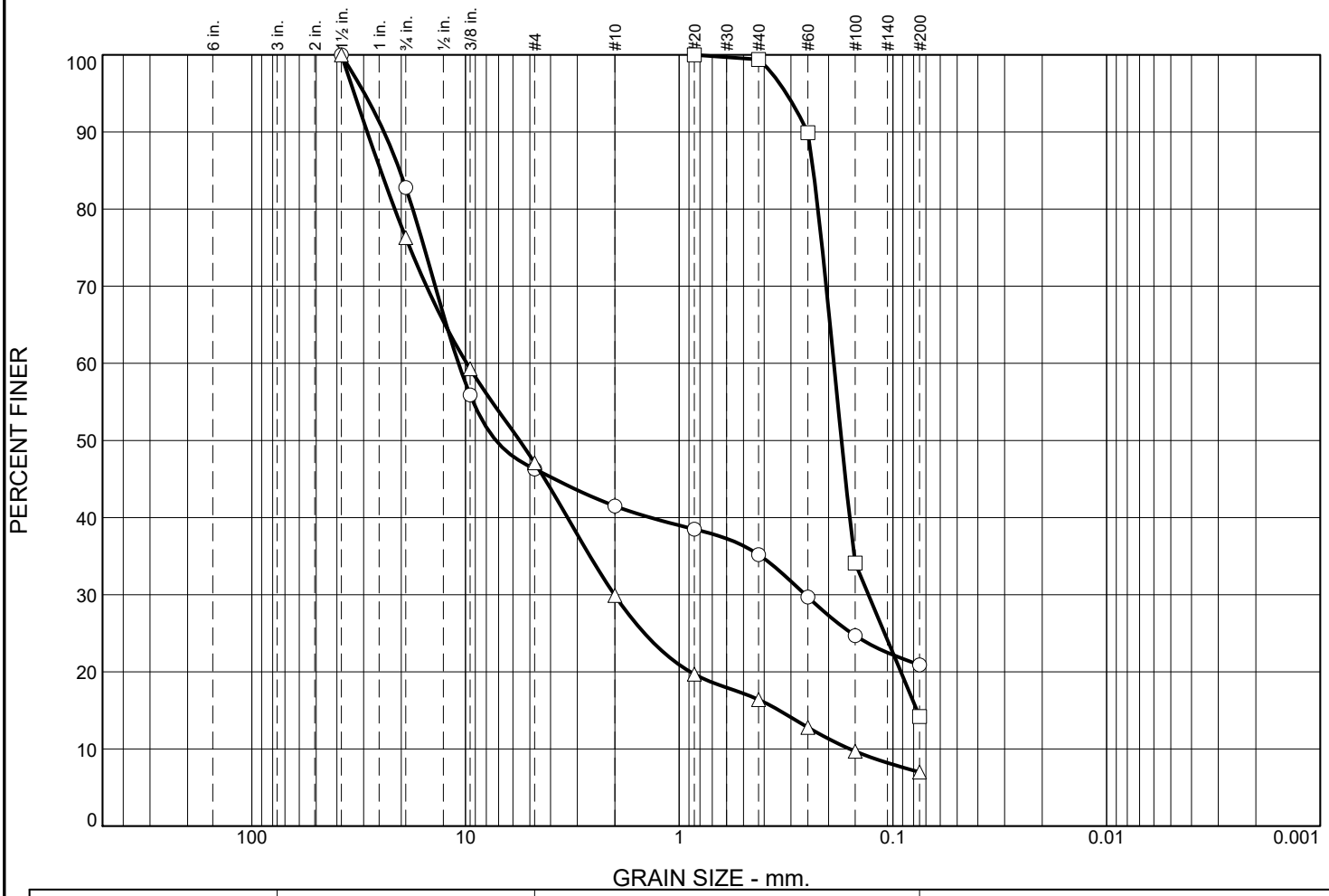
Kirkland, WA

Remarks:

Figure A-55

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	17.2	36.5	4.8	6.3	14.3	20.9	
□	0.0	0.0	0.0	0.0	0.6	85.2	14.2	
△	0.0	23.7	29.2	17.2	13.5	9.4	7.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			20.3179	10.7962	7.2007	0.2568				
□			0.2358	0.1889	0.1739	0.1300	0.0771			
△			24.9590	9.8712	5.5891	2.0114	0.3401	0.1590	2.58	62.07

Material Description	USCS	AASHTO
○ silty GRAVEL with sand	GM	
□ silty SAND	SM	
△ GRAVEL with silt and sand	GW-GM	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** TP-18 **Depth:** 7'

□ **Location:** TP-25 **Depth:** 9'

△ **Location:** TP-29 **Depth:** 5'

Terra Associates, Inc.

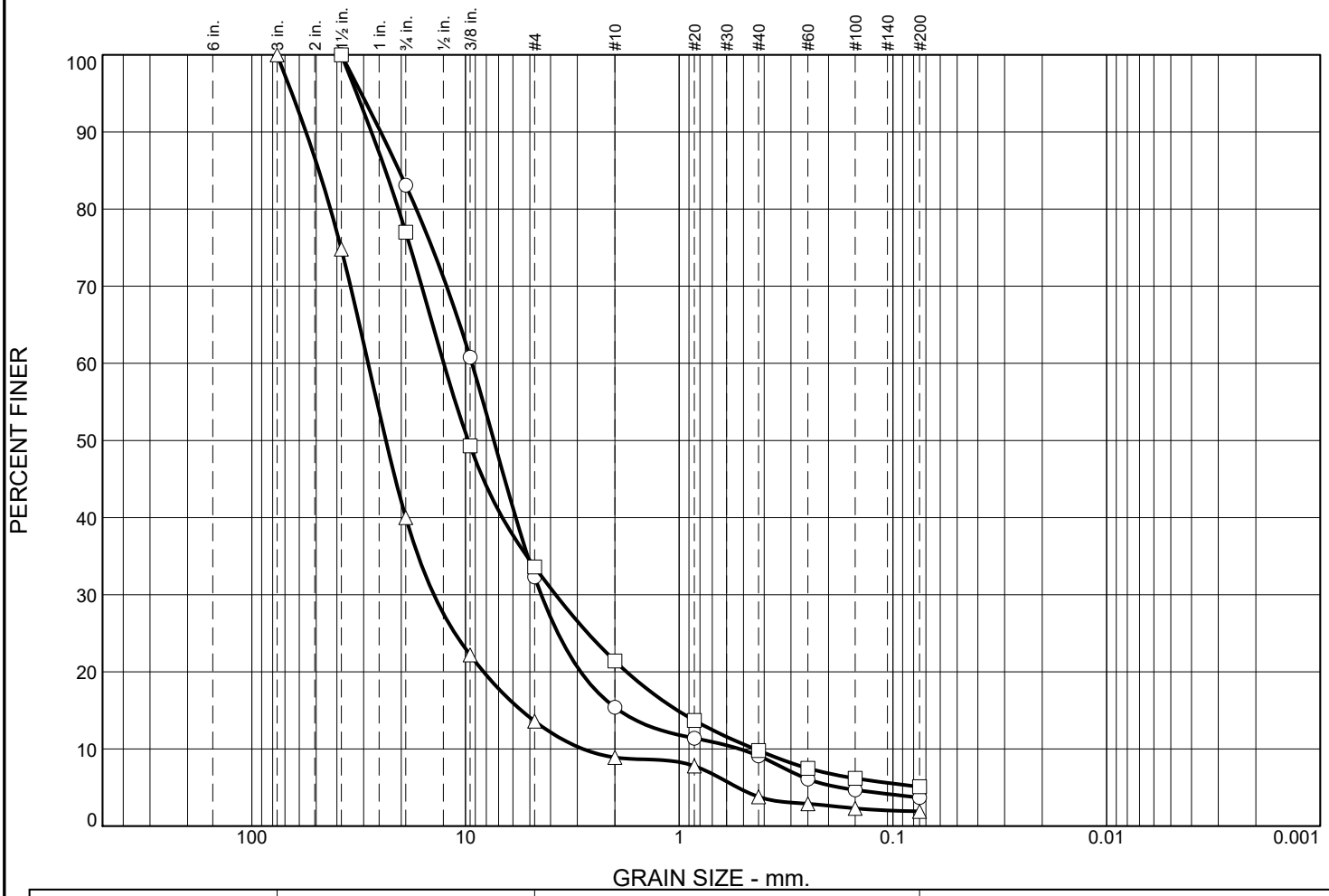
Kirkland, WA

Remarks:

Figure A-56

Tested By: FQ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	16.9	50.8	16.9	6.3	5.4	3.7	
□	0.0	23.0	43.4	12.2	11.6	4.7	5.1	
△	0.0	60.0	26.4	4.7	5.1	1.9	1.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			20.4742	9.3359	7.3664	4.4268	1.9097	0.5214	4.03	17.90
□			23.7103	12.6450	9.7263	3.7874	1.0183	0.4426	2.56	28.57
△			48.5817	28.5428	23.6057	14.0690	5.4856	2.8195	2.46	10.12

Material Description	USCS	AASHTO
○ GRAVEL with sand	GP	
□ GRAVEL with silt and sand	GW-GM	
△ GRAVEL	GP	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** B-1 **Depth:** 20'

□ **Location:** B-2 **Depth:** 20'

△ **Location:** Test Pit TP-201 **Depth:** 6'

Remarks:

△ Tested on October 25, 2022

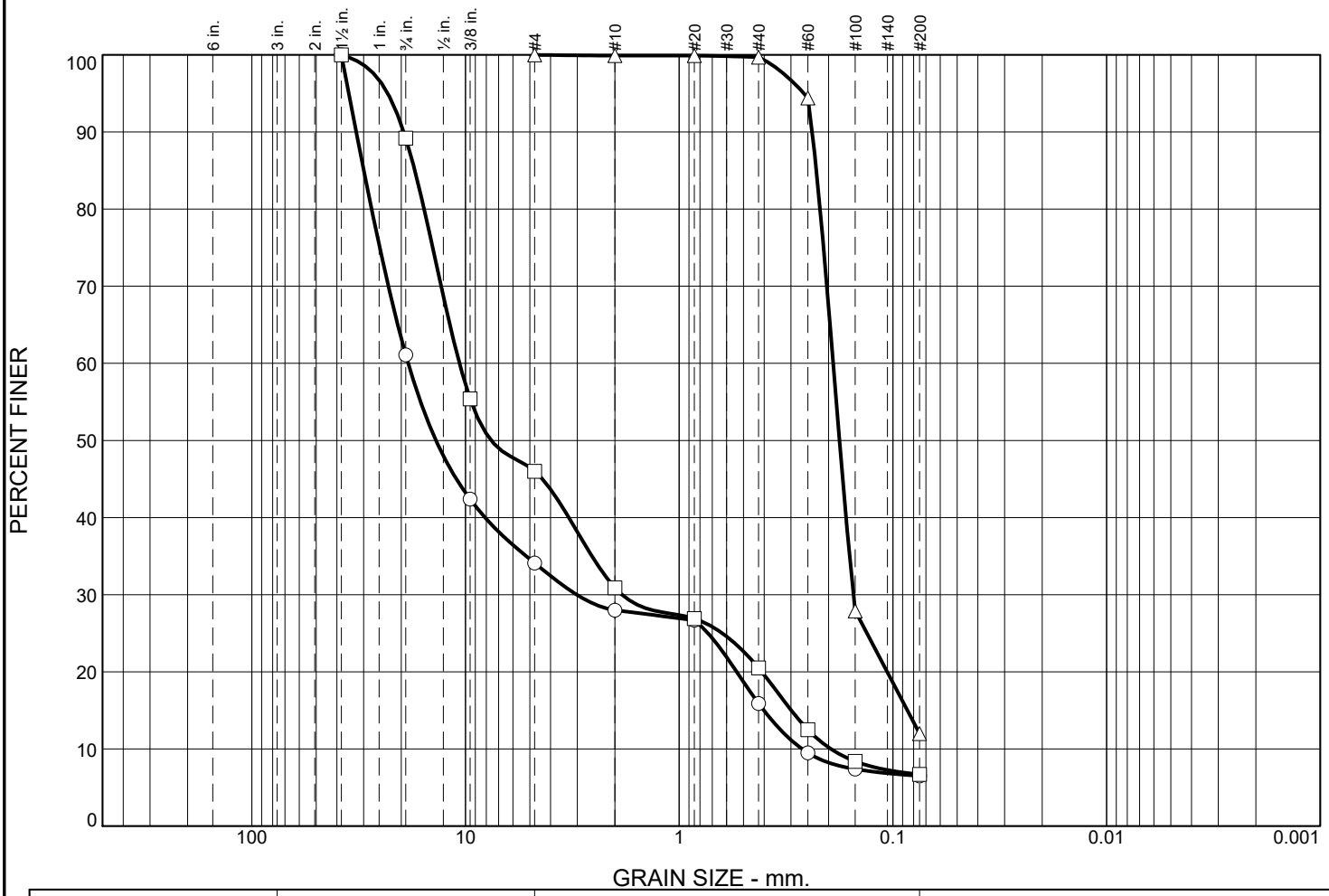
Terra Associates, Inc.

Kirkland, WA

Figure A-57

Tested By: ● FQ ■ FQ ▲ KJ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	38.9	27.0	6.1	12.1	9.4	6.5	
□	0.0	10.8	43.2	15.1	10.4	13.8	6.7	
△	0.0	0.0	0.0	0.1	0.2	87.7	12.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			29.9206	18.5554	13.7534	3.0123	0.4016	0.2660	1.84	69.76
□			17.2777	10.6798	7.5797	1.8506	0.2985	0.1950	1.64	54.76
△			0.2280	0.1902	0.1777	0.1529	0.0855			

Material Description	USCS	AASHTO
○ GRAVEL with silt and sand	GP-GM	
□ GRAVEL with silt and sand	GP-GM	
△ silty SAND	SM	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** Test Pit TP-203 **Depth:** 8'

□ **Location:** Test Pit TP-204 **Depth:** 7'

△ **Location:** Test Pit TP-205 **Depth:** 7'

Terra Associates, Inc.

Kirkland, WA

Remarks:

○ Tested on October 25, 2022

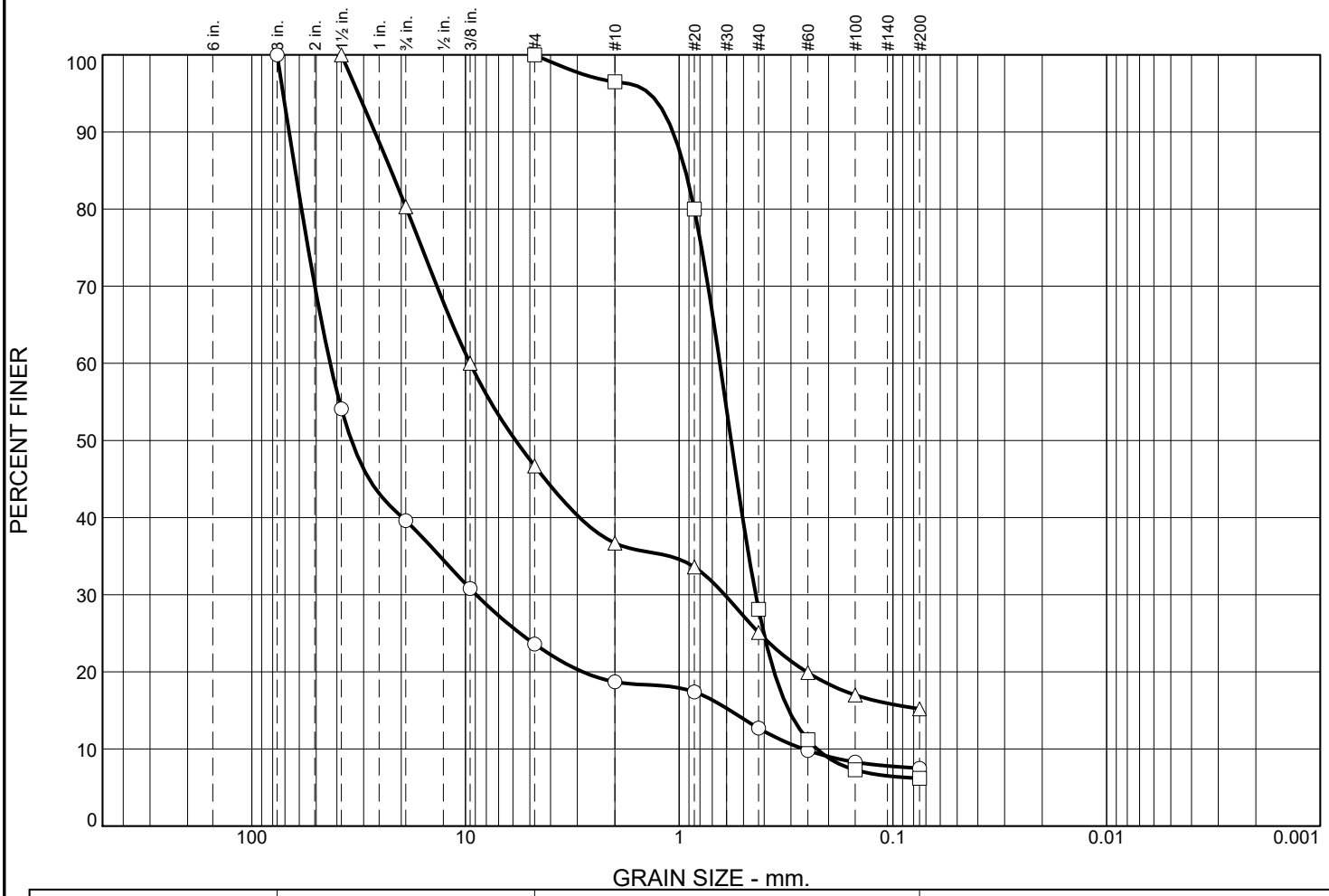
□ Tested on October 25, 2022

△ Tested on October 25, 2022

Figure A-58

Tested By: KJ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	60.4	16.0	4.9	6.0	5.2	7.5	
□	0.0	0.0	0.0	3.5	68.4	21.9	6.2	
△	0.0	19.7	33.6	10.0	11.6	9.9	15.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			62.6932	42.9993	34.1990	8.9169	0.5780	0.2623	7.05	163.95
□			0.9362	0.6453	0.5718	0.4384	0.3067	0.2269	1.31	2.84
△			22.3263	9.5250	5.8296	0.6128				

Material Description	USCS	AASHTO
○ GRAVEL with silt and sand	GP-GM	
□ SAND with silt	SP-SM	
△ silty GRAVEL with sand	GM	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** Test Pit TP-207 **Depth:** 4'

□ **Location:** Test Pit TP-208 **Depth:** 10'

△ **Location:** Test Boring B-102 **Depth:** 10'

Terra Associates, Inc.

Kirkland, WA

Remarks:

○ Tested on October 25, 2022

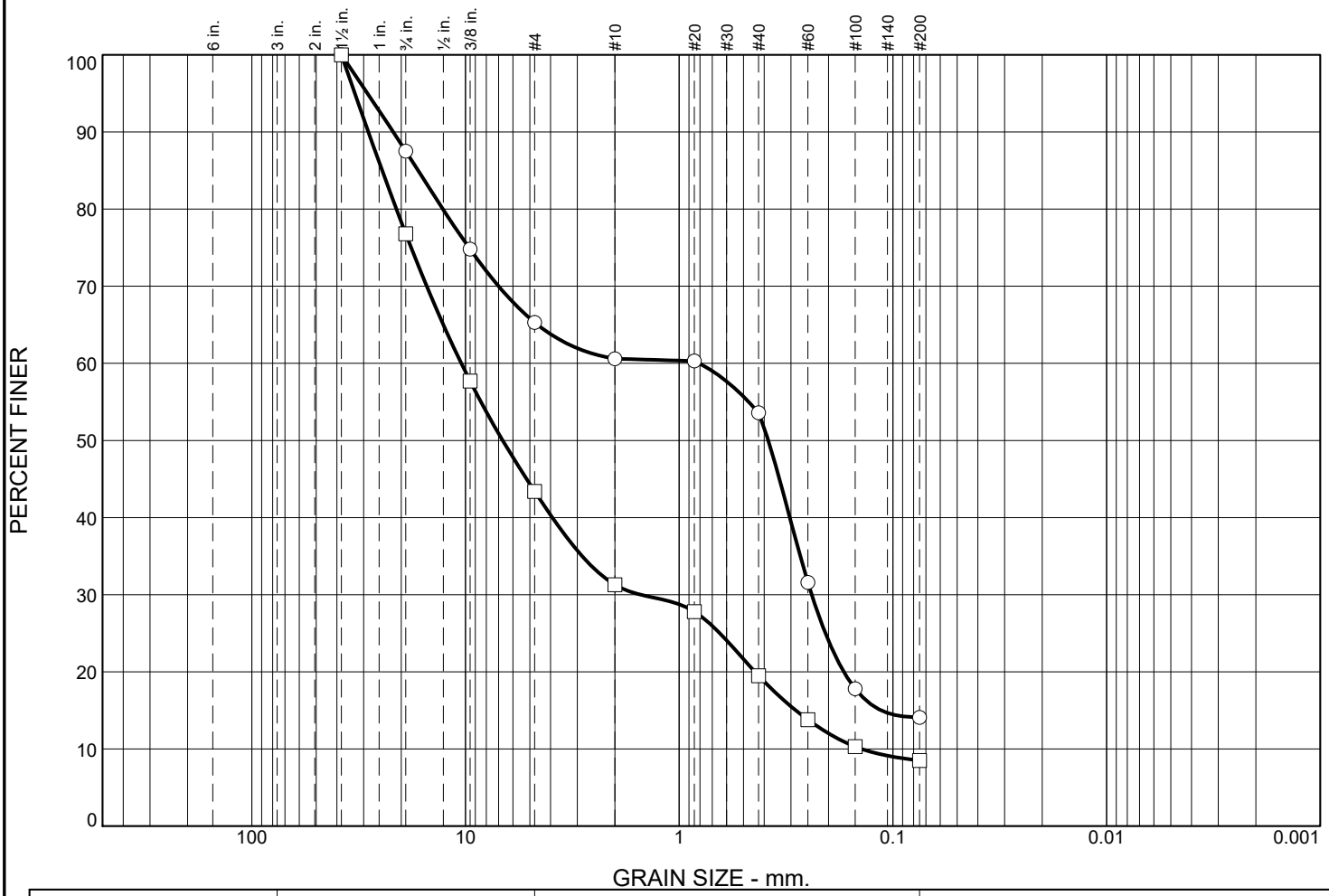
□ Tested on October 25, 2022

△ Tested on October 25, 2022

Figure A-59

Tested By: KJ

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	12.5	22.2	4.7	7.0	39.5	14.1	
□	0.0	23.2	33.4	12.1	11.8	11.0	8.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			16.6708	0.8072	0.3829	0.2399	0.1134			
□			24.5576	10.4720	6.7005	1.5164	0.2846	0.1401	1.57	74.73

Material Description	USCS	AASHTO
○ SAND with silt and gravel	SM	
□ GRAVEL with silt and sand	GP-GM	

Project No. T-8613 **Client:** Panattoni Development Company

Project: Skookumchuck Commerce Center

○ **Location:** Test Boring B-103 **Depth:** 8'

□ **Location:** Test Boring B-104 **Depth:** 12.5'

Remarks:

○ Tested on October 25, 2022

□ Tested on October 25, 2022

Terra Associates, Inc.

Kirkland, WA

Figure A-60

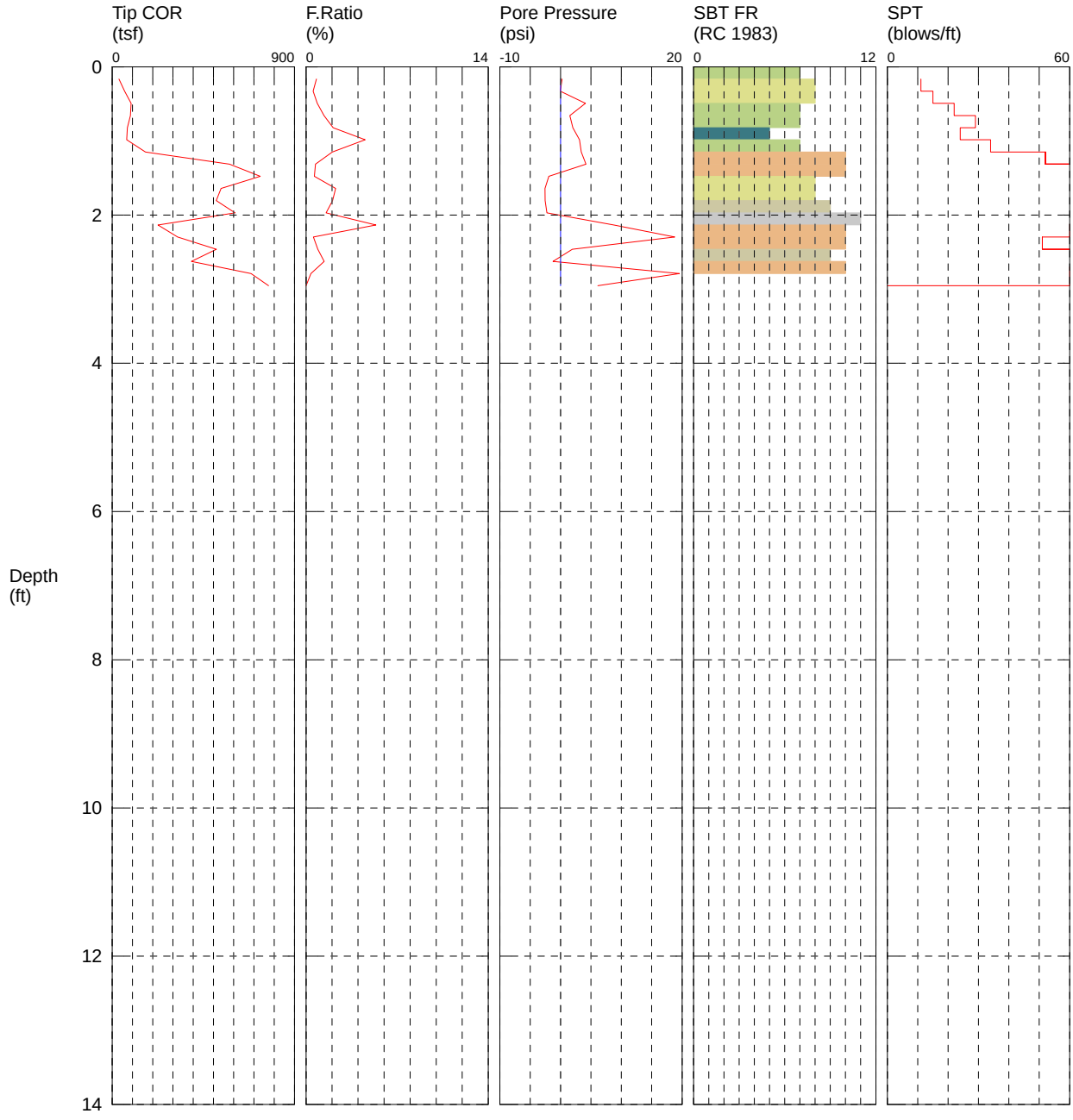
Tested By: KJ

CPT LOGS

CPT-01

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 11:21:21 AM
PREDRILL:
BACKFILL: 20% Bentonite Grout + Bentonite Chip
SURFACE PATCH:



COMMENT:

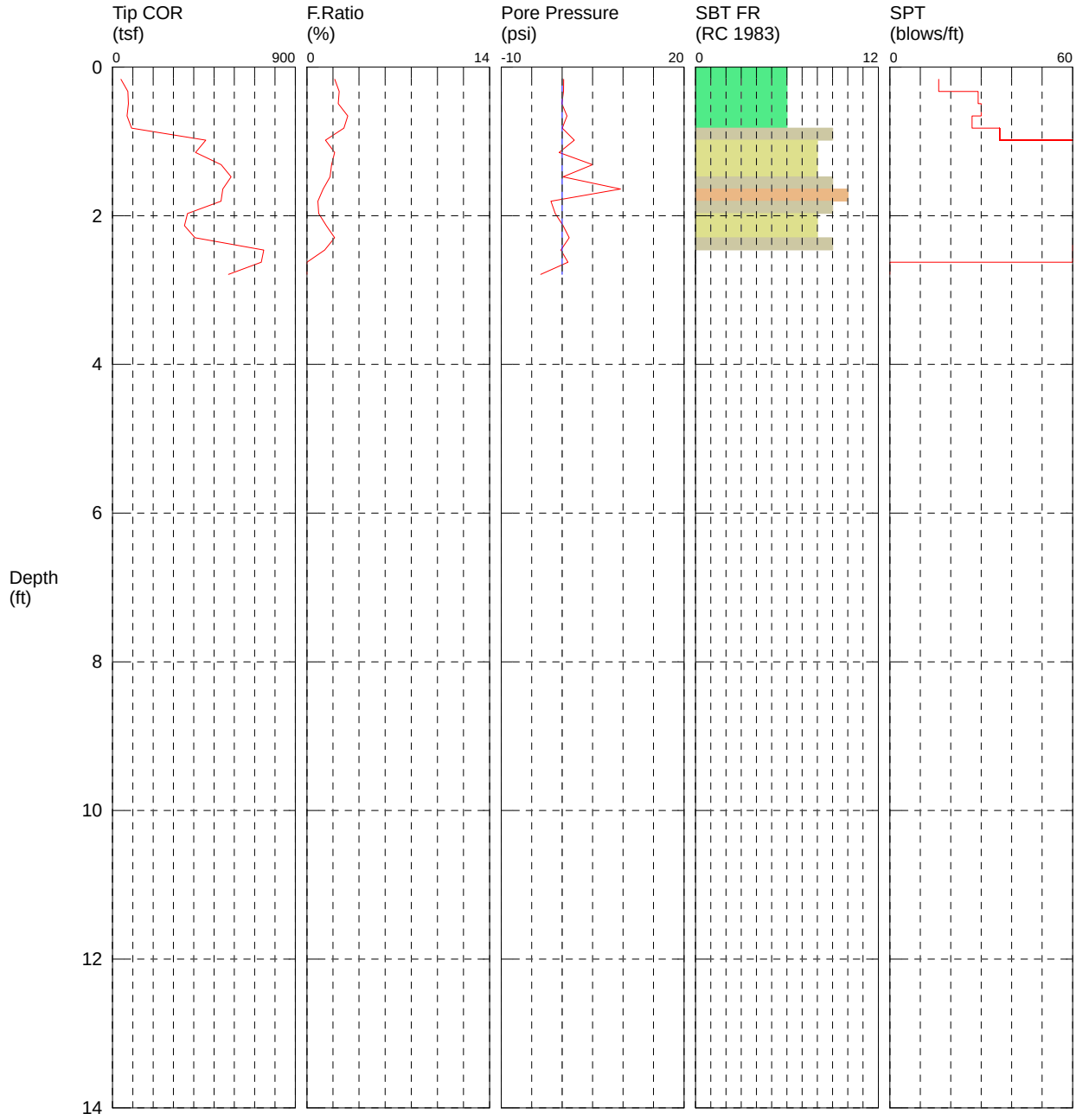
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

CPT-01A

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 11:33:37 AM
PREDRILL:
BACKFILL: 20% Bentonite Grout + Bentonite Chip
SURFACE PATCH:



COMMENT: 5' East of CPT-01

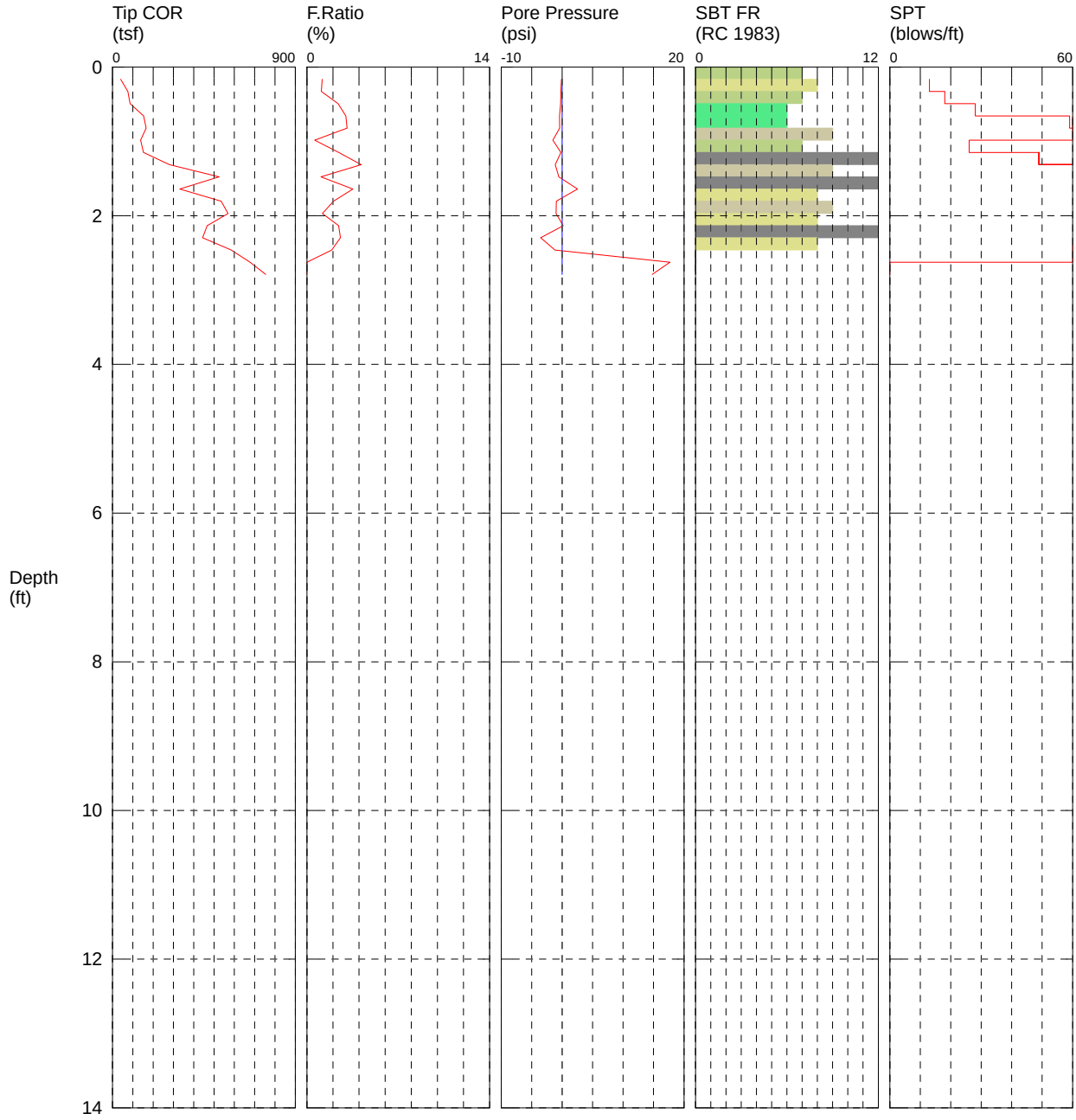
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

CPT-01B

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 11:47:14 AM
PREDRILL:
BACKFILL: 20% Bentonite Grout + Bentonite Chip
SURFACE PATCH:



COMMENT: 5' to west of CPT-01

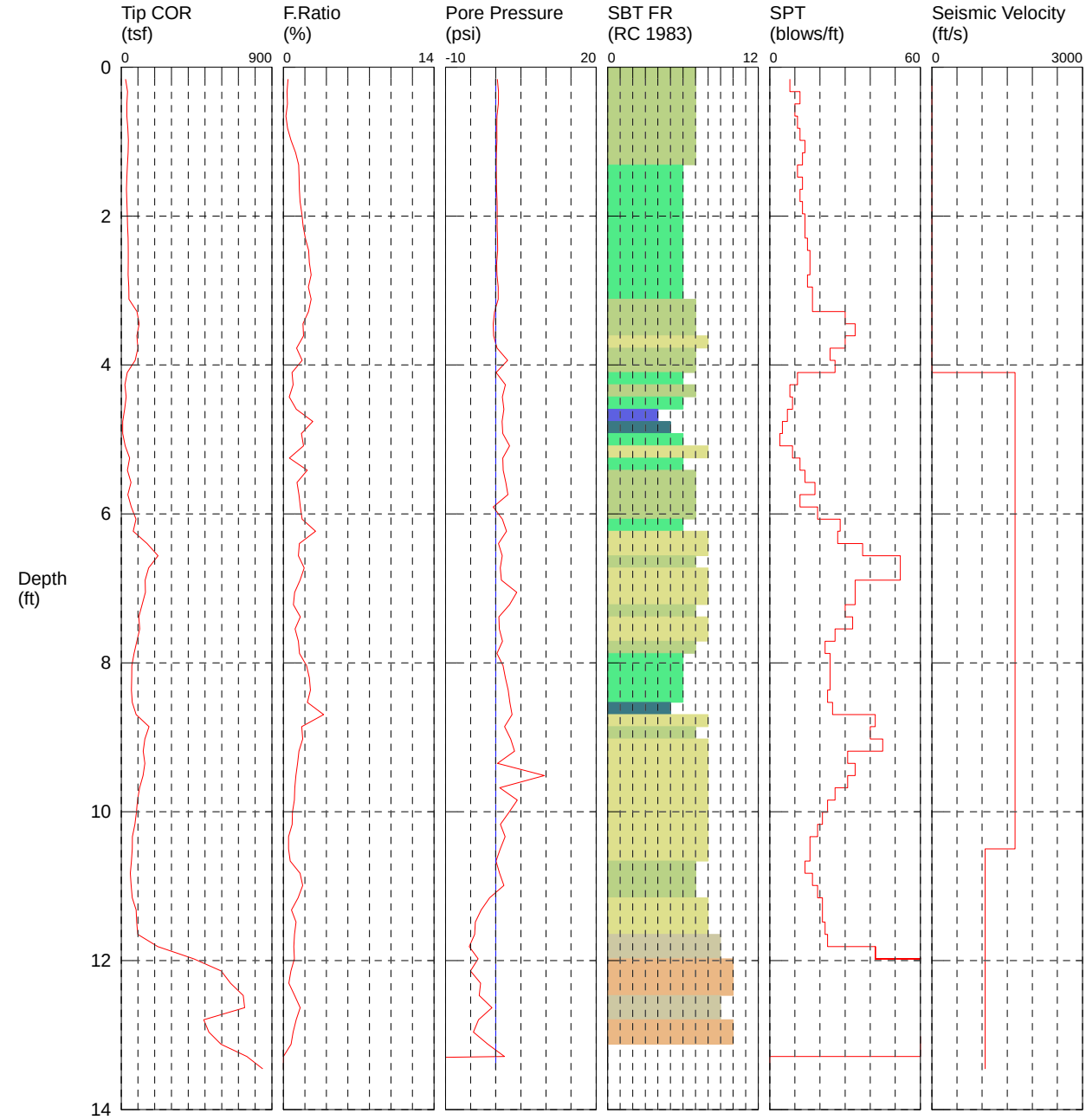
1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

CPT-02

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 12:08:13 PM
PREDRILL:
BACKFILL: 20% Bentonite Grout + Bentonite Chip
SURFACE PATCH:



COMMENT: 5' to west of CPT-01

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

HOLE NUMBER: CPT-02

OPERATOR: Mayfield

CUSTOMER: Terra

LOCATION: Centralia

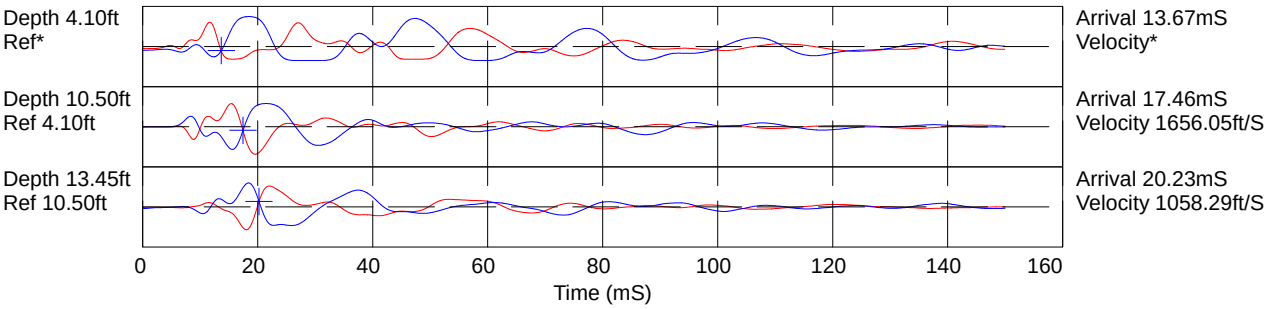
JOB NUMBER: T-8613

CPT CONTRACTOR: In Situ Engineering

CONE ID: DDG1263

TEST DATE: 8/31/2021 12:08:13 PM

HOLE NUMBER: CPT-02



Hammer to Rod String Distance (ft): 1.31
* = Not Determined

CPT-02A

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 12:41:15 PM
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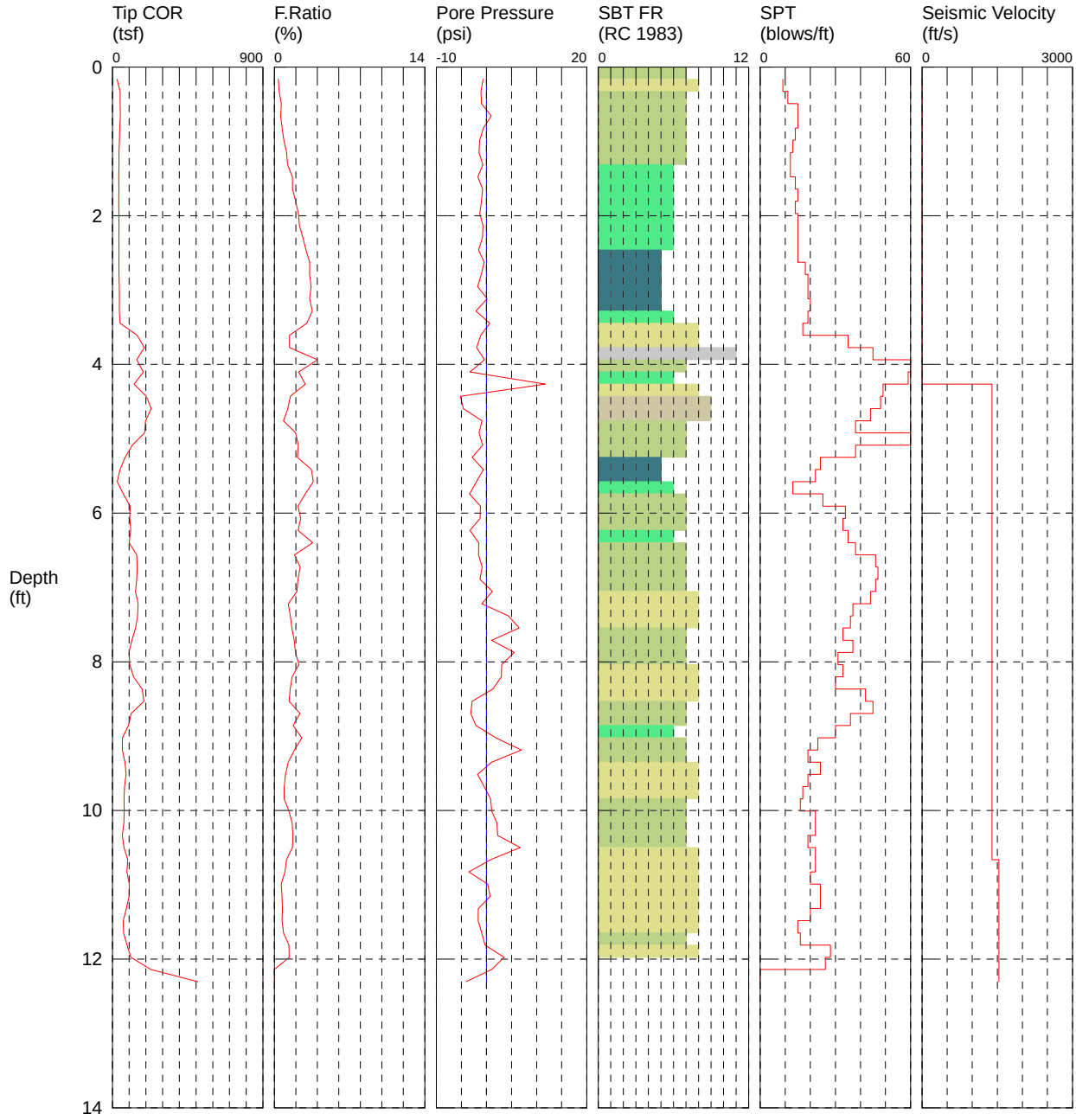
SURFACE PATCH:



COMMENT: 3' S of CPT-02

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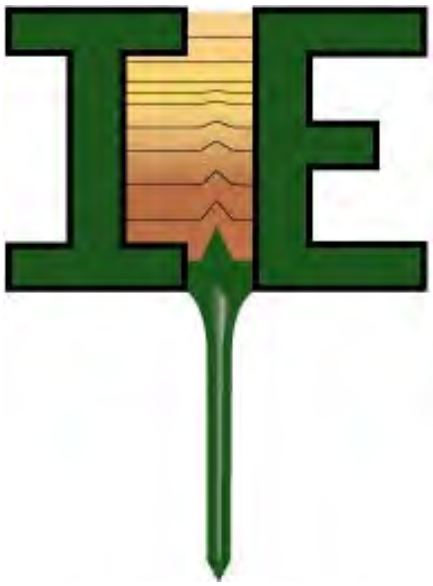
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

HOLE NUMBER: CPT-02A



OPERATOR: Mayfield

CUSTOMER: Terra

LOCATION: Centralia

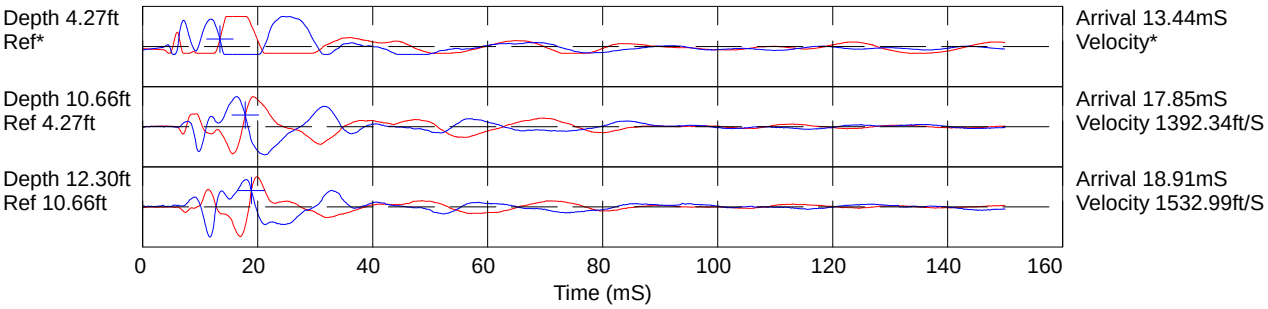
JOB NUMBER: T-8613

CPT CONTRACTOR: In Situ Engineering

CONE ID: DDG1263

TEST DATE: 8/31/2021 12:41:15 PM

HOLE NUMBER: CPT-02A



Hammer to Rod String Distance (ft): 1.97

* = Not Determined

CPT-02B

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
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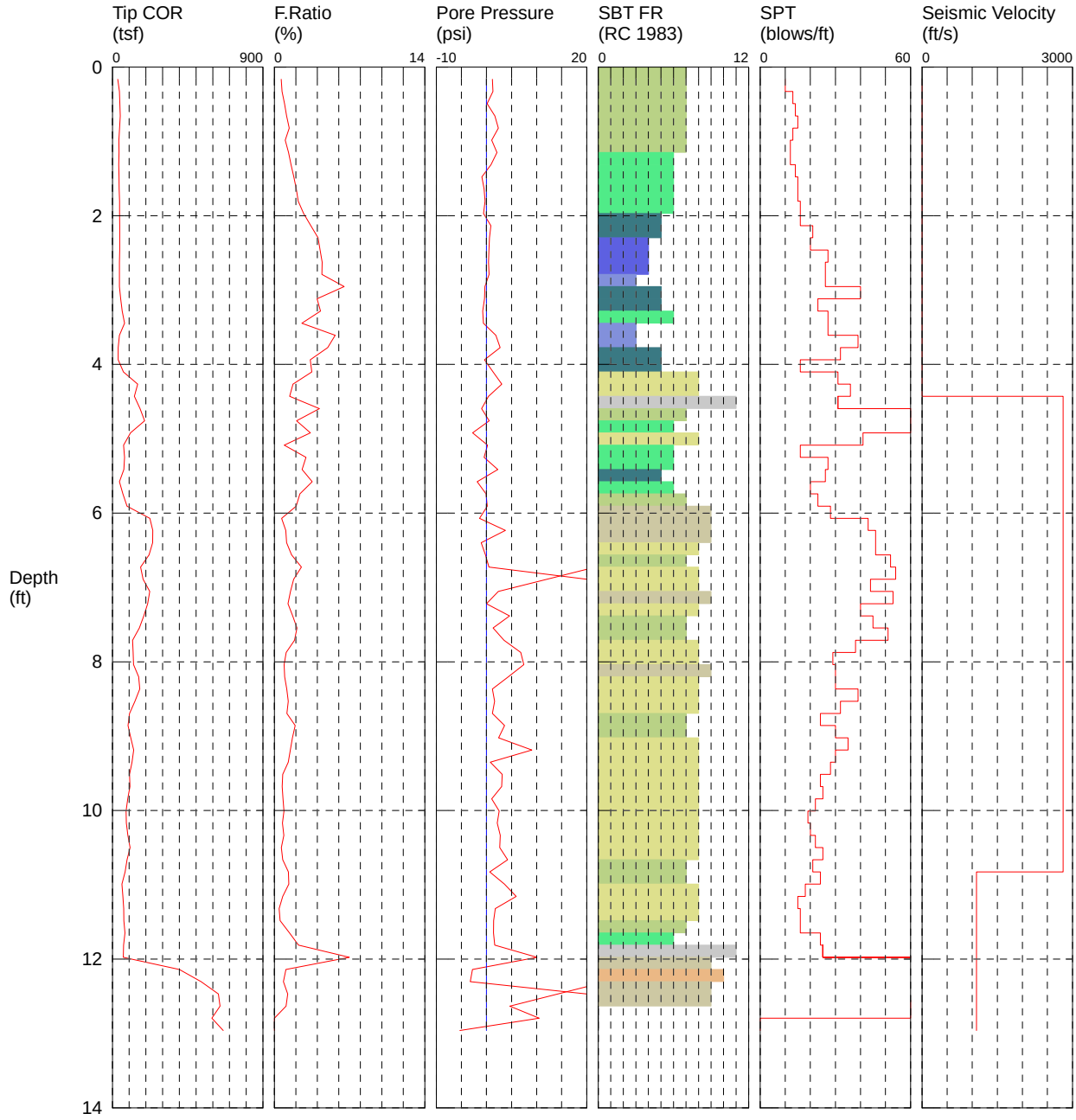
SURFACE PATCH:



COMMENT: 3' N of CPT-02

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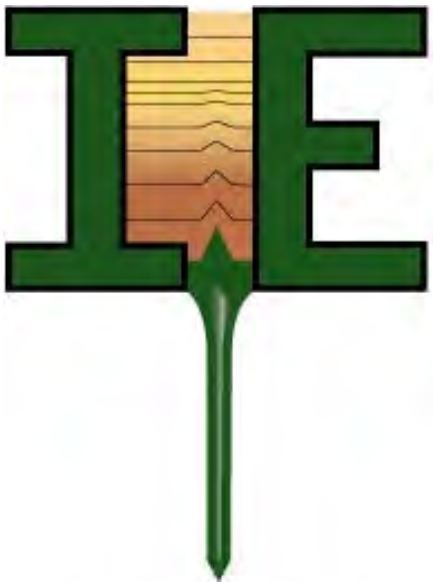
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

HOLE NUMBER: CPT-02B



OPERATOR: Mayfield

CUSTOMER: Terra

LOCATION: Centralia

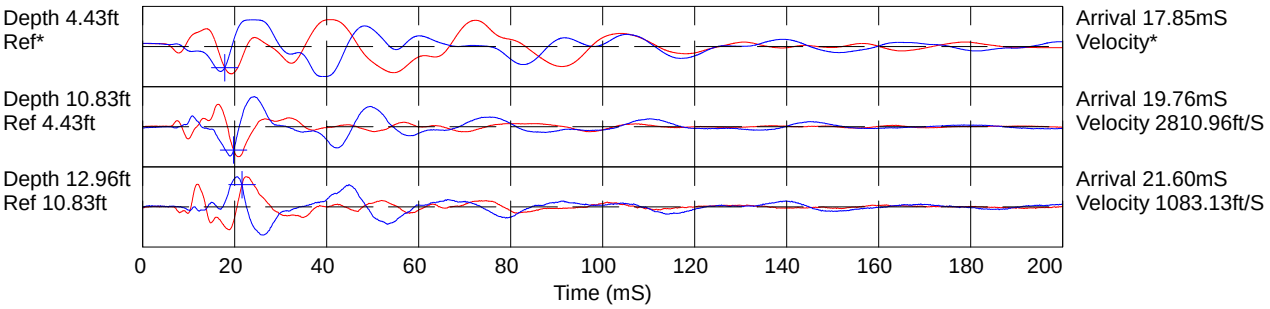
JOB NUMBER: T-8613

CPT CONTRACTOR: In Situ Engineering

CONE ID: DDG1263

TEST DATE: 8/31/2021 1:02:54 PM

HOLE NUMBER: CPT-02B



Hammer to Rod String Distance (ft): 4.59
* = Not Determined

CPT-03

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
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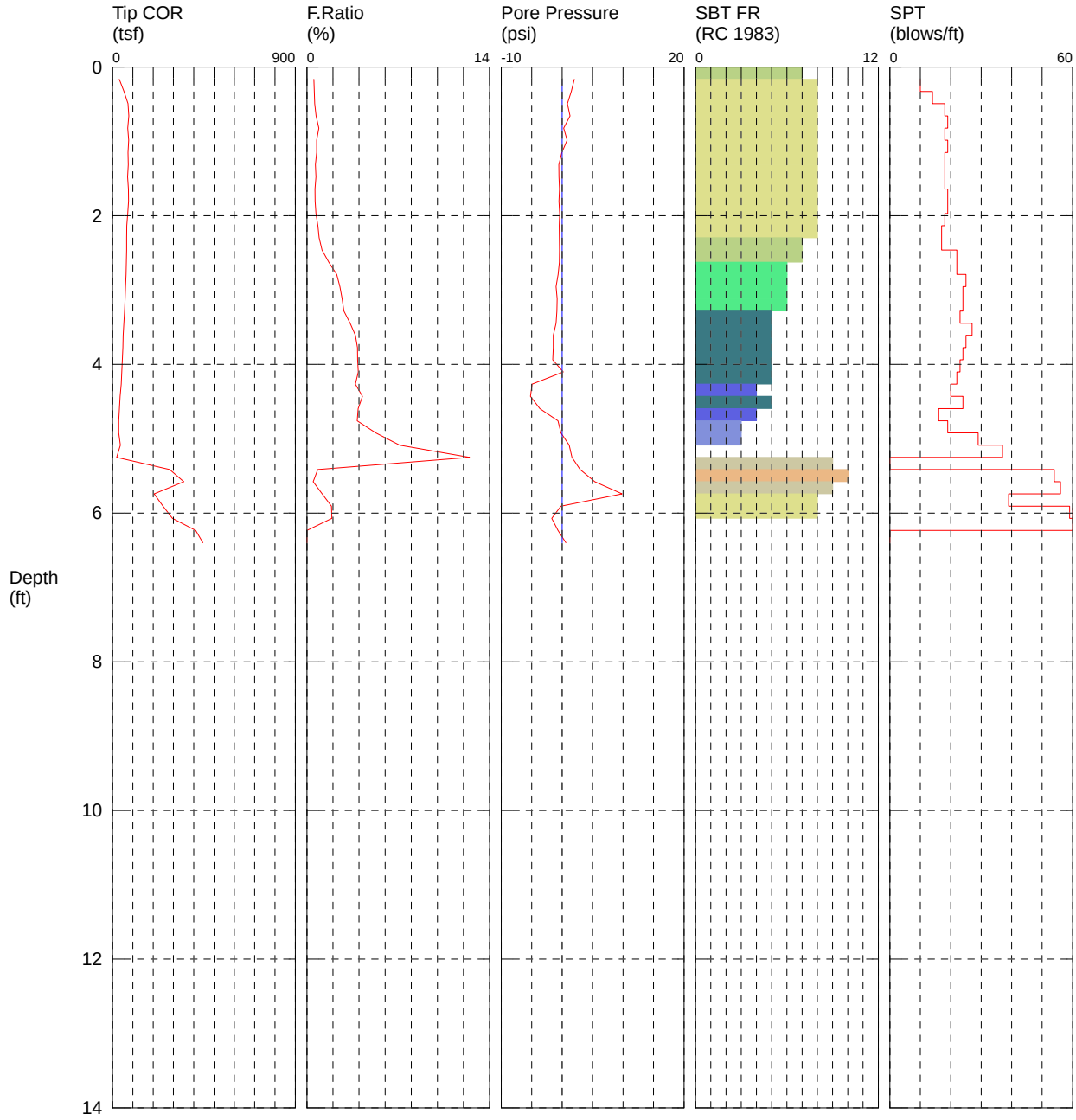

COMMENT: 3' N of CPT-02

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2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

CPT-03A

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
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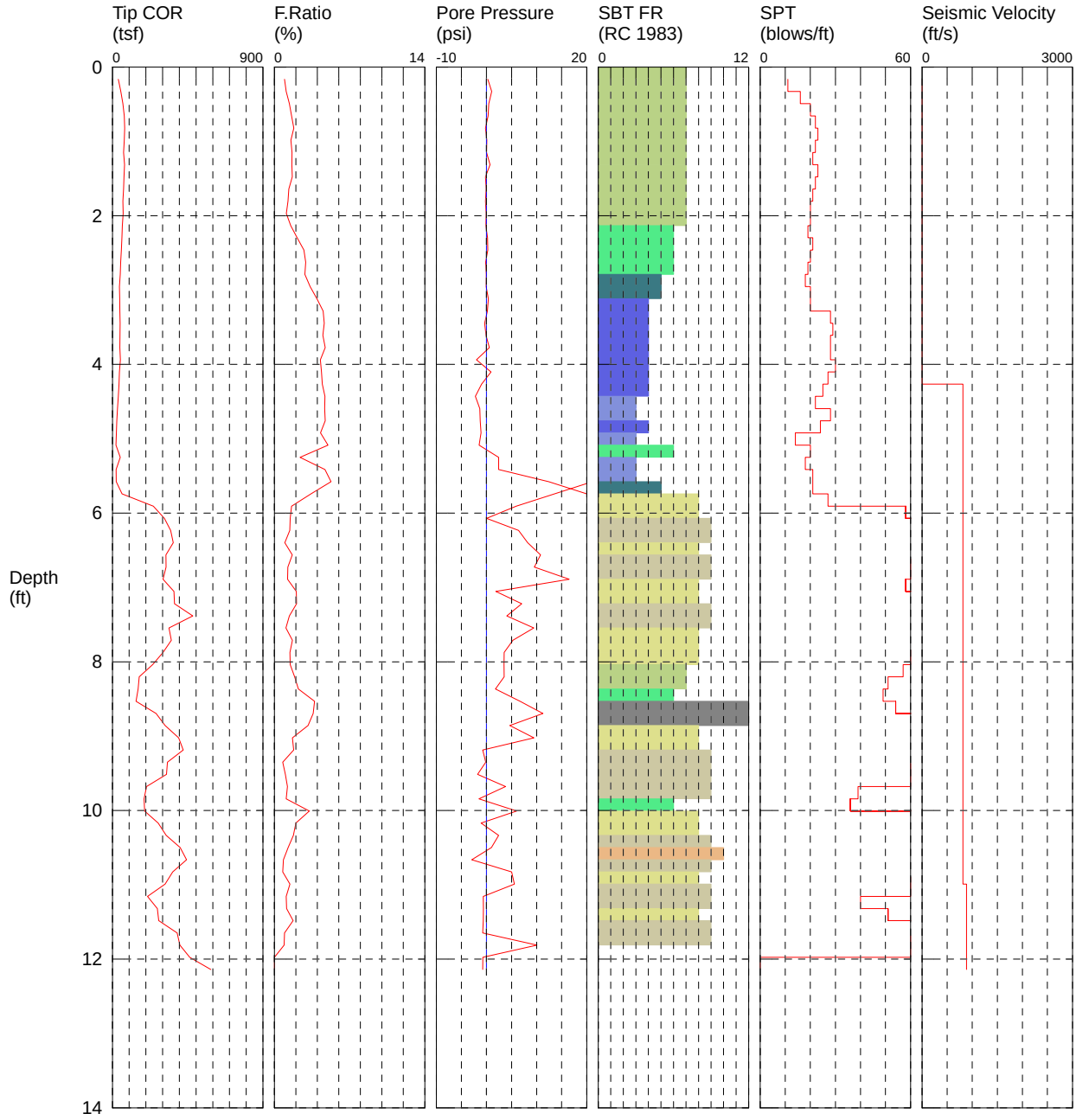

COMMENT: 3' E of CPT-03

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3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

HOLE NUMBER: CPT-03A

OPERATOR: Mayfield

CUSTOMER:

LOCATION: Centralia

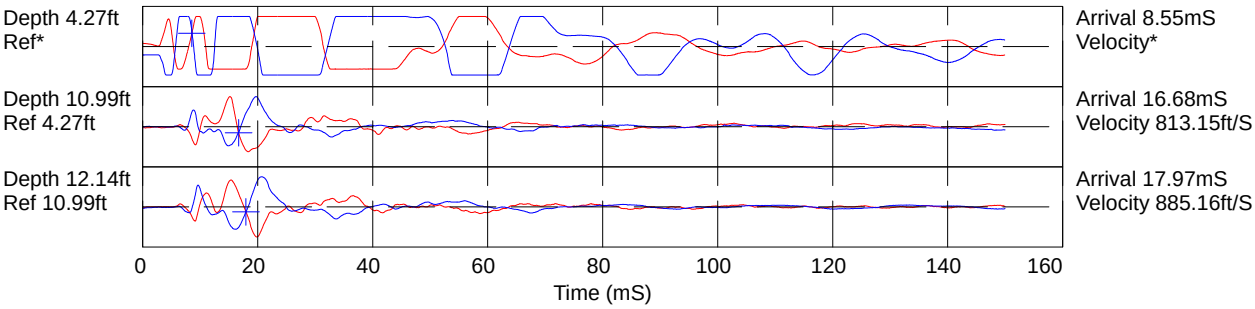
JOB NUMBER: T-8613

CPT CONTRACTOR: In Situ Engineering

CONE ID: DDG1263

TEST DATE: 8/31/2021 2:13:38 PM

HOLE NUMBER: CPT-03A



Hammer to Rod String Distance (ft): 1.31
* = Not Determined

CPT-03B

CPT CONTRACTOR: In Situ Engineering
CUSTOMER: Terra
LOCATION: Centralia
JOB NUMBER: T-8613

OPERATOR: Mayfield
CONE ID: DDG1263
TEST DATE: 8/31/2021 2:35:08 PM
PREDRILL:
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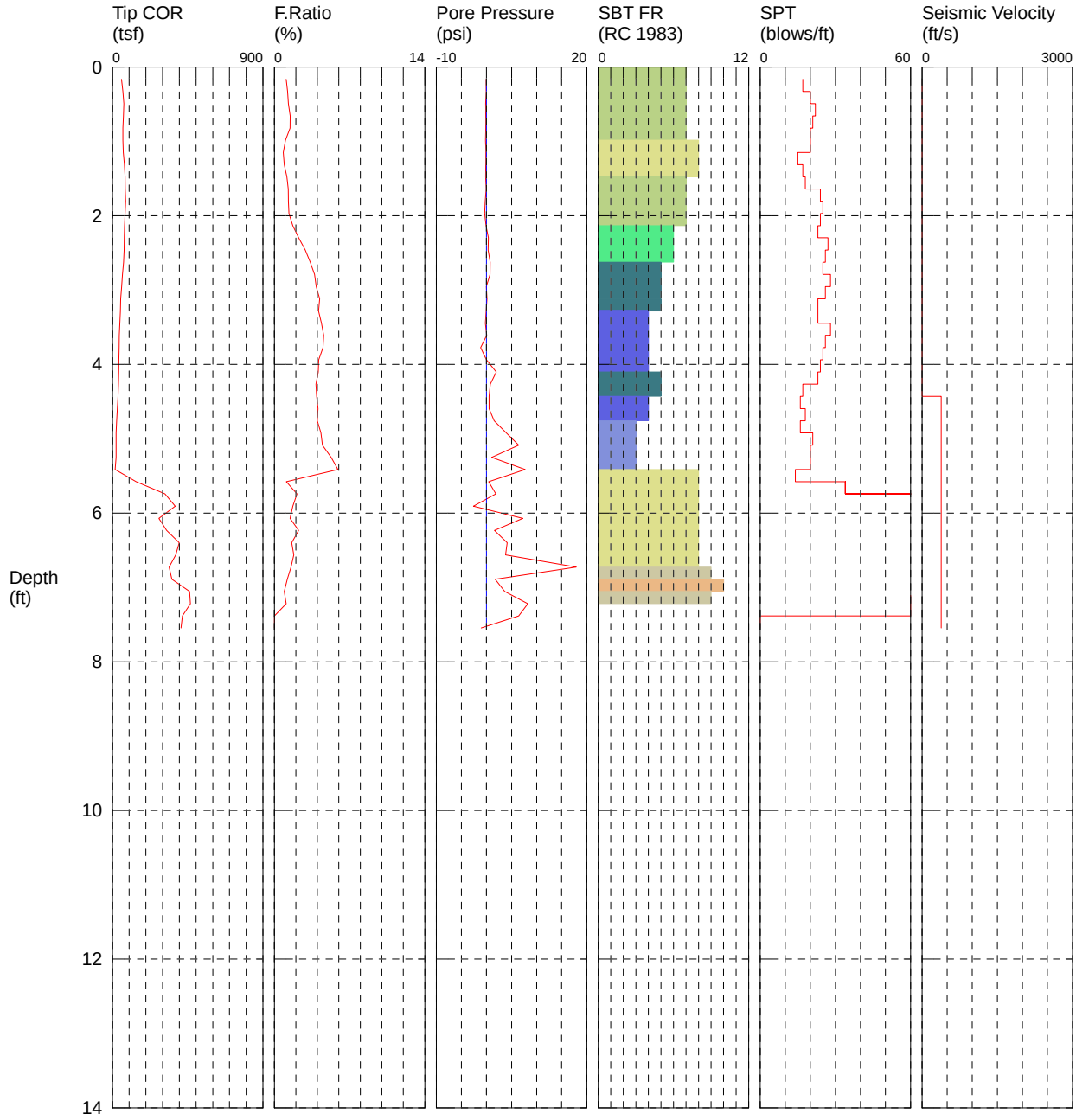
SURFACE PATCH:



COMMENT: 6' E of CPT-03

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2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

*SBT/SPT CORRELATION: UBC-1983

HOLE NUMBER: CPT-03B

OPERATOR: Mayfield

CUSTOMER:

LOCATION: Centralia

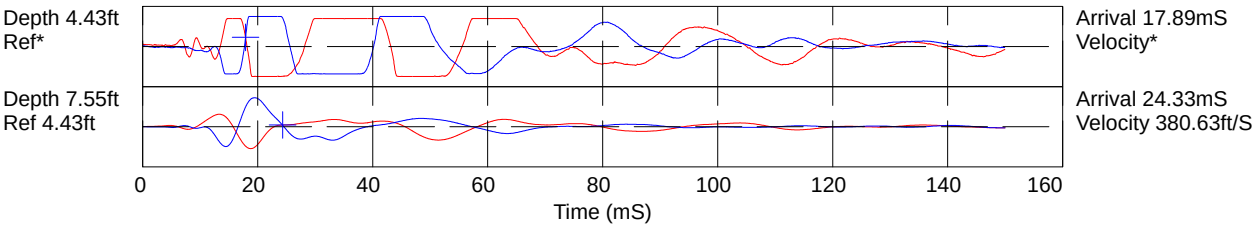
JOB NUMBER: T-8613

CPT CONTRACTOR: In Situ Engineering

CONE ID: DDG1263

TEST DATE: 8/31/2021 2:35:08 PM

HOLE NUMBER: CPT-03B



Hammer to Rod String Distance (ft): 4.59
* = Not Determined

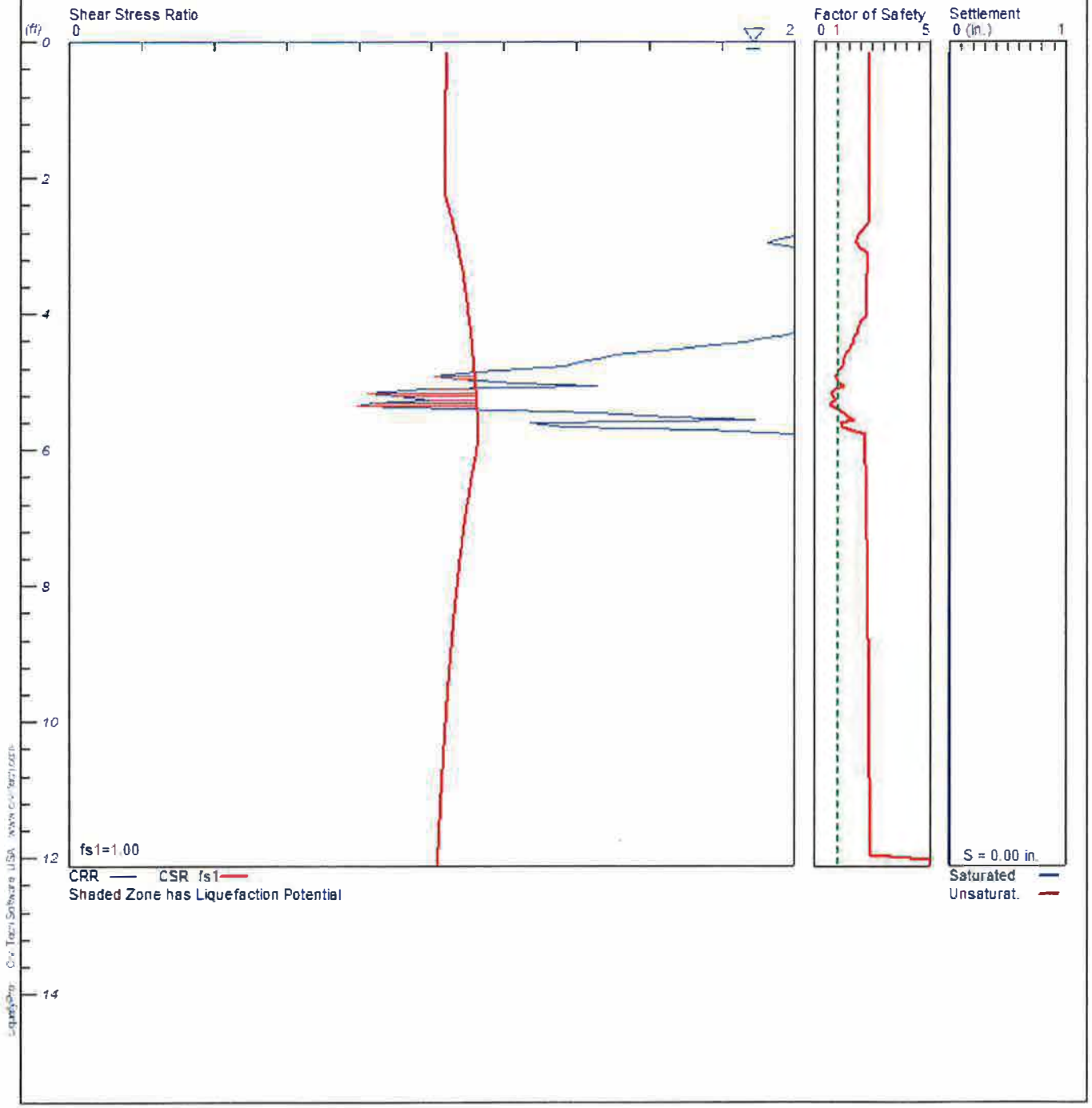
APPENDIX B
LIQUEFACTION ANALYSIS

LIQUEFACTION ANALYSIS

Skookumchuck Commerce Center

Hole No.=CPT-3A Water Depth=0 ft

Magnitude=7
Acceleration=0.65g



Appendix D

Shoreline, Wetland, and Fish and Wildlife Habitat Assessment Report

Soundview Consultants LLC
March 21, 2023

SHORELINE, WETLAND, AND FISH AND WILDLIFE HABITAT ASSESSMENT REPORT

SKOOKUMCHUCK COMMERCE CENTER

MARCH 2023

Soundview Consultants
Environmental Assessment
Planning + Land Use Solutions

SHORELINE, WETLAND, AND FISH AND WILDLIFE HABITAT ASSESSMENT REPORT

SKOOKUMCHUCK COMMERCE CENTER

MARCH 21, 2023

PROJECT LOCATION
1406 AND 1620 WEST REYNOLDS AVE
CENTRALIA, WASHINGTON 98531

PREPARED FOR

PDC Seattle LPIV BB/TH, LLC
1821 DOCK ST SUITE 100
TACOMA, WA 98402

PREPARED BY

SOUNDVIEW CONSULTANTS LLC
2907 HARBORVIEW DRIVE
GIG HARBOR, WASHINGTON 98335
(253) 514-8952

Soundview Consultants
Environmental Assessment
Planning + Land Use Solutions

Executive Summary

Soundview Consultants, LLC (SVC) has been assisting PDC Seattle LPIV BB/TH, LLC (Applicant) with a shoreline, wetland, and fish and wildlife habitat assessment report for the proposed industrial development of a 71.36-acre site located at 1406 and 1620 West Reynolds Avenue in the City of Centralia, Washington. The subject property consists of sixteen parcels located in the Northwest ¼ of Section 5 and Northeast ¼ of Section 6, Township 14 North, Range 2 West, W.M. (Lewis County Tax Parcel Numbers 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021044004000, 021060000000, 021039000000, 021043002000, 021043003000, 021043001000, 021041001000, 021059000000, 021037000000, 021041000000).

SVC investigated the subject property for the presence of potentially regulated wetlands, waterbodies, and other fish and wildlife habitat in the summer of 2021 and winter of 2023. Using current methodology, SVC identified two streams (Coffee Creek and the Skookumchuck River) on the subject property and one offsite wetland (Wetland A). Coffee Creek is a Type F (Fish-Bearing) stream and subject to a standard 150-foot buffer per Centralia Municipal Code (CMC) 16.20.080.A. The Skookumchuck River is a Type S (Shoreline of the State) stream, and subject to a standard 175-foot buffer per CMC 16.20.080.A. As a Shoreline of the State, the Skookumchuck River is also regulated by the City of Centralia Shoreline Master Program (CSMP). Per CSMP 3.2.B, the shoreline jurisdiction for streams includes lands that extend 200 feet in all directions of the OHWM, the SMP flood course and contiguous floodplain areas that extend up to 200 feet from the flood course, the FEMA floodway and the contiguous floodplain areas up to 200 feet from the floodway, stream-associated wetlands, and lands within a river delta. Portions of the subject property adjacent to the Skookumchuck River are identified within the FEMA floodway, and the entirety of the subject property is within the FEMA 100-year floodplain. The shoreline jurisdiction onsite includes all areas 200-feet landward of the FEMA floodway. Portions of Coffee Creek are located within the shoreline jurisdiction, Wetland A is located entirely outside of the shoreline jurisdiction. The shoreline environment designation on the subject property is Urban Conservancy. Wetland A is classified as a Category IV wetland with a low habitat score of 3 points and is subject to a standard 50-foot buffer based on the proposed high intensity land use per Centralia Municipal Code (CMC) 16.17.050.F. The projected 50-foot buffer does not extend onsite.

The Applicant is planning industrial development of the subject property. Project impacts, mitigation, and necessary code analytics will be provided in a mitigation plan under separate cover.

The table below summarizes the critical areas and identifies the potential regulatory status by local, state, and federal agencies.

Waterbody Name	Size Onsite	Category[1]	Regulated Under CMC Title 16	Regulated Under RCW 90.48 &/or 90.58	Regulated Under Clean Water Act
Wetland A	N/A	IV	Yes	Yes	Likely
Coffee Creek	~ 830 linear feet	Type F	Yes	Yes	Likely
Skookumchuck River	~615 linear feet	Type S	Yes	Yes	Likely

1. Current WSDOE and CMC 16.17.040 wetland ratings. Streams are classified according to the DNR water typing system per CMC 16.20.080.

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Appendix B – Background Information
Appendix C – Historical Aerial Photographs
Appendix D – Existing Conditions
Appendix E – Data Forms
Appendix F – Wetland Rating Forms
Appendix G – Wetland Rating Maps
Appendix H – Qualifications

Chapter 1. Introduction

Soundview Consultants, LLC (SVC) has been assisting PDC Seattle LPIV BB/TH, LLC (Applicant) with a shoreline, wetland, and fish and wildlife habitat assessment report for the proposed industrial development of a 71.36-acre site located at 1406 and 1620 West Reynolds Avenue in the City of Centralia, Washington. The subject property consists of sixteen parcels located in the Northwest ¼ of Section 5 and Northeast ¼ of Section 6, Township 14 North, Range 2 West, W.M. (Lewis County Tax Parcel Numbers 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021044004000, 021060000000, 021039000000, 021043002000, 021043003000, 021043001000, 021041001000, 021059000000, 021037000000, 021041000000).

The purpose of the shoreline, wetland, and fish and wildlife habitat assessment is to identify the presence of potentially regulated wetlands, waterbodies, or other fish and wildlife habitat conservation areas that may be found on or near the subject property. Project impacts, mitigation, and necessary code analytics will be provided in a mitigation plan under separate cover.

This report provides conclusions, recommendations, and preliminary specifications regarding:

- Site description, project description, and area of assessment;
- Background research and identification of potentially regulated critical areas within the vicinity of the proposed project;
- Identification and assessment of potentially regulated wetlands and other aquatic features;
- Identification and assessment of potentially regulated fish and wildlife habitat;
- Existing site map detailing identified critical areas and standard buffers; and
- Supplemental information necessary for regulatory review.

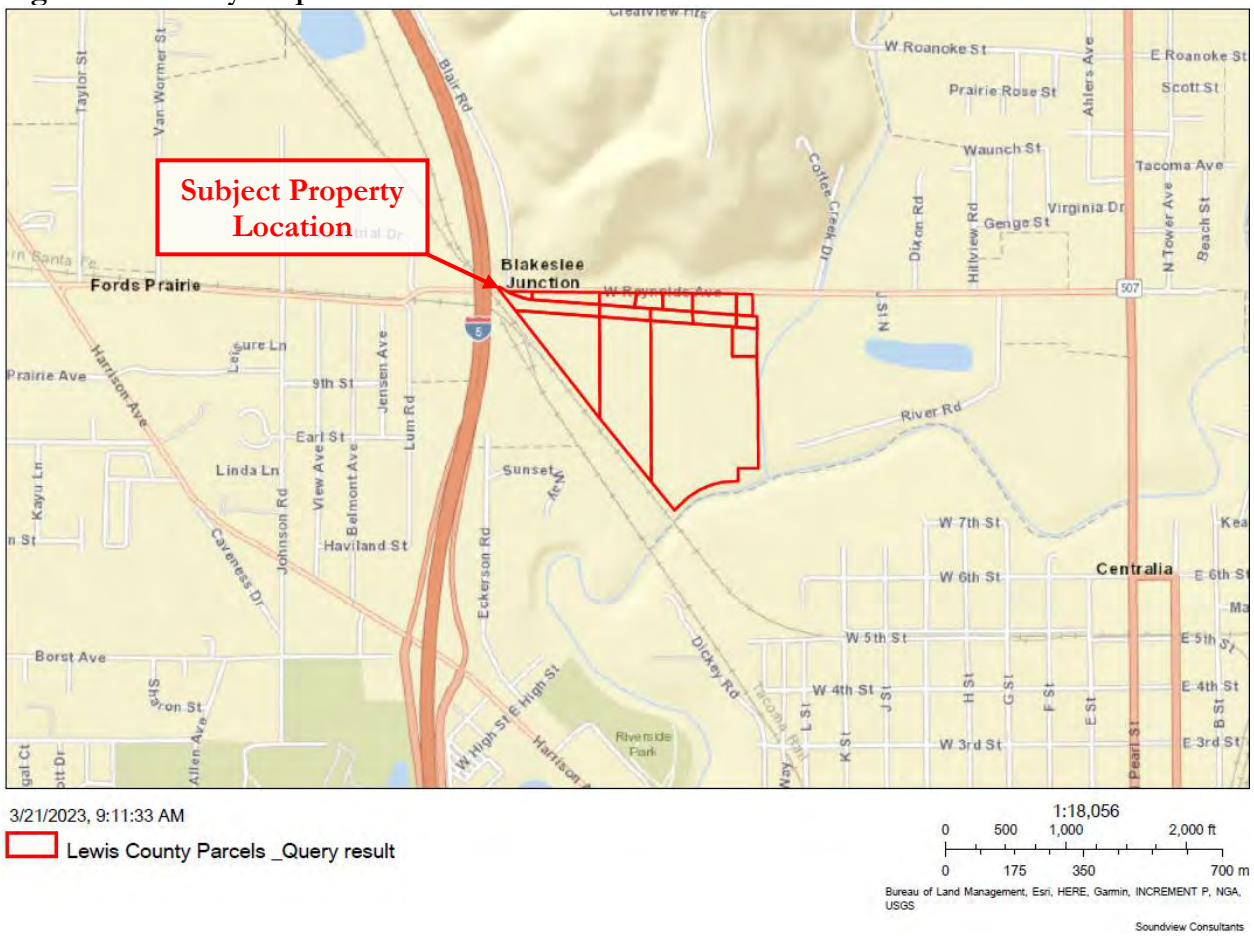
Chapter 2. Project Plan

2.1 Project Location

The subject property consists of a 71.36-acre site located at 1406 and 1620 West Reynolds Avenue in the City of Centralia, Washington (Figure 1). The subject property consists of sixteen parcels located in the Northwest ¼ of Section 5 and Northeast ¼ of Section 6, Township 14 North, Range 2 West, W.M. (Lewis County Tax Parcel Numbers 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021044004000, 021060000000, 021039000000, 021043002000, 021043003000, 021043001000, 021041001000, 021059000000, 021037000000, 021041000000).

To access the subject property from Interstate-5 South in the Centralia area, take Exit 82 for Harrison Avenue toward WA-507 North/Mellen Street and turn right onto Harrison Avenue. Continue for 0.2 mile and turn right onto Johnson Road. After 0.4 mile, turn right onto West Reynolds Avenue. Continue straight on West Reynolds Avenue, where after 0.4 mile the subject property will be located on the right.

Figure 1. Vicinity Map



2.2 Project Description

The Applicant's preliminary site plan includes industrial development of the subject property with two industrial buildings, parking and loading areas, stormwater detention/retention facilities, and associated infrastructure. All necessary code analytics, impact evaluation, and mitigation strategy will be outlined in a mitigation plan under separate cover.

Chapter 3. Methods

SVC investigated and assessed any potentially regulated wetlands, streams, and other fish and wildlife habitat conservation areas on or within 200 feet of the subject property in the summer of 2021 and winter of 2023. All determinations were made using observable vegetation, hydrology, and soils in conjunction with data from the U.S. Geological Survey (USGS) topographic maps, National Resource Conservation Service (NRCS) soil survey, U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI), Washington State Department of Natural Resources (DNR) water typing system, Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) mapping tool, WDFW and Northwest Indian Fisheries Commission (NWIFC) Statewide Fish Distribution (SWIFD) mapping tool, City of Centralia and Lewis County Geographic Information Systems (GIS) data, and various orthophotographic resources. Appendix A contains further details for the methods and tools used to prepare this report.

Wetland boundaries were determined using the routine approach described in the U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Environmental Laboratory, 1987) and modified according to the guidelines established in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region* (Version 2.0) (USACE, 2010) and *Field Indicators of Hydric Soils in the United States* (NRCS, 2018). Pink surveyor's flagging was labeled alpha-numerically and tied to 3-foot lath or vegetation at formal sampling locations to mark the points where detailed data was collected (DP-1 to DP-9).

Wetlands were classified using both the hydrogeomorphic (Brinson, 1993) and Cowardin (Cowardin, 1979) classification systems. Following classification and assessment, wetlands were rated and categorized using the *Washington State Wetlands Rating System for Western Washington—Washington Department of Ecology, 2014, Publication No. 04-06-029,* per Centralia Municipal Code (CMC) 16.17.040.A.

OHW mark determinations were made using WSDOE's method as detailed in *Determining the Ordinary High Water Mark for Shoreline Management Act Compliance in Washington State* (Anderson et. al., 2016) and the definitions established in the Revised Code of Washington (RCW) 90.58.030(2)(b) and WAC 173-22-030(5). To mark the centerline or banks of potentially-regulated streams and shorelines, blue surveyor's flagging was alpha-numerically labeled and tied to vegetation. Streams and surface water features were classified using the DNR water typing system as outlined in WAC 222-16-030 and the guidelines established in CMC 16.20.080.A.

The fish and wildlife habitat assessment was conducted during the same site visits by qualified fish and wildlife biologists. The experienced biologists made visual observations using stationery and walking survey methods for both aquatic and upland habitats noting any special habitat features or signs of fish and wildlife activity.

Chapter 4. Existing Conditions

4.1 Landscape Setting

The subject property is located in a mixed rural, residential, light-industrial, and commercial setting in the City of Centralia (Figure 2). The northwest corner of the subject property has been cleared, graded, and contains soil stockpiles actively used by an adjacent landscaping company. The northeast corner of the subject property is developed with single-family residences and associated outbuildings. The remainder of the subject property consists of maintained agricultural fields. The subject property abuts a mix of commercial and residential developments and West Reynolds Avenue to the north, and residential developments to the east. To the south, the subject property is bound by the Skookumchuck River, with agricultural fields and residential developments beyond. To the west, the subject property is bound by the Burlington Northern Santa Fe and Tacoma Rail railroads, with residential developments and Interstate-5 beyond. Topography on the site is generally flat, with a gentle slope from the northwest to the southeast. Elevations onsite range from approximately 186 feet above mean sea level (amsl) to approximately 180 feet amsl. A Lewis County topographic map is provided in Appendix B1. The subject property is located within Water Resource Inventory Area (WRIA) 23 – Upper Chehalis.

Figure 2. Aerial View of the Subject Property

4.2 Soils

The NRCS Soil Survey of Lewis County, Washington identifies three main soil series on the subject property: Spanaway gravelly sandy loam (212), Maytown-Cehalis-Rennie complex, 0 to 10 percent slopes (1223), and Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes (1212). A soil map is provided in Appendix B2. Below is a detailed description of the soil profiles.

Spanaway gravelly sandy loam (212)
According to the survey, Spanaway gravelly sandy loam is a very deep, excessively drained soil found on glacial outwash terraces and plains. The soil is formed in coarse textured glacial outwash. In a typical profile, the surface layer is a black gravelly sandy loam about 7 inches thick. The underlying material to a depth of approximately 18 inches is a very dark grey very gravelly sandy loam. From 18 to 60 inches, the soil is dark yellowish and extremely gravelly sand. Spanaway gravelly sandy loam contains inclusions of up to 5 percent Indianola and 5 percent Nisqually soils. Spanaway gravelly sandy loam is listed as non-hydric on the Lewis County Hydric Soil List, but as much as 5 percent of mapped areas may contain inclusions of hydric Klaber Variant soils (NRCS, n.d).

Maytown-Cehalis-Rennie complex, 0 to 10 percent slopes (1223)
Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes is not described in the *Soil Survey of Lewis County Area, Washington* (Evens and Fibich, 1987). According to the NRCS web soil survey, Maytown-Cehalis-Rennie complex, 0 to 10 percent slopes is composed of multiple soil components: Maytown, frequently flooded soils, Chehalis soils, Rennie, undrained soils, and other minor components; the primary soil component is Maytown, frequently flooded soils (NRCS, 2022). This soil complex consists of very deep, moderately well-drained soils formed in alluvium on floodplains and oxbows, and is considered prime farmland if protected from flooding or not frequently flooded during the growing season. In a typical profile, the surface layers to a depth of 17 inches consists of a silt loam or silty clay loam. From 5 to 17 inches, soil transitions to a silt loam or silty clay loam. From 17 to 47 inches, the soil transitions to a silty clay loam. The underlying material to a depth of 59 inches ranges from loam to silty clay. underlain by a loam layer 47 to 59 inches thick. Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes is listed as predominantly hydric on the Lewis County Hydric Soils List, and as much as 15 percent of mapped areas may contain hydric inclusions of Rennie soils (NRCS, n.d).

Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes (1212)
Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes is not described in the *Soil Survey of Lewis County Area, Washington* (Evens and Fibich, 1987). According to the NRCS web soil survey, Scatter-Fordprairie-Roundtree complex, 0 to 12 percent slopes is composed of multiple soil components: Scatter soils, Fordprairie soils, Roundtree soils, and other minor components; the primary component is Scatter soils (NRCS, 2022). This soil complex consists of very deep, moderately well drained soils formed in alluvium on natural levees, floodplains, and in depressions and overflow stream channels, and are considered prime farm land. In a typical soil profile, the surface layer is a loam from approximately 0 to 28 inches thick. From 28 to 49 inches, the soil transitions to a fine sandy loam or clay loam. The underlying layer to a depth of 59 inches is a loamy fine sand of clay loam. Scatter-Fordprairie-Rountree complex, 0 to 12 percent slopes is listed as predominantly hydric on the Lewis County Hydric Soils List, and as much as 15 percent of mapped areas may contain hydric inclusions of Roundtree soils (NRCS, n.d.).

4.3 Vegetation

Upland vegetation varies throughout the subject property. The northwest corner of the subject property was previously cleared and graded with gravelly substrate. Vegetation on this portion of the site consists of small patches of bedstraw (*Galium aparine*), perennial ryegrass (*Lolium perenne*), and non-native invasive Himalayan blackberry (*Rubus armeniacus*), reed canarygrass (*Phalaris arundinacea*) and teasel (*Dipsacus fullonum*) that have begun to emerge over time. The remainder of the subject property consists predominantly of fields dominated by grasses typical of agricultural fields including perennial ryegrass, orchard grass (*Dactylis glomerata*), and tall fescue (*Schedonorus arundinaceus*). Scrub-shrub patches are also present along the eastern, southern, and portions of the western boundary of the subject property, and are dominated by perennial ryegrass and non-native invasive Himalayan blackberry and reed canarygrass. Oregon ash (*Fraxinus latifolia*) was also observed in forested patches on the eastern and southern boundaries of the subject property.

4.4 Critical Area Inventories

The City of Centralia wetlands map (Appendix B3) and Lewis County stream and wetland map (Appendix B4), USFWS NWI map (Appendix B5), and WDFW PHS map (Appendix B6) identify one potential wetland area that wraps around the eastern, southern, and western boundaries of the subject property, only extending slightly onsite on the eastern and southern boundaries of the subject property. The USFWS NWI map identifies one pond to the east of the subject property; this pond is also visible on current aerial photography. Based on historical aerial imagery, the pond was constructed between 1952 and 1981 (Appendix C). As an artificially constructed feature, the pond is not likely regulated according to the definition of "wetland" under CMC 16.16.160. The pond is also approximately 160 feet east of the subject property boundary and the buffer would likely not project onsite even if the pond were to be regulated under CMC 16.17 or CMC 16.20. No further investigation or discussion of the pond is provided in this report.

The USFWS NWI map also identifies one linear riverine wetland feature crossing the northeast portion of the subject property. The DNR stream typing map (Appendix B7) identifies this riverine feature as a Type N (Non-Fish Bearing) stream. In addition, the DNR stream typing map identifies on Type F (Fish-Bearing) stream (Coffee Creek) on/adjacent to the eastern boundary of the subject property, and one Type S (Shoreline of the State) stream (the Skookumchuck River) on the southern boundary of the subject property. The WDFW SalmonScape map (Appendix B8) and WDFW PHS map identify documented presence of coho salmon and rainbow, cutthroat, and steelhead trout in Coffee Creek and identify documented presence of coho and chinook salmon and rainbow, cutthroat, and steelhead trout in the Skookumchuck River, as well as breeding habitat for coho and chinook salmon and steelhead trout in the Skookumchuck River. The WDFW PHS map also identifies potential Oregon white oak (*Quercus garryana*) woodlands in the forested areas adjacent to the subject property and identifies the presence of big brown bat (*Eptesicus fuscus*) in the same township as the subject property, though not necessarily onsite. The City of Centralia Adopted Floodway and Floodplain Map (Appendix B9) also identifies the entire subject property within the FEMA 100-year floodplain. No other potential wetlands, streams, fish and wildlife habitat conservation areas, or priority species are identified on or within 200 feet of the subject property.

4.5 Precipitation

Precipitation data was obtained from the NOAA weather station at Olympia Regional Airport in order to obtain percent of normal precipitation during and preceding the investigations. A summary of data collected is provided in Table 1.

Table 1. Precipitation Summary[1]

Date	Day of	Day Before	1 Week Prior	2 Weeks Prior	Last 30 Days (Observed/Normal)	Year-to-Date[2] (Observed/Normal)	Percent of Normal (Last 30 days/Year)
07/21/21	0.00	0.00	0.00	0.00	0.00/0.75	29.10/26.35	0/110
02/14/23	0.01	0.22	1.13	2.40	3.52/6.86	25.18/31.61	51/80

Notes:

1. Precipitation volume in inches. Data obtained from the NOAA (http://w2.weather.gov/climate/xmacis.php?wfo=sew) for Olympia Airport.
2. Year-to-date precipitation for the July 2021 site visit is the for the 2021 calendar year from January 1st to the onsite date; year-to-date precipitation for the February 2023 site visit is for the 2022/2023 water year from October 1st to the onsite date.

During the July 2021 site visit, precipitation levels were within the statistical normal range for the 2021 calendar year (110 percent of normal), and lower than the statistical normal range for the prior 30 days (0 percent of normal). Given that the month of July is typically one of the driest times of year in the Pacific Northwest region, this precipitation data suggests that hydrologic conditions encountered were relatively normal for the time of year.

During the February 2023 site visit, precipitation levels were within the statistical normal range for the 2022/2023 water year, and lower than the statistical normal range for the prior 30 days (51 percent of normal). In addition, over an inch of precipitation was observed the week prior to the site investigation and 0.22 inch of precipitation was observed the day before the site investigation. This precipitation data suggests that hydrologic conditions were relatively normal at the time of the February 2023 site investigation.

Such conditions were considered in making professional wetland boundary determinations.

Chapter 5. Results

SVC identified the following potentially regulated critical areas onsite: two streams (Coffee Creek/Stream Y and the regulated shoreline of the Skookumchuck River/Stream Z). One wetland (Wetland A) was observed offsite to the west of the site. No other potentially regulated wetlands, waterbodies, or other fish and wildlife habitat conservation areas were identified on or within 200 feet of the subject property during the site investigation.

5.1 Wetlands

5.1.1 Overview

The identified wetland contained indicators of wetland hydrology and a predominance of hydrophytic vegetation according to current wetland delineation methodology. Due to its offsite location, Wetland A was not formally delineated and as such hydric soils were assumed. Wetland rating forms are provided in Appendix F; and wetland rating maps are provided in Appendix G. Table 2 summarizes the wetland identified during the site investigations.

Table 2. Identified Wetlands

Wetland	Predominant Wetland Classification / Rating				Wetland Size Onsite	Standard Buffer Width (feet)[5]
	Cowardin[1]	HGM[2]	WSDOE[3]	City of Centralia[4]		
Wetland A	PSS/EMBC	Depressional	IV	IV	N/A	50

Notes:

1. Cowardin et al. (1979); Federal Geographic Data Committee (2013); class based on vegetation: PSS = Palustrine Scrub Shrub, PEM = Palustrine Emergent. Modifiers for Water Regime and special situations: B = Seasonally Saturated, C = Seasonally Flooded
2. Brinson, M. M. (1993).
3. Current WSDOE rating (Hruby, 2014).
4. CMC 16.17.040.A wetland ratings.
5. CMC 16.17.050.F buffer width standards.

Wetland A

Wetland A is approximately located 65 feet offsite to the west of the subject property, west of one of the railroad tracks. Hydrology for Wetland A is provided by surface sheet flow from adjacent uplands, direct precipitation, and a seasonally high groundwater table. The outlet for Wetland A is a water control structure located adjacent to the railroad tracks at the northwestern end of the wetland. This water control structure appears to be a screw gate or similar type control structure that functionally controls water levels within the wetland. Wetland vegetation is dominated by hardhack (*Spiraea douglasii*), Nootka rose (*Rosa nutkana*), and non-native invasive reed canarygrass (*Phalaris arundinacea*). Oregon ash and Pacific willow (*Salix lasiandra*) were also observed along the fringes of the wetland. Wetland A is a Palustrine Scrub-Shrub/Emergent, Seasonally Flooded and Saturated wetland (PSS/EMBC). Per CMC 16.17.040.A.1.d, Wetland A is a Category IV depressional wetland with a low habitat score of 3 points. Table 3 summarizes Wetland A.

Table 3. Wetland A Summary.

WETLAND A – INFORMATION SUMMARY			
Location:	Located 65 feet offsite to the west of the subject property		
		Local Jurisdiction	City of Centralia
		WRIA	23 – Upper Chehalis
		WSDOE Rating (Hruby, 2014)	IV
		City of Centralia Rating	IV
		City of Centralia Buffer Width	50 feet
		Wetland Size Onsite	N/A
		Cowardin Classification	PSS/EMBC
		HGM Classification	Depressional
		Wetland Data Sheet(s)	N/A (Offsite)
		Upland Data Sheet (s)	N/A (Offsite)
		Boundary Flag color	N/A (Offsite)
Dominant Vegetation	Wetland vegetation is dominated by hardhack, nootka rose, and non-native invasive reed canarygrass.		
Soils	N/A – Hydric soils are assumed due to wetland's offsite location.		
Hydrology	Surface sheet flow, direct precipitation, and a seasonally high groundwater table.		
Rationale for Delineation	Topographic drop and transition to hydrophytic plant community and wetland hydrology.		
Rationale for Local Rating	Local rating is based upon WSDOE's current rating system per CMC 16.17.040.A		
Wetland Functions Summary			
Water Quality (Scores 7 out of 9 points)	• Moderate site potential to trap sediments and pollutants and remove nitrogen due to >95% cover of persistent ungrazed plants and seasonal ponding in over ¼ of the wetland. • Moderate landscape potential to receive sediment and pollutants due to adjacent railroads. • High societal value for water quality functions due to location in a watershed important for maintaining water quality.		
Hydrologic (Scores 4 out of 9 points)	• Low site potential to reduce flooding and erosion due to the wetlands small size which limits flood storage capacity. • Moderate landscape potential to provide flood protection due to the adjacent railroads and intensive land uses in the contributing basin. • Low societal value for hydrologic functions due to control structure located along railroad bed that constrains outflows from the wetland		
Habitat (Scores 3 out of 9 points)	• Low site potential to provide diverse and complex habitat as the wetland has low habitat interspersion and limited special habitat features. • Low landscape potential to support habitat use due to the adjacent agricultural land use and railroads. • Low societal value for habitat functions due to the lack of nearby WDFW Priority Habitats		
Buffer Condition	The buffer surrounding Wetland A is degraded due to adjacent railroads and the presence of non-native invasive species.		

5.2 Streams

5.2.1 Overview

Two streams (Coffee Creek/Stream Y) and the regulated shoreline of the Skookumchuck River/Stream Z) were identified on or adjacent to the subject property.

Coffee Creek (Stream Y)

Coffee Creek (flagged as Stream Y onsite) was identified on the eastern boundary of the subject property. Coffee Creek originates offsite to the northeast and flows south along the eastern boundary of the subject property for approximately 830 feet before being conveyed to the Skookumchuck River. During the site investigation, Coffee Creek was observed to have a defined bed and bank approximately 12-15 feet wide on average. The onsite, the stream banks were lined with Douglas fir (*Pseudotsuga menziessi*) and non-native invasive Himalayan blackberry. Substrate within Coffee Creek consisted of silt with sorted cobbles and gravels, and pools and riffles were observed along the length of the stream.

Coffee Creek is identified by the City of Centralia, Lewis County, DNR, and WDFW; Lewis County and DNR identify Coffee Creek as a Type F (Fish-Bearing) stream. WDFW identifies documented presence of coho salmon and rainbow, cutthroat, and steelhead trout in Coffee Creek. As Coffee Creek has a defined bed and bank greater than 2 feet wide on average, it meets the definition of a Type F stream under WAC 222-16-030 and 222-16-031 per CCC 16.20.080.A. Table 4 summarizes Coffee Creek.

Skookumchuck River (Stream Z)

The Skookumchuck River was identified on the southern boundary of the subject property. The Skookumchuck River originates offsite to the east and flows west along the southern boundary of the subject property for approximately 585 feet before continuing southwest offsite. During the site investigation, the Skookumchuck River was observed to have a defined bed and bank ranging from 20 to 50 feet wide. Vegetation adjacent to the river onsite was dominated by non-native invasive Himalayan blackberry and reed canarygrass. Stream substrate consisted of silt with sorted cobbles and gravel.

The Skookumchuck River is identified by the City of Centralia, Lewis County, DNR, and WDFW; Lewis County and DNR identify the Skookumchuck River as a Type S (Shoreline of the State) stream. The Skookumchuck River is also identified as a regulated shoreline in the City of Centralia's Adopted Shoreline Master Plan (City of Centralia, 2019). WDFW identifies documented presence of coho and Chinook salmon and rainbow, cutthroat, and steelhead trout in the Skookumchuck River, as well as breeding habitat for coho and Chinook salmon and steelhead trout. Table 5 summarized the Skookumchuck River.

Table 4. Stream Summary – Coffee Creek (Stream Y)

STREAM INFORMATION SUMMARY		
	Feature Name	Coffee Creek
	WRIA	23 – Upper Chehalis
	Local Jurisdiction	City of Centralia
	DNR Stream Type	Type F (Fish-Bearing)
	Local Stream Rating	Type F (Fish-Bearing)
	Buffer Width	150 feet
	Documented Fish Use	Coho salmon and rainbow, cutthroat, and steelhead trout
Location of Feature	Coffee Creek was identified on the eastern boundary of the subject property.	
Connectivity (where water flows from/to)	Coffee Creek originates offsite, over 5.5 miles north of the subject property and flows south, branching several times and flowing through several culverts before crossing the eastern boundary of the subject property. Coffee Creek flows along the eastern boundary of the subject property for approximately 830 feet before discharging to the Skookumchuck River.	
Riparian/Buffer Condition	The onsite riparian buffer is largely degraded due to a prevalence of non-native invasive Himalayan blackberry and adjacent agricultural land use.	

Table 5. Stream Summary – Skookumchuck River (Stream Z)

STREAM INFORMATION SUMMARY		
	Feature Name	Skookumchuck River
	WRIA	23 – Salmon-Washougal
	Local Jurisdiction	City of Centralia
	DNR Stream Type	Type S (Shoreline of the State)
	Local Stream Rating	Type S (Shoreline of the State)
	Buffer Width	175 feet
	Documented Fish Use	Coho and Chinook salmon, rainbow, cutthroat, and steelhead trout
Location of Feature	The Skookumchuck River was identified on the southern boundary of the subject property.	
Connectivity (where water flows from/to)	The Skookumchuck River originates from the Skookumchuck Reservoir, over 14 miles northeast of the subject property. The Skookumchuck River flows southwest, crossing the southern boundary of the subject property and flowing onsite for approximately 585 feet before continuing southwest offsite and discharging to the Chehalis River, approximately 1 mile southwest of the subject property.	
Riparian/Buffer Condition	The onsite riparian buffer is largely degraded due to the prevalence of non-native invasive Himalayan blackberry and reed canarygrass, and adjacent agricultural land use.	

5.3 Drainage Swale

One drainage swale was observed along the subject property's western boundary and adjacent to the offsite railroad tracks. This drainage swale consists of a recognizable depression that drains beneath a low trestle crossing of the railroad, into Wetland A and was likely artificially constructed. Water levels within Wetland A and the drainage swale are controlled by the man-made outlet to Wetland A, which consists of a water control structure that appears to be a screw gate or similar type structure. The representative DP-4 was collected adjacent to and upgradient of the swale and did not meet wetland criteria due to a lack of hydric soil and wetland hydrology indicators, suggesting that areas surrounding the drainage swale are uplands. The uplands surrounding the swale have a gentle slope to the south, towards the Skookumchuck River. In 1952, the subject property consisted of agricultural fields with a line of shrubs running along most of the railroad length. The 1982 historical aerial photograph shows the clearing and grading of the northeastern corner of the site, and a logging yard site in the 1990-2009 historical aerial photos. Google Earth imagery from 2003 to 2009 shows that a stormwater facility was constructed along the eastern edge of the logging yard. In Google Earth imagery from 2011 onward, the stormwater facility is no longer evident and appears to have been reclaimed (Appendix C). This stormwater facility was located adjacent and east of the drainage swale and likely drained to the swale based on the surrounding topography and lack of any other visible

drainage features. Per CMC 16.16.160.B, wetlands do not include those artificial wetlands intentionally created from nonwetland sites, including, but not limited to, irrigation and drainage ditches, grass-lined swales, canals, detention facilities, wastewater treatment facilities, farm ponds, and landscape amenities. The drainage swale appears to have been artificially created for the purposes of conveying water beneath the railroad to Wetland A, where water next to the railroads are drained through a man-made outlet. The drainage swale feature is therefore likely not considered to be a wetland.

Chapter 6. Regulatory Considerations

SVC identified the following potentially regulated critical areas onsite: two streams (Coffee Creek/Stream Y and the regulated shoreline of the Skookumchuck River/Stream Z). One wetland (Wetland A) was observed offsite to the west of the site. No other potentially regulated wetlands, waterbodies, or other fish and wildlife habitat conservation areas were identified on or within 200 feet of the subject property during the site investigation. The sections below are limited to establishing standard buffers and the regulatory status of the identified critical areas onsite. All necessary code analytics for the proposed project and a conceptual mitigation plan will be prepared under separate cover.

6.1 Local Considerations

6.1.1 Shoreline Considerations

The Skookumchuck River, a regulated shoreline of the state, was identified on the southern boundary of the subject property. The City of Centralia regulates shorelines of the state under CMC 16.20 – Fish and Wildlife Habitat Conservation Areas and under the City of Centralia's Adopted Shoreline Master Program (CSMP) (City of Centralia, 2019). Per CSMP 3.2.B, the shoreline jurisdiction for streams includes lands that extend 200 feet in all directions of the OHWM, the SMP flood course and contiguous floodplain areas that extend up to 200 feet from the flood course, the FEMA floodway and the contiguous floodplain areas up to 200 feet from the floodway, stream-associated wetlands, and lands within a river delta. Areas immediately surrounding the Skookumchuck River are mapped as part of the FEMA floodway, and the FEMA 100-year floodplain encumbers the entirety of the subject property. As such, the shoreline jurisdiction onsite extends 200 feet landward from the FEMA floodway. Portions of Coffee Creek are located within the shoreline jurisdiction and subject to regulation under the CSMP. Wetland A is located entirely outside of the shoreline jurisdiction.

The shoreline of Skookumchuck River is subject to shoreline environment designations that implement policies and regulations for proposed uses and developments. CSMP Appendix B identifies the shoreline environment designation for the Skookumchuck River on the subject property as Urban Conservancy. Per CSMP 3.3.3.A, the purpose of the Urban Conservancy shoreline environment designation is to provide for ecological rehabilitation in open space, floodplain, and other sensitive areas, while allowing for agricultural, low intensity water-related uses, very-low and low intensity residential developments. CSMP 7.3 Table 7-1 states allowed uses within each shoreline environment. Non-water oriented commercial and industrial land uses are prohibited within the Urban Conservancy environment.

CSMP 7.4.2 states shoreline setbacks required for each shoreline environment designation; no shoreline setback is established for commercial or industrial development in the Urban Conservancy shoreline environment. However, the CSMP adopts the buffer standards of CMC Title 16 – Environment by reference for critical areas. Standard buffers described under CMC Title 16 are described in section 6.1.2 below.

6.1.2 Buffer Requirements

The City of Centralia has adopted the current wetland rating system for western Washington (Hruby, 2014). Category IV wetlands have the lowest level of functions (scores less than 16 points) and are often heavily disturbed.

CMC 16.17.050.F establishes wetland buffers based on wetland rating, wetland water quality and/or habitat score, and the intensity of land use proposed on the development site. Wetland A is classified as a Category IV wetland with a low habitat score and is subject to a standard 50-foot buffer based on the proposed high-intensity land use per CMC 16.17.050.F. The projected 50-foot buffer does not extend onsite.

Coffee Creek is a Type F (Fish-Bearing) stream and subject to a standard 150-foot buffer per CMC 16.20.080.A. The Skookumchuck River is classified as a Type S (Shoreline of the State) stream and subject to a standard 175-foot buffer.

6.2 State and Federal Requirements

On January 18, 2023, USACE and EPA published a revised definition of "Waters of the United States." The revised rule becomes effective on March 20, 2023. Under the 2023 revised rule, Waters of the United States is described as follows (USACE and EPA, 2023):

(a) Waters of the United States means:

(1) Waters which are: (i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide; (ii) The territorial seas; or (iii) Interstate waters, including interstate wetlands;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section: (i) That are relatively permanent, standing or continuously flowing bodies of water; or (ii) That either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section;

(4) Wetlands adjacent to the following waters: (i) Waters identified in paragraph (a)(1) of this section; or (ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3)(i) of this section and with a continuous surface connection to those waters; or (iii) Waters identified in paragraph (a)(2) or (3) of this section when the wetlands either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section;

(5) Intrastate lakes and ponds, streams, or wetlands not identified in paragraphs (a)(1) through (4) of this section: (i) That are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3)(i) of this section; or (ii) That either alone or in combination with similarly situated waters in the region, significantly affect the chemical, physical, or biological integrity of waters identified in paragraph (a)(1) of this section.

The Skookumchuck River is likely regulated under Section 404 of the Clean Water Act (CWA) as it is a tributary to the Chehalis River, a traditional navigable water. Coffee Creek is also likely to be regulated as it is a tributary to the Skookumchuck River, a likely jurisdictional water. Wetland A is assumed to be regulated due to its proximity to the Skookumchuck River.

All of the identified waters above are considered natural waters that are likely regulated by the WSDOE through the Revised Code of Washington (RCW) 90.48.

The wetland is located offsite; no direct wetland impacts are proposed. No in-water work is proposed, and no coordination with USACE or WSDOE is anticipated.

Chapter 7. Closure

The findings and conclusions documented in this assessment report have been prepared for specific application to the Skookumchuck Commerce Center project. These findings and conclusions have been developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. The conclusions and recommendations presented in this assessment report are professional opinions based on an interpretation of information currently available to us and are made within the operation scope, budget, and schedule of this project. No warranty, expressed or implied, is made. In addition, changes in government codes, regulations, or laws may occur. Due to such changes, our observations and conclusions applicable to this assessment may need to be revised wholly or in part in the future.

Wetland and waterbody status and boundaries identified by SVC are based on conditions present at the time of the site visit and considered preliminary until the wetland and waterbody boundaries validated by the jurisdictional agencies. Validation of the boundaries and jurisdictional status of such features by the regulatory agencies provides a certification, usually written, that the critical area determination and boundaries verified are the units that will be regulated by the agencies until a specific date or until the regulations are modified. Only the regulatory agencies can provide this certification.

As wetlands and waterbodies are dynamic communities affected by both natural and human activities, changes in boundaries may be expected; therefore, delineations cannot remain valid for an indefinite period of time. Regulatory agencies typically recognize the validity of critical area delineations for a period of 5 years after completion of an assessment report. Development activities on a site five years after the completion of this assessment report may require reassessment of the wetland and waterbody status and/or boundaries. In addition, changes in government codes, regulations, or laws may occur. Due to such changes, our observations and conclusions applicable to this site may need to be revised wholly or in part.

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Appendix A – Methods and Tools

Table A1. Methods and tools used to prepare the report.

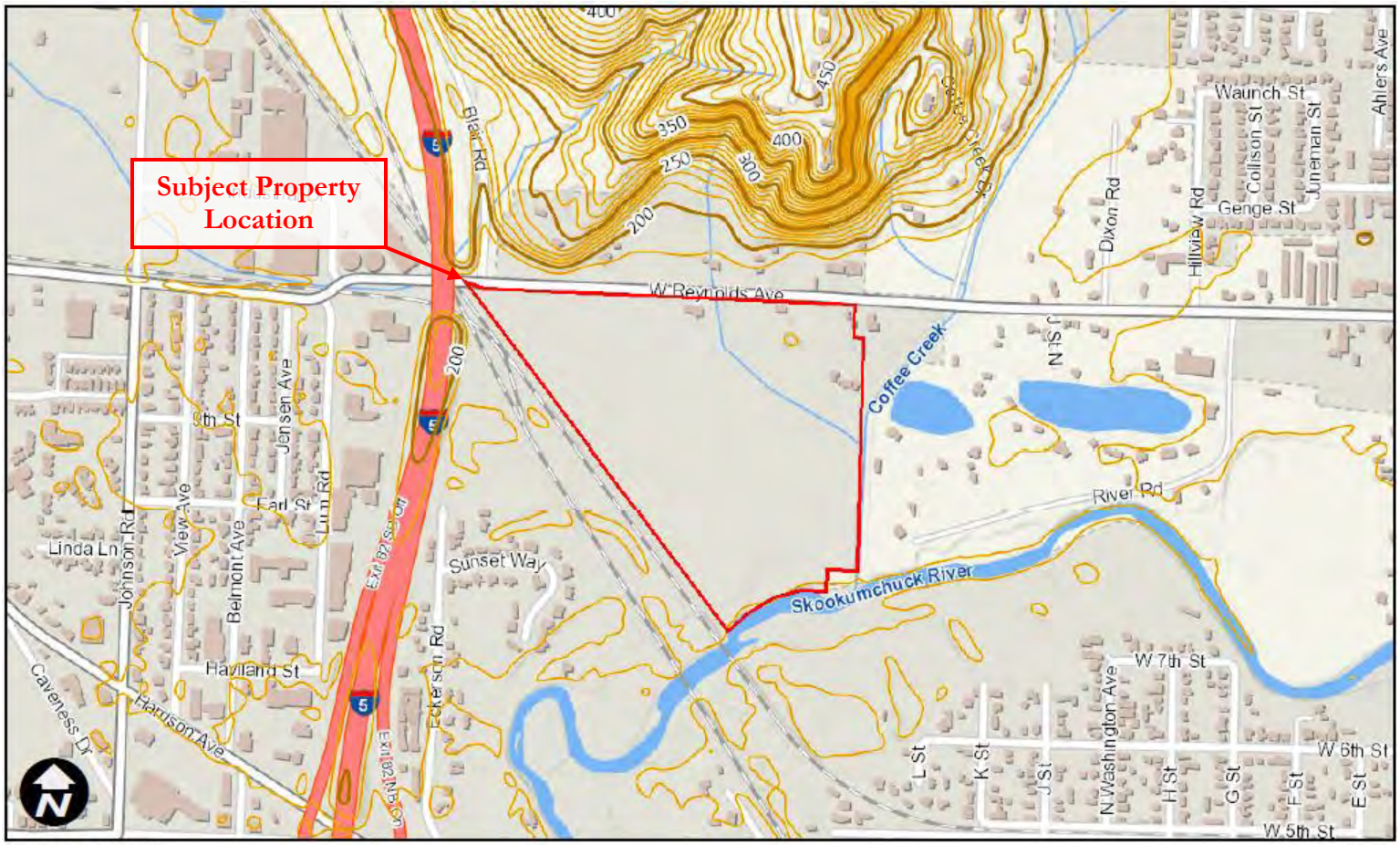
Parameter	Method or Tool	Website	Reference
Wetland Delineation	USACE 1987 Wetland Delineation Manual	http://el.erdc.usace.army.mil/elpubs/pdf/wlman87.pdf	**Environmental Laboratory.** 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, US Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
	Western Mountains, Valleys, and Coast Region Regional Supplement	http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/west_mt_finalsupp.pdf	**U.S. Army Corps of Engineers.** 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-3. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
Wetland Classification	USFWS / Cowardin Classification System	http://www.fws.gov/wetlands/Documents/Classification-of-Wetlands-and-Deepwater-Habitats-of-the-United-States.pdf https://www.fgdc.gov/standards/projects/wetlands/nvcs-2013	**Cowardin**, L. M., V. Carter, F. C. Golet, E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. Government Printing Office, Washington, D.C. **Federal Geographic Data Committee.** 2013. Classification of Wetlands and Deepwater Habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC.
	Hydrogeomorphic Classification (HGM) System	http://el.erdc.usace.army.mil/wetlands/pdfs/wrpde4.pdf	**Brinson**, M. M. (1993). "A hydrogeomorphic classification for wetlands," Technical Report WRP-DE-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.
Wetland Rating	Washington State Wetland Rating System	http://www.ecy.wa.gov/biblio/0406025.html	**Hruby, T**. 2014. Washington State wetland rating system for western Washington –Revised. Publication # 04-06-025.
Wetland Indicator Status	2016 National Wetland Plant List	https://www.fws.gov/wetlands/documents/National-Wetland-Plant-List-2016-Wetland-Ratings.pdf	**Lichvar**, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. *The National Wetland Plant List: 2016 wetland ratings*. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X
Plant Names	USDA Plant Database	http://plants.usda.gov/	Website.
Soils Data	NRCS Soil Survey	http://websoilsurvey.nrcs.usda.gov/app/	Website GIS data based upon: **Evans R., and Fibich WR.** 1987. Soil Survey of Lewis County Area, Washington. United States Department of Agriculture, Soil Conservation Service in cooperation with Washington State Department of Natural Resources, and Washington State University, Agriculture Research Center. Washington, D.C.
	Washington State Hydric Soils List	http://www.wa.nrcs.usda.gov/technical/soils/hydric_lists/hydsoil-wa-653.pdf	**Natural Resources Conservation Service.** 1983. Hydric Soils List: Lewis County, Washington. U.S. Department of Agriculture. Washington D.C.
	Soil Color Charts		**Munsell®** Color. 2000. Munsell® Soil Color Charts. New Windsor, New York.
Threatened and Endangered Species	Washington Natural Heritage Program	http://data-wadnr.opendata.arcgis.com/datasets/wnhp-current-element-occurrences	**Washington Natural Heritage Program** (Data published 07/19/17). Endangered, threatened, and sensitive plants of Washington. Washington State Department of Natural Resources, Washington Natural Heritage Program, Olympia, WA

Parameter	Method or Tool	Website	Reference
	Washington Priority Habitats and Species	http://wdfw.wa.gov/hab/phspage.htm	**Priority Habitats and Species (PHS) Program** Map of priority habitats and species in project vicinity. Washington Department of Fish and Wildlife.
Species of Local Importance	WDFW GIS Data	http://wdfw.wa.gov/mapping/salmonscape/	Website
Report Preparation	Centralia Municipal Code (CMC)	http://www.codepublishing.com/WA/Centralia/	CMC Title 16 – Environment.

Appendix B – Background Information

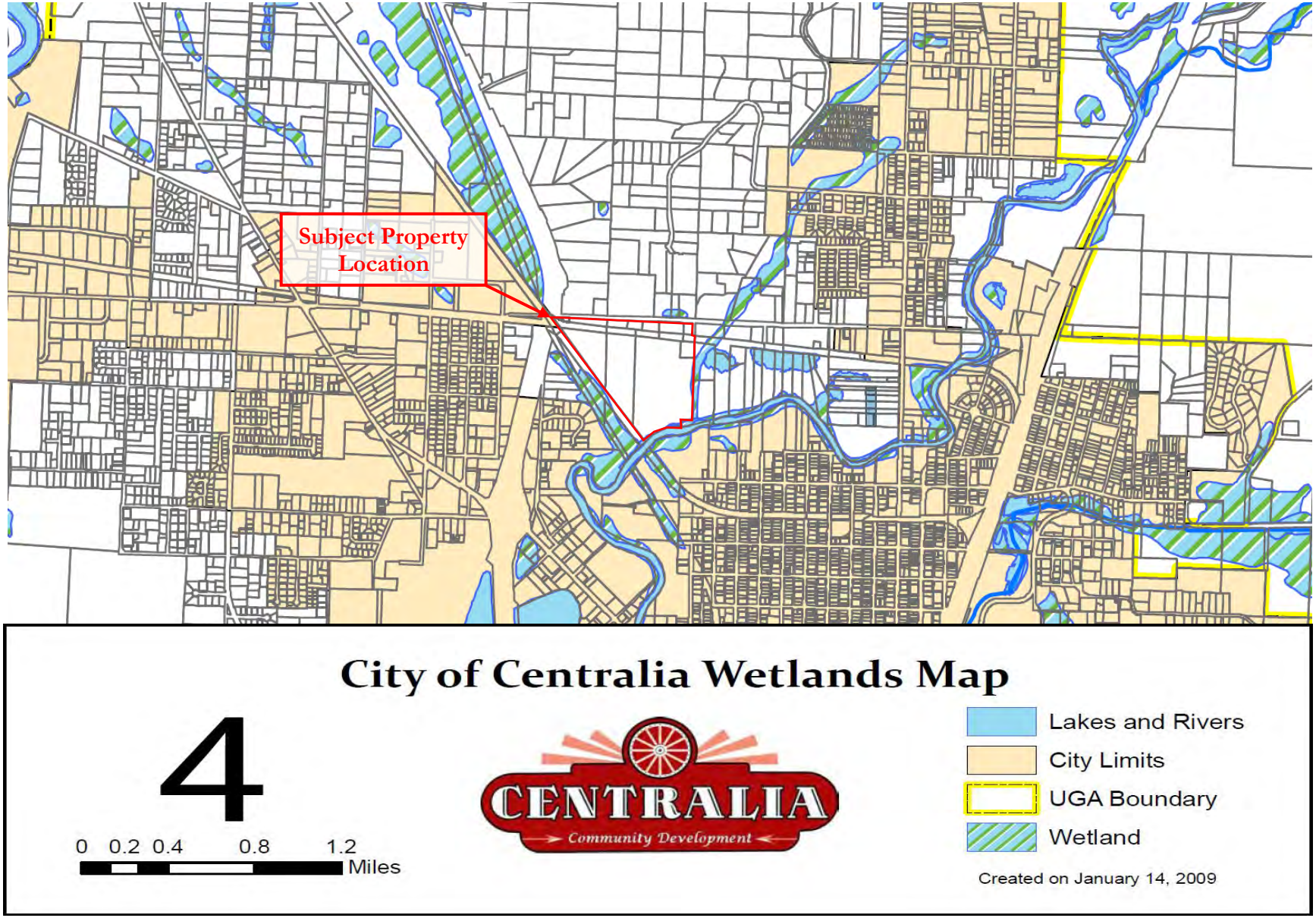
This Appendix includes a Lewis Contours Map (B1); NRCS Soil Survey Map (B2); Centralia Stream and Wetland Inventory (B3); Lewis County Stream and Wetland Inventory (B4); USFWS NWI Map (B5); WDFW PHS Map (B6); DNR Stream Typing Map (B7); WDFW SalmonScape Map (B8) and Centralia Adopted Floodway and Floodplain Map (B9).

Appendix B1. Lewis County Contours Map

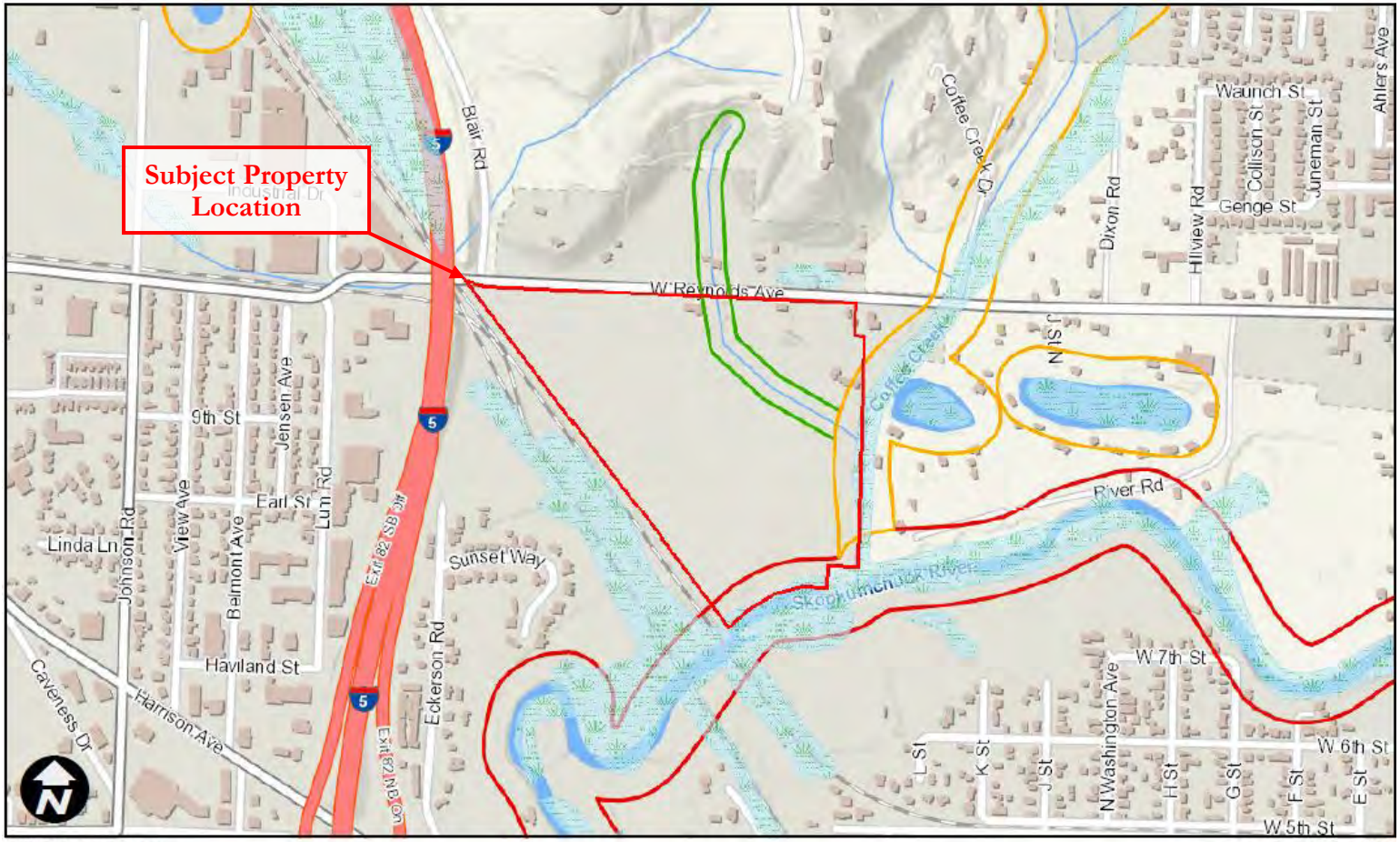


Appendix B2. NRCS Soil Survey Map

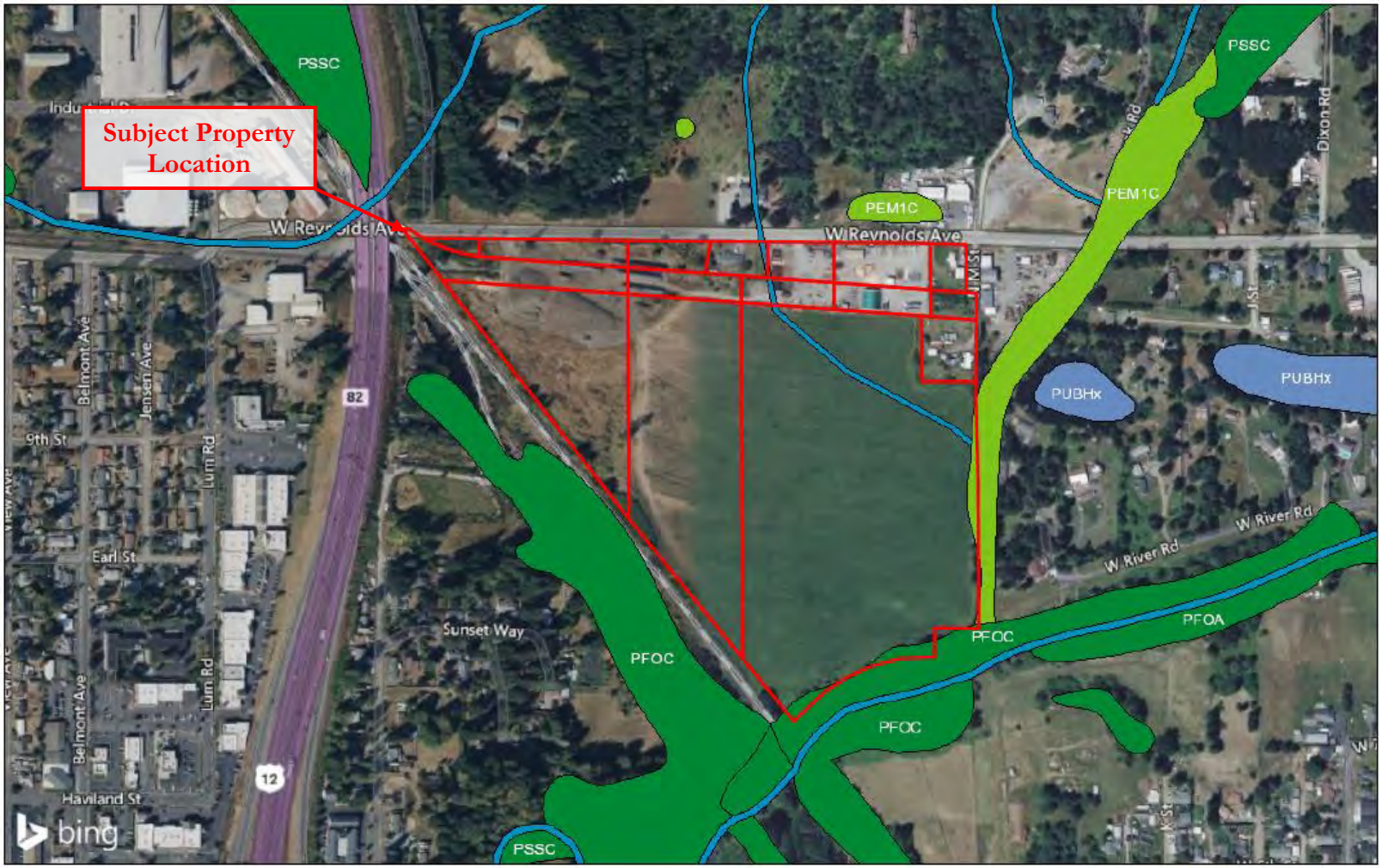
Appendix B3. City of Centralia Stream and Wetland Inventory



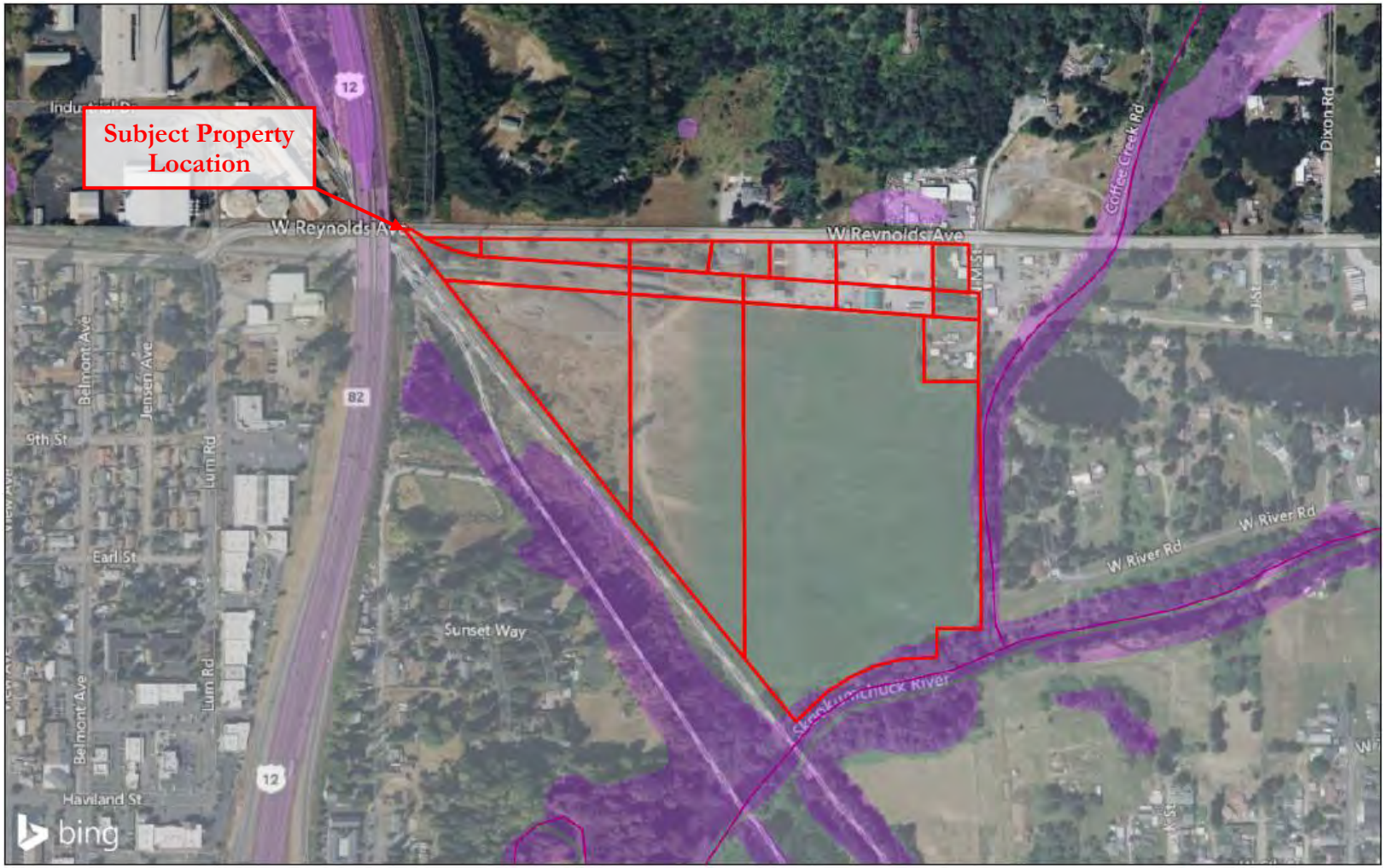
Appendix B4. Lewis County Stream and Wetland Inventory



Appendix B5. USFWS NWI Map



Appendix B6. WDFW PHS Map



Priority Habitats and Species on the Web

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Coho	N/A	N/A	No
Cutthroat	Candidate	N/A	No
Spring Chinook	N/A	N/A	No
Winter Steelhead	N/A	N/A	No
Resident Coastal Cutthroat	N/A	N/A	No
Chinook	Not Warranted	N/A	No
Fall Chinook	N/A	N/A	No
Coho	Candidate	N/A	No
Rainbow Trout	N/A	N/A	No
Steelhead	Not Warranted	N/A	No
Freshwater Emergent Wetland	N/A	N/A	No
Freshwater Forested/Shrub Wetland	N/A	N/A	No
Oak Woodland	N/A	N/A	No
Big brown bat	N/A	N/A	Yes

PHS Species/Habitats Details:

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence/Migration
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	55388
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Stock Name: Chehalis Coastal Cutthroat, Run: Unspecified, Status: Unknown
Source Record	7580
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Candidate
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Breeding Area
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Coho Salmon, Run Time: Unknown or not Applicable, Life History: Anadromous
Source Record	55662
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Spring Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Breeding Area
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Chinook Salmon, Run Time: Spring, Life History: Anadromous
Source Record	55659
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Breeding Area
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	55665
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Resident Coastal Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence/Migration
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	55656
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Stock Name: Chehalis Spring Chinook, Run: Spring, Status: Healthy
Source Record	1432
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Fall Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Breeding Area
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Chinook Salmon, Run Time: Fall, Life History: Anadromous
Source Record	55657
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Stock Name: Chehalis Coho, Run: Unspecified, Status: Healthy
Source Record	3605
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Candidate
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Rainbow Trout	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Fish Name: Rainbow Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	55389
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Coho	
Scientific Name	*Oncorhynchus kisutch*
Priority Area	Occurrence
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Stock Name: Chehalis Coho, Run: Unspecified, Status: Healthy
Source Record	3605
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Candidate
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Stock Name: Chehalis Coastal Cutthroat, Run: Unspecified, Status: Unknown
Source Record	7580
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Candidate
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversity/soc/soc.htm
Geometry Type	Lines

Chinook	
Scientific Name	*Oncorhynchus tshawytscha*
Priority Area	Occurrence
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Stock Name: Chehalis Fall Chinook, Run: Fall, Status: Healthy
Source Record	1435
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversity/soc/soc.htm
Geometry Type	Lines

Resident Coastal Cutthroat	
Scientific Name	*Oncorhynchus clarki*
Priority Area	Occurrence/Migration
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Fish Name: Cutthroat Trout, Run Time: Unknown or not Applicable, Life History: Resident
Source Record	55387
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Rainbow Trout	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Fish Name: Rainbow Trout, Run Time: Unknown or not Applicable, Life History: Unknown
Source Record	55663
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence
Site Name	Skookumchuck River
Accuracy	NA
Notes	LLID: 1229812467196, Stock Name: Skookumchuck/Newaukum Winter Steelhead, Run: Winter, Status: Healthy
Source Record	6609
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversity/soc/soc.htm
Geometry Type	Lines

Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Stock Name: Skookumchuck/Newaukum Winter Steelhead, Run: Winter, Status: Healthy
Source Record	6609
Source Dataset	SASI
Source Name	Not Given
Source Entity	WDFW Fish Program
Federal Status	Not Warranted
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversity/soc/soc.htm
Geometry Type	Lines

Winter Steelhead	
Scientific Name	*Oncorhynchus mykiss*
Priority Area	Occurrence/Migration
Site Name	Coffee Creek
Accuracy	NA
Notes	LLID: 1229590467471, Fish Name: Steelhead Trout, Run Time: Winter, Life History: Anadromous
Source Record	55390
Source Dataset	SWIFD
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
More Info	http://wdfw.wa.gov/wlm/diversty/soc/soc.htm
Geometry Type	Lines

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Emergent Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Emergent Wetland - NWI Code: PEM1C
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFOA
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFOC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFOC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFOC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PSSC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

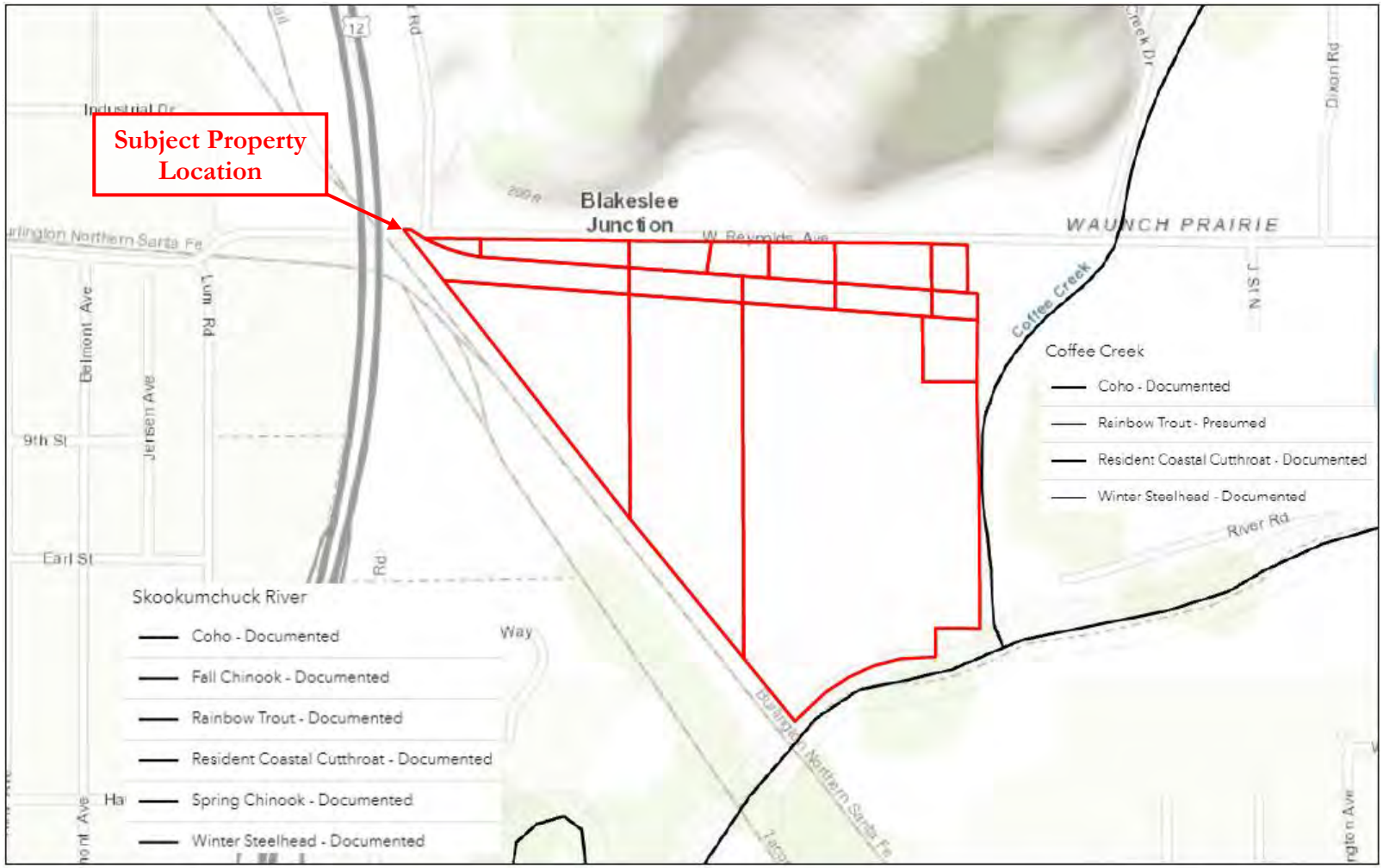
Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PSSC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Oak Woodland	
Priority Area	Habitat Feature
Site Name	LEWIS COUNTY OAK
Accuracy	NA
Notes	OAK STANDS IN RURAL AND URBAN LEWIS COUNTY.
Source Record	902189
Source Name	LABBE, TED
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00030
Geometry Type	Polygons

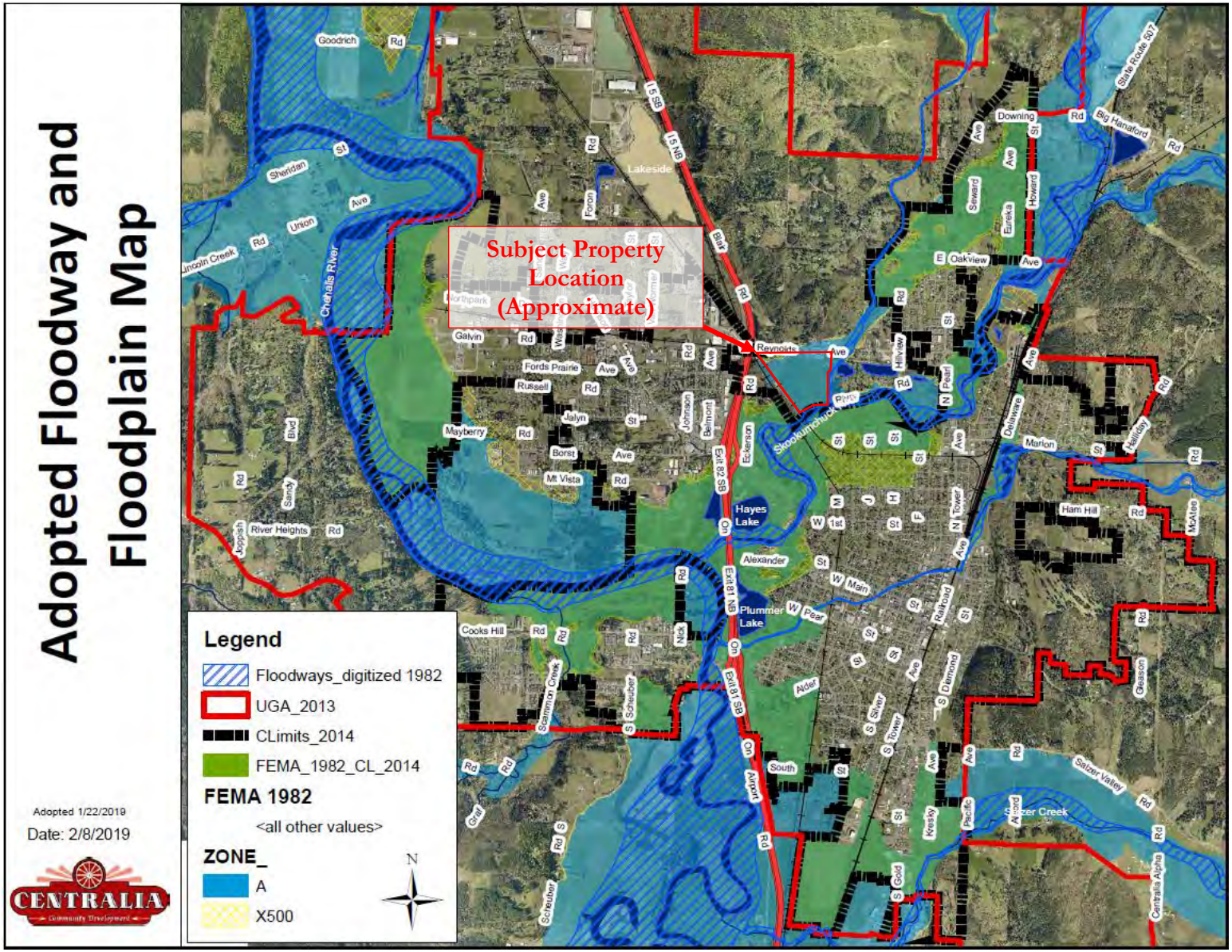
Big brown bat	
Scientific Name	*Eptesicus fuscus*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release at phsproducts@dfw.wa.gov for obtaining information about masked sensitive species and habitats.
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00605

Appendix B7. DNR Stream Typing Map

Appendix B8. WDFW and NWIFC SWIFD Map



Appendix B9. Centralia Adopted Floodway and Floodplain Map



Appendix C – Historical Aerial Photographs

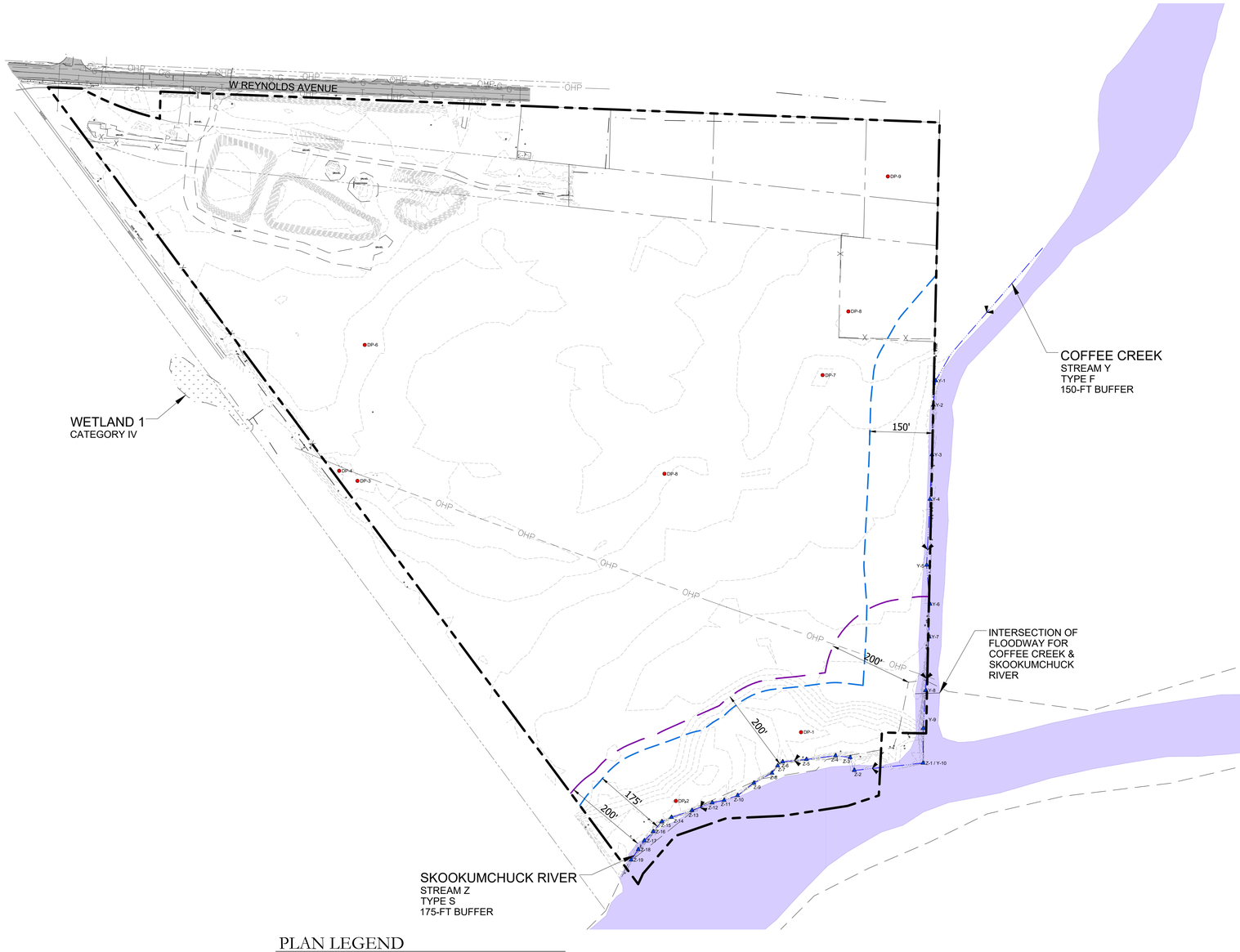
1952 Historical Aerial Photograph of Subject Property

1981 Historical Aerial Photograph of Subject Property – Clearing and Grading on NW Corner

2009 Google Earth Imagery – Log Yard and Stormwater Facility

2021 Google Earth Imagery – Log Yard Removed and Stormwater Facility Reclaimed

Appendix D – Existing Conditions



VICINITY MAP

SOURCE: ESRI (ACCESSED 03/13/2023)

LOCATION

THE NW/NE ¼ OF SECTION 05/06,

TOWNSHIP 14N, RANGE 2W, WM

APPLICANT/OWNER

NAME: PDC SEATTLE LPIV BB/TH, LLC
ADDRESS: 1821 DOCK STREET, SUITE 100
TACOMA, WA 98402
CONTACT: DARREN PEUGH
PHONE: 206-248-0283
E-MAIL: DPEUGH@PANATTONI.COM

ENVIRONMENTAL CONSULTANT

SOUNDVIEW CONSULTANTS LLC
2907 HARBORVIEW DRIVE
GIG HARBOR, WA 98355
(253) 514-8952

SHEET INDEX

SHEET NUMBER	SHEET TITLE
1	EXISTING CONDITIONS
2	EXISTING CONDITIONS

PLAN LEGEND

- PROPERTY LINE
- APPROXIMATED WETLAND BOUNDARY (NOT SURVEYED)
- DP-# DATA PLOT LOCATION
- STREAM CENTERLINE
- STREAM BUFFER
- SHORELINE JURISDICTION
- O-# STREAM OHW (ORDINARY HIGH WATER) FLAG LOCATION
- FLOODCOURSE
- FLOODWAY
- DITCH CENTERLINE
- EXISTING CONTOUR
- EXISTING TREES (CONIFEROUS - DECIDUOUS)

0 140' 280' 560'

GRAPHIC SCALE
1"= 140'

PRELIMINARY
INFORMATION ONLY

NOT FOR CONSTRUCTION

SOUNDVIEW CONSULTANTS LLC ASSUMES NO LIABILITY OR RESPONSIBILITY FOR CONSTRUCTION, IMPROVEMENTS, OR ESTIMATES BASED ON THIS PLAN SET

SOURCES:
AHBL
TACOMA · SEATTLE · SPOKANE · TRI-CITIES
2215 North 30th Street, Suite 300 Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com WEB

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2907 HARBORVIEW DRIVE P. 253.514.8952
GIG HARBOR, WASHINGTON 98335 F. 253.514.8954
WWW.SOUNDVIEWCONSULTANTS.COM

SKOOKUMCHUCK COMMERCE CENTER
1406 & 1620 W REYNOLDS AVENUE,
CENTRALIA, WA 98531
LEWIS COUNTY PARCEL NUMBER(S):
021058010000, 021059000000, 021037000000, 021045000000, 021044020000, 021044003000, 021060000000, 021043003000, 021059000000, 021037000000, 021041000000, 021041001000, 021043001000, & 021044004000.

DATE: 03/13/2023
JOB: 1144.0036
BY: DLS
SCALE: AS SHOWN
SHEET: 1

S:\CURRENT\1144 Panattoni Construction\1144.0036 Skookumchuck Commerce Center\Graphics & Maps\CAD\A - CURRENT SVC DRAWINGS\A - Current Base DWGs\1144.0036 (2023-03) base.dwg
Plotted March 15, 2023

Appendix E – Data Forms

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-1

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): floodplain, swale Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.731318 Long: -122.96725077 Datum: WGS 84

Soil Map Unit Name: Scatter-Fordprarie-Roundtree complex, 0 to 12 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; only vegetation met due to typical agricultural hayland present. Data collected on the southeast portion of the property approximately 75 feet north of ordinary high water of Skookumchuck River.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rubus armeniacus	20	Yes	FAC
2.			
3.			
4.			
5.			
	20	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Lolium perenne	70	Yes	FAC
2. Equisetum arvense	10	No	FAC
3. Taraxacum officinale	10	No	FACU
4. Convolvulus arvensis	8	No	FACU
5. Phalaris arundinacea	2	No	FACW
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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: 2 (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met due to planted and managed agricultural hayland grasses.

SOIL

Sampling Point: DP-1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-14	10YR 3/2	100	-	-	-	-	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. No primary indicators and only one secondary indicator were observed.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-2U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): floodplain, swale Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.730817 Long: -122.96842797 Datum: WGS 84

Soil Map Unit Name: Scatter-Fordprarie-Roundtree complex, 0 to 12 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☒ No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; no hydric soil indicators present. Data collected on the south portion of the property approximately 30 feet north of ordinary high water of Skookumchuck River.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1. Fraxinus latifolia	5	Yes	FACW
2.			
3.			
4.			
	5	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rubus armeniacus	40	Yes	FAC
2.			
3.			
4.			
5.			
	40	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Phalaris arundinacea	90	Yes	FACW
2. Galium aparine	5	No	FACU
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	95	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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: 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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met through dominance test.

SOIL

Sampling Point: DP-2U

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
0-16	10YR 3/2	100	-	-	-	-	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☒ No ☐

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

Remarks:

Wetland hydrology criterion met through two secondary indicators (geomorphic position and FAC-Neutral test).

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-3U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): hillslope Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.730817 Long: -122.97097648 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; only hydrophytic vegetation is present. Data collected on the western portion of the property approximately 150 feet east of railroad tracks.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0 = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0 = Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. Lolium perenne	50	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	50 = Total Cover		
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 50

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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met with Dominance Test.

SOIL

Sampling Point: DP-3U

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
0-12	10YR 3/2	99	2.5 YR 4/8	1	C	PL,M	SiLo	Silt loam
12-16	10YR 3/1	99	7.5 YR 5/8	1	C	PL	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present. 0-12" layer does not have sufficient redox (5 percent or more) to meet F6.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

No wetland hydrology indicators met.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-4U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.732852 Long: -122.97156257 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; only hydrophytic vegetation present. Data collected on the western portion of the property approximately 150 feet east of railroad tracks.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. Rubus armeniacus	5	Yes	FAC
2.			
3.			
4.			
5.			
	5	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Lolium perenne	70	Yes	FAC
2. Phalaris arundinacea	15	No	FACW
3. Poa pratensis	15	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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: 2 (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met with Dominance Test.

SOIL

Sampling Point: DP-4U

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
0-12	10YR 3/2	99	-	-	-	-	SiLo	Silt loam
12-16	10YR 3/2	99	7.5YR 5/8	1	C	M	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. No primary indicators and only one secondary indicator observed.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-5U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): swale Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.732979 Long: -122.96863894 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; no hydric soil nor hydrology indicators present. Data collected in the central portion of the property.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Lolium perenne	70	Yes	FAC
2. Schedonorus arundinaceus	20	Yes	FAC
3. Convolvulus arvensis	5	No	UPL
4. Scorzoneroides autumnalis	5	No	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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: 2 (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met with Dominance Test on planted hayland grasses.

SOIL

Sampling Point: DP-5U

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
0-16	10YR 3/2	100					SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. Only one secondary indicator met.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-6U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): none Slope (%): 0%

Subregion (LRR): A2 Lat: 46.733738 Long: -122.97151246 Datum: WGS 84

Soil Map Unit Name: Spanaway gravelly sandy loam NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; no hydric soil or wetland hydrology indicators present. Data collected on the western portion of the property in historic logging yard storm water management pond/ditch that was reclaimed/filled.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Phalaris arundinacea	80	Yes	FACW
2. Dipsacus fullonum	20	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met with invasive reed canary grass growing in previously disturbed area.

SOIL

Sampling Point: DP-6U

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
0-16	10YR 3/2	100	-	-	-	-	SiLo	Silt Loam (w/ gravel & cobble 15%)

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present. Previously leveled and graded, mixed fill soils.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. Only one secondary indicator present.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 7-21-21

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-7U

Investigator(s): Ryan Krapp Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): swale Local relief (concave, convex, none): Concave Slope (%): 1%

Subregion (LRR): A2 Lat: 46.733639 Long: -122.96714220 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☐ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
Not all three wetland criteria met; no hydric soil nor hydrology indicators present. Data collected on the northeastern portion of the property approximately 250 feet west of Coffee Creek.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Lolium perenne	50	Yes	FAC
2. Schedonorus arundinaceus	50	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= 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: 2 (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☒ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
Hydrophytic vegetation criteria met with Dominance Test on planted hayland grasses.

SOIL

Sampling Point: DP-7U

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
0-13	10YR 3/2	100		0	0	0	SiLo	Silt Loam
13-16+	10YR 3/2	99	7.5 YR 5/8	1	C	PL,M	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. Only one secondary indicator observed.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 2-14-23

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-8

Investigator(s): Casey Lanier Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): None Slope (%): 0%

Subregion (LRR): A2 Lat: 46.734052 Long: -122.96683800 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☒ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
No wetland criteria met. Data collected adjacent to residential development on northeast portion of subject property.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Dactylis glomerata	98	Yes	FACU
2. Rumex crispus	2	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
No hydrophytic vegetation criteria met. Prevalence Index not warranted due to lack of both hydric soil and wetland hydrology indicators.

SOIL

Sampling Point: DP-8

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
0-14	10YR 3/2	100	-	-	-	-	SiLo	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.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. No primary indicators and only one secondary indicator were observed.

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

Project/Site: 1144.0036 - Skookumchuck Commerce Center City/County: Centralia, Lewis Sampling Date: 2-14-23

Applicant/Owner: PDC Seattle LPIV BB/TH, LLC State: WA Sampling Point: DP-9

Investigator(s): Casey Lanier Section, Township, Range: 05, 14N, 02W

Landform (hillslope, terrace, etc.): terrace Local relief (concave, convex, none): None Slope (%): 0%

Subregion (LRR): A2 Lat: 46.734052 Long: -122.96683800 Datum: WGS 84

Soil Map Unit Name: Maytown-Chehalis-Rennie complex, 0 to 10 percent slopes NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in 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 ☒ Hydric Soil Present? Yes ☐ No ☒ Wetland Hydrology Present? Yes ☐ No ☒	**Is the Sampled Area within a Wetland?** Yes ☐ No ☒

Remarks:
No wetland criteria met. Data collected adjacent to residential development on northeast corner of subject property.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. Dactylis glomerata	79	Yes	FACU
2. Taraxacum officinale	20	Yes	FACU
3. Hypochaeris radicata	1	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0

Dominance Test worksheet:

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

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (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:

- ☐ Rapid Test for Hydrophytic Vegetation
- ☐ Dominance Test is >50%
- ☐ Prevalence Index is ≤3.0[1]
- ☐ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ 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:
No hydrophytic vegetation criteria met. Prevalence Index not warranted due to lack of both hydric soil and wetland hydrology indicators.

SOIL

Sampling Point: DP-9

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 - 18	10YR 1/2	100	-	-	-	-	Loam	Loam with cobble

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

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

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) (**except MLRA 1**)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

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

Restrictive Layer (if present):

Type: None

Depth (inches): ---

Hydric Soil Present? Yes ☐ No ☒

Remarks:

No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

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

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

Secondary Indicators (2 or more required)

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

Field Observations:

Surface Water Present? Yes ☐ No ☒ Depth (inches): None

Water Table Present? Yes ☐ No ☒ Depth (inches): None

Saturation Present? (includes capillary fringe) Yes ☐ No ☒ Depth (inches): None

Wetland Hydrology Present? Yes ☐ No ☒

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

Remarks:

Wetland hydrology criterion not met. No primary indicators and only one secondary indicator were observed.

Appendix F – Wetland Rating Forms

Wetland name or number A

RATING SUMMARY – Western Washington

Name of wetland (or ID #): A Date of site visit: 07/21/21

Rated by Ryan Krapp Trained by Ecology? ✔ Yes ___No Date of training 10/2018

HGM Class used for rating Depressional Wetland has multiple HGM classes? ___Y ✔ N

NOTE: **Form is not complete without the figures requested** *(figures can be combined)*.

Source of base aerial photo/map ESRI ArcGIS

OVERALL WETLAND CATEGORY IV (based on functions ✔ 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	M	L	L	
Landscape Potential	M	M	L	
Value	H	L	L	TOTAL
Score Based on Ratings	7	4	3	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	
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	

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?

☐ 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 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

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	5
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	2
Total for D 1 Add the points in the boxes above	9

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 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	1
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	1

Rating of Landscape Potential If score is: ___ **3 or 4 = H** _X_ **1 or 2 = M** ___ **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	0
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	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

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) points = 4 Wetland has an intermittently flowing stream or ditch, OR highly constricted permanently flowing outlet points = 2 Wetland is a flat depression (QUESTION 7 on key), whose outlet is a permanently flowing ditch points = 1 Wetland has an unconstricted, or slightly constricted, surface outlet that is permanently flowing 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 points = 7 Marks of ponding between 2 ft to < 3 ft from surface or bottom of outlet points = 5 Marks are at least 0.5 ft to < 2 ft from surface or bottom of outlet points = 3 The wetland is a "headwater" wetland points = 3 Wetland is flat but has small depressions on the surface that trap water points = 1 Marks of ponding less than 0.5 ft (6 in) 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 points = 5 The area of the basin is 10 to 100 times the area of the unit points = 3 The area of the basin is more than 100 times the area of the unit points = 0 Entire wetland is in the Flats class points = 5	0
Total for D 4 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 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	1
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	1
Total for D 5 Add the points in the boxes above	2

Rating of Landscape Potential If score is: ___ **3 = H** X **1 or 2 = M** ___ **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. points = 2 • Surface flooding problems are in a sub-basin farther down-gradient. points = 1 Flooding from groundwater is an issue in the sub-basin. points = 1 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* Railroad created/installed controlled water control struc points = 0 Railroad created/installed controlled water control structure on wetland. Wat er levels controlled by railroad. No release during flooding. There are no problems with flooding downstream of the wetland. points = 0	0
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	0

Rating of Value If score is: ___ **2-4 = H** ___ **1 = M** X **0 = L** *Record the rating on the first page*

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.*

____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
____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

1

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*).

____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
__×__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.

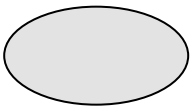
Different patches of the same species can be combined to meet the size threshold and you do not have to name the species. ***Do not include Eurasian milfoil, reed canarygrass, purple loosestrife, Canadian thistle***

If you counted: > 19 species	points = 2
5 - 19 species	points = 1
< 5 species	points = 0

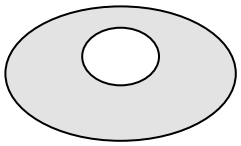
1

H 1.4. Interspersion of habitats

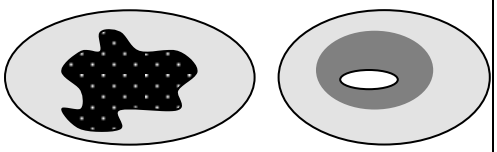
Decide from the diagrams below whether interspersion among Cowardin plants classes (described in H 1.1), or the classes and unvegetated areas (can include open water or mudflats) is high, moderate, low, or none. *If you have four or more plant classes or three classes and open water, the rating is always high.*



None = 0 points

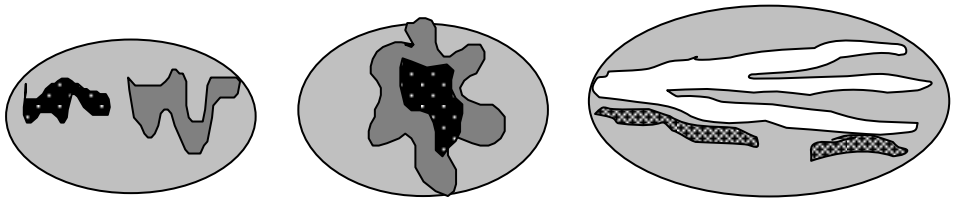


Low = 1 point



Moderate = 2 points

All three diagrams in this row are **HIGH** = 3points



1

Wetland name or number A

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.* __x__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)* ____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	5

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:* [0] % undisturbed habitat **+** [(% moderate and low intensity land uses) [0.34] /2] **=** 0.17 % 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	0
H 2.2. Undisturbed habitat in 1 km Polygon around the wetland. *Calculate:* [5.90] % undisturbed habitat **+** [(% moderate and low intensity land uses) [40.66] /2] **=** 26.2299999999999 % 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	-2
Total for H 2 Add the points in the boxes above	-1

Rating of Landscape Potential If score is:___**4-6 = H** ___**1-3 = M** _X_**< 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

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**	
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**	
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**	
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**	

Wetland name or number A

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**

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**

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**

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 G – Wetland Rating Maps

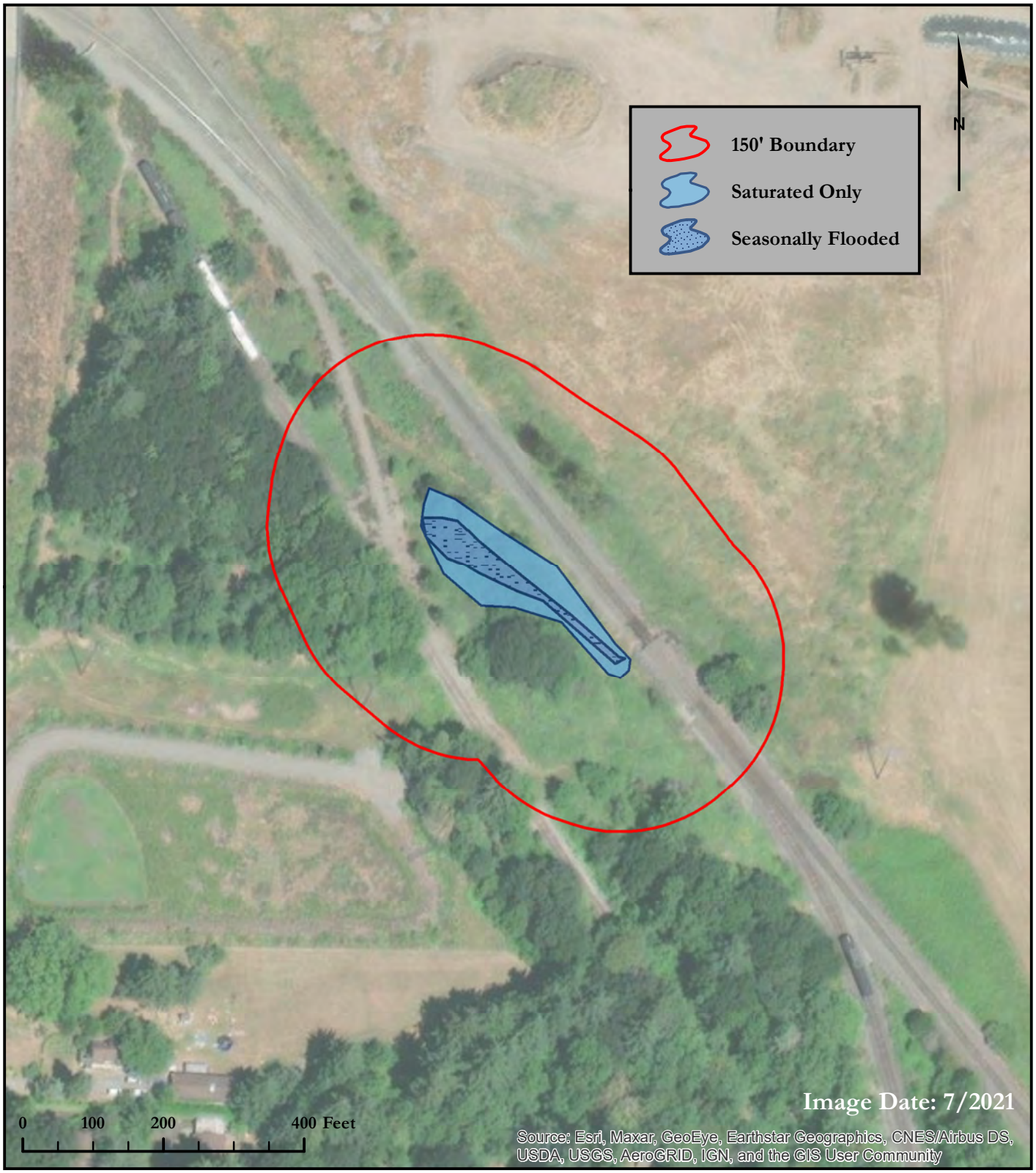
Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 Harborview Dr., Suite D, Gig Harbor, WA 98335
Phone: (253) 514-8952 Fax: (253) 514-8954
www.soundviewconsultants.com

Skookumchuck Commerce Center

1406 & 1620 W REYNOLDS AVE CENTRALIA, WA 98531
LEWIS COUNTY PARCEL NUMBERS: 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021060000000, 021043003000, 021059000000, 021037000000 & 021041000000

DATE:	10/13/2022
JOB:	1144.0036
BY:	RJK
SCALE:	1 " = 250 '
FIGURE NO.	1 of 5

HYDROPERIOD



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1406 & 1620 W REYNOLDS AVE
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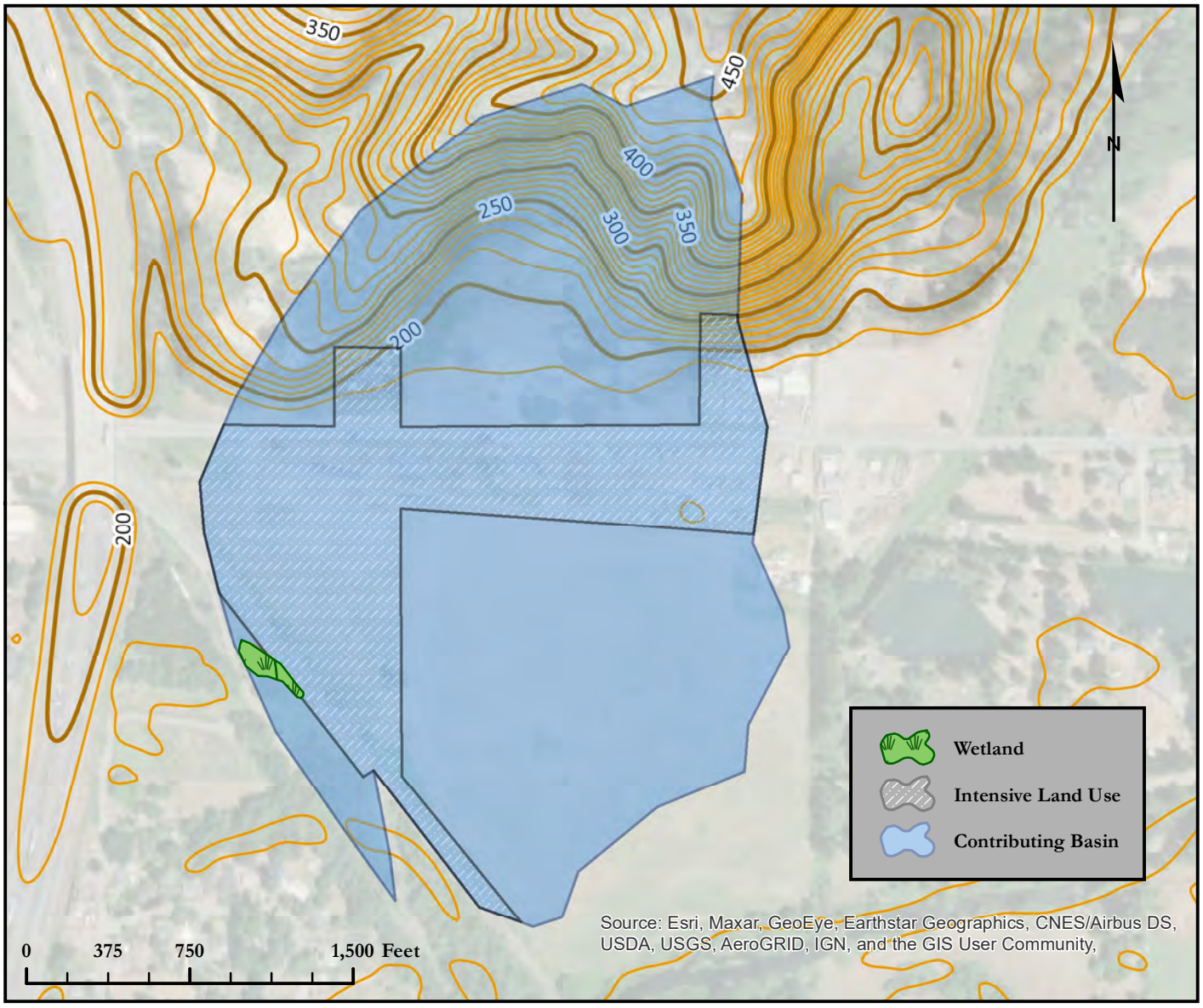
LEWIS COUNTY PARCEL NUMBERS:
021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021060000000, 021043003000, 021059000000, 021037000000 & 021041000000

DATE:	10/13/2022
JOB:	1144.0036
BY:	RJK
SCALE:	1 " = 200 '
FIGURE NO.	2 of 5

CONTRIBUTING BASIN



D.4.0		
D.4.3		
	Area of Contributing Basin (SF)	3,488,685
	Area of Wetland (SF)	11,913
	Percent of Wetland within Contributing Basin	**0.341%**
D.5.0		
D.5.3		
	Area of Contributing Basin	3,488,685
	Area of Intensive Human Land Uses	1,005,058
	Percent of Intensive Human Land Use within Contributing Basin	**29%**

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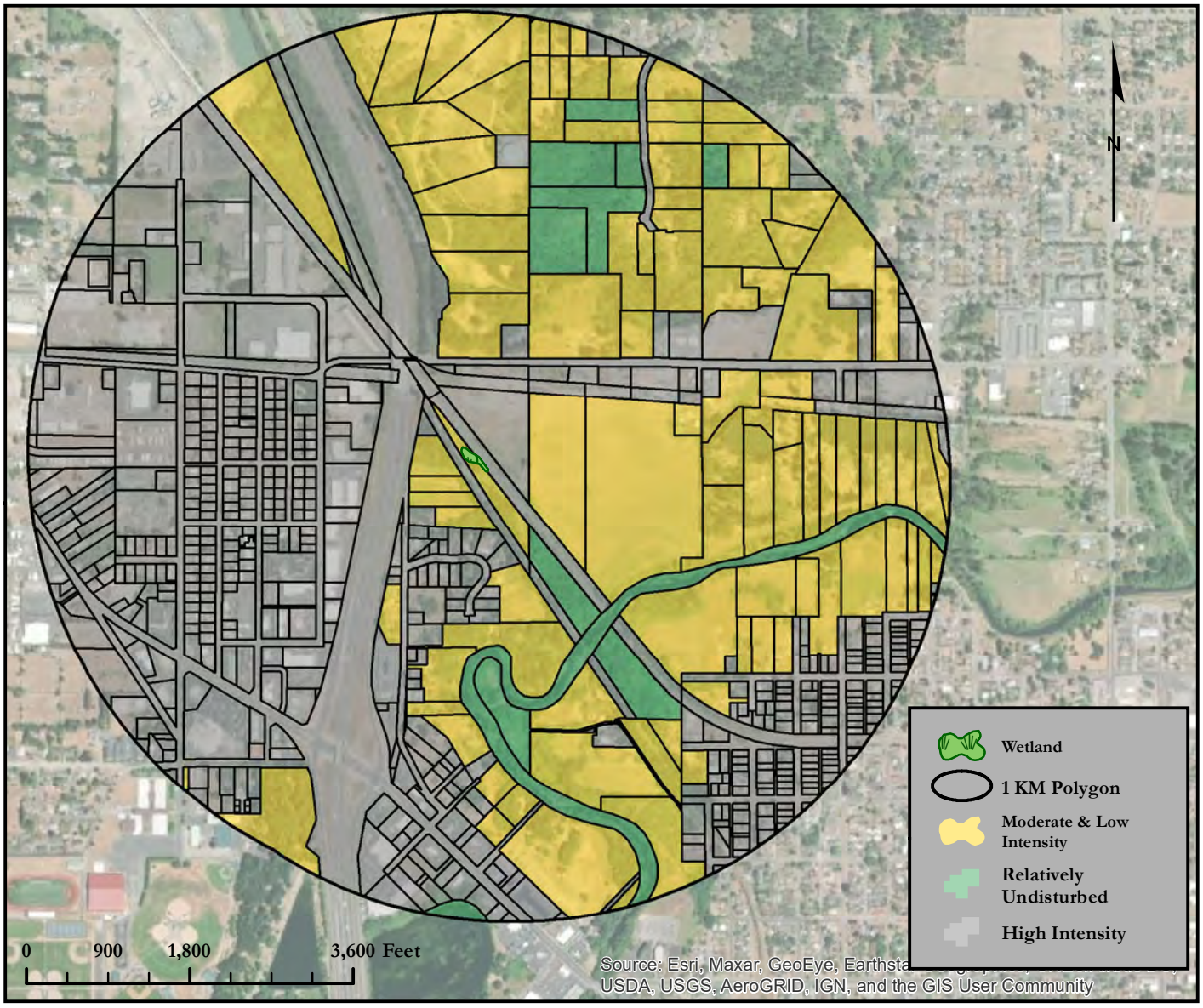
Skookumchuck Commerce Center

1406 & 1620 W REYNOLDS AVE CENTRALIA, WA 98531
LEWIS COUNTY PARCEL NUMBERS: 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021060000000, 021043003000, 021059000000, 021037000000, & 021041000000

DATE: 10/13/2022
JOB: 1144.0036
BY: RJK
SCALE: 1 " = 750 '
FIGURE NO. 3 of 5

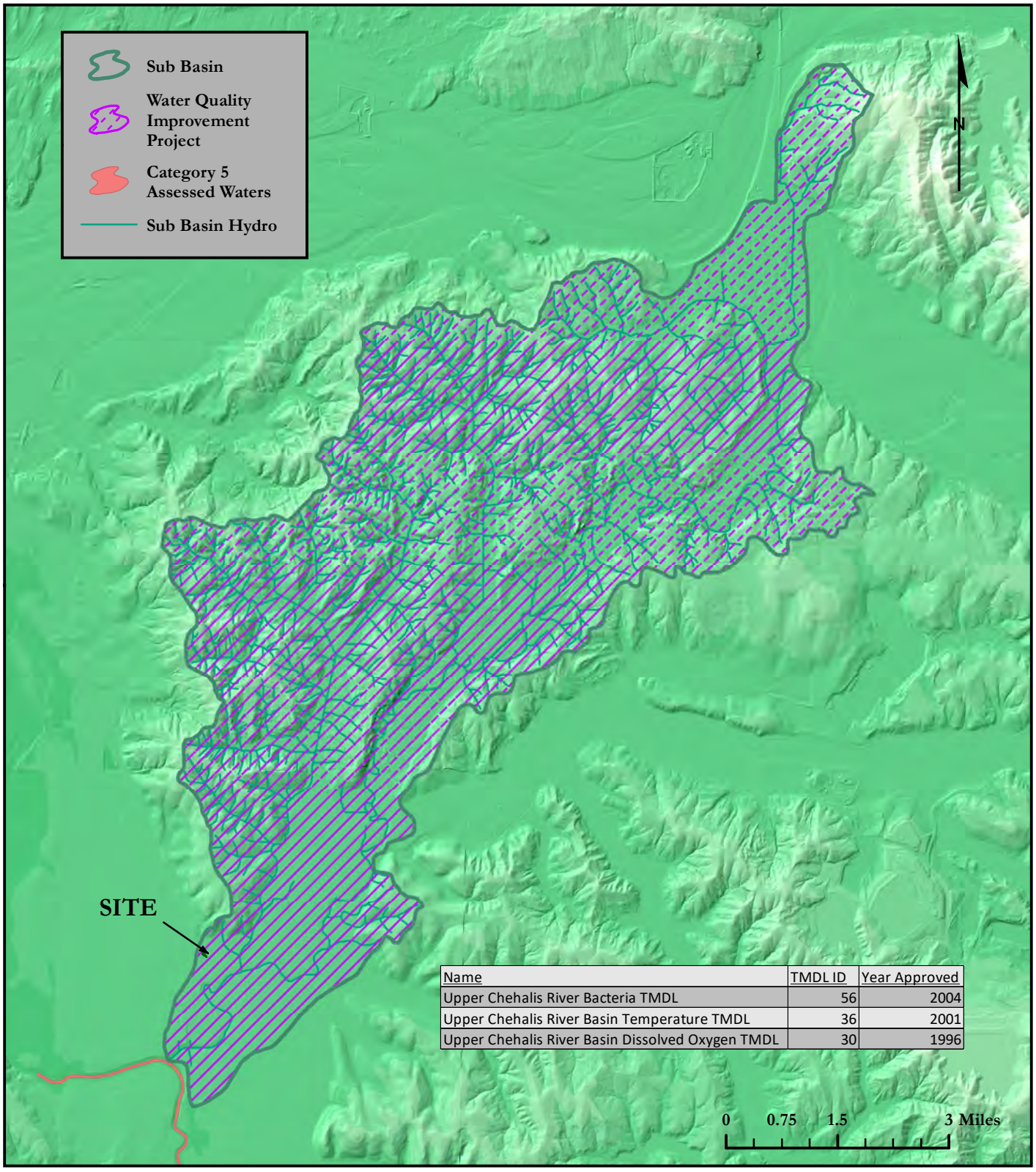


H.2.0 Wetland A		
H.2.1		
	Abutting Undisturbed Habitat	0.00%
	Abutting Moderate & Low Intensity Land Uses	0.34%
	Accessible Habitat	**0.17%**
H.2.2		
	Undisturbed Habitat	5.90%
	Moderate & Low Intensity Land Uses	40.66%
	Undisturbed Habitat in 1 KM Polygon	**26.23%**
H.2.3		
	High Intensity Land Use in 1 KM Polygon	**53.45%**

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
2907 Harborview Dr., Suite D, Gig Harbor, WA 98335
Phone: (253) 514-8952 Fax: (253) 514-8954
www.soundviewconsultants.com

Skookumchuck Commerce Center
1406 & 1620 W REYNOLDS AVE CENTRALIA, WA 98531
LEWIS COUNTY PARCEL NUMBERS: 021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021060000000, 021043003000, 021059000000, 021037000000 & 021041000000

DATE: 10/13/2022
JOB: 1144.0036
BY: RJK
SCALE: 1 " = 1,800 '
FIGURE NO. 4 of 5



Name	TMDL ID	Year Approved
Upper Chehalis River Bacteria TMDL	56	2004
Upper Chehalis River Basin Temperature TMDL	36	2001
Upper Chehalis River Basin Dissolved Oxygen TMDL	30	1996

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DATE: 10/13/2022
JOB: 1144.0036
BY: RJK
SCALE: 1 " = 10,000 '
FIGURE NO. 5 of 5

Appendix H – Qualifications

All field inspections, habitat assessments, wetland delineations, and supporting documentation, including this ***Wetland, Shoreline and Fish and Wildlife Habitat Assessment Report*** prepared for the ***Skookumchuck Commerce Center*** project were prepared by, or under the direction of Matt DeCaro of SVC. In addition, the field investigations were performed by Ryan Krapp. Report preparation was completed by Shauna Willett. Final quality assurance was completed by Morgan Kentch.

Matt DeCaro

Associate Principal
Professional Experience: 13 years

Matt DeCaro is an Associate Principal and Senior Scientist with a diverse background in environmental planning, wetland science, stream ecology, water quality, tree assessments, site remediation, NEPA compliance, and project management. He manages a wide range of industrial, commercial, and multi-family residential projects throughout Western Washington, providing environmental permitting and regulatory compliance assistance for land use projects from their planning stages through entitlement and construction. His local expertise, diverse professional background, and positive relationships with regulatory personnel are integral components of his successful project outcomes.

Matt earned a Bachelor of Science degree with a focus in Environmental Science from the Evergreen State College in Olympia, Washington, with additional graduate-level coursework and research in aquatic restoration and salmonid ecology. Matt has received 40-hour wetland delineation training (*Western Mountains, Valleys, & Coast and Arid West Regional Supplements*) and regularly performs wetland, stream, and shoreline delineations. Matt has been formally trained in the use of the *2014 Washington State Wetland Rating System* and *Determination of Ordinary High Water Mark* by WSDOE, and he is a Pierce County Qualified Wetland Specialist and Wildlife Biologist. He has attended USFWS survey workshops for multiple threatened and endangered species, and he is a Senior Author of WSDOT Biological Assessments. Matt holds 40-hour HAZWOPER training and has managed Phase I Environmental Site Assessments, subsurface investigations, and contaminant remediation projects throughout the Pacific Northwest. His diverse experience also includes NEPA compliance for federal permitting projects; noxious weed abatement; army ant research in the Costa Rican tropical rainforest; spotted owl surveys on federal and private lands; and salmonid spawning and migration surveys.

Ryan Krapp

Environmental Scientist / Field Lead
Professional Experience: 10+ years

Ryan Krapp is an Environmental Scientist and Field Lead with a background in conducting wetland delineations, habitat assessments, botanical surveys, avian surveys, threatened & endangered species surveys, and fisheries studies. He has considerable experience in production of Environmental Assessments and Biological Assessments and Evaluations under NEPA guidelines for projects regulated by the U.S. Forest Service, U.S. Army Corps of Engineers, and Bureau of Indian Affairs as

well as leading Section 7 ESA consultation with the U.S. Fish and Wildlife Service. Project planning, permitting, and compliance are all part of his professional experiences and practices at SVC.

Ryan has managed environmental investigation projects including wetlands, streams, and critical habitats data collection on large pipeline corridors, overhead electrical transmission corridors, and oil/natural gas drilling development. He has extensive experience in utilizing GIS to collect, manage, and analyze large volumes of spatial and temporal field data to aide in project management, monitoring, analysis, and mapping. In addition, he is a FAA trained recreational pilot and a PADI certified SCUBA diver with fresh and saltwater diving experience. Ryan is a USFWS-approved Mazama pocket gopher survey biologist.

Shauna Willett

Certified Arborist and Environmental Scientist
Professional Experience: 15 years

Shauna Willett is an Environmental Scientist and ISA Certified Arborist. She has performed individual tree assessments, tree inventories and environmental assessments of many habitats including oak woodlands, forests, riparian corridors, and wetlands of the Puget Sound region and throughout California. She has worked as a consulting arborist in the residential, commercial, and utility sectors of arboriculture where she conducted preventative maintenance inspections of distribution and high voltage transmission lines for Puget Sound Energy. This assessment work has involved field identification of tree and plant species, pest and disease diagnosis, and data collection and analysis in public and private sectors. Her research background is highly varied, spanning the fields of agriculture, nutrition - domestically and internationally, aquatic toxicology and urban forestry. Shauna received her master's degree in geography with a dual emphasis in urban forestry and landscape architecture at the University of California, Davis. Shauna is a Tree Risk Assessment Qualified (ISA) arborist. She has extensive knowledge on local plant taxonomy and ecological vegetative indicators.

Shauna currently performs tree assessments, wetland and stream delineations, fish and wildlife habitat assessments; conducts environmental code analysis; creates and modifies maps and tree surveys using AutoCAD, prepares environmental assessment and mitigation reports, biological evaluations, and permit applications to support clients through the regulatory and planning process for various land use projects. She has been formally trained by the Washington State Department of Ecology in the use of the Washington State Wetland Rating System. Shauna earned a Bachelor of Science degree in Landscape Architecture from the University of California, Davis, with a focus on the relationship between communities and their urban forest ecosystems.

Morgan Kentch

Environmental Scientist
Professional Experience: 4 years

Morgan Kentch is an Environmental Scientist with a background in marine and freshwater ecology, wildlife and natural resource assessments, and monitoring wetland and riparian habitat restoration sites in the Pacific Northwest. Morgan has field experience conducting wetland, stream, and shoreline delineations and fish and wildlife habitat assessments in Washington State. She currently assists with performing wetland, stream, and shoreline delineations and fish and wildlife habitat assessments,

conducting environmental code analysis, and preparing and/or providing final quality assurance/control for various types of scientific reports and permits for agency submittal.

Morgan earned her Bachelor of Science degree in Biology with Marine Emphasis from Western Washington University, Bellingham. There she received extensive, hands-on experience working in lab and field settings, conducting scientific background research, and performing statistical analyses. She has also received 40-hour wetland delineation training (Western Mountains, Valleys, and Coast and Arid West Regional Supplements) and has received formal training through the Washington State Department of Ecology and Coastal Training Program in Using the 2014 Wetland Rating System and How to Determine the Ordinary High Water Mark.

Exhibit K

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Southwest Region Office
PO Box 47775, Olympia, WA 98504-7775 • 360-407-6300

February 7, 2025

Hillary Hoke, Asst. Director
City of Centralia
Community Development Department
PO Box 609
Centralia, WA 98531

Dear Hillary Hoke:

Thank you for the opportunity to comment on the mitigated determination of non-significance for the Skookumchuck Commerce Center Project (2023 0242) located at 1406 West Reynolds Avenue as proposed by Darren Peugh, Panattoni Development Co., Inc. The Department of Ecology (Ecology) reviewed the environmental checklist and has the following comment(s):

HAZARDOUS WASTE & TOXICS REDUCTION: Garret Peck (564) 669-0836

The applicant proposes to demolish an existing structure(s). In addition to any required asbestos abatement procedures, the applicant should 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. It is important that these materials and wastes are removed and appropriately managed prior to demolition. It is equally important that demolition debris is also safely managed, especially if it contains painted wood or concrete, treated wood, or other possibly dangerous materials.

Please review the "Dangerous Waste Rules for Demolition, Construction, and Renovation Wastes," posted at Ecology's website, https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Dangerous-waste-guidance/Common-dangerous-waste/Construction-and-demolition. The applicant may also contact Katy Harvey of Ecology's Hazardous Waste and Toxics Reduction Program at katy.harvey@ecy.wa.gov for more information about safely handling dangerous wastes and demolition debris.

SOLID WASTE MANAGEMENT: Derek Rockett (360) 995-3176

All grading and filling of land must utilize only clean fill. All other materials may be considered solid waste and permit approval may be required from your local jurisdictional health department prior to filling. All removed debris resulting from this project must be disposed of at an approved site. Contact the local jurisdictional health department or Department of Ecology for proper management of these materials.

TOXICS CLEANUP: Tim Mullin (360) 999-9589

There is one listed cleanup site within 750 feet of the proposed project area, Pieces Family Trust (FSID: 16394; CSID: 11405). Though CSID 11405 has a cleanup status of "awaiting cleanup", the proposed project is not likely to be impacted by this cleanup site.

Should contamination be unexpectedly encountered during the proposed project, please report it to comply with WAC 173-340-120 and -300 by using the online statewide environmental incident reporting (ERTS) form at: https://ecology.wa.gov/footer-pages/report-an-environmental-issue/statewide-reporting-form-erts

Ecology's comments are based upon information provided by the lead agency. As such, they may not constitute an exhaustive list of the various authorizations that must be obtained or legal requirements that must be fulfilled in order to carry out the proposed action.

If you have any questions or would like to respond to these comments, please contact the appropriate reviewing staff listed above.

Department of Ecology
Southwest Regional Office

(JKT:202405615)

cc: Garret Peck, HWTR
Derek Rockett, SWM
Tim Mullin, TCP

Quinault Indian Nation

POST OFFICE BOX 189 • TAHOLAH, WASHINGTON 98587 • TELEPHONE (360) 276-8211

February 7th 2025

Hillary Hoke, Asst. Director
PO Box 609,
Centralia WA 98531

Dear Ms. Hoke:

The Quinault Indian Nation (QIN or Nation) submits the following comments regarding the Mitigated Determination of Non significance (MDNS) for case 202405615 issued by the City of Centralia. The applicant, Panattoni Development Co., Inc. is requesting to construct two distribution warehouses within the 100 - year flood plain of the Skookumchuck River and Coffee Creek.

Quinault Indian Nation Interests

The Quinault Nation is a federally-recognized Indian tribe and sovereign tribal government. The Nation is signatory to the Treaty of Olympia (1856), by which it reserved, among other things, the right of "taking fish, at all usual and accustomed fishing grounds and stations" and the privilege of hunting and gathering, among other rights, in exchange for ceding lands it historically roamed freely.

In a landmark court case known as the "Boldt decision," a federal court confirmed the Quinault Nation's Treaty fishing rights and established the plaintiff tribes, including the Quinault Nation, as co-managers of off-Reservation fisheries resources entitled to half of the harvestable number of fish returning to Washington waters. *United States v. Washington*, 384 F. Supp. 312 (W.D. Wash. 1974), *aff'd* 520 F.2d 676 (9th Cir. 1975), *cert. denied*, 423 U.S. 1086 (1976). Based on evidence provided, the court determined the usual and accustomed areas of the Quinault Nation include "the waters adjacent to their territory" and "Grays Harbor and those streams which empty into Grays Harbor." *Id.* at 374-75; *see also United States v. Washington*, 459 F.Supp. 1020, 1097 (W.D. Wash. 1978), *aff'd* 645 F.2d 749 (9th Cir.1981). In a later compilation of key court findings, the court concluded: "The Quinault Tribe has usual and accustomed fishing places in Grays Harbor and its watershed, including the Humptulips River." *United States v. Washingto*n, 459 F.Supp. 1020, 1038 (W.D. Wash. 1978) *aff'd*, 645 F.2d 749 (9th Cir. 1981). The Skookumchuck River is within the QIN usual and accustomed fishing area.

Importantly, a Treaty does not grant rights to Indians, but rather is a "grant of right from them—a reservation of those not granted." *United States v. Winans*, 198 U.S. 371, 381 (1905). Thus, the Quinault Nation's Treaty rights are reserved by, and not rights granted to, them. Treaties impose the "highest responsibility" on the government and create a special fiduciary duty and trust responsibility upon all agencies of the United States and states to protect Treaty rights, including fishing rights. *Seminole Nation v. United States*, 316 U.S. 286, 297 (1942). These rights cannot be abrogated or diminished except by explicit Congressional authorization.

Federal courts have consistently required the federal agencies to keep the Treaty promises upon which Indian tribes relied when they ceded huge tracts of land by way of the Treaties. *See, e.g.*, *Winans*, 198 U.S. at 371; *Confederated Tribes of Umatilla Indian Reservation v. Alexander*, 440 F. Supp. 553 (D. Or. 1977); *United States v. Orego*n, 718 F.2d 299, 304 (9th Cir. 1983); *Muckleshoot v. Hall*, 698 F. Supp. 1504, 1510 (W.D. Wash. 1988); *Northwest Sea Farms v. U.S. Army Corps of Eng'rs*, 931 F. Supp. 1515 (W.D. Wash. 1996); *United States v. Washington*, 2007 WL 2437166 (W.D. Wash. 2007). Treaties are the supreme law of the land. *Worcester v. Georgia*, 31 U.S. 515, 531 (1832).

The Quinault Indian Nation has an obvious and keen interest in protecting the fish and fish habitat that it relies on in the Chehalis River Basin, including the Skookumchuck River, to exercise its federally-guaranteed Treaty fishing rights, as well as the traditional areas used for gathering plants for traditional cultural use. Because the proposed development is within the usual and accustomed Treaty fishing area of the Nation, the aquatic species that will be significantly impacted by the development are Treaty resources that will be unlawfully and significantly impacted. These collective federally-protected Treaty rights must be fully considered and addressed. They provide the backdrop for the following comments.

SEPA REQUIREMENTS

SEPA is Washington's core environmental policy and review statute. SEPA broadly serves two purposes: first, to ensure that government decision-makers are fully apprised of the environmental consequences of their actions, and second, to encourage public participation in the consideration of environmental impacts. *Norway Hill Preservation and Prot. Ass'n v. King Co*, 87 Wn.2d 267, 279 (Wash. 1976). For decades, SEPA has served these purposes effectively, requiring full environmental reviews for projects with significant environmental impacts. See RCW 43.21C.030; *Lassila v. City of Wenatchee*, 89 Wn.2d 804, 813 (1978).

In adopting SEPA, the Washington legislature declared the protection of the environment to be a core state priority. RCW 43.21C.010. SEPA declares that "[t]he legislature recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." RCW 43.21C.020(3). This policy statement "indicates in the strongest possible terms the basic importance of environmental concerns to the people of the state." *Leschi v. Highway Comm'n*, 84 Wn.2d 271, 279-80 (1974).

SEPA requires an EIS for any action that has a "probable significant, adverse environmental impact." RCW 43.21C.031(1). A major action significantly affects the environment "whenever more than a moderate effect on the quality of the environment is a reasonable probability." *Norway*, at 278; WAC 197-11-794.

SEPA requires careful consideration of "the range of probable impacts, including short-term and long-term effects." WAC 197-11-060(4)(c). Impacts shall include those that are likely to arise or exist over the lifetime of a proposal or, depending on the particular proposal, longer." These include "direct and indirect impacts caused by a proposal." WAC 197-11-060(4)(d). SEPA also requires consideration of cumulative effects. WAC 197-11-060(4)(e); WAC 197-11-330(3)(c).

Based on the foregoing, an EIS must be completed to analyze the probable significant effects of the proposed development activities.

Technical Comments

Fish Habitat

Based on SWIFD (Statewide Washington Integrated Fish Distribution) fall-run Chinook, spring-run Chinook, steelhead and coho are documented within the project area, they utilize the area for migration, spawning, and rearing. The SEPA and supporting environmental documents provided by the applicant fail to assess how the proposal will affect anadromous fisheries. We have major concerns with how this proposal will impact spring-run Chinook, which have recently been proposed for ESA listing.

The Center for Biological Diversity and Pacific Rivers has petitioned to list the spring-run Chinook Salmon on the Washington Coast as a threatened or endangered Evolutionarily Significant Unit. NOAA Fisheries determined the petition presents substantial scientific information and NOAA is currently conducting a status review to determine whether action to list is warranted. The SEPA analysis includes no mention or analysis of the dire circumstances for spring-run Chinook. The direct, indirect, and cumulative impacts will further degrade spring-run Chinook Salmon habitat by impairing water quality, floodplain storage function, and expanding habitat degradation. These significant adverse environmental impacts must be fully analyzed in an EIS.

Given the decline of salmon, steelhead, and other species, the State of Washington has committed under the Chehalis Basin Strategy to restore aquatic species habitat in the Chehalis River Basin. As part of the restoration strategy, several restoration project projects for the Skookumchuck River have been implemented, indicating substantial local interest in restoring aquatic species habitat in the Skookumchuck Watershed. Continued development that harms fish habitat could preclude successful restoration of aquatic habitats resulting in long term declines in salmon production and other aquatic species, resulting in harm to the reserved Treaty rights of the Quinault Nation. As is evident through the SEPA and NEPA analyses of the proposed dam on the Chehalis River, future climate impacts will exacerbate flood concerns throughout the Chehalis River Basin. Building within the floodplain is antithetical to both Legislative directives of the Chehalis Basin Strategy—to reduce flood damage and restore aquatic species.

Floodplain Issues

Based on what we know from the Chehalis Basin Strategy about the risks of flooding and the enormous financial and social costs of flood damage, this proposed project contradicts the significant local efforts and investment to protect infrastructure knowingly placed in harm's way. There is a long history in the Chehalis Basin of building infrastructure in the floodplain that then must be protected through fish habitat-harming actions. This project is yet another development that will cumulatively negatively impact fish habitat within the Quinault Nation's Treaty fishing area. We do not support

adding infrastructure in areas likely to be flooded, or at risk from future erosion. Furthermore, we oppose habitat-harming projects as a violation of our Treaty-protected interests.

The City of Centralia Shoreline Policies and Regulations and the Shoreline Management Act prohibit new development when it is possible that structural flood hazard reduction measures within the channel migration zone or SMP flood course would be required. Based on analysis of aerial photography, it appears the Southern portion of the project area, along the Skookumchuck River, has showed signs of bank erosion and lateral channel movement. We have concerns that bank erosion will occur at this site and future structural shoreline stabilization measures will be necessary in the future. The SEPA analysis must demonstrate the proposal will not require future shoreline stabilization improvements. The analysis must consider the best available science, it is also critical to fully assess whether the proposal is within a Channel Migration Zone, and if so, what are the ramifications. Currently, the Geotechnical Report (pg.6) provides no evidence to support the claim that the subject site is not susceptible to potential hazards associated with Channel Migration Zones.

Environmental Concerns

Based on QIN's technical review of the SEPA Checklist and environmental documents on file, the applicant has failed to demonstrate the proposed activities will not have significant adverse impacts to aquatic species habitat for priority species or cause a no-net-loss of ecological functions. Accordingly, an EIS is warranted, which should address the following questions and concerns:

The SEPA fails to demonstrate the proposal will not interfere with fluvial hydrological and geomorphological processes. Specifically, there are concerns with the conceptual flood storage plans (Shoreline No Net Loss Analysis and Habitat Management Plan, Attachment A). The Geotechnical Report (pg.4) indicates the site soils will be susceptible to erosion when exposed during site development. The proponent must demonstrate that the proposed flood storage will not result in shoreline erosion or require any future shoreline stabilization improvements.

We have concerns that the conceptual flood storage design and stormwater management facilities will create fish stranding issues as floodwaters recede. Will the designs include any fish screening? Further, an analysis should be completed that demonstrates the proposal will not create any water quality issues such as increased stream temperature or turbidity when water is released.

The proponent heavily relies the impacts analysis on the interpretation that the proposed development is not within the Shoreline Management Jurisdiction. Yet, the City of Centralia's adopted Shoreline Environment Designation maps include this area in the Shoreline Management Jurisdiction. Has the city made any official determination on this topic? This is of concern because the proposed industrial development use is incompatible with the City of Centralia's adopted Shoreline Environment Designation in the project area. The proposed action is located in CE-02 which is designated as Urban Conservancy. The purpose of the designation is to provide ecological protection and rehabilitation in open space, floodplain and other sensitive areas. The proposed development within the floodplain is not compatible with restoring and preserving ecological functions. Further, the Central Shoreline Master Plan (7.3 Table 7-1) states non-water oriented commercial and industrial land uses are prohibited within the Urban Conservancy environment.

The SEPA Checklist fails to provide enough information to make an informed decision. The SEPA analysis lacks adequate information regarding the type of material proposed to be stored and

manufactured at the facility. The SEPA Checklist (7.a) indicates "It is not anticipated that there will be any hazardous materials sored at the site…". This is an important piece of information that is key in defining the proposal, identifying all the related and interdependent pieces of the proposal, and assessing the environmental impacts. The proponent must provide a complete project description that includes possible future activities.

The Shoreline No Net Loss Analysis and Habitat Management Plan is broad brushed and fails to demonstrate how important shoreline ecological services such as hydrologic and hyporheic functions will be affected by the proposal. Further, the report bases it's analysis on the assumption that the existing shoreline conditions are poor so the proposal will result in a benefit – but this is an incorrect assumption, nearly all shoreline areas even areas that have experienced anthropomorphic degradation, retain important ecological functions. The proponent must fully characterize and assess the sites ecological functions to demonstrate No Net Loss has been achieved. Further, given the importance of the Skookumchuck River to Spring Chinook which are declining, we request the No-Net Loss Mitigation Report require consideration of the site's ecological functions within a larger context, such as the watershed scale.

The SEPA Checklist (B.1.g) indicates "Approximately 80% of the site would be covered with impervious surfaces". The SEPA analysis fails to assess the environmental impacts associated with the proposed increase in impervious surfaces. Constructing impervious surfaces within the floodplain results in increased runoff, higher peak flood flows, and impacts to important floodplain functions such as hydrologic and floodwater storage, groundwater recharge, and sediment storage and filtering. The SEPA analysis falls short of identifying all the impacts associated with the proposed impervious surface.

The SEPA Checklist (8.1.h) indicates the project is located within the Critical Aquifer Recharge Area. The SEPA analysis fails to demonstrate that the proposed activities will not adversely affect the recharging of the critical aquifer, consistent with CMC Chapter 16.18.

The SEPA analysis fails to adequately assess cumulative impacts including all past, present, and reasonably foreseeable impacts. The City of Centralia SMP discourages development inside the floodplain to reduce the risk of flood, cumulative adverse impacts and ensure no net loss of ecological functions.

The Geotechnical Report indicates that the use of onsite filtration to manage site stormwater will not be feasible due to the low hydraulic conductivity of the fine-grained alluvial soils and the potential for seasonal fluctuations of ground water levels indicated by the mottling and iron-oxide staining (pg. 10). This is a major concern and the SEPA analysis must analyze the full range of environmental ramifications related to the proposed compensatory flood storage and stormwater management at the site given this geotechnical opinion.

The SEPA Checklist (13.b) indicates eight archaeological resources are within the project area. The proponent must include QIN in the section 106 process.

In summary, the City of Centralia must prepare an EIS to analyze environmental impacts, including the likely cumulative impacts that will arise as a result of proposed development. This analysis should include, but not be limited to effects on water quality and quantity, impervious surfaces, flooding, fish habitat, and cumulative impacts.

We request you withdraw the MDNS and complete an EIS in accordance with SEPA. Thank you for consideration of these comments. If you have questions, please contact Lauren Macfarland, Environmental Protection Manager, at Lauren.Macfarland@quinault.org.

Sincerely,

Lauren Macfarland

Environmental Protection Manager
Division of Natural Resources
Quinault Indian Nation

Hillary Hoke

From: R5 Planning (DFW) <R5.Planning@dfw.wa.gov>
Sent: Tuesday, July 16, 2024 4:50 PM
To: Hillary Hoke
Cc: Smith, Amaia A (DFW); Johnson, Elliot (DFW)
Subject: [External]RE: City of Centralia - MDNS - Skookumchuck Commerce Center
Attachments: WDFW Re Skookumchuck Commerce Ctr (1).pdf

Caution: Think before you click! This email is from an outside organization. Exercise caution when opening attachments or clicking links, especially from unknown senders.

Hello Hillary,

Thank you for the opportunity to comment on the Skookumchuck Commerce Center. Previous WDFW Habitat biologist Karen Adams commented on this proposal on June 12,2023. We have attached the letter to ensure our initial concerns are considered.

After reviewing the current No Net Loss and Habitat Restoration Plan, we believe efforts have been made in addressing our initial concerns regarding the proposed project. After careful review, we'd like confirmation that the following conditions are met:

- **Shoreline Buffer**: The project must strictly adhere to staying out of the shoreline buffer area. This is crucial for preserving the natural habitat and preventing erosion.
- **Stormwater Pond Location**: I understand that the stormwater pond will be situated upland from potential flooding areas. This precautionary measure is essential to prevent any adverse impact on nearby ecosystems.
- **Buffer Restoration:** The commitment to restore the buffer with native plants and trees is commendable. This restoration effort will enhance biodiversity and contribute to the overall health of the ecosystem.
- **Flood Control Ponds:** The proposal's inclusion of flood control ponds that also serve as habitat is a positive step. These dual-purpose features align with our goal of achieving no net loss of ecological value.

In summary, I believe this proposal meets our criteria for responsible development. However, I kindly request that these conditions be clearly documented and enforced throughout the project's lifecycle. Should any deviations occur, I trust that appropriate corrective measures will be taken promptly.

Please contact Lewis County Habitat Biologist Elliot Johnson for assistance or to discuss these recommendations further.

Thank you,

Brittney Salter
Environmental Planner 3
Region 5 Land Use Lead
WDFW Habitat Program
(360)-764-6665 *****

CC: Amaia Smith, WDFW Assistant Regional Habitat Program Manager
Elliot Johnson, Lewis County Habitat Biologist

Hillary Hoke

From: Williams, Daron (DFW) <Daron.Williams@dfw.wa.gov>
Sent: Monday, February 10, 2025 4:06 PM
To: Hillary Hoke
Cc: R5 Planning (DFW)
Subject: RE: City of Centralia - SEPA MDNS #2023 0242
Attachments: WDFW email 7-16-2024.pdf; WDFW Re Skookumchuck Commerce Ctr.pdf

Hello Hillary,

Thank you for the opportunity to comment on the Skookumchuck Commerce Center. WDFW's Region 5 Land Use Lead, Brittany Salter and Previous WDFW Habitat Biologist Karen Adams previously commented on this proposal on July 16th, 2024, and June 12th, 2023. We have attached a copy of the previous comments to ensure our initial concerns are considered.

After reviewing the current No Net Loss and Habitat Restoration Plan, it does look like our initial concerns are being addressed. However, after a careful review with one of our habitat engineers, we do have concerns over the long-term sustainability of the proposed flood retention structure.

Going off the provided materials, we were unable to determine if the outside berms of the flood retention structure could withstand high flows and flood events. Erosion or failure of the flood control structure could result in the stranding of fish and potentially Coffee Creek or the Skookumchuck River shifting closer to the proposed commerce center. This would result in a decrease in the riparian buffer and could threaten the proposed commerce center.

If this project moves forward, these concerns will need to be addressed during the Hydraulic Project Approval (HPA) process, we are happy to provide additional technical assistance upon request to ensure this project achieves no net loss of ecological function and to determine HPA requirements.

Thank you,

Daron Williams (he/him)
Habitat Biologist, Western Lewis County / Chehalis Basin ASRP
Washington Department of Fish and Wildlife
daron.williams@dfw.wa.gov
253-303-3504

Hillary Hoke

From: Matthew Mullin <matt.mullin@me.com>
Sent: Wednesday, January 8, 2025 10:21 AM
To: Hillary Hoke
Subject: Public comments Re: City of Centralia - SEPA MDNS #2023 0242
Attachments: MDNS - Website.pdf; Skookumchuck Commerce Center - SEPA Checklist.pdf

Attn: Hillary Hoke

I am a resident of Centralia and own property along the Skookumchuck river. I vehemently oppose construction on the property referenced in SEPA # 2023 0242, and it seems a real disservice to the community that you're requiring repeated public comments on a proposal that last sparked a petition against.

The massive warehouses would displace floodwaters from a large portion of that floodplain. Additionally, the removal of plants and trees removes the living roots in the ground which work to hold and absorb floodwaters.

I live on a property on over 4 acres along the river, and own an additional 6+ acres, also along the river. Both properties are immediately south of the proposed site. Without question, this construction wildly increases the risk of flood to my property and home. In result, the proposed plans put myself, my family, and my pets at an increase risk of injury, disaster, loss, and death.

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Matthew Mullin

> On Jan 3, 2025, at 8:53 AM, Hillary Hoke <hhoke@cityofcentralia.com> wrote:
>
> Attached please find a SEPA MDNS and Checklist for a project in the City of Centralia. Additional information may be viewed on our website at the following link: SEPAS and Public Notices | Centralia, WA

Due to shoreline permitting requirements, the project requires a 30-day comment period. ***Comments are due by February 10, 2025***. A public hearing will be scheduled at a later date and distributed under a separate public notice. A previous MDNS for this project was distributed in May 2024. The project description has not changed. An additional permit requirement of Shoreline Conditional Use Permit has been added to the threshold determination. To comply with WAC 197-11 SEPA Rules and Centralia Municipal Code 16.04 Environmental Policy, a revised MDNS is being distributed for public notice and comment.

Please contact me if you have any questions. Thank you.

Sincerely,
Hillary Hoke
Hillary Hoke, Assistant Director
Community Development Department
118 W Maple Street, Centralia
P: 360-330-7684
C: 360-523-3930

This document may not be a confidential document. Emails and text messages sent by City employees and City Council members during the course of business, may constitute a public record, making this communication subject to the Washington State Public Records, RCW Chapter 42.56. This document may be available to the public for disclosure

ATTENTION:
Hillary Hoke, Asst. Dir.
Centralia Community Development
PO Box 609
Centralia WA 98531

February 7, 2025

[ELECTRONIC DELIVERY ONLY]

RE: SEPA #: 2023 0242 – Skookumchuck Commerce Ctr – UPDATED SEPA COMMENTS

SEPA requires agencies to fully disclose and consider all environmental impacts from proposed projects. In adopting SEPA, the state legislature declared the protection of the environment to be a core state priority. RCW 43.21C.010. SEPA declares that "The legislature recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment." RCW 43.21C.020(3). This policy statement, which is stronger than a similar statement in the federal counterpart of SEPA, the National Environmental Policy Act (NEPA), "indicates in the strongest possible terms the basic importance of environmental concerns to the people of the state." Leschi v. Highway Comm'n, 84 Wn.2d 271, 279-80 (1974).

SEPA and its implementing regulations explicitly require consideration of direct and indirect impacts. RCW 43.21C.030 Guidelines for State Agencies and Local Government Decision-making:

> The legislature authorizes and directs that, to the fullest extent possible: (1) The policies, regulations, and laws of the state of Washington shall be interpreted and administered in accordance with the policies set forth in this chapter, and (2) all branches of government of this state, including state agencies, municipal and public corporations, and counties shall: . .
>
> (b) Identify and develop methods and procedures . . . which will insure that presently unquantified environmental amenities and values will be given appropriate consideration in decision making along with economic and technical considerations." (*emphasis added*)

SEPA regulations also explicitly direct that environmental impacts outside the jurisdiction of the deciding agency should be considered. WAC 197-11-060(c).

At the heart of SEPA is a requirement to fully analyze the environmental impact of projects that have a significant impact on the environment. RCW 43.21C.031(1). An environmental impact statement ("EIS") is required for any action that has a significant effect on the quality of the environment. WAC 197-11-330. Significance means a "reasonable likelihood of more than a moderate adverse impact on environmental quality." WAC 197-11-794. The purpose of this analysis is not to generate paperwork. Rather, the EIS allows decision-makers to make judgments based on a fully informed appreciation for the environmental impacts of decisions, the available alternatives, and any mitigation that may be appropriate.

Most importantly SEPA is more than a purely "procedural" statute that encourages informed and politically accountable decision-making. SEPA empowers agencies to say no to a proposed project. Courts have confirmed agencies' authority to deny projects under SEPA substantive authority in several cases since Polygon. See, *Dep't of Nat. Res. v. Thurston Cty.*, 92 Wn. 2d 656, (1979).[1] In enacting SEPA, the Legislature gave decision makers the affirmative authority to condition or even deny projects where environmental impacts are serious, cannot be mitigated, or collide with local policies. WAC 197-11-660.

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[1] *See also*, Law Seminars International, SEPA & NEPA (2021), "Substantive SEPA: What Role is It Playing, What Role Should It Play?".

The present MDNS determination is based on flawed analyses and qualified factual justifications. In previous correspondence, the Washington State Department of Fish and Wildlife (WDFW) and the Washington State Department of Transportation (WSDOT) have identified significant negative impacts of this project. I would incorporate those comments as my own. In addition to the analyses failure to adequately address floodwater and stormwater runoff (and impervious surfaces), there remain unaddressed issues of aquifer protection, noting this site is subject to heightened critical areas analyses. There remain unaddressed issues as to stormwater runoff mitigation, under both current Phase II guideline and general agency guidance of the State Department of Ecology. During Skookumchuck River flood events, Reynolds is the sole ingress for emergency and fire responders and egress by property owners in north Centralia, with Pearl-south and SR 507-north inaccessible during flood events, and which project impacts have not addressed.

As for traffic analyses, in addition to incorporating and averaging data during the pandemic, shut-down period, the Port of Centralia accurately notes the traffic study failed to adequately address the impacts at the Galvin Road/Harrison Avenue interchange. I would incorporate those comments as my own. Ironically, that interchange is currently impacted by Port traffic from its own developments, which a prior SEPA analyses had forecast would direct Port traffic north to the Grand Mound, US Highway 12 interchange—and did not. Those traffic impacts stretch onto Harrison Avenue, eastbound lanes, restricting I-5 freeway access. Further, the traffic study does not address the impacts (or frequency) of rail traffic interruptions at the Blakeslee Junction, Patriot Rail railroad interchange, which will redirect truck traffic easterly and onto Pearl Avenue. This concern is compounded by the proposed 'rail spur' to service the project site, which may lead to additional delays and is not otherwise addressed by any study or mitigation. Although there is mention of rail traffic within the transportation section, there is no mention of impacts by rail traffic or blockage of Reynolds, and response impacts by emergency responders and Riverside Fire Authority.

Mitigation measures, in order to be considered as valid mitigation of adverse environmental impacts, "shall be reasonable and capable of being accomplished." *Anderson v. Pierce Cty.,* 86 Wn. App. 290, 301 (1997) (citing *Kiewit Const. Group, Inc. v. Clark Cty*., 83 Wn. App. 133, 143 (1996)). See also, *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380-81 (9th Cir. 1998). A simple list of mitigation measures is not adequate, nor is a perfunctory discussion of what might happen with mitigation. The cryptic mitigation offered for the project impacts fail to meet state requirements.

I travel Reynolds Avenue at this location on a daily basis. I also reside within the Skookumchuck floodplain and on Waunches Prairie. The MDNS should be withdrawal and this matter revisited.

Respectfully submitted,
/s/ Douglas Jensen
PO Box 1072, Centralia, WA 98531

Hillary Hoke

From: AJ Tavares III <ajschs@aol.com>
Sent: Wednesday, January 8, 2025 10:52 AM
To: Hillary Hoke
Subject: Public comments Re: City of Centralia - SEPA MDNS #2023 0242

Attn: Hillary Hoke

I am a resident of Centralia and own property along the Skookumchuck river. I vehemently oppose construction on the property referenced in SEPA # 2023 0242, and it seems a real disservice to the community that you're requiring repeated public comments on a proposal that last sparked a petition against.

The massive warehouses would displace floodwaters from a large portion of that floodplain. Additionally, the removal of plants and trees removes the living roots in the ground which work to hold and absorb floodwaters.

I live on a property on over 4 acres along the river, and own an additional 6+ acres, also along the river. Both properties are immediately south of the proposed site. Without question, this construction wildly increases the risk of flood to my property and home. In result, the proposed plans put myself, my family, and my pets at an increase risk of injury, disaster, loss, and death.

Further, this town (and county) are filled with empty infrastructure. This is a waste of land and is unsightly. Surely, there are buildings that could be repurposed for whatever is intended for these warehouses.

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In conclusion, I frankly find it shocking that four years after historic local flooding, and with observable changes to our climate and weather patterns, the City of Centralia has put the pressure on the neighboring community to fight what is clearly a disastrous plan at the cost of its residents. Again, I oppose this shameful and dangerous project.

Adam Tavares III

Hillary Hoke

From: Amy Wasson <wassonrdh@yahoo.com>
Sent: Tuesday, January 7, 2025 9:39 PM
To: Hillary Hoke
Subject: SEPA#2023 0242

Ms. Hoke,

We would like it on record we are not in favor of the projected project. We strongly do not feel that enough drainage research has been done to rule out flooding within adjacent properties. With the last large flood within the past three years the building site had multiple areas of flooding. As a homeowner that sits directly adjacent to the property- with a slice of our property running down one side, even we are very concerned about the flooding that will be brought into Coffee Creek as well as the Skookumchuck River.
Our property in the past as never flooded. And with this project and all the fill dirt being brought in it is apparent we are at a significant chance of flooding on our property.

One year ago we spoke with Kim Ashmore about subdividing our property. He informed us that this area is under a water aquifir and cannot be built on. So you can explain how the subject building is not in the same aquifir? How are they even allowed to build on that piece of land?

Another concern we have is the noise involved with the volume of trucks coming in and out of the property. The truck motion alarms will be heard constantly in our back yard.

In addition the volume of exterior building lighting that will shine into our back yard is concerning. We will be greatly affected by exterior lights shining into our back windows.

There has been no mention of extending Blair Rd as an on ramp for all of the additional trucks that will be operating during high peak traffic/commuting hours. Reynold Road is already a mess with the train.

We also would like it noted we have given no permission for access or use of our property that runs down the Skookumchuck River.

In closing, we do not agree with the city's comment "The City of Centralia Community Development Dept. has determined this project, with mitigating conditions, does not have a probable significant adverse impact on the environment." We feel it is very PROBABLE that there will be multiple negative and significant adverse affects. This statement is vague and unfortunately leaves way too much to chance with no regard for the local residents and their quality of life in the City of Centralia.

We would appreciate a response to the above questions. Thank you.

Regards,

John and Amy Wasson