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# Technical Memorandum

**To:** **Darren Peugh, PDC Seattle LPIV BB/TH, LLC** **File Number: 1144.0036**

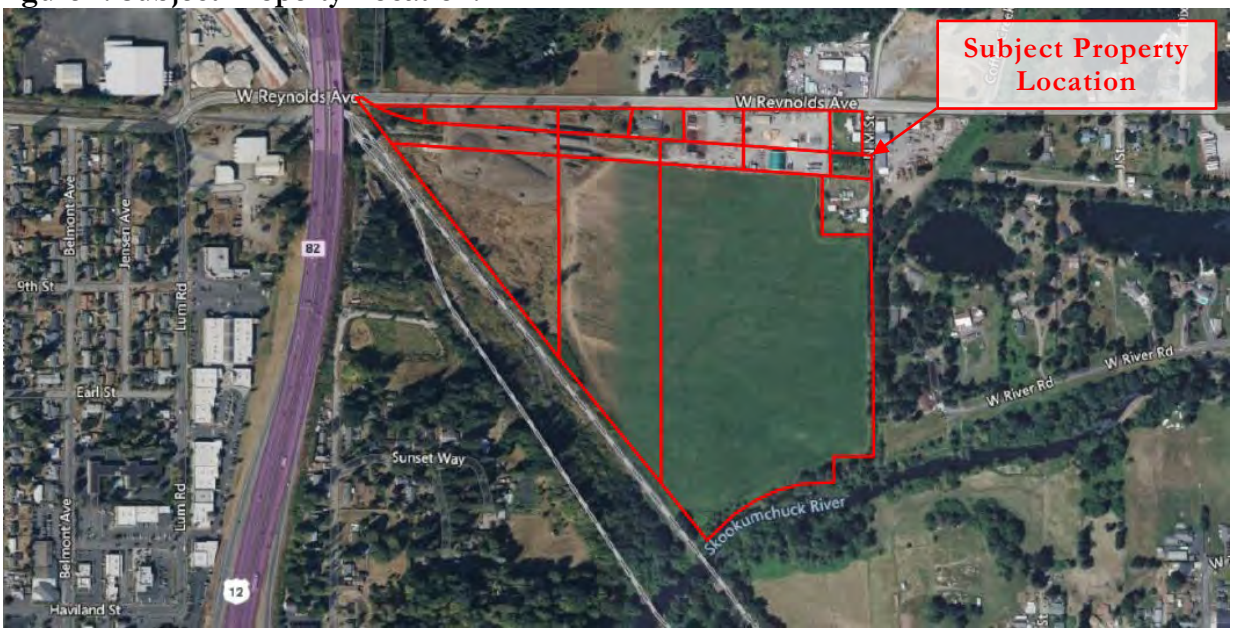
**From:** **Alex Murphy, Soundview Consultants LLC**
**Morgan Kentch, Soundview Consultants LLC** **Date: May 23, 2023**

**Re:** **Shoreline No Net Loss Analysis and Habitat Management Plan**
**Skookumchuck Commerce Center**

Dear Mr. Peugh,

Soundview Consultants LLC (SVC) is supporting PDC Seattle LPIV BB/TH, LLC with a shoreline no-net loss analysis and habitat restoration plan associated with the proposed industrial development of an approximately 56.29-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, 021041000000). This Technical Memorandum has been prepared to provide a no net loss analysis and habitat restoration plan associated with the proposed industrial redevelopment of the subject property with two warehouse buildings and associated infrastructure.

**Figure 1. Subject Property Location.**



## Existing Conditions

SVC investigated the subject property for the presence of potentially regulated wetlands, waterbodies, and other fish and wildlife habitat conservation areas in the summer of 2021 and winter of 2023. The results of this assessment are documented in the *Shoreline, Wetland, and Fish and Wildlife Habitat Assessment Report – Skookumchuck Commerce Center* prepared March 21, 2023 (SVC, 2023). Using current methodology, SVC identified and delineated one Type S (Shoreline of the State) stream (the Skookumchuck River) and one Type F (fish-habitat) stream (Coffee Creek) on the subject property, and one Category IV wetland (Wetland A) offsite. In addition, the entire subject property is located within the FEMA 100-year floodplain.

## Proposed Project

The Applicant proposes industrial development of the subject property consisting of two warehouses: Building A (approximately 483,276 square feet in size) and Building B (approximately 295,356 square feet in size) and associated site access, parking, truck loading and turnaround, stormwater facilities, utilities, and associated infrastructure. Stormwater infrastructure will consist of four interconnected stormwater ponds that will discharge treated stormwater at two points landward of the 200-foot shoreline management area with flow paths to both the Skookumchuck River and Coffee Creek. The proposed project has been carefully designed to avoid direct impacts to all identified critical areas, and all site development will be located outside of the 200-foot shoreline management area. However, the entire subject property is located within the FEMA 100-year floodplain and will need to be cleared, graded, and raised above the current elevation to support the proposed industrial development. As such, compensatory flood storage is required to meet the general standards for floodplain development under CMC 16.21.170. A total of 151,000 cubic yards of fill within the FEMA 100-year floodplain areas will be compensated by providing 151,000 cubic yards of flood storage via upland stormwater detention ponds and excavated ponds within the buffers associated with the Skookumchuck River and Coffee Creek. All excavation activities will be located landward of the ordinary high water (OHW) mark of the Skookumchuck River and Coffee Creek. The current buffers and shoreline management area are degraded and consist of maintained fields and non-native invasive Himalayan blackberry (*Rubus armeniacus*) and reed canarygrass (*Phalaris arundinacea*) and lack woody vegetation and tree cover. The proposed riparian habitat restoration actions will include excavating flood storage areas, removing non-native invasive species, providing soil amendments, and replanting with native trees, shrubs, and groundcover suitable for occasionally flooded and upland buffer areas to increase water quality, hydrologic, and habitat functions onsite. The flood compensation will ensure no net rise in floodplain elevations per CMC 16.21.170.F.1.b and CSMP 6.12.B(1)(b).

## Regulatory Considerations

### 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 SMP flood course, 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 and SMP flood course as shown in Attachment A. 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 6.2 Table 6-1 states allowed modifications within each shoreline environment. The proposed industrial development and associated infrastructure are located entirely outside of the shoreline jurisdiction. Activities within the shoreline jurisdiction are limited to the excavation of depressional areas for compensatory flood storage and habitat restoration actions. Per CSMP 6.2 Table 6-1, compensatory flood storage and fill, grading, and excavation activities exceeding 500 cubic yards are permitted in the shoreline jurisdiction subject to a Conditional Use Permit (CUP). Restoration and enhancement activities are permitted.

CSMP 7.4.2 states shoreline setbacks required for each shoreline environment designation; no shoreline setback is established for industrial 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 the "Critical Area Considerations" section below.

*Substantial Development Permits*

Per CSMP 2.2.A, a Shoreline Substantial Development Permit (SSDP) is required for all projects located within the shoreline jurisdiction. Per CSMP 2.2.B, in order for the City to approve a SSDP, a project must be consistent with the following:

1. *All applicable regulations of this Program appropriate to the shoreline environment designation and the type of use or development proposed shall be met, except those bulk and dimensional standards that may have been modified by approval of a shoreline variance.*

   Activities within the shoreline jurisdiction have been designed to meet all applicable regulations outlined in the CSMP. Compliance with specific regulations is demonstrated in the sections below.

2. *All policies of this Program appropriate to the shoreline environment designation and the type of use or development activity proposed shall be considered and substantial compliance demonstrated.*

   See the response to Item 1 above.

3. *The review criteria in WAC 173-27-140 and 150.*

   WAC 173-27-140 and 150 require development activities within the shoreline jurisdiction are consistent with the policies and provisions of the Shoreline Management Act (SMA). All

activities described herein are consistent with the SMA. Compliance with specific regulations is demonstrated in the sections below.

*Conditional Use*

Per CSMP 2.3.A, uses that require a CUP may be authorized provided the following criteria are met:

1. *The proposal is consistent with the policies of RCW 90.58, this Program, underlying zoning, Comprehensive Plan and other applicable regulations.*

   Activities within the shoreline jurisdiction have been designed to comply with the policies of the SMA outlined under RCW 90.58, the underlying zoning of the shoreline area onsite, the City's comprehensive plan, and all other applicable regulations, as demonstrated throughout this report. The subject property is zoned M-1 (light industrial) and the shoreline environment designation onsite is Urban Conservancy. Activities proposed in the shoreline jurisdiction include the excavation of areas for compensatory flood storage and habitat restoration. Compensatory flood storage is permitted in the Urban Conservancy environment designation subject to a CUP and habitat restoration activities are permitted outright. All stormwater infrastructure will be located outside of the shoreline jurisdiction.

2. *The proposal meets all the requirements of WAC 173-27-160; including but not limited to the following:*

   a. *That the proposed use is consistent with the policies of RCW 90.58.020 and the master program;*

      See the response to Item 1 above.

   b. *That the proposed use will not interfere with the normal public use of public shorelines;*

      As no existing public access to the shoreline is present onsite, the proposed project activities in the shoreline jurisdiction will not interfere with normal public use of the shoreline.

   c. *That the proposed use of the site and design of the project is compatible with other authorized uses within the area and with uses planned for the area under the comprehensive plan and shoreline master program;*

      The proposed project activities in the shoreline are compatible with authorized uses in the Urban Conservancy shoreline environment and with uses planned for the area under the City's comprehensive plan and SMP.

   d. *That the proposed use will cause no significant adverse effects to the shoreline environment in which it is to be located; and*

      The proposed activities in the shoreline jurisdiction have been designed to ensure no net loss of shoreline ecological functions. All excavation activities for floodplain compensation and restoration actions will be located landward of OHW. The existing shoreline areas onsite are degraded due to the presence of managed agricultural fields and non-native invasive species. Following excavation of the onsite shoreline areas for compensatory flood storage, the shoreline areas associated with the Skookumchuck River and buffer areas associated with Coffee Creek will be fully restored with native trees, shrubs, and groundcover. These actions will improve habitat and screening

between the Skookumchuck River and Coffee Creek, and improve water quality for surface runoff entering the streams and hydrologic functions onsite by providing increased plant structure to filter pollutants and slow and attenuate flooding. Overall, these actions are anticipated to provide a net lift in shoreline ecological onsite. Further details are provided in the Habitat Restoration Plan section below.

*e. That the public interest suffers no substantial detrimental effect*

The proposed project activities in the shoreline jurisdiction will have no detrimental effect on public interest. All activities are proposed landward of OHW. Compensatory flood storage and habitat restoration actions provided onsite will minimize downgradient flooding that will benefit the public interest. In addition, habitat restoration actions in the shoreline areas associated with the Skookumchuck River and the buffer of Coffee Creek will provide a net lift in ecological functions onsite. Further details are provided in the Habitat Restoration Plan section below.

*Management Policies*

CSMP 3.3.3 outlines the following policies for development in the urban conservancy shoreline environment:

1. *Uses should result in no net loss of ecological functions to the greatest extent feasible and promote preservation of ecological functions.*

   The proposed activities within the shoreline have been designed to ensure no net loss of ecological functions onsite. Excavation of the compensatory flood storage areas will be located entirely landward of the OHW of the Skookumchuck River and Coffee Creek and will minimize downgradient flooding. Further, habitat restoration actions in the shoreline areas associated with the Skookumchuck River and the buffer of Coffee Creek will provide a net lift in ecological functions onsite. Further details are provided in the "Habitat Restoration Plan" section below.

2. *Preserve, restore and protect the ecological functions to the greatest extent feasible.*

   Habitat restoration is proposed for the shoreline areas associated with the Skookumchuck River onsite and buffer area associated with Coffee Creek. The existing shoreline areas are degraded to the presence of maintained agricultural fields and non-native invasive species. Habitat restoration actions will include excavating flood storage areas, removing non-native invasive species, applying soil amendments, and planting native trees, shrubs, and groundcover to provide a net lift in ecological functions onsite.

3. *Implement public access and recreation objectives in areas where feasible and ecological impacts can be mitigated.*

   Providing public access and recreational opportunities as part of the proposed development is not feasible due to the need for compensatory flood storage to offset industrial development activities in the 100-year floodplain but outside of the shoreline jurisdiction. No existing public access or recreational activities are present onsite, and the surrounding shoreline areas in the landscape are developed with private land uses that also lack public access and recreation opportunities.

4. *Water-oriented uses should be given preference over non- water- oriented uses.*

   No water-oriented uses are proposed. Activities within the shoreline jurisdiction are limited to the excavation of soils for compensatory flood storage and habitat restoration.

*General Regulations*

CSMP Chapter 5 provides general regulations applicable for activities proposed in the shoreline jurisdiction. This section addresses regulations applicable for the construction of compensatory flood storage and habitat restoration actions proposed in the shoreline area associated with the Skookumchuck River onsite. In addition, regulations related to water quality are addressed in relation to a stormwater discharge located adjacent to the 200-foot shoreline jurisdiction.

Per CSMP 5.1, the following regulations are universally applicable to projects with activities proposed in the shoreline jurisdiction:

1. *All shoreline uses and developments within shoreline jurisdiction, regardless of whether a shoreline permit is required or not, shall conform to the SMA and the policies and regulations of the SMP.*

   The proposed activities within the shoreline jurisdiction have been designed to conform with the SMA and policies and regulations of the CSMP, as demonstrated throughout this document. The proposed project requires the excavation of areas for compensatory flood storage within the shoreline jurisdiction. In addition, habitat restoration will be provided throughout the entire shoreline area onsite. The proposed compensatory flood storage activities are permitted in the shoreline jurisdiction subject to a CUP. The habitat restoration activities are permitted outright.

2. *If provisions of this Program conflict, or if provisions of this Program conflict with other regulations, the provisions most directly achieving the objectives of the SMA shall apply. A final determination of which provisions apply will be made by the Administrator.*

   No conflicting provisions have been identified when considering the proposed project activities.

3. *Shoreline uses, developments and/or modifications listed as prohibited shall not be eligible for consideration as a shoreline variance or conditional use.*

   No prohibited activities are proposed in the shoreline jurisdiction.

Per CSMP 5.4, the following regulations for environmental protection and mitigation are applicable to all uses within the shoreline environment:

1. *The provisions of this section and CMC Title 16 – Environment, as incorporated into the SMP in section 5.7, shall apply to all uses and developments within shoreline jurisdiction, whether or not a shoreline permit or letter of exemption is required.*

   The activities proposed within the shoreline jurisdiction have been designed in compliance with the provisions of this section and CSMP 5.7, as demonstrated in this section.

2. *The provisions of the State Environmental Policy Act (SEPA), WAC 197- 11, may be applicable.*

   A SEPA application has been submitted to the City of Centralia to support the proposed project.

3. *The cumulative effects of individual projects and projects within the same reach shall be considered to ensure no net loss of ecological functions.*

   Surrounding areas within the same reach as the proposed development are similarly developed with industrial/industrial land uses or developed for residential uses. The proposed project has been carefully designed to avoid no net loss of ecological functions onsite or in the greater Upper Chehalis watershed (Water Resource Inventory Area (WRIA) 23). No infrastructure is proposed within the shoreline jurisdiction. The proposed compensatory flood storage and buffer restoration actions will provide increased ecological functions onsite when compared to the current degraded condition. Therefore, no negative cumulative effects are anticipated but rather a net improvement in water quality, hydrologic, and habitat functions in addition to no net rise in floodplain elevations.

4. *Mitigation shall be required for all projects having impacts on ecological functions. The applicant/owner must demonstrate all reasonable efforts have been made to avoid and minimize impacts. Mitigation ratios are established in CMC Title 16 – Environment as incorporated into this Program. Mitigation sequencing is as follows, listed in the order of priority:*
   a. *Avoid the impact completely by redesigning, restructuring and/or relocating the development components.*
   b. *Minimize the impact by limiting the magnitude of the action and its implementation by using appropriate technology and/or taking affirmative action.*
   c. *Rectify the impact by repairing, rehabilitating or restoring the impacted environment to its original state.*
   d. *Reduce or eliminate the impact over time by preservation and maintenance actions.*
   e. *Compensate for the impact by replacing, enhancing and/or providing substitute resources and/or environments.*
   f. *Monitor the impact and compensation projects and take appropriate corrective measures as required.*

   See the "Mitigation Sequencing" section below.

5. *When determining required mitigation measures, lower priority measures shall be applied only when it is adequately demonstrated that higher priority measures are infeasible.*

   Higher priority mitigation measures were implemented to the greatest extent feasible, given that all critical area impacts are avoided and buffer restoration is provided to increase ecological functions.

6. *Required mitigation shall not be in excess of the minimum necessary to ensure no net loss of ecological functions.*

   No mitigation is required given that all critical area impacts are avoided. However, compensatory flood storage and buffer restoration will be provided which will increase ecological functions onsite and in the basin when compared to the existing degraded conditions of the shoreline management area.

7. *Mitigation actions shall not have an adverse impact on other shoreline functions or critical areas.*

   No mitigation is required given that all critical area impacts are avoided. However, compensatory flood storage and buffer restoration will be provided. These actions will transform the existing degraded managed fields and areas of non-native invasive species to a highly interspersed occasionally flooded and upland buffer area with native tree, shrub, and groundcover plantings to increase habitat suitability and complexity, increase sediment and pollutant filtration, and slow surface runoff. Therefore, the proposed restoration actions will provide a net lift in shoreline and critical area functions onsite.

8. *When compensatory mitigation is required, the following shall apply in the order listed:*
   a. *Compensatory mitigation actions in the immediate vicinity of the proposal.*
   b. *Compensatory mitigation actions in the same watershed of the proposal. Limiting factors that make the immediate vicinity mitigation infeasible must be adequately identified.*

   No mitigation is required given that all critical area impacts are avoided. However, all flood compensation and habitat restoration activities are located onsite, in the immediate vicinity of the proposed project.

9. *Authorization of these compensatory mitigation actions may require safeguards, terms or conditions to ensure no net loss of ecological functions.*
   *Hydrologic connections between water bodies and associated wetlands shall be protected.*

   No mitigation is required given that all critical area impacts are avoided. The proposed habitat restoration actions will be implemented in accordance with approved BMPs and TESC measures to ensure no net loss of ecological functions during construction. All work will be located landward of the OHW of the Skookumchuck River and Coffee Creek, and hydrologic connectivity between these features will be maintained. No other wetlands or waterbodies were identified in the shoreline jurisdiction.

Portions of Coffee Creek and the associated buffer area are located within the shoreline jurisdiction associated with the Skookumchuck River. Per CSMP 5.7.B, the following vegetation and critical areas conservation regulations are applicable to development activities in the shoreline jurisdiction:

1. *Required critical area buffers within shoreline jurisdiction, or the minimum setback required by Table 7-3 in this Program, whichever is greater, shall be considered the vegetation conservation area.*

   The buffer area within the shoreline jurisdiction will be considered the vegetation conservation area.

2. *All shoreline uses and activities shall be located, designed, constructed and operated to protect and/or enhance the ecological functions and ecosystem- wide processes provided by critical areas and shoreline vegetation. Critical areas are defined in Chapter 9.*

   No direct impacts to the critical areas identified on/adjacent to the subject property are proposed. However, compensatory flood storage and buffer restoration will be provided. These actions will transform the existing degraded managed fields and areas of non-native invasive species to a highly interspersed occasionally flooded and upland buffer area with native tree, shrub, and groundcover plantings to increase habitat suitability and complexity,

increase sediment and pollutant filtration, and slow surface runoff. Therefore, the proposed restoration actions will provide a net lift in shoreline and critical area functions onsite.

3. *Normal maintenance of vegetated areas, such as pruning and trimming, is allowed.*

   Maintenance and monitoring will be provided for the shoreline restoration areas to ensure the restoration actions are successful.

4. *Clearing and grading activities must meet all requirements of this Program and other local, state and federal regulations.*

   All clearing and grading activities have been designed to meet the requirements of this program and all applicable local, state, and federal regulations. The clearing and grading for the proposed project will result in no net rise of floodplain elevations.

5. *Speculative vegetation removal shall be prohibited. Vegetation removal shall be accomplished in the least invasive manner possible.*

   No speculative vegetation removal is proposed. Vegetation removal will occur as the result of excavation within the shoreline jurisdiction to meet compensatory flood storage requirements. Non-native invasive species will also be treated and removed with the proposed maintenance and monitoring of the restoration areas to ensure the restoration actions are successful.

6. *The Critical Areas regulations, CMC Title 16 - Environment, in effect on April 10, 2018, by adoption of Ordinance No. 2396, contained in the City of Centralia Critical Areas Ordinance, CMC Chapters 16.16 through 16.21 shall be adopted as part of this Program, except as modified below:*

   a. *CMC 16.16.100 - Application and Review Process. Within shoreline jurisdiction, critical area review, approval, notice and appeal periods/processes shall be integrated with the associated shoreline permit or exemption (see Chapter 2).*

      Critical areas review will be integrated with the shoreline substantial development permit and shoreline conditional use permit.

   b. *CMC 16.16.110 – Reasonable Use Exception. Within shoreline jurisdiction, the process for seeking relief from critical area standards shall be a shoreline variance.*

      No shoreline variance is proposed.

   c. *CMC 16.17.030 - Mapping. Identification of wetlands and delineation of their boundaries shall be done in accordance with the approved federal wetland delineation manual and applicable regional supplements.*

      All identified critical areas were identified within 300 feet of the site, delineated onsite, and included on the Existing Conditions figure in Attachment A. No wetlands were identified onsite.

   d. *CMC 16.17.050 (F)(4) and 16.20.080 (C) - Buffers. In shoreline jurisdiction, buffers may not be decreased by more than 25% of the base buffer width. Administrative buffer reductions of more than 25% shall require a variance. Buffer averaging shall be considered and shown infeasible before administrative buffer reductions may be authorized.*

No buffer reduction is proposed.

e. *CMC 16.17.050(F)(6)(d) – Stormwater Management Facilities, in shoreline jurisdiction, stormwater management facilities are allowed in the outer twenty-five percent of the buffer of Category III and IV wetlands only; provided, that no other location is feasible and the location of such facilities will not degrade the functions or values of the wetland.*

No stormwater management facilities are proposed within the identified wetland buffer.

f. *CMC 16.21.190 - Floodways. Within shoreline jurisdiction, uses and activities that may be authorized within floodways or the SMP flood course are listed in Section 5.5(B)(7).*

No project elements are proposed within the floodway.

7. *Any provision of Title 16 that is not consistent with the SMA and applicable RCW and WAC chapters shall not apply in shoreline jurisdiction.*

All proposed project elements are consistent with the SMA and applicable RCW and WAC.

8. *Areas cleared of vegetation and not developed shall be re-planted with native vegetation as soon as feasible but no later than one year from the date of clearing.*

Areas cleared during the excavation of compensatory flood storage areas within the shoreline jurisdiction and buffer areas will be immediately replanted as part of the restoration plan once grading is complete to stabilize soils and avoid adverse ecological impacts.

9. *Re-planted areas shall be monitored and maintained so that vegetation is 90% re-established within three (3) years. At the discretion of the Administrator, a bond may be required to ensure the success of re- planted areas.*

A five-year monitoring plan will be implemented to ensure the successful establishment of the proposed habitat restoration plantings.

10. *Proposed uses and developments must protect and preserve native trees and vegetation to the greatest extent feasible during and after construction.*

The excavation of necessary compensatory flood storage within the shoreline jurisdiction and buffer areas will require the clearing of a majority of the existing vegetation. Existing vegetation consists of a mix of native and non-native invasive grasses typical of maintained agricultural fields in addition to Himalayan blackberry. Following the completion of excavation and grading activities, all cleared areas will be planted with native trees, shrubs, and groundcover to provide a net lift in ecological functions onsite when compared to the current degraded condition.

11. *Developments that propose removal of, or adverse impact to, vegetation conservation areas shall require a mitigation plan to ensure no net loss of ecological functions or ecosystem-wide processes. Such mitigation plan shall be prepared by a qualified professional. Such plan shall include details on how the project complies with the mitigation sequence outlined in section 5.4.B(4). Compensatory mitigation requirements shall be the minimum necessary to ensure no net loss of ecological functions, and at a minimum shall be 1:1 for riparian habitat buffers.*

Clearing and grading of managed field grasses and non-native invasive Himalayan blackberry will be required to provide flood compensation areas within the shoreline jurisdiction and buffers. Following grading actions, soil amendments will be added, and native trees, shrubs, and groundcover will be installed to improve ecological functions when compared to the existing degraded conditions. A habitat restoration plan has been prepared to ensure no net loss of ecological functions or ecosystem-wide processes. Mitigation sequencing outlined in CSMP 5.4.B(4) is demonstrated above. Further details are provided in the "Habitat Restoration Plan" section below.

12. *Trees that are in immediate danger of collapse and represent a clear danger to persons or property, may be removed or topped without a permit or mitigation plan. Immediate danger of collapse means the tree is already leaning, surrounding soil is heaving and there is significant likelihood that the tree or a portion of will fall and has the potential to result in damage to persons or property before a permit can be obtained. Replacement and/or mitigation may be required.*

    No trees in immediate danger of collapse or that represent a clear danger to persons or property have been identified in the shoreline jurisdiction.

13. *Approved uses within vegetation conservation areas shall permanently remove no more than fifteen percent (15%) of the native vegetation; except for those uses allowed in section 5.5.B(7). Vegetation removal shall be limited to the minimum amount necessary to accommodate the approved use.*

    No permanent vegetation removal is proposed. The proposed buffer restoration plan will install native trees, shrubs, and groundcover throughout the entire shoreline jurisdiction and onsite buffer areas to improve ecological functions when compared to the existing degraded condition.

14. *The following uses may be allowed in shoreline jurisdiction, vegetation conservation areas, and critical area buffers without a shoreline variance permit:*
    a. *Uses and activities allowed in Section 5.5.B, when uses are also allowed in the Shoreline Environment Designation and the underlying zoning.*
    b. *Water-oriented uses as allowed in Table 7-1, provided development is located, designed, constructed and operated to minimize the critical area impacts to the maximum extent feasible. Such development shall not be exempt from the protection and mitigation requirements of section 5.4, and shall comply with the setbacks in Table 7-3.*
    c. *Non-water oriented commercial and industrial uses may be allowed within the vegetation conservation areas in the following reaches without a variance permit, provided they're in compliance with the underlying zoning designation, existing ecological functions are protected and previously degraded ecological functions are restored and/or improved:*
        1. *CE-01 – PMP, M-1, M-2 zoning designations in and around the Port of Centralia; and H-1 zoning designation on the north side of Cooks Hill Road.*
        2. *CE-02 – Commercial areas adjacent to Harrison Avenue and Hayes Lake in the High Intensity environment.*
        3. *CE-05 – Commercial areas adjacent to Kresky Avenue and National Avenue in the High Intensity environment.*

        *Non-water-oriented uses shall be located no closer to the OHWM than those existing as of the date of adoption of this Program.*

        *These uses may be required to increase or enhance public access and/or restore or enhance ecological functions. Such developments are not exempt from the protection and mitigation requirements of section 5.4.*

*d. Compensatory flood storage consistent with section 6.12.*
*e. Restoration and enhancement, including mitigation actions, consistent with section 6.11.*

Proposed activities within the shoreline jurisdiction include the excavation of flood storage and habitat restoration actions. As such, the proposed activities in the shoreline jurisdiction do not require a shoreline variance.

15. *Critical area buffer regulations shall not apply to the removal of noxious weeds, aquatic weeds and freshwater algae when conducted in accordance with WAC 173-201.*

    The maintenance and monitoring for the proposed restoration will include treatment and removal of non-native invasive species and noxious weeds to ensure success of the restoration actions.

16. *The Administrator may approve removal of vegetation that exceeds the 15% limit outlined in item 13 above, when the applicant commits through an approved mitigation plan to re-establish and maintain plantings that are documented to provide a greater benefit to ecological functions then what would be provided by strict application of this section.*

    No permanent vegetation removal is proposed. Compensatory flood storage areas will be excavated and graded within the shoreline jurisdiction and stream buffers which are currently comprised of managed agricultural fields and non-native invasive species. The proposed buffer restoration plan will install native trees, shrubs, and groundcover throughout the entire shoreline jurisdiction and onsite buffer areas to improve ecological functions when compared to the existing degraded condition. The plantings will be monitored for a period of 5 years to ensure successful establishment.

17. *Facilities, landscape areas, vegetation areas, uses, structures, etc. legally in existence prior to the adoption date of this Program shall be allowed to be maintained and repaired to their existing condition.*

    No existing facilities, landscape areas, vegetation areas, uses, structures, et cetera are present that will be maintained or repaired under the proposed project.

18. *Aquatic vegetation control shall occur only where native plant communities and associated habitats are threatened or where an existing water-dependent use is restricted by the presence of vegetation. Aquatic vegetation control shall be conducted in the least invasive manner possible and in compliance with all other applicable local, state and federal regulations.*

    No aquatic vegetation control is proposed.

Per CSMP 5.8, the following water quality regulations are applicable when considering stormwater discharges to the onsite shoreline areas and construction activities within the shoreline jurisdiction:

1. *Stormwater management systems shall be designed, constructed and maintained in accordance with all current local, state and federal regulations.*

   The proposed stormwater discharge is part of a greater stormwater management system consisting of four stormwater ponds and two outfall structures: one stormwater discharge outfall and one outfall for emergency overflow. All stormwater infrastructure is located outside of the shoreline jurisdiction and critical area buffers onsite. The stormwater facilities will be

designed, constructed, and maintained in accordance with all current local, state, and federal regulations and will incorporate enhanced water quality treatment and flow control structures.

2. *Best management practices for erosion and sediment control shall be implemented. A Temporary Erosion and Sediment Control plan (TESC) will be required for applicable developments.*

   BMPs for erosion and sediment control, including silt fencing between the Skookumchuck River, Coffee Creek, and the areas proposed to be excavated for compensatory flood storage will be implemented to minimize impacts to the identified streams during construction. A TESC plan has been prepared by the Project Engineer under separate cover for the proposed project.

3. *Structures that may come in contact with water shall be constructed of materials that will not adversely impact water quality, aquatic plants or animals. Materials used for decking and other structural components shall be approved by the applicable agencies to avoid discharge of pollutants from waves, rain or runoff.*

   The proposed stormwater infrastructure is located outside of the shoreline jurisdiction and will not adversely impact water quality, aquatic plants, or animals.

*Shoreline Modification Regulations*

Chapter 6 of the CSMP outlines regulations applicable for modifications to the shoreline environment. The proposed excavation of shoreline areas for compensatory flood storage (exceeding 500 cubic yards) and habitat restoration activities are considered shoreline modifications.

Per CSMP 6.1, the following general regulations are applicable when modifications are proposed in the shoreline jurisdiction:

1. *Structural shoreline modifications shall be allowed only when necessary to support an allowed primary structure or legally existing shoreline use, or when necessary for mitigation or enhancement.*

   No structural shoreline modifications are proposed.

2. *The applicant shall provide all necessary scientific, technical and comprehensive analysis data, as required by the Administrator, in order to make an informed decision.*

   Calculations to support the compensatory flood storage plan will be provided by the Project Engineer under separate cover. The frequency and duration of the compensatory flood storage areas and proposed topography throughout the restoration areas were the primary factors in determining the proposed plantings for the restoration plan as discussed in greater detail in the "Habitat Restoration Plan" below.

3. *Shoreline modifications shall be limited in number and extent to the greatest extent feasible.*

   The excavation of compensatory flood storage areas within the shoreline jurisdiction and stream buffers is the minimum necessary for the project development to ensure no net rise of floodplain elevation. Given the large special needs for any industrial development and the entire site mapped within 100-year floodplain, no design modifications would result in less floodplain fill. The Applicant is proposing four stormwater detention ponds throughout the upland areas onsite and outside of the shoreline jurisdiction to fulfill as much of the required compensatory storage as possible. However, due to the large amount of compensatory storage

needed, additional flood compensation is needed within the shoreline jurisdiction and stream buffers to meet the no net rise requirement. Adherence to the general standards for floodplain development under CMC 16.21.170 are demonstrated in the site plans provided under separate cover by the Project Engineer. All shoreline and buffer areas disturbed during excavation will be fully restored with native trees, shrubs, and groundcover to ensure no net loss of shoreline or buffer ecological functions onsite.

4. *Shoreline modifications must be designed and located to ensure no net loss of ecological functions and no significant adverse impact to shoreline uses, resources and values pursuant to RCW 90.58.020.*

   The excavation of compensatory flood storage areas within the shoreline jurisdiction is required to ensure no net rise in floodplain elevations onsite. The existing shoreline areas are largely degraded due to the presence of maintained agricultural fields and non-native invasive species. Therefore, the required excavation, clearing, and grading for floodplain compensation will result in limited habitat removal. Immediately following excavation, all areas within shoreline jurisdiction and the stream buffers will be planted with native trees, shrubs, and groundcover. These actions will provide a net lift in ecological functions onsite and in the greater Upper Chehalis watershed and will ensure no significant adverse impacts to shoreline uses, resources, or values occur pursuant to RCW 90.58.020. Further details are provided in the "Habitat Restoration Plan" section below.

5. *Shoreline modifications and uses shall be designed, constructed and maintained to prevent degradation of water quality and natural hydrographic conditions.*

   The excavation of compensatory flood storage areas and habitat restoration activities will be designed, constructed, and maintained to prevent the degradation of water quality and natural hydrographic conditions. The compensatory flood storage areas are necessary to offset fill within the 100-year floodplain areas located onsite but outside of the shoreline jurisdiction and will help prevent increases in stream flows and downgradient flooding issues. The proposed habitat restoration actions will provide a dense suite of native trees and shrubs that will improve water quality and hydrologic functions by providing increased plant structure to filter sediments and pollutants and slow and attenuate flooding when compared to the existing maintained agricultural fields and non-native invasive species present in the shoreline areas onsite.

6. *Existing structures may be maintained, repaired and operated as existed prior to the adoption date of this Program. Shoreline modification standards shall not apply retroactively to legally existing modifications.*

   No existing structures are present in the shoreline jurisdiction onsite.

7. *All disturbed areas shall be protected from erosion by planting native vegetation or other approved methods.*

   All areas disturbed during excavation of compensatory flood storage areas will be fully restored with native trees, shrubs, and groundcover which will stabilize soils and minimize erosion. Further, all shoreline and buffer areas proposed for flood storage and restoration will incorporate all appropriate BMPs and TESC measures during construction to minimize runoff and erosion.

8. *All shoreline modifications waterward of the OHWM are subject to all applicable local, state and federal regulations.*

   No shoreline modifications are proposed waterward of the OHWM of the Skookumchuck River or Coffee Creek.

9. *All shoreline modifications are subject to the mitigation sequencing process outlined in section 5.4. If other critical areas within shoreline jurisdiction are subject to impact, the requirements of section 5.7 may also be applicable.*

   Mitigation sequencing is addressed in the "Critical Area Regulations" section below.

Per CSMP 6.8, the following regulations are applicable when fill, grading, and/or excavation activities are proposed in the shoreline jurisdiction:

1. *The use of solid waste and organic debris, such as wood and other vegetative materials, in a fill shall be prohibited.*

   No solid waste or organic debris will be placed as fill material in the shoreline jurisdiction. Any proposed fill will be limited to a layer of native topsoil if determined necessary for the successful establishment of habitat restoration plantings following excavation of the compensatory flood storage areas.

2. *Fills shall consist of clean materials including such earth materials as clay, sand and gravel. In addition, concrete may be included in fill material if it is not likely to pollute ground water and is approved by the Administrator or Department.*

   Any fill material will consist of clean soils similar to those currently present onsite and will be sourced onsite or from an approved supplier. No concrete fill material will be utilized.

3. *Fill, grading and excavation shall be designed, constructed and maintained to prevent, minimize and control all material movement, erosion and sedimentation from the affected area.*

   BMPs and TESC measures will be implemented for the duration of excavation activities within the shoreline jurisdiction to prevent, minimize, and control all material movement, erosion, and sedimentation from the affected area. Immediately following the completion of excavation activities, all disturbed areas will be planted with native trees, shrubs, and groundcover to stabilize the affected areas and prevent future erosion and sedimentation.

4. *Fill, grading and excavation areas shall be covered with sufficient earth material to support native vegetative ground cover and replanted with vegetation to blend with the surrounding environment.*

   If necessary, areas excavated for the purpose of compensatory flood storage will be covered with sufficient earth material to ensure the success of proposed habitat restoration plantings.

5. *Fill, grading and excavation may be allowed only when it can be demonstrated that the proposed action will not result in significant damage to water quality, fish, shellfish and/or wildlife habitat; adversely alter natural drainage and circulation patterns, currents, river flows; or significantly reduce flood water capacities.*

   The excavation of compensatory flood storage areas within the shoreline jurisdiction and stream buffers is the minimum necessary for the project development to ensure no net rise of

floodplain elevation. These actions will not result in significant damage to water quality, fish, shellfish, and/or wildlife habitat, adversely alter natural drainage patterns, or significantly reduce flood water capacities. The existing shoreline areas are largely degraded due to the presence of maintained agricultural fields and non-native invasive species. Therefore, the required excavation, clearing, and grading for floodplain compensation will result in limited habitat removal. Immediately following excavation, all areas within shoreline jurisdiction and the stream buffers will be planted with native trees, shrubs, and groundcover to ensure no net loss of ecological functions. The proposed compensatory flood storage is necessary to avoid adverse alterations to drainage and circulation patterns, currents, river flows, and flood water capacity. The proposed habitat restoration activities will improve habitat and screening between the Skookumchuck River, Coffee Creek, and the proposed development. The restoration actions will improve habitat suitability and complexity with the addition of woody plant species. Water quality and hydrologic functions will improve with the increased plant structure to filter pollutants and slow and attenuate flooding when compared to the existing shoreline and stream buffer areas that consist primarily of native and non-native grasses typical of agricultural fields. Overall, these actions are anticipated to provide a net lift in ecological functions onsite and in the greater Upper Chehalis watershed. Additional details are provided in the "Habitat Restoration Plan" section below.

6. *Fill, grading and excavation which will interfere with public rights of navigation shall be prohibited unless there is an overriding public interest.*

   No fill, grading, or excavation is proposed within public rights of navigation.

7. *Fill for the purpose of providing land for a septic tank drainfield is prohibited.*

   No fill for the purpose of providing a septic tank or drainfield is proposed.

8. *Filling and grading for the sole purpose of creating new dry land is prohibited.*

   No filling or grading for the purpose of creating new dry land is proposed.

9. *Fill within a 100-year floodplain shall meet the requirements of CMC Title 16, as incorporation into this SMP, and CMC Title 18.*

   Fill within the 100-year floodplain areas is located outside of the shoreline jurisdiction; nonetheless, the proposed fill activities have been designed to meet the requirements of CMC Title 16 and CMC Title 18 as demonstrated by the Project Engineer under separate cover.

10. *Fill within a floodway is prohibited, except as outlined in section 5.5.B(7).*

    No fill is proposed within the floodway.

11. *Fill located waterward of the ordinary high water mark for the purpose of ecological restoration may be allowed subject to a shoreline substantial development permit.*

    No fill is proposed waterward of the OHW of the Skookumchuck River or Coffee Creek.

12. *Fill may be allowed waterward of the ordinary high water mark only for cleanup and disposal of contaminated sediments, public access, mitigation and water dependent uses, and shall require a Conditional Use Permit.*

No fill is proposed waterward of the OHW of the Skookumchuck River or Coffee Creek.

Per CSMP 6.11, the following regulations are applicable for restoration and enhancement activities in the shoreline jurisdiction:

1. *Restoration shall be carried out in accordance with the policies and regulations of this Program. The Shoreline Restoration Plan, and the plans of the Chehalis Basin Lead Entity, and other salmon recovery lead entities, identify potential restoration priorities and project in shoreline areas. These plans may be used as a guide for shoreline restoration and enhancement projects.*

   All habitat restoration activities in the shoreline jurisdiction have been designed and will be carried out in accordance with the policies and regulations of the CSMP. The overall goal of the restoration plan is to increase ecological functions within the floodplain associated with two stream systems that will benefit salmonids. This large area of shoreline is currently in active agricultural management, contains non-native invasive species, and lacks hydrologic connection to the Skookumchuck River other than being situated adjacent to the river. Therefore, in its existing condition, the shoreline area and floodplain do not provide a high level of function. The Chehalis Basin Lead Entity identifies several major habitat restoration goals within the Chehalis watershed, including "restore and preserve properly functioning riparian areas" and "restore floodplain and stream channel function" (Kleim & Holden, 2011). The proposed habitat restoration plan will remove non-native invasive vegetation, excavate flood compensation areas with various hydrologic regimes that will occasionally be hydrologically connected to the Skookumchuck River, and replant the entire shoreline and buffer areas with primarily native woody species which are currently lacking. The proposed habitat restoration actions will significantly improve sediment and pollutant filtration, slow surface water runoff and provide designated flood storage areas connected to the river, screen the shoreline from the proposed industrial site use, and increase habitat suitability and complexity for a wide range of urban fauna including salmonid species.

2. *Restoration and enhancement projects that include shoreline modification actions or measures may be authorized if the primary purpose of such action is clearly restoration of the natural character and ecological functions of the shoreline.*

   The excavation of compensatory flood storage areas within the shoreline jurisdiction and stream buffers is the minimum necessary for the project development to ensure no net rise of floodplain elevation. As part of the habitat restoration plan, these actions along with the removal of non-native invasive vegetation, and replanting with native woody species will significantly increase ecological functions when compared to the current degraded condition of the shoreline and buffer areas. As discussed above, the overall goal of the restoration plan is to increase ecological functions within the floodplain associated with two stream systems that will benefit salmonids. See the "Habitat Restoration Plan" below for further details.

Per CSMP 6.12, the following regulations are applicable for compensatory flood storage in the shoreline jurisdiction:

1. *The amount of compensatory mitigation for lost flood water storage area required within the floodplain is determined by the following:*
   a. *Zero to five hundred cubic yards of fill: No mitigation is required unless the project will cause adverse impacts to flood levels, as determined by the Shoreline Administrator.*

b. *More than five hundred cubic yards of fill: Mitigation is required which is a zero- rise or a minimum of a one-to-one ratio which means new excavated storage volume shall be equivalent to the flood storage capacity eliminated by filling or grading. "Equivalent" shall mean that the storage removed shall be replaced by equal live storage volume.*

The proposed project requires approximately 151,000 cubic yards of fill within the 100-year floodplain areas located outside of the shoreline jurisdiction. As such, approximately 151,000 cubic yards will be excavated from the shoreline and stream buffer areas onsite to mitigate for the loss of flood storage at a 1:1 ratio and ensure zero rise.

2. *The compensatory mitigation area shall meet the mitigation sequence requirements of section 5.4, and the fill, grading and excavation requirements of section 6.8.*

The mitigation sequencing requirements of CSMP 5.4.B(4) are demonstrated in the "Mitigation Sequencing" section below. The grading and excavation requirements of CSMP 6.8 is demonstrated above.

3. *Documentation by a qualified professional shall indicate, to the satisfaction of the Administrator and all other applicable agencies with jurisdiction, that zero- rise and no net loss of ecological functions are achieved. Documentation may include hydraulic, hydrological, geomorphological and/or other analyses.*

A no net rise analysis has been prepared under separate cover by the Project Engineer. The documentation provided herein is intended to demonstrate no net loss of ecological functions achieved by the proposed project. The large area of shoreline onsite is currently in active agricultural management, contains non-native invasive species, and lacks hydrologic connection to the Skookumchuck River other than being situated adjacent to the river. Therefore, in its existing condition, the shoreline area and floodplain do not provide a high level of function. The proposed habitat restoration plan will remove non-native invasive vegetation, excavate flood compensation areas with various hydrologic regimes that will occasionally be hydrologically connected to the Skookumchuck River, and replant the entire shoreline and buffer areas with primarily native woody species which are currently lacking. The proposed habitat restoration actions will significantly improve sediment and pollutant filtration, slow surface water runoff and provide designated flood storage areas connected to the river, screen the shoreline from the proposed industrial site use, and increase habitat suitability and complexity for a wide range of urban fauna including salmonid species. Therefore, it is anticipated that the proposed project will increase ecological functions onsite and within the Chehalis River basin.

4. *Mitigation storage may be located off site but must be located within the city of Centralia jurisdictional boundaries unless the director approves other alternatives if it is within the same drainage area.*

All compensatory flood storage areas are proposed onsite via four stormwater detention ponds outside of the shoreline jurisdiction and excavated flood storage areas within the shoreline jurisdiction.

5. *All mitigation storage areas must be documented by a legally binding contract that maintains the storage in perpetuity, or until such time as the official shoreline map is amended and compensatory mitigation is no longer required. This document must be recorded with the Lewis County Assessor's Office.*

The compensatory flood storage areas will be documented and placed in a separate tract or easement to be maintained in perpetuity. The tract or easement will be recorded with the Lewis County Assessor's office.

Critical Area Considerations

*Local 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.

Centralia Municipal Code (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.

*Allowed Uses*

The proposed project requires clearing and grading activities in the buffer areas associated with the Skookumchuck River to support the excavation of compensatory flood storage areas required to meet the floodplain development standards. Per CMC 16.20.100.A, when clearing and grading is permitted as part of an authorized use or activity, the following standards apply:

1. *Grading is allowed only during the dry season, which is typically regarded as beginning on May 1st and ending on October 31st of each year. This period may be extended or shortened by community development on a case-by case basis, determined by weather conditions, soil types and topography.*

   Compensatory flood storage areas will be excavated and graded during the dry season.

2. *Filling or modification of a wetland or wetland buffer is permitted only if it is conducted as part of an approved wetland alteration.*

   No filling or modification of a wetland or wetland buffer is proposed.

3. *The soil duff layer shall remain undisturbed to the maximum extent possible. Where feasible, any soil disturbed shall be redistributed to other areas of the project area.*

   Soils within the buffer of the Skookumchuck River and Coffee Creek will be excavated to a depth necessary to provide compensatory flood storage required to meet the floodplain development standards of CMC 16.21.170. Following excavation, topsoil will be installed if needed to allow for the successful establishment of habitat restoration plantings.

4. *The moisture holding capacity of the topsoil layer shall be maintained by minimizing soil compaction or reestablishing natural soil structure and infiltrative capacity on all areas of the project area not covered by impervious surfaces.*

   Soil compaction will be minimized to the greatest extent feasible through the implementation of BMPs specified by the Project Engineer under separate cover. In addition, following excavation and grading within the stream buffer areas onsite, a layer of native topsoil will be placed if applicable to ensure the success of native plantings to be installed as part of the proposed habitat restoration activities. The installation of topsoil if needed will also re-establish natural soil structure and infiltrative capacity within the compensatory flood storage areas. No impervious surfaces are proposed within the onsite stream buffer areas.

5. *Erosion and sediment control that meets or exceeds the standards set forth in the Stormwater Manual for Western Washington as adopted by Centralia as it exists now or hereafter amended shall be provided.*

   BMPs and TESC measures that meet the standards set forth in the Stormwater Manual for Western Washington will be implemented for the duration of excavation activities within the stream buffers to minimize impacts from erosion and sedimentation. Further details are provided Project Engineer under separate cover.

*Habitat Management Plan*

The proposed project requires development within the FEMA 100-year floodplain and excavation activities within the buffers of the Skookumchuck River and Coffee Creek for compensatory flood storage. The Skookumchuck River and Coffee Creek are both considered fish and wildlife habitat areas based on the criteria under CMC 16.20.030. Per CMC 16.30.050.A, proposals within 200 feet of or requiring impacts to fish and wildlife habitat areas shall submit a Habitat Management Plan (HMP). Per CMC 16.30.050.C, a HMP shall include an assessment of habitats including the following at a minimum:

1. *Detailed description of vegetation on and adjacent to the project area.*

   As documented in the *Wetland and Fish and Wildlife Habitat Assessment – Skookumchuck Commerce Center* (SVC, 2023), vegetation is variable 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, perennial ryegrass, and non-native invasive Himalayan blackberry, reed canarygrass, and teasel 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, and tall fescue. 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. A few Oregon ash were also observed in small forested patches on the eastern and southern boundaries of the subject property.

2. *Identification of any species of local importance, priority species, or endangered, threatened, sensitive or candidate species that have a primary association with habitat on or adjacent to the project area, and assessment of potential project impacts to the use of the site by the species.*

WDFW identifies the following habitats on or within 200 feet of the subject property: Coffee Creek and the Skookumchuck River on the eastern and southern property boundaries, respectively, and Oregon white oak woodlands offsite, adjacent to the western and southern property boundaries. WDFW also identifies the following priority species on or within 200 feet of the subject property: Chinook and coho salmon and steelhead, rainbow, and cutthroat trout documented or presumed in Coffee Creek and/or the Skookumchuck River. In addition, the occurrence of big brown bat is documented in the same township as the project area, although not necessarily onsite, and the USFWS IPaC mapping database identifies marbled murrelet, streaked horned lark, yellow-billed cuckoo, bull trout, and Taylor's checkerspot as having the potential to occur in on/within 200 feet of the project area.

The subject property is approximately 56.29 acres in size, is located over 20 miles from marine waters, and is degraded by past agricultural activities, earthwork, and other anthropogenic disturbances. A majority of the subject property consists of maintained agricultural fields, although riparian habitat areas with trees and shrubs are present offsite and minimally along the eastern and southern property boundaries. These riparian habitat areas are also degraded due to the dominance of non-native invasive Himalayan blackberry and reed canarygrass.

The identified salmonids may be present in Coffee Creek and the Skookumchuck River; however, no work is proposed below the OHW of the identified streams. The excavation of compensatory flood storage areas in the adjacent shoreline and stream buffer areas will occur during the dry season and with the implementation of BMPs and TESC measures to minimize impacts during excavation and prevent erosion and sediment inputs from reaching the streams. In addition, following excavation, the disturbed areas will be planted with native trees, shrubs, and groundcover. These plantings will improve habitat by providing overhanging vegetation, improve water quality by providing increased shading along the stream channels and increased plant structure to filter pollutants and sediments, and improve screening between the stream channels and the proposed industrial development. As such, the proposed project is not anticipated to adversely affect these species.

Due to the offsite location of the Oregon white oak woodlands identified by WDFW, no adverse impacts to these areas or associated species are anticipated/proposed.

Big brown bats are known to roost communally in trees, buildings, bridges, and other structures. Preferred roosting habitat typically consists of trees with a diameter at breast height (DBH) of 50 centimeters or more, height of 18 meters or taller, and evidence of decay (Hayes and Wiles, 2013). The subject property consists predominantly of field areas previously maintained for agriculture. A majority of the habitat for big brown back is located offsite or on the eastern and southern property boundaries. If big brown bats are present during construction activities, they would avoid the project area and remain in the forested areas offsite. As such, the proposed project is not anticipated to adversely affect Big brown bats.

The Cornell Lab or Ornithology Species Map does not identify any documented sightings of marbled murrelet, streaked horned lark, or yellow-billed cuckoo on or within 200 feet of the subject property. In addition, no habitat for these species is present on or near the subject

property. Marbled murrelet are year-round residents on coastal waters and require tree stands 5 acres or more in size composed of 50 percent or more conifer cover (WSDOT, 2014). Yellow-billed cuckoo habitat consists of low to mid-level riparian forests; suitable habitat is 100 to 198 acres in size and wider than 200 meters, marginal habitat is 20 to 100 acres and 100 to 200 meters wide, and unsuitable habitat is smaller than 37 acres and less than 100 meters wide (Wiles and Kalasz, 2017). Streaked horned lark are found primarily in prairies or unvegetated to sparsely vegetated open habitats 300 acres or greater in size (USFWS, 2013). The subject property does not contain the necessary suitable habitat. As such, these species are not anticipated to occur on or adjacent to the proposed project.

WDFW does not identify documented or presumed presence of bull trout in Coffee Creek or the Skookumchuck River. Bull trout have the most specific habitat requirements of salmonids. They require cold water temperatures, clean stream substrates for spawning and rearing, complex habitats including streams with riffles and deep pools, undercut banks and large logs, and they also rely on river, lake, and ocean habitats that connect to headwater streams for annual spawning and feeding migrations (Shellberg, 2002). As the riparian areas in the vicinity of the project area are largely degraded by surrounding development, bull trout are not likely to be present on or adjacent to the proposed project; nonetheless, the proposed project activities will be located entirely landward of the OHW of the identified streams and will provide a net lift in adjacent shoreline and stream buffer functions. As such, the proposed project is not anticipated to adversely affect bull trout.

Taylor's checkerspot is found primarily in open prairie and grass/oak woodland habitat (Potter, 2016). In Washington, there are seven populations remaining and are primarily found on coastal bluffs and estuarine grasslands along the Straight of Juan de Fuca and in post-glacial, gravelly outwash prairies in Thurston, Mason, Pierce and Lewis counties. Females lays eggs in April and May, depositing up to 1,200 eggs on the undersides of host plants, which can include members of the figwort or snapdragon family, harsh paintbrush, marsh speedwell, American brooklime, native seashore plantain, goose tongue as well as golden paintbrush and non-native species such as ribwort plantain and thyme-leaved speedwell (WDFW, 2013). The subject property and surrounding areas are largely degraded due to the extent of development. The subject property itself is a large, maintained agricultural field that lacks suitable host plants for Taylor's checkerspot. As such, Taylor's checkerspot are not anticipated to be present on or in the vicinity of the proposed project.

Steelhead need productive, well-oxygenated streams for spawning that have riffles, pools, overhanging vegetation, boulders and gravel to lay their eggs. They prefer fast water in small-to-large mainstem rivers, and medium-to-large tributaries. Steelhead are sensitive to sedimentation and channel scouring. Steelhead presence is documented in the Skookumchuck River and Coffee Creek. The Skookumchuck River contains mostly silty substrate with some areas of gravel and has minimal functional, vegetated buffer onsite for shading and organic inputs. Coffee Creek has similar habitat conditions. Therefore, minimal habitat for this species is present.

In freshwater, spawning chinook require deep, coarse gravel with adequate irrigation to build their redds. Water temperatures must not exceed 14 degrees Celsius and as chinook are larger salmon, they are able to spawn in faster flowing rivers compared to other species. Chinook will spawn in a variety of habitats from small, shallow tributaries to the main stem of a large river. Chinook presence is documented in the Skookumchuck River. The Skookumchuck

River contains mostly silty substrate with some areas of gravel and has minimal functional, vegetated buffer onsite for shading and organic inputs. Therefore, minimal habitat for this species is present.

3. *A discussion of any federal, state, or local special management recommendations, including Department of Fish and Wildlife habitat management recommendations, that have been developed for species or habitats located on or adjacent to the project area;*

   WDFW management recommendations for salmonid species documented in Coffee Creek and the Skookumchuck River generally consist of maintaining riparian vegetation through the establishment of a protective buffer in order to control stream temperatures, provide cover, and protect against lateral erosion (WDFW, 1991). WDFW identifies similar management recommendations for riparian habitats, with the goal of maintaining or enhancing the structural and functional integrity of riparian habitat and associated aquatic systems needed to perpetually support fish and wildlife populations on both site and landscape levels (WDFW, 1997). The proposed habitat restoration activities within the shoreline and stream buffer areas associated with the Skookumchuck River and Coffee Creek are consistent with these management recommendations as they have been designed to provide a net lift in riparian functions onsite and in the greater Upper Chehalis watershed.

   Big brown bats are not anticipated to be present in the project area; however, may be present in offsite forested areas. WDFW's *Living with Wildlife – Bats* document (WDFW, 2005) recommends excluding bats by closing off access to homes and buildings during their hibernation period (from mid-October to mid-March), creating an undesirable atmosphere with noise and light, or installing exclusion devices. If bats are present in onsite structures prior to construction, these measures will be implemented; however, this is not anticipated to be necessary as any bats are anticipated to be present outside of the project area.

   WDFW's management recommendations for Oregon white oak woodlands largely focus on maintaining and protecting Oregon white oak habitat (WDFW, 1998). As the identified Oregon white oak trees are located entirely offsite, they will not be impacted by the proposed project activities consistent with these recommendations.

4. *A discussion of the project's effects on fish and wildlife habitat;*

   All industrial development activities are located outside of the shoreline and stream buffer areas onsite. Activities within these areas are limited to the excavation of compensatory flood storage areas which will occur entirely landward of the OHW of the Skookumchuck River and Coffee Creek. As mentioned above, existing habitat within these areas is degraded due to the presence of maintained agricultural fields and non-native invasive species; therefore, there will be limited functional habitat removal. In addition, following excavation, disturbed areas will be restored with a diverse assortment of native trees, shrubs, and groundcover. The proposed restoration activities will improve fish and wildlife habitat by increasing plant diversity, providing stream shading along the banks of the Skookumchuck River and Coffee Creek, and improving screening between the identified streams and the proposed development.

5. *A discussion of measures, including avoidance, minimization and mitigation, proposed to preserve existing habitats;*

   See the "Mitigation Sequencing" section below.

6. *A discussion of proposed measures which mitigate the impacts of the project;*

   See the "Habitat Restoration Plan" section below. In general, shoreline and stream buffer areas be fully restored through the creation of flood compensation areas with varying hydrologic regimes and replanting with native trees, shrubs, and groundcover which will provide a net lift in shoreline and stream buffer functions when compared to the existing degraded areas present onsite.

7. *An evaluation of the effectiveness of the proposed mitigation measures;*

   See the "Habitat Restoration Plan" section below. The proposed restoration actions are anticipated to result in a net increase in ecological functions onsite and within the greater watershed when compared to the existing degraded condition of the shoreline and buffer areas.

8. *A discussion of ongoing management practices that will protect habitat after the project site has been developed, including proposed monitoring and maintenance programs; and*

   Habitat restoration actions will be maintained and the site will be kept free of non-native invasive species, trash, and debris. A Maintenance and Monitoring Plan will be implemented for a period of 5 years to meet specific performance standards to ensure the success of the proposed habitat restoration actions. See the "Habitat Management Plan" section below for further details.

9. *Any additional information necessary to determine the impacts of a proposal and mitigation of the impacts.*

   Additional details are provided in the "Habitat Management Plan" section below.

Mitigation Sequencing

The proposed project requires fill of FEMA 100-year floodplain areas onsite that will require excavation of compensatory flood storage areas in the shoreline area as part of the habitat restoration plan. Per CSMP 5.4.B(4) and CMC 16.30.050.C.5, impacts to the shoreline, critical areas, and associated buffer areas should be mitigated in the following sequence:

a. *Avoid the impact completely by redesigning, restructuring and/or relocating the development components.*

   The Applicant proposes industrial development of the subject property consisting of two warehouses: Building A (approximately 483,276 square feet in size) and Building B (approximately 295,356 square feet in size) and associated site access, parking, truck loading and turnaround, stormwater facilities, utilities, and associated infrastructure. Stormwater infrastructure will consist of four interconnected stormwater ponds that will discharge treated stormwater at two points landward of the 200-foot shoreline management area with flow paths to both the Skookumchuck River and Coffee Creek. The proposed project has been carefully designed to avoid direct impacts to all identified critical areas, and all site development will be

located outside of the 200-foot shoreline management area. However, the entire subject property is located within the FEMA 100-year floodplain and will need to be cleared, graded, and raised above the current elevation to support the proposed industrial development. The excavation of compensatory flood storage areas within the shoreline jurisdiction and stream buffers is the minimum necessary for the project development to ensure no net rise of floodplain elevation. Given the large special needs for any industrial development and the entire site mapped within 100-year floodplain, no design modifications would result in less floodplain fill. The Applicant is proposing four stormwater detention ponds throughout the upland areas onsite and outside of the shoreline jurisdiction to fulfill as much of the required compensatory storage as possible. However, due to the large amount of compensatory storage needed, additional flood compensation is needed within the shoreline jurisdiction and stream buffers to meet the no net rise requirement. A total of 151,000 cubic yards of fill within the FEMA 100-year floodplain areas will be compensated by providing 151,000 cubic yards of flood storage via upland detention ponds and excavated ponds within the buffers associated with the Skookumchuck River and Coffee Creek. All excavation activities will be located landward of the ordinary high water (OHW) mark of the Skookumchuck River and Coffee Creek.

*b. Minimize the impact by limiting the magnitude of the action and its implementation by using appropriate technology and/or taking affirmative action.*

BMPs and TESC measures will be implemented for the duration of the proposed excavation and grading activities within the shoreline and stream buffer areas to minimize construction impacts to the Skookumchuck River, Coffee Creek, and the associated buffer areas. Further details are provided in the SWPPP plan prepared by the Project Engineer under separate cover.

*c. Rectify the impact by repairing, rehabilitating or restoring the impacted environment to its original state.*

The current buffers and shoreline management area are degraded and consist of maintained fields and non-native invasive Himalayan blackberry (*Rubus armeniacus*) and reed canarygrass (*Phalaris arundinacea*) and lack woody vegetation and tree cover. The proposed riparian habitat restoration actions will include excavating flood storage areas, removing non-native invasive species, providing soil amendments, and replanting with native trees, shrubs, and groundcover suitable for occasionally flooded and upland buffer areas to increase water quality, hydrologic, and habitat functions onsite. The flood compensation will ensure no net rise in floodplain elevations per CMC 16.21.170.F.1.b and CSMP 6.12.B(1)(b). Further details are provided in the "Habitat Restoration Plan" section below.

*d. Reduce or eliminate the impact over time by preservation and maintenance actions.*

For the proposed habitat restoration actions, reduction of the impact over time will be implemented through a Maintenance and Monitoring Plan that will meet specific performance standards to ensure the success of the actions. Non-native invasive species will be removed during the excavation of compensatory flood storage areas, and the shoreline and stream buffer areas onsite will be kept free of trash and debris. Additionally, the habitat restoration areas will be placed in a conservation easement or similar protective mechanism to protect and preserve the Skookumchuck River, Coffee Creek, and the associated buffer and shoreline areas in perpetuity consistent with CMC 16.20.080.A.

*e. Compensate for the impact by replacing, enhancing and/or providing substitute resources and/or environments.*

Fill activities within the 100-year floodplain areas onsite will be compensated by providing compensatory flood storage onsite at a 1:1 ratio consistent with the requirement of CMC 16.21.170.F.1.b and CSMP 6.12.B(1)(b). These actions will be part of the habitat restoration actions that will also include installation of native trees, shrubs, and groundcover which will provide a net lift in shoreline and stream buffer functions when compared to the existing degraded conditions.

*f. Monitor the impact and compensation projects and take appropriate corrective measures as required.*

The Applicant is committed to compliance with the Habitat Restoration Plan provided herein and, as such, will continue to maintain the project, keeping the site free of invasive vegetation, trash, and debris. A Maintenance and Monitoring Plan will be implemented for a period of 5 years to meet specific performance standards to ensure the success of the proposed habitat restoration actions.

Abbreviated State and Federal Considerations

The Skookumchuck River, Coffee Creek, and offsite Wetland A are all likely regulated by the U.S Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act (CWA). Coffee Creek is a tributary to the Skookumchuck River onsite, and the Skookumchuck River is a tributary to the Chehalis River, a traditional navigable water. Wetland A is likely regulated due to its proximity to the Skookumchuck River.

The identified waters above are considered natural surface waters and also subject to regulation by the Washington State Department of Ecology (WSDOE) through the Revised Code of Washington (RCW) 90.48.

No in-water work or wetland fill is proposed. As such, no formal permitting through the USACE or WSDOE is anticipated.

## Habitat Restoration Plan

This section discuss the habitat restoration actions proposed within the shoreline and stream buffer areas associated with the Skookumchuck River and Coffee Creek onsite within the Urban Conservancy Shoreline Environment.

Description of Project Elements

The Applicant proposes industrial development of the subject property consisting of two warehouses: Building A (approximately 483,276 square feet in size) and Building B (approximately 295,356 square feet in size) and associated site access, parking, truck loading and turnaround, stormwater facilities, utilities, and associated infrastructure. Stormwater infrastructure will consist of four interconnected stormwater ponds that will discharge treated stormwater at two points landward of the 200-foot shoreline management area with flow paths to both the Skookumchuck River and Coffee Creek. The proposed project has been carefully designed to avoid direct impacts to all identified critical areas, and all site development will be located outside of the 200-foot shoreline management area. However, the entire subject property is located within the FEMA 100-year floodplain and will need to be cleared, graded, and raised above the current elevation to support the proposed industrial development. As

such, compensatory flood storage is required to meet the general standards for floodplain development under CMC 16.21.170. A total of 151,000 cubic yards of fill within the FEMA 100-year floodplain areas will be compensated by providing 151,000 cubic yards of flood storage via excavated ponds within the buffers associated with the Skookumchuck River and Coffee Creek. All excavation activities will be located landward of the ordinary high water (OHW) mark of the Skookumchuck River and Coffee Creek. All appropriate BMPs and TESC measures will be implemented for the duration of project activities to minimize potential construction impacts to the identified streams.

Habitat Restoration Plan

The current buffers and shoreline management area are degraded and consist of maintained fields and non-native invasive Himalayan blackberry (*Rubus armeniacus*) and reed canarygrass (*Phalaris arundinacea*) and lack woody vegetation and tree cover. The proposed riparian habitat restoration actions will include excavating flood storage areas, removing non-native invasive species, providing soil amendments, and replanting with native trees, shrubs, and groundcover suitable for occasionally flooded and upland buffer areas to increase water quality, hydrologic, and habitat functions onsite. The flood compensation will ensure no net rise in floodplain elevations per CMC 16.21.170.F.1.b and CSMP 6.12.B(1)(b).

Areas within the onsite buffers will be graded to provide a large shallow depression that will store occasional floodwaters and can accommodate up to the 100-year modeled flood event. The shallow depression will have a low topographic point (i.e. outlet) that will allow the occasional floodwaters to recede. As such, the flood compensation area will not hold water for long durations. Rather, the flood compensation areas will be replanted with primarily facultative (FAC) to facultative-wetland (FACW) native vegetation – species that can withstand short periods of inundation and would otherwise likely survive in drier conditions adjacent to the stream and provide terrestrial habitat and screening. The general upland buffer areas will be planted with FAC to facultative-upland (FACU) plant species more suitable to drier areas. As such, the restored buffer areas will function as standard buffers and occasionally as flood compensation areas. Flood models will be provided by the Project Engineer to determine anticipated frequency and duration of flooding within the flood compensation areas, if needed.

The establishment of dense assortment of native trees, shrubs, and groundcover will provide screening between the Skookumchuck River, Coffee Creek, and the proposed industrial development, and will improve habitat conditions onsite by providing a vertically and horizontally diverse native plant community and shading along the identified stream channels. In addition, the plantings will improve water quality and hydrologic functions onsite by providing increased plant structure to filter pollutants, stabilize soils, and slow and attenuate flooding. The transition of upland and occasionally flooded areas within the buffers will significantly increase habitat interspersion and complexity, providing a functional riparian corridor beneficial to common urban fauna. Overall, these habitat restoration actions are anticipated to provide a net lift in shoreline and stream buffer functions onsite and result in no net rise within the 100-year floodplain.

The habitat restoration and general project minimization actions include the following:

- Clear and grade the shoreline and buffer to create the appropriate flood compensation and upland buffer areas.
- Install a layer of native topsoil within the habitat restoration area to ensure successful plant establishment.

- An approved native seed mix will be used to seed the disturbed areas after the excavation of compensatory flood storage areas to reduce short-term erosion potential.
- Replant all buffer enhancement areas with native trees, shrubs, and/or groundcovers listed in Appendix A, or substitutes approved by the responsible Project Biologist, to help retain soils, filter stormwater, and increase biodiversity.
- Maintain and control invasive plants annually, at a minimum, or more frequently if necessary. Maintenance to reduce the growth and spread of invasive plants is not restricted to chemical applications but may include hand removal, if warranted.
- Provide dry-season irrigation as necessary to ensure native plant survival.
- Install critical area fencing along the outer boundary of the shoreline and stream buffer areas facing the proposed development.
- Direct exterior lights away from the shoreline and stream buffer areas wherever possible; and
- Place all activities that generate excessive noise (e.g., generators and air conditioning equipment) away from the shoreline and stream buffer areas where feasible.

Restoration Implementation

The onsite habitat restoration actions will occur concurrently with the development of the project. A pre-construction meeting should occur between the Applicant, general contractor, and the Project Biologist to discuss the project and limitations specifically related to protection of critical areas and implementation of mitigation actions.

Equipment used will be typical for land clearing, grading, and excavation activities and will be kept in good working conditions and free of leaks. Equipment to be used will likely include excavators, backhoes, bulldozers, dump trucks, graders, et cetera. All equipment staging and materials stockpiles for the proposed development will be kept out of streams and regulated shoreline and stream buffer areas, and the area will be kept free of spills and/or hazardous materials. Equipment and materials necessary to excavate compensatory flood storage areas and perform habitat restoration actions may be allowed within buffers.

All appropriate BMPs and TESC measures, including dedicated construction entrance(s), silt fencing, and brush barriers, will be installed prior to and maintained throughout construction in order to minimize potential temporary impacts to the onsite streams and associate shoreline and buffer areas.

The recommended project sequencing is as follows:

- Pre-construction conferences and regulatory notifications;
- Install TESC measures;
- Excavate compensatory flood storage areas;
- Prepare grounds for planting by installing native topsoils within the habitat restoration area;
- Seed entire restoration area;
- Plant inspections;
- Install plant materials;
- Post-construction inspection and as-built survey; and
- Post-construction maintenance, monitoring, and annual reporting.

Performance Standards

The overarching goals for the habitat restoration actions are to improve shoreline and stream buffer functions and increase screening between the proposed development and identified streams by

removing non-native invasive species and establishing native riparian forest habitat onsite. Non-native invasive species present within the shoreline and stream buffer areas will be removed during the excavation of areas for compensatory flood storage, and disturbed areas will be planted with a dense suite of native trees, shrubs, and groundcover. These actions will improve water quality, hydrologic, and habitat functions onsite when compared to the existing conditions which consist primarily of maintained agricultural fields encumbered by non-native invasive species.

**Goal 1** – Restore and improve habitat functions within the shoreline and stream buffer areas associated with the Skookumchuck River and Coffee Creek onsite.

*Objective 1.1* – Establish a forested and shrub riparian plant community within the shoreline and stream buffer areas onsite by planting a dense suite of native trees, shrubs, and groundcover.

**Performance Standard 1.1.1** – Minimum plant survivorship within the habitat restoration area will be 80 percent of installed trees and shrubs at the end of Year 1.

**Performance Standard 1.1.2** – Native plant species (including existing vegetation, planted trees/shrubs, and volunteer species) will cover at least 20 percent of the habitat restoration area at the end of Year 2, 30 percent at the end of Year 3, 50 percent by the end of Year 4, and 60 percent at the end of Year 5.

**Performance Standard 1.1.3** – At least 5 native shrub and/or tree species will be present in the habitat restoration area in all monitoring years, including volunteer species.

*Objective 2* – Effectively control and/or eliminate non-native invasive species from the habitat restoration area.

**Performance Standard 4.2.1** – Non-native invasive plants will not make up more than 15 percent total cover in any growing season during the monitoring period following Year 1. Any state-listed noxious weeds and other non-native invasive species including Himalayan blackberry and reed canarygrass observed at any time during construction, monitoring and maintenance activities within the habitat restoration area will be marked for immediate treatment and/or removal.

Mitigation Specifications

The following specifications are established as a set of minimum standards for proper implementation of the proposed habitat restoration actions. Additional actions, modifications, and/or substitutions may be approved in advance by the responsible Project Biologist.

*Plant Scheduling, Species, Density, and Location*

All planting should occur between September 1 and May 1 to ensure plants do not dry out after installation, or temporary irrigation measures may be necessary. All planting will be installed per the procedures detailed in the following subsections using the species and densities outlined in Attachment A of this Technical Memorandum.

Shoreline and buffer areas associated with the Skookumchuck River and Coffee Creek shall be replanted with the native species listed in Attachment A in addition to a native grass seed mix,

following the excavation of compensatory flood storage areas and removal of invasive species. The proposed planting plan will result in an improvement in existing onsite shoreline and stream buffer conditions and restore habitat functions to the extent possible.

*Plant Materials*

All plant materials to be used on the site will be nursery grown stock from a reputable, local source. Only native species are to be used; no hybrids or cultivars will be allowed. Plant material provided will be typical of their species or variety; if not cuttings, they will exhibit normal, densely developed branches and vigorous, fibrous root systems. Plants will be sound, healthy, vigorous plants free from defects and all forms of disease and infestation.

Any container stock provided in-lieu of specified bare root stock shall have been grown in its delivery container for not less than six months but not more than two years. Plants shall not exhibit rootbound conditions. Under no circumstances shall container stock be handled by their trunks, stems, or tops. Seed mixture used for hand shall contain fresh, clean, and new crop seed mixed by an approved method.

All plant material shall be inspected upon delivery. Plant material not conforming to the specifications above will be rejected and replaced. Rejected plant materials shall be immediately removed from the site.

Fertilizer will be in the form of Agraform plant tabs or an approved like form. Mulch will consist of sterile wheat straw or clean recycled wood chips approximately 1/2 inch to 1 inch in size and 1/2 inch thick. If free of invasive plant species, the mulch material may be sourced from woody materials salvaged from the land clearing activities for the proposed residence.

*Quality Control for Planting Plan*

All plant material shall be inspected by the Project Biologist upon delivery. Plant material not conforming to the specifications above will be rejected and replaced by the planting contractor. Rejected plant materials shall be immediately removed from the site. Under no circumstances shall container stock be handled by their trunks, stems, or tops.

The landscape contractor shall provide the Project Biologist with documentation of plant material that includes the supplying nursery contact information, plant species, plant quantities, and plant sizes.

*Product Handling, Delivery, and Storage*

All seed and fertilizer should be delivered in original, unopened, and undamaged containers showing weight, analysis, and name of manufacturer. This material should be stored in a manner to prevent wetting and deterioration. All precautions customary in good trade practice shall be taken in preparing plants for moving. Workmanship that fails to meet industry standards will be rejected. Plants will be packed, transported, and handled with care to ensure protection against injury and from drying out. If plants cannot be planted immediately upon delivery they should be protected with soil, wet peat, or moss. Plants, fertilizer, and mulch not installed immediately upon delivery shall be secured on the site to prevent theft or tampering. No plant shall be bound with rope or wire in a manner that could damage or break the branches. Plants transported on open vehicles should be secured with a protective covering to prevent windburn.

*Preparation and Installation of Plant Materials*

The Applicant or the landscape contractor will verify the location of all elements of the planting plan, prior to installation. The Applicant or landscape contractor may adjust the locations of landscape elements during the installation period as appropriate. If obstructions are encountered that are not shown on the drawings, planting operations will cease until alternate plant locations have been selected by and/or approved by the Project Scientist.

Prior to plant installation, native topsoil will be installed within the areas excavated for compensatory flood storage to provide suitable substrate for native plant establishment.

Circular plant pits with vertical sides will be excavated for all stock with roots. The pits should be at least twelve (12) inches in diameter, and the depth of the pit should accommodate the entire root system. The bottom of each pit will be scarified to a depth of four (4) inches.

Broken roots should be pruned with a sharp instrument and rootballs should be thoroughly soaked prior to installation. Set plant material upright in the planting pit to proper grade and alignment. Water plants thoroughly midway through backfilling and add Agraform tablets. Water pits again upon completion of backfilling. No filling should occur around trunks or stems. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water, and install a four- to six-inch layer of mulch around the base of each container plant.

*Optional Temporary Irrigation Specifications*

While the native species selected for habitat restoration are hardy and typically thrive in northwest conditions, and the proposed mitigation actions are planned in areas with sufficient hydroperiods for the species selected, some individual plants might perish due to dry conditions. Therefore, irrigation or regular watering may be provided as necessary for the duration of the first two growing seasons while the native plantings become established.

*Invasive Plant Control and Removal*

Invasive species to be controlled include reed canarygrass, Himalayan blackberry, and all listed noxious weeds. These species can also be found nearby; therefore, to ensure these species do not expand following the mitigation actions, invasive shrubs within the mitigation area should be pretreated with a root-killing herbicide approved for use in aquatic sites (i.e. Rodeo) a minimum of two weeks prior to being cleared and removed from the targeted buffer enhancement areas. Treated invasive plant material may be left on steep hillsides or cut flush with the ground surface at the discretion of the Project Biologist. The pre-treatment with herbicide should occur prior to all planned mitigation actions, and spot treatment of any surviving other invasive vegetation should be performed again each fall prior to leaf senescence for a minimum of three years.

<u>Maintenance and Monitoring Plan</u>

Maintenance and Monitoring Plans are described below in accordance with CMC 16.20.050.C.8 and CSMP 5.4.B(4)(f). The Applicant is committed to compliance with the enhancement plan and overall success of the project. As such, the Applicant will continue to maintain the project, keeping the site free from non-native invasive vegetation, trash, and waste.

The habitat restoration plan will require continued monitoring and maintenance to ensure the actions are successful. Therefore, the project site will be monitored for a period of five years with formal inspections by a qualified Project Scientist. Monitoring events will be scheduled at the time of construction, 30 days after planting, early in the growing season and the end of the growing season for Year 1, twice during Year 2, and annually in Years 3, 4, and 5. Closeout assessment will also be conducted in Year 5 to ensure the enhancement area was established.

Monitoring will consist of percent cover measurements at permanent monitoring stations, walk-through surveys to identify invasive species presence and dead or dying enhancement plantings, photographs taken at fixed photo points, wildlife observations, and general qualitative habitat, shoreline, and stream buffer function observations.

To determine percent cover, observed vegetation will be identified and recorded by species and an estimate of areal cover of dominant species within each sampling plots. Circular sample plots, approximately 30 feet in diameter (706 square feet), are centered at each monitoring station. The sample plots encompass the specified wetland areas and terminate at the observed wetland boundary. Trees and shrubs within each 30-foot diameter monitoring plot are then recorded to species and areal cover. Herbaceous vegetation is sampled from a 10-foot diameter (78.5 square feet) within each monitoring plot, established at the same location as the center of each tree and shrub sample plot. Herbaceous vegetation within each monitoring plot is then recorded to genus and includes an estimate of percent areal cover. A list of observed tree, shrub, and herbaceous species including percent areal cover of each species and wetland status is included within the monitoring report.

Reporting

Following each monitoring event, a brief monitoring report detailing the current ecological status of the habitat restoration actions, measurement of performance standards, and management recommendations will be prepared and submitted to the City within 90 days of each monitoring event to ensure full compliance with the restoration plan.

Contingency Plan

If monitoring results indicate that performance standards are not being met, it may be necessary to implement all or part of the contingency plan. Careful attention to maintenance is essential in ensuring that problems do not arise. Should any portion of the site fail to meet the success criteria, a contingency plan will be developed and implemented with City approval. Such plans are adaptive and should be prepared on a case-by-case basis to reflect the failed enhancement characteristics. Contingency plans can include additional plant installation, erosion control, and plant substitutions including type, size, and location. The Contingency measures outlined below can also be utilized in perpetuity to maintain the shoreline and stream buffer areas associated with the proposed project site.

Contingency/maintenance activities may include, but are not limited to:

1. Using plugs instead of seed for emergent vegetation coverage where seeded material does not become well-established;
2. Replacing plants lost to vandalism, drought, or disease, as necessary;
3. Replacing any plant species with a 20 percent or greater mortality rate after 2 growing seasons with the same species or native species of similar form and function;
4. Irrigating the restoration areas only as necessary during dry weather if plants appear to be too dry, with a minimal quantity of water;

5. Reseeding and/or repair of shoreline/buffer areas as necessary if erosion or sedimentation occurs;
6. Spot treat non-native invasive plant species;
7. Removing all trash or undesirable debris from the shoreline and stream buffer areas as necessary, and
8. Removing additional shrub species or girdling additional trees to ensure better light penetration

Critical Area Protective Measures

Per CMC 16.20.080.A, stream buffers shall be established by a permanent protective easement, public or private land trust dedication, or similar protective mechanism as approved by the Director. The Skookumchuck River, Coffee Creek, and the associated shoreline and stream buffer areas will be placed in a permanent protective easement for protection in perpetuity. This easement will be shown on the face of the deed applicable to the property and recorder with the Lewis County recording department.

Performance and Monitoring Security

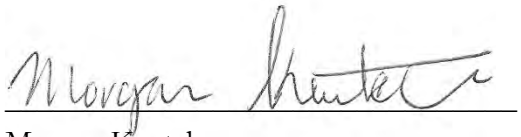
CMC 16.16.130 contains provisions and requirements for providing financial security to guarantee that projects with mitigation elements are completed in a manner that complies with the conditions of approval and that any associated monitoring requirements are followed. Prior to final inspection, a maintenance and warranty security (bond) shall be obtained in an amount equal to 150 percent of the estimated cost for mitigation and/or monitoring. A bond quantity worksheet will be provided with a Final Mitigation Plan.

If you have any further questions, please contact us at your earliest convenience.

Sincerely,

Alex Murphy
Planner and Project Manager

May 23, 2023
Date



Morgan Kentch
Environmental Scientist

May 23, 2023
Date

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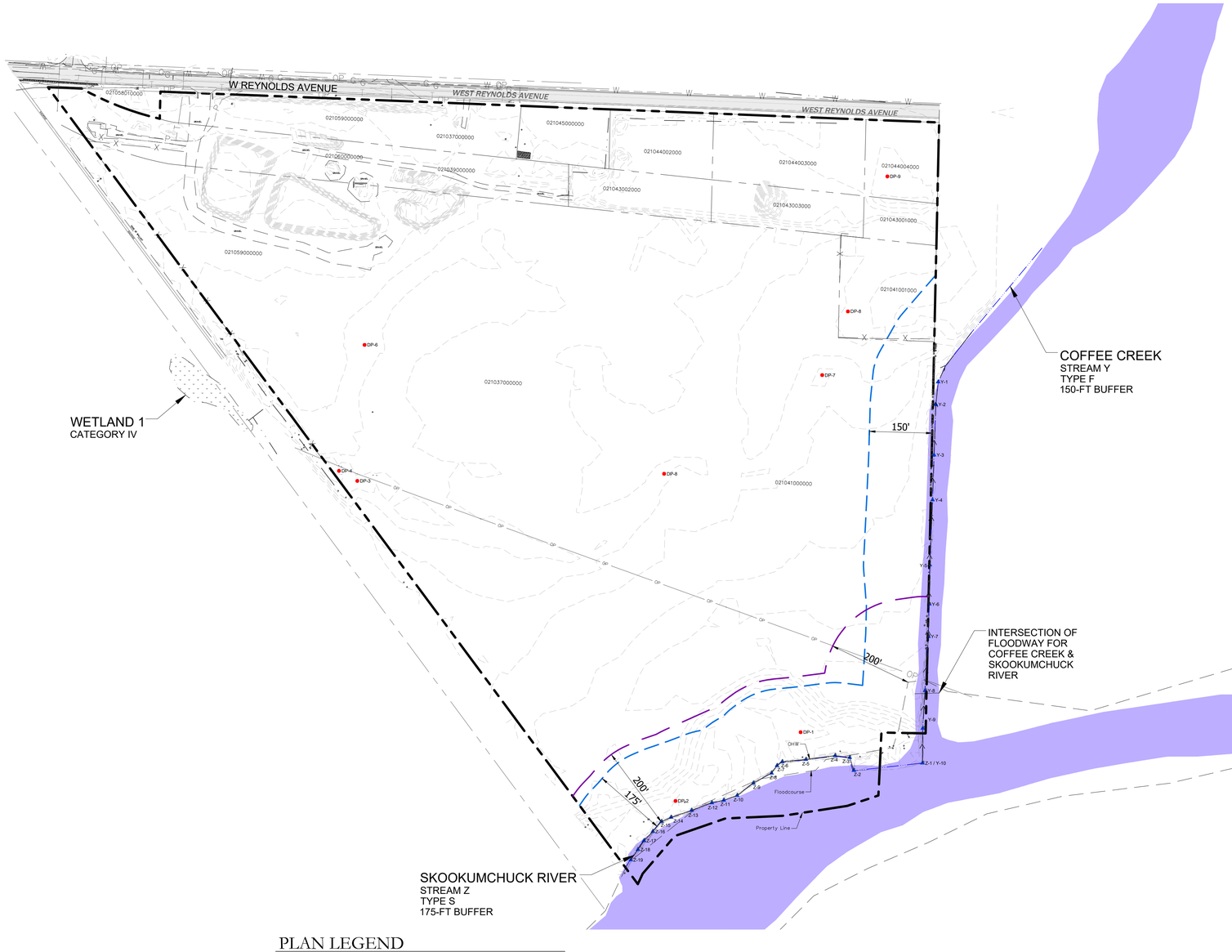
# Attachment A – Proposed Project and Habitat Restoration Plan




## 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'

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 | PROPOSED SITE PLAN, IMPACTS & MITIGATION PLANTING PLAN |
| 3 | CROSS-SECTIONS & CONCEPTUAL FLOOD STORAGE DETAIL |
| 4 | PLANT SCHEDULE, NOTES, & DETAILS |


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
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SKOOKUMCHUCK COMMERCE CENTER
1406 & 1620 W REYNOLDS AVENUE,
CENTRALIA, WA 98531

LEWIS COUNTY PARCEL NUMBER(S):
021058010000, 021059000000, 021037000000, 021045000000, 021044002000, 021044003000, 021044004000, 021043002000, 021043003000, 021043001000, 021041001000, 021041000000

DATE: 05/23/2023
JOB: 1144.0036
BY: DLS
SCALE: AS SHOWN
SHEET: 1

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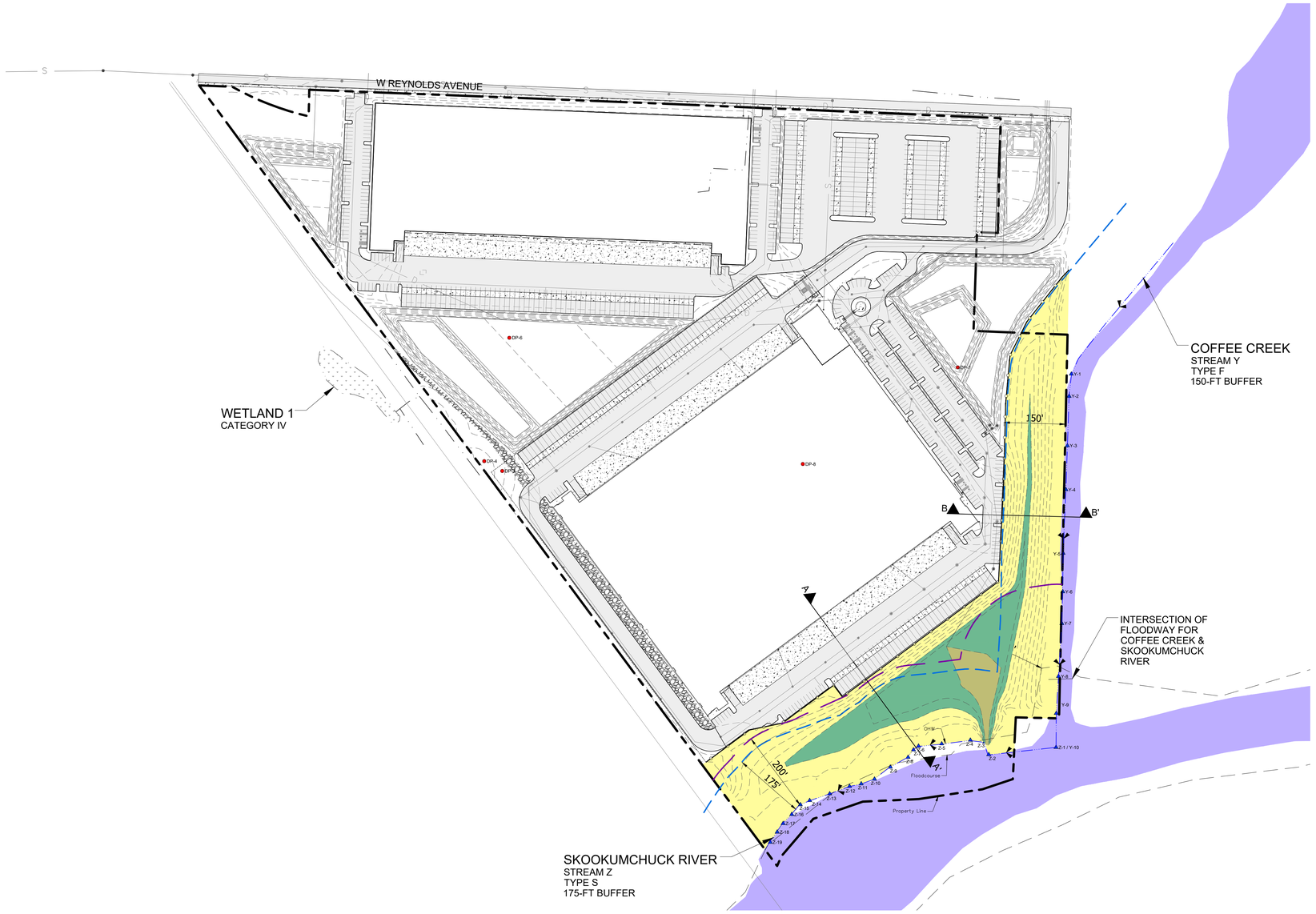
Plotted May 22, 2023

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- FLOODCOURSE
- FLOODWAY
- DITCH CENTERLINE
- CRITICAL AREA FENCING
- EXISTING CONTOUR
- CONIFEROUS - DECIDUOUS EXISTING TREES

## RESTORATION LEGEND

FLOOD STORAGE HABITAT

| | |
|---|---|
| UPPER FLOOD STORAGE AREA | 250,129 SF |
| LOWER FLOOD STORAGE AREA | 69,467 SF |
| FLOW BASIN | 12,980 SF |
| TOTAL RESTORATION: | 332,576 SF |

0 140' 280' 560'

GRAPHIC SCALE
1"=140'

PRELIMINARY INFORMATION ONLY

NOT FOR CONSTRUCTION

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LEWIS COUNTY PARCEL NUMBER(S):
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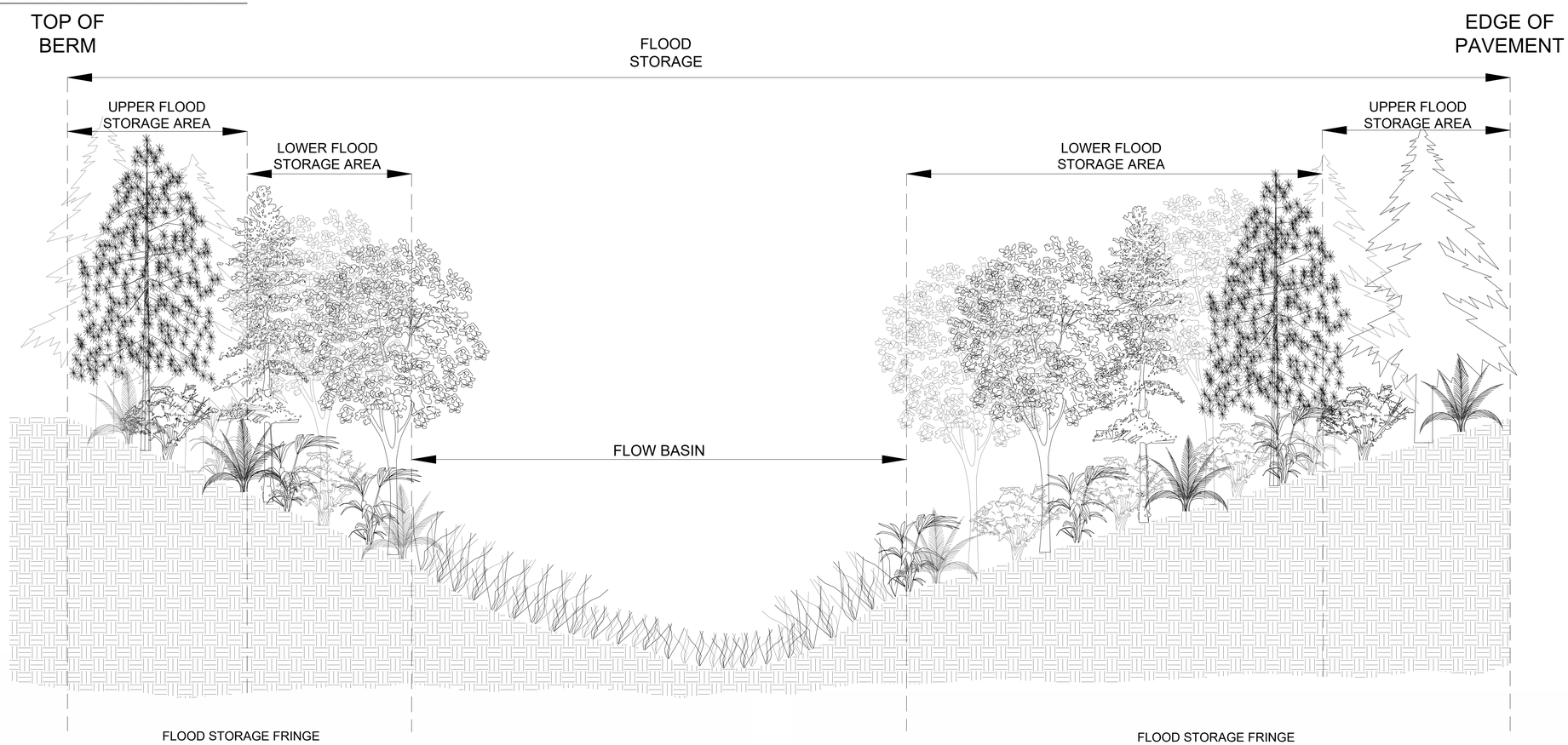
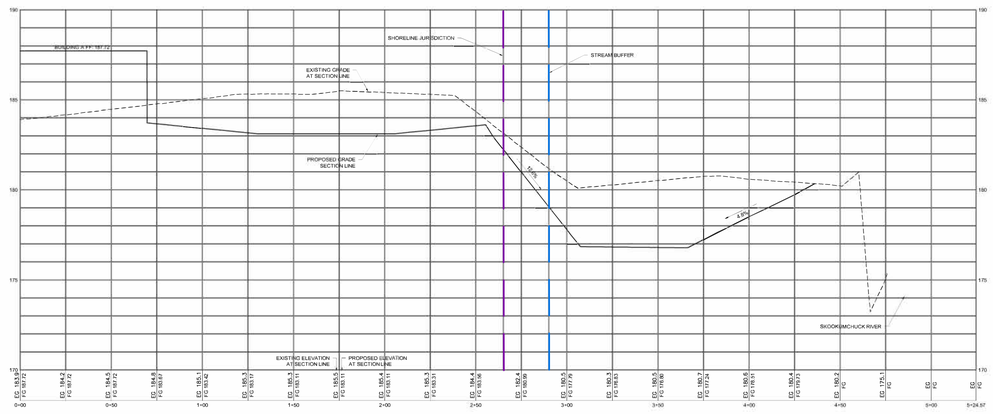
DATE: 05/23/2023
JOB: 1144.0036
BY: DLS
SCALE: AS SHOWN
SHEET: 2

S:\CURRENT\1144 Panattoni Construction\1144.0036 Skookumchuck Commerce Center\Graphics & Maps\CAD\A - CURRENT SVC DRAWINGS\A - Current Base DWGs\1144.0036 (2023-05) base.dwg
Plotted May 25, 2023

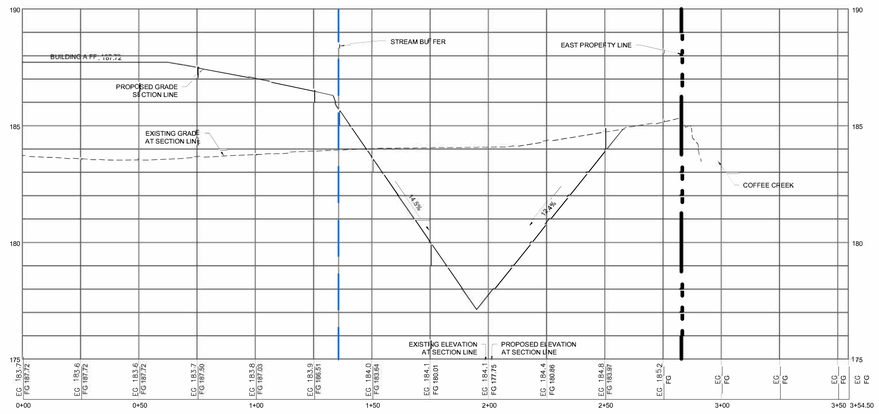
## CONCEPTUAL FLOOD STORAGE DETAIL

TYPICAL (NOT TO SCALE)




PROFILE VIEW OF HABITAT RESTORATION AREA SECTION A




PROFILE VIEW OF HABITAT RESTORATION AREA SECTION B

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

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
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):
02105801000, 02105990000, 02103700000, 02104500000,
02104400200, 02104490300, 02106000000, 02104300300,
02105990000, 02103700000, 02104100000

DATE: 05/23/2023
JOB: 1144.0036
BY: DLS
SCALE: AS SHOWN
SHEET: 3

S:\CURRENT\1144 Pataulloni Construction\1144.0036 Skookumchuck Commerce Center\Graphics & Maps\CAD\A - CURRENT SVC DRAWINGS\A - Current Base DWGs\1144.0036 (2023-05) base.dwg
Plotted May 22, 2023

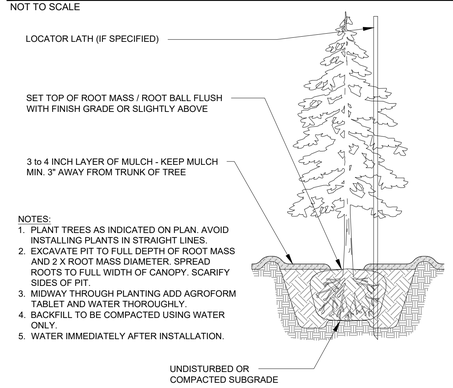
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Area (sf): | 250,129 | 69,467 | 12,980 | 332,576 | | | |
| | | | Cov'g (%): | 100 | 100 | 100 | | | | |
| | | | Trees (%): | 50 | 50 | 0 | | | | |
| | | | Shrubs (%): | 50 | 50 | 0 | | | | |
| *Scientific Name* | Common Name | WL Status | UPPER FLOOD STORAGE AREA | LOWER FLOOD STORAGE AREA | FLOW BASIN | TOTAL | Spacing (min.) | Height (min.) | Size (min.) | Planting Area |
| **TREES** | | | (Qty) | (Qty) | (Qty) | (Qty) | | | | |
| ***Alnus rubra*** | red alder | FAC | 52 | 0 | 0 | **52** | 10 ft | 3 ft | 1 gal | **Dry/Moist - on hummock** |
| ***Frangula purshiana (Rhamnus p.)*** | cascara | FAC | 104 | 0 | 0 | **104** | 10 ft | 3 ft | 1 gal | **Dry** |
| ***Fraxinus latifolia*** | Oregon ash | FACW | 0 | 31 | 0 | **31** | 12 ft | 3 ft | 2 gal | **Wet - in wetland** |
| ***Malus fusca (Pyrus f.)*** | Pacific crabapple | FACW | 0 | 22 | 0 | **22** | 10 ft | 3 ft | 2 gal | **Wet - in wetland** |
| ***Picea sitchensis*** | Sitka spruce | FAC | 312 | 44 | 0 | **356** | 10 ft | 3 ft | 2 gal | **Moist - on hummock** |
| ***Populus trichocarpa*** | black cottonwood | FAC | 0 | 22 | 0 | **22** | 10 ft | 3 ft | 1 gal | **Moist/Wet - on hummock** |
| ***Salix lasiandra*** | Pacific willow | FACW | 11 | 22 | 0 | **33** | 10 ft | 4 ft | Stakes | **Wet** |
| ***Salix scouleriana*** | Scouler's willow | FAC | 541 | 0 | 0 | **541** | 5 ft | 4 ft | Stakes | **Dry** |
| ***Salix sitchensis*** | Sitka willow | FACW | 0 | 262 | 0 | **262** | 5 ft | 4 ft | Stakes | **Moist/Wet** |
| ***Thuja plicata*** | western redcedar | FAC | 416 | 0 | 0 | **416** | 10 ft | 3 ft | 2 gal | **Moist - on hummock** |
| ***Tsuga heterophylla*** | western hemlock | FACU | 11 | 0 | 0 | **11** | 10 ft | 3 ft | 2 gal | **Moist - on hummock** |
| | | **Total:** | **1447** | **403** | **0** | **1850** | | | | |
| **SHRUBS** | | | (Qty) | (Qty) | (Qty) | (Qty) | | | | |
| ***Acer circinatum*** | vine maple | FAC | 127 | 52 | 0 | **179** | 10 ft | 4 ft | 2 gal | **Dry/Moist** |
| ***Amelanchier alnifolia*** | serviceberry | FACU | 198 | 0 | 0 | **198** | 8 ft | 3 ft | 2 gal | **Dry** |
| ***Cornus stolonifera*** | red-osier dogwood | FACW | 0 | 532 | 0 | **532** | 4 ft | 3 ft | 1 gal | **Moist/Wet** |
| ***Corylus cornuta var. californica*** | western hazlenut | FACU | 0 | 35 | 0 | **35** | 10 ft | 2 ft | 2 gal | **Moist** |
| ***Crataegus douglasii*** | Douglas hawthorn | FAC | 505 | 137 | 0 | **642** | 5 ft | 3 ft | 2 gal | **Moist** |
| ***Holodiscus discolor*** | oceanspray | FACU | 505 | 0 | 0 | **505** | 5 ft | 2 ft | 1 gal | **Dry** |
| ***Lonicera involucrata*** | black twinberry | FAC | 789 | 213 | 0 | **1002** | 4 ft | 2 ft | 1 gal | **Moist/Wet** |
| ***Mahonia aquifolium*** | tall Oregon grape | FACU | 789 | 0 | 0 | **789** | 4 ft | 2 ft | 1 gal | **Dry** |
| ***Ribes sanguineum*** | red-flowering currant | FACU | 505 | 0 | 0 | **505** | 5 ft | 2 ft | 1 gal | **Dry/Moist** |
| ***Rosa nutkana*** | Nootka rose | FAC | 789 | 0 | 0 | **789** | 4 ft | 2 ft | 1 gal | **Dry** |
| ***Rubus spectabilis var. spectabilis*** | salmonberry | FAC | 0 | 213 | 0 | **213** | 4 ft | 2 ft | 1 gal | **Moist** |
| ***Spiraea douglasii*** | Douglas spirea | FACW | 0 | 426 | 0 | **426** | 4 ft | 2 ft | 1 gal | **Moist/Wet** |
| ***Symphoricarpos albus var. laevigatus*** | common snowberry | FACU | 789 | 0 | 0 | **789** | 4 ft | 2 ft | 1 gal | **Dry** |
| ***Vaccinium ovatum*** | evergreen huckleberry | FACU | 789 | 0 | 0 | **789** | 4 ft | 2 ft | 1 gal | **Dry/Moist** |
| | | **Total:** | **5785** | **1608** | **0** | **7393** | | | | |

| **SEED MIXES (www.riverrefugeseed.com)** | | WL Status | UPPER FLOOD STORAGE AREA | LOWER FLOOD STORAGE AREA | FLOW BASIN | TOTAL |
|---|---|---|---|---|---|---|
| **Bio-swale Mix #8** | **20 lbs/acre** | | (Qty) | (Qty) | (Qty) | (Qty) |
| ***Beckmannia syzigachne*** | American sloughgrass | 15% | | | | |
| ***Hordeum brachyantherum*** | Meadow barley | 10% | | | | |
| ***Bromus carinatus*** | California brome | 10% | | | | |
| ***Elymus glaucus*** | Blue wildrye | 10% | | | | |
| ***Agrostis exarata*** | Spike bentgrass | 10% | | | | |
| ***Deschampsia cespitosa*** | Tufted hairgrass | 10% | | | | |
| ***Festuca roemeri*** | Roemer's fescue | 10% | | | | |
| ***Alopecurus aequalis*** | Shortawn foxtail | 5% | | | | |
| ***Eleocharis palustris*** | Creeping spikerush | 5% | | | | |
| ***Deschampsia elongata*** | Slender hairgrass | 5% | | | | |
| ***Carex unilateralis*** | One-sided sedge | 5% | | | | |
| ***Juncus tenuis*** | Slender rush | 2.5% | | | | |
| ***Juncus bufonius*** | Toad rush | 2.5% | | | | |
| | | **Total (lbs):** | **0** | **32** | **0** | **32** |
| **Native Upland Grass Mix #9** | **20 lbs/acre** | | (Qty) | (Qty) | (Qty) | (Qty) |
| ***Elymus glaucus*** | Blue wildrye | 30% | | | | |
| ***Bromus carinatus*** | California brome | 25% | | | | |
| ***Hordeum brachyantherum*** | Meadow barley | 10% | | | | |
| ***Festuca roemeri*** | Roemer's fescue | 10% | | | | |
| ***Deschampsia elongata*** | Slender hairgrass | 10% | | | | |
| ***Agrostis exarata*** | Spike bentgrass | 5% | | | | |
| ***Deschampsia cespitosa*** | Tufted hairgrass | 5% | | | | |
| ***Festuca rubra var. rubra*** | Red fescue | 5% | | | | |
| | | **Total (lbs):** | **115** | **0** | **0** | **115** |
| **Native Moist Soil Mgmt Mix #12** | **20 lbs/acre** | | (Qty) | (Qty) | (Qty) | (Qty) |
| ***Glyceria occidentalis*** | Western mannagrass | 35% | | | | |
| ***Alisma subcordatum*** | American water plantain | 15% | | | | |
| ***Polygonum pensylvanicum*** | Pennsylvania smartweed | 15% | | | | |
| ***Beckmannia syzigachne*** | American sloughgrass | 10% | | | | |
| ***Alopecurus aequalis*** | Shortawn foxtail | 5% | | | | |
| ***Eleocharis palustris*** | Creeping spikerush | 5% | | | | |
| ***Hordeum brachyantherum*** | Meadow barley | 5% | | | | |
| ***Eleocharis ovata*** | Ovate spikerush | 4% | | | | |
| ***Leersia oryzoides*** | Rice cutgrass | 3% | | | | |
| ***Scirpus tabernaemontani*** | Softstem bulrush | 3% | | | | |
| | | **Total (lbs):** | **0** | **0** | **6** | **6** |

1 - Scientific names and species identification taken from *Flora of the Pacific Northwest, 2nd Edition (Hitchcock and Cronquist, Ed. by Giblin, Ledger, Zika, and Olmstead, 2018).*
2 - Over-sized container plants are suitable for replacement pending Wetland Scientist approval.
3 - Alternate native plant species may be substituted or added with Wetland Scientist approval.
4 - All disturbed and bare soil areas in the buffer to be seeded with a native grass seed mix.
5 - Shrub calculations based upon 5-ft average spacing.
6 - Tree calculations based upon 10-ft average spacing.

## CONIFEROUS TREE PLANTING DETAIL (TYPICAL)

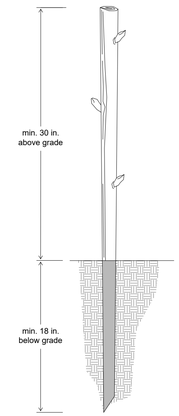
NOT TO SCALE




NOTES:
1. PLANT TREES AS INDICATED ON PLAN. AVOID INSTALLING PLANTS IN STRAIGHT LINES.
2. EXCAVATE PIT TO FULL DEPTH OF ROOT MASS AND 2 X ROOT MASS DIAMETER. SPREAD ROOTS TO FULL WIDTH OF CANOPY. SCARIFY SIDES OF PIT.
3. MIDWAY THROUGH PLANTING ADD AGROFORM TABLET AND WATER THOROUGHLY.
4. BACKFILL TO BE COMPACTED USING WATER ONLY.
5. WATER IMMEDIATELY AFTER INSTALLATION.

## LIVE STAKE PLANTING DETAIL (TYPICAL)

NOT TO SCALE




STORAGE OF LIVE STAKES:
ALL WOODY PLANT CUTTINGS COLLECTED MORE THAN 12 HR PRIOR TO INSTALLATION, MUST BE CAREFULLY BOUND, SECURED, AND STORED OUT OF DIRECT SUNLIGHT AND SUBMERGED IN CLEAN FRESH WATER FOR A PERIOD OF UP TO TWO WEEKS.

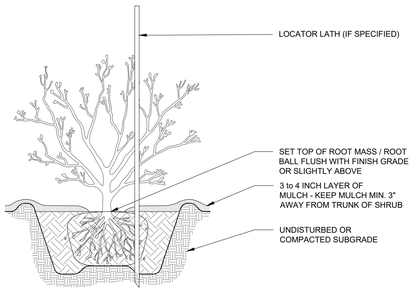
OUTDOOR TEMPERATURES MUST BE LESS THAN 50 DEGREES F AND TEMPERATURE INDOORS AND IN STORAGE CONTAINERS MUST BE BETWEEN 34 AND 50 DEGREES F.

IF THE LIVE STAKES CANNOT BE INSTALLED DURING THE DORMANT SEASON, CUT DURING THE DORMANT SEASON AND HOLD IN COLD STORAGE AT TEMPERATURES BETWEEN 33 AND 39 DEGREES F FOR UP TO 2 MONTHS.

NOTES:
1. LIVE STAKES TO BE A MIN. 1/2 INCH DIAMETER; MIN. 48 INCH LENGTH.
2. USE 1/2 INCH MIN. DIAMETER REBAR OR ROCK BAR TO MAKE PILOT HOLE WHEN PLANTING IN DENSE OR GRAVELY SOILS TO A MIN. DEPTH OF 18 INCHES.
3. MANUALLY INSERT LIVE STAKE INTO PILOT HOLE TAPERED END UP AND TEMP SOIL AROUND BASE. CUTTINGS SHOULD BE INSERTED TO A DEPTH OF AT LEAST 18 INCHES. LEAVE A MIN. OF 30" OF THE CUTTING ABOVE GROUND SURFACE TO ALLOW FOR SUCCESSFUL FOLIAGE DEVELOPMENT.
4. MINUMUM TWO BUDS ABOVE GRADE.
5. SET LIVE STAKES WITH DEAD-BLOW HAMMER.
6. WATER IMMEDIATELY AFTER INSTALLATION.

## TREE AND SHRUB PLANTING DETAIL (TYPICAL)

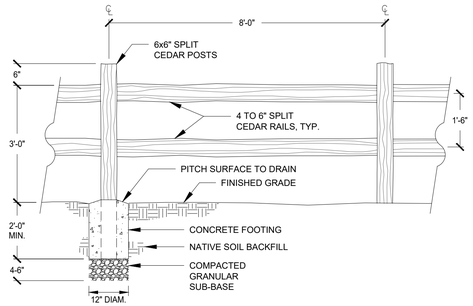
NOT TO SCALE




NOTES:
1. PLANT SHRUBS OF THE SAME SPECIES IN GROUPS OF 3 to 9 AS APPROPRIATE, OR AS SHOWN ON PLAN. AVOID INSTALLING PLANTS IN STRAIGHT LINES TO ACHIEVE A NATURAL-LOOKING LAYOUT.
2. EXCAVATE PIT TO FULL DEPTH OF ROOT MASS AND 2 X ROOT MASS DIAMETER. SPREAD ROOTS TO FULL WIDTH OF CANOPY. SCARIFY SIDES OF PIT.
3. MIDWAY THROUGH PLANTING ADD AGROFORM TABLET AND WATER THOROUGHLY.
4. BACKFILL TO BE COMPACTED USING WATER ONLY.
5. WATER IMMEDIATELY AFTER INSTALLATION.

## SPLIT RAIL FENCE DETAIL

NOT TO SCALE

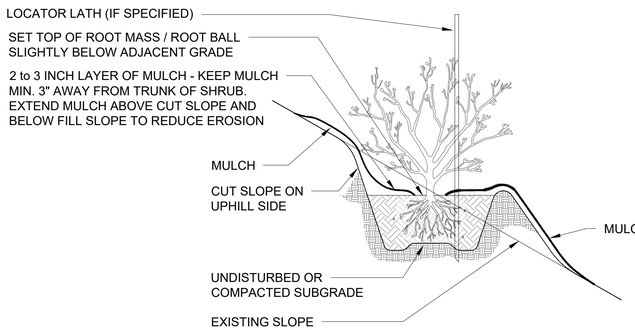



**NOTES:**

1. POSTS AND RAILINGS PRE-CUT FOR ASSEMBLY.
2. 3-RAIL DESIGNS ARE PERMITTED.
3. FENCE SHALL BE PLACED AT APPROVED BUFFER EDGE.

## TREE AND SHRUB PLANTING ON STEEP SLOPE

NOT TO SCALE




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

Soundview Consultants LLC
Environmental Assessment • Planning • Land Use Solutions
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, 021044030000, 021060000000, 021043003000, 021059000000, 021057000000, 021041000000

DATE: 05/23/2023
JOB: 1144.0036
BY: DLS
SCALE: AS SHOWN
SHEET: 4

S:\CURRENT\1144 Panahloni Construction\1144.0036 Skookumchuck Commerce Center\Graphics & Maps\CAD\A - CURRENT SVC DRAWINGS\A - Current Base DWGs\1144.0036 (2023-05) base.dwg
Plotted May 25, 2023

# Attachment B – Qualifications

All field inspections, wetland determinations, habitat assessments, and supporting documentation, including this ***Shoreline No Net Loss Analysis*** prepared for the ***Skookumchuck Commerce Center Project*** were prepared by, or under the direction of, Alex Murphy of SVC. In addition, report preparation was completed by Morgan Kentch, with final quality assurance completed by Kyla Caddey.

## Alex Murphy, AICP

Planner & Project Manager
Professional Experience: 7 years

Alex Murphy is a Planner and Project Manager with a background in land use planning, site planning & design, permitting, and project management. He has over 7 years of experience working for local jurisdictions in the Intermountain West and Pacific Northwest with an emphasis on maximizing opportunities for culturally and environmentally sensitive projects.

Alex earned a Bachelor of Landscape Architecture degree from Utah State University. He is a Certified Planner through the American Institute of Certified Planners and has received formal training in climate adaptation planning for coastal communities from NOAA. Mr. Murphy currently assists in wetland, stream, and shoreline delineations and fish and wildlife habitat assessments; conducts environmental code analysis; and prepares environmental assessment and mitigation reports. He also manages development projects, supporting clients through the regulatory and planning process for various land use proposals.

## Kyla Caddey, PWS, Certified Ecologist

Senior Environmental Scientist
Professional Experience: 8 years

Kyla Caddey is a Senior Environmental Scientist with a diverse background in stream and wetland ecology, wildlife ecology and conservation, wildlife and natural resource assessments and monitoring, and riparian habitat restoration at various public and private entities. Kyla has field experience performing in-depth studies in both the Pacific Northwest and Central American ecosystems which included various environmental science research and statistical analysis. Kyla has advanced expertise in federal- and state-listed endangered, threatened, and sensitive species surveys and assessment of aquatic and terrestrial systems throughout the Puget Sound region. She has completed hundreds of wetland delineations and has extensive knowledge and interest in hydric soil identification. As the senior writer, she provides informed project oversight and performs final quality assurance / quality control on various types of scientific reports for agency submittal, including: Biological Assessments/Evaluations; Wetland, Shoreline, and Fish and Wildlife Habitat Assessments; Mitigation Plans, and Mitigation Monitoring Reports. She currently performs wetland, stream, and shoreline delineations and fish and wildlife habitat assessments; prepares scientific reports; and provides environmental permitting and regulatory compliance assistance to support a wide range of industrial, industrial, and multi-family residential land use projects.

Kyla earned a Bachelor of Science degree in Environmental Science and Resource Management from the University of Washington, Seattle with a focus in Wildlife Conservation and a minor in Quantitative Science. She has also completed additional coursework in Comprehensive Bird Biology from Cornell University. Ms. Caddey is a Certified Professional Wetland Scientist (PWS #3479) through the Society of Wetland Scientists and Certified Ecologist through the Ecological Society of America. She has received 40-hour wetland delineation training (Western Mtns, Valleys, & Coast and

Arid West Regional Supplement), is a Pierce County Qualified Wetland Specialist and Wildlife Biologist, and is a USFWS-approved Mazama pocket gopher survey biologist. Kyla has been formally trained through the Washington State Department of Ecology, Coastal Training Program, and the Washington Native Plant Society in winter twig and grass, sedge, and rush identification for Western WA; Using the Credit-Debit Method in Estimating Wetland Mitigation Needs; How to Determine the Ordinary High Water Mark; Using Field Indicators for Hydric Soils; How to Administer Development Permits in Washington Shorelines; Puget Sound Coastal Processes; and Forage Fish Survey Techniques. Additionally, she has received formal training in preparing WSDOT Biological Assessments.

## 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.

# 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.

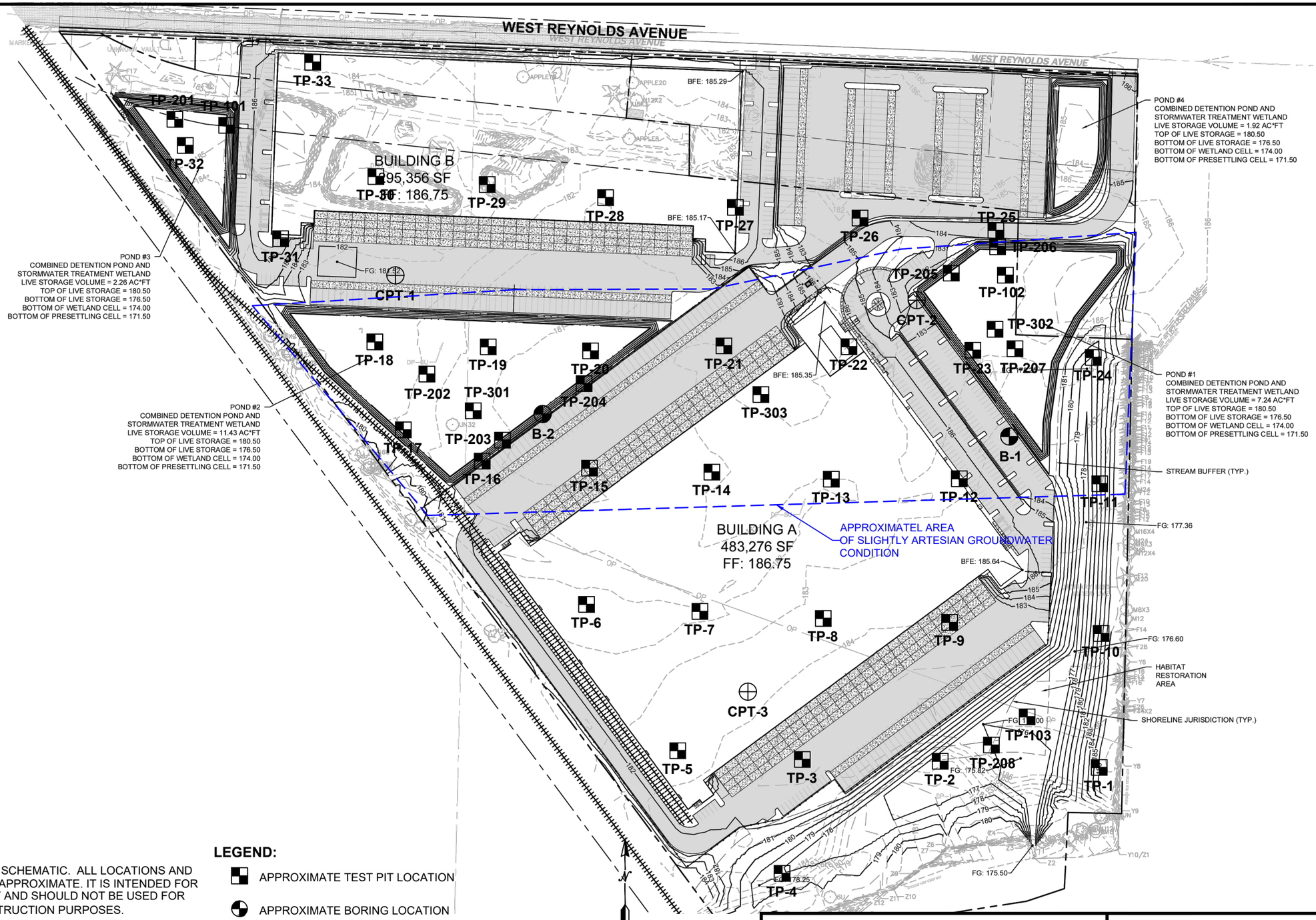
| Test Pit Number | Seasonal High Groundwater (Depth below Grade, feet) |
|---|---|
| 201 | 7.62 feet below grade |
| 202 | 0.78 feet below grade |
| 203 | 0.00 feet below grade |
| 204 | 0.12 feet below grade |
| 205 | 0.85 feet below grade |
| 206 | 0.22 feet below grade |
| 207 | 0.40 feet below grade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

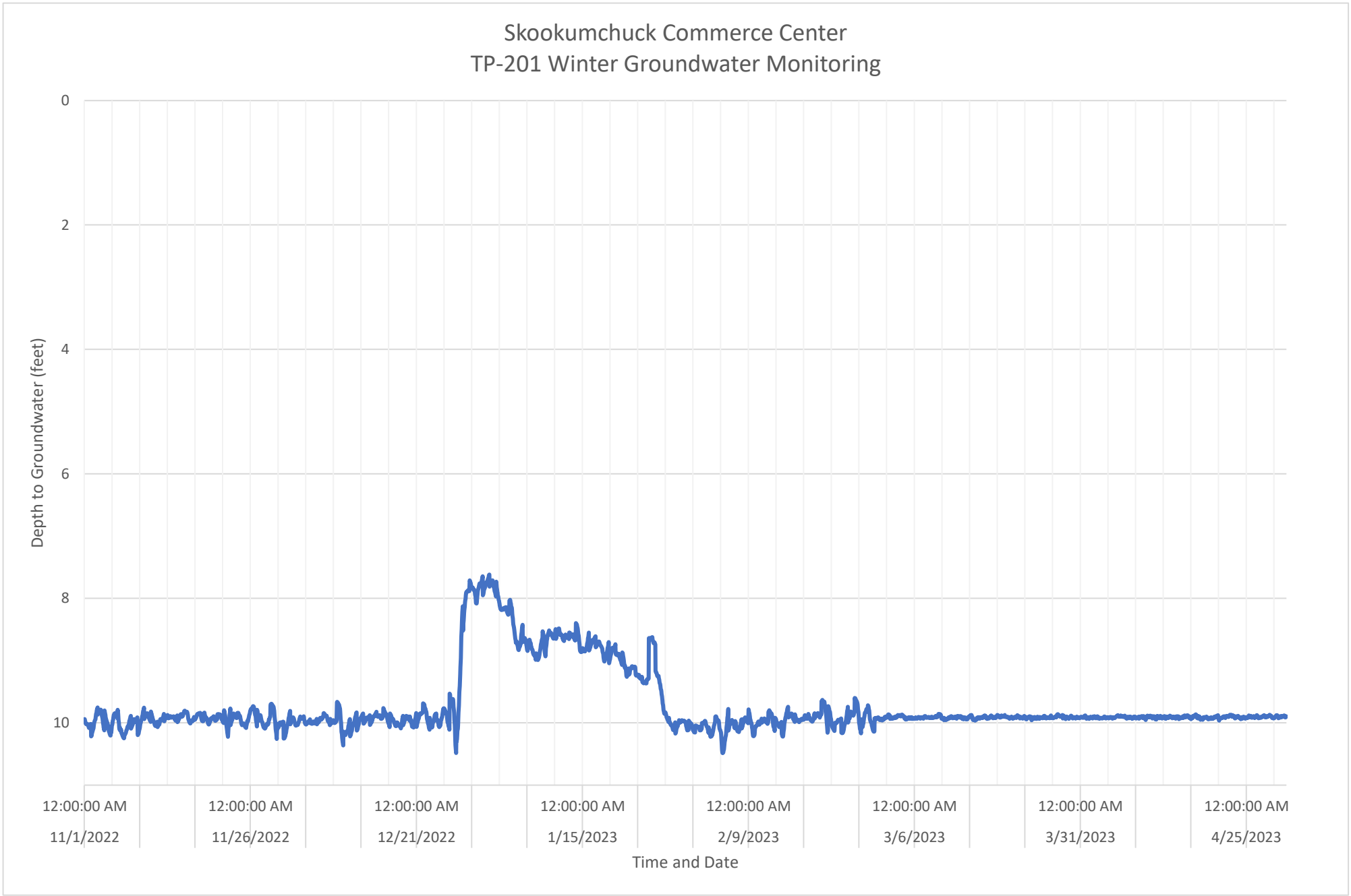
- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE BORING LOCATION
- APPROXIMATE CPT LOCATION

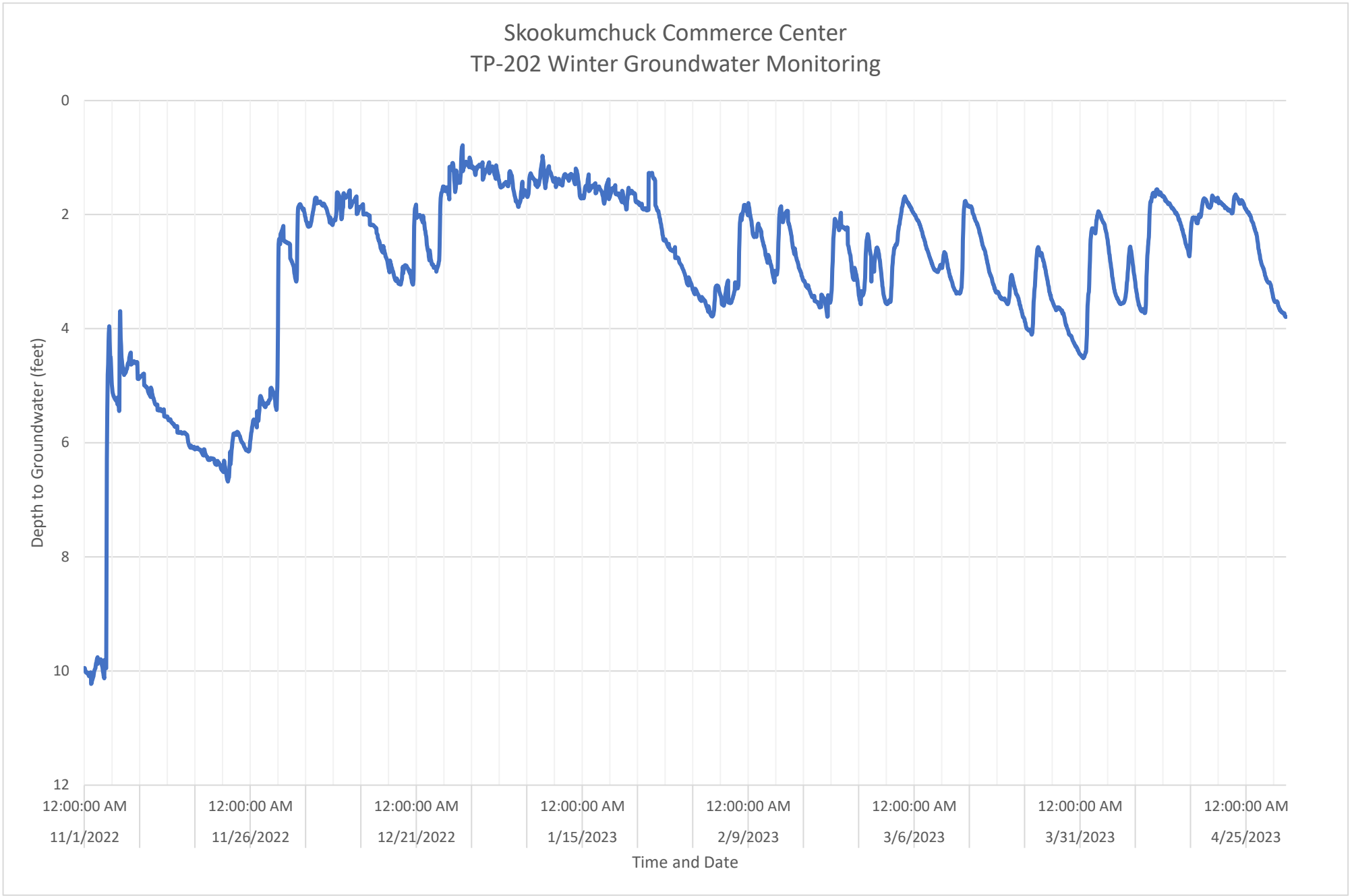
**Terra Associates, Inc.**

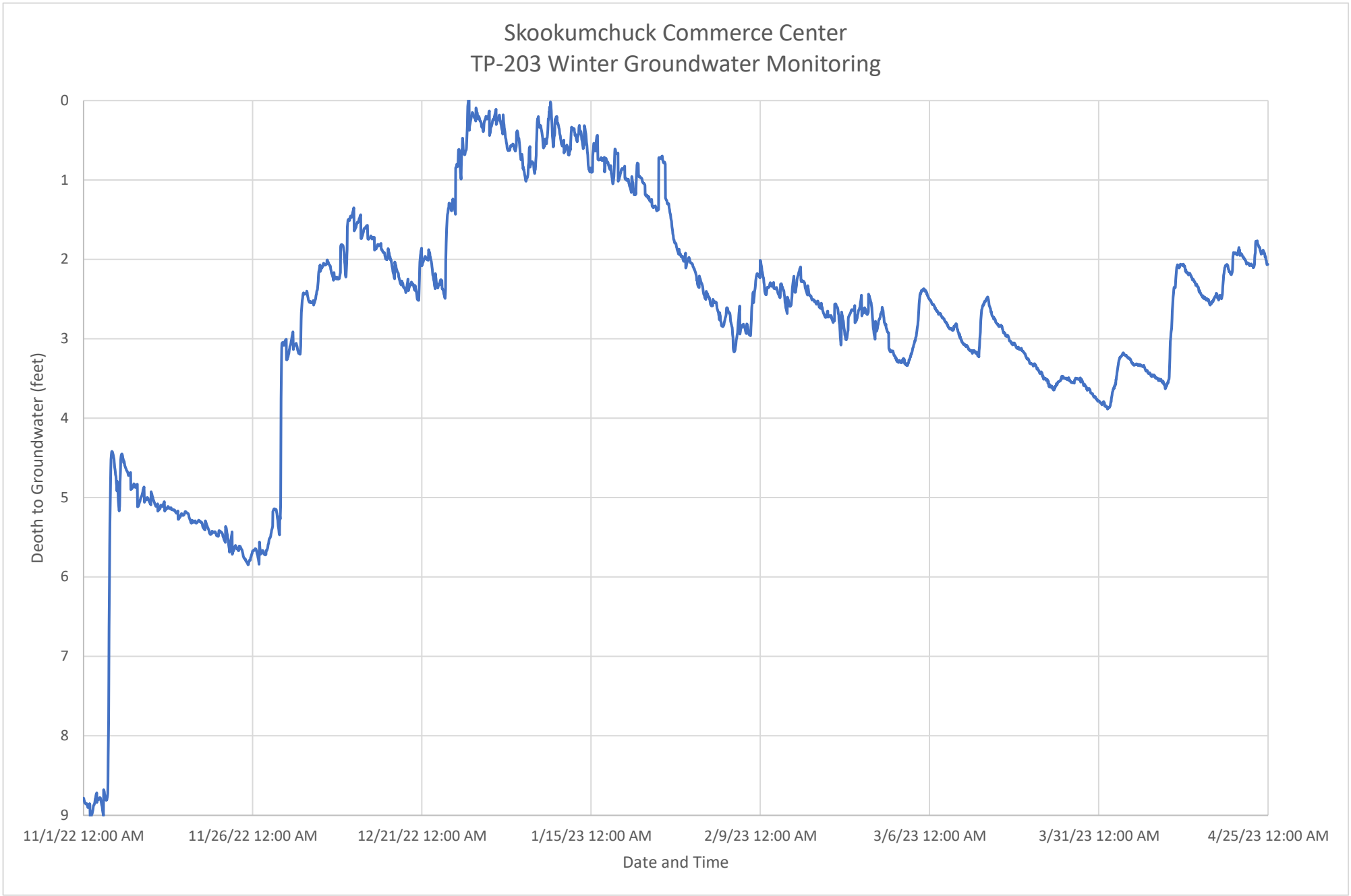
Consultants in Geotechnical Engineering
Geology and
Environmental Earth Sciences

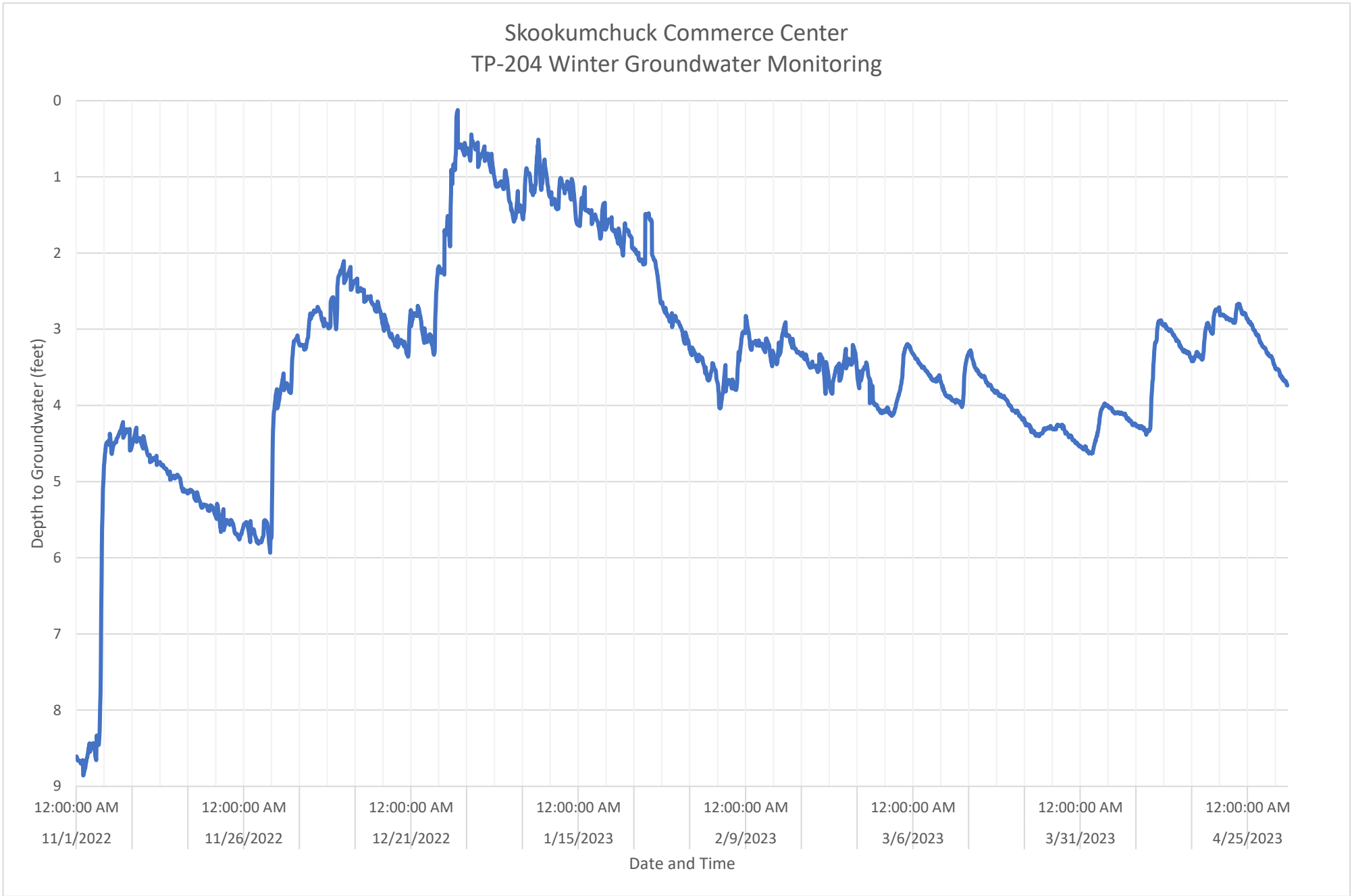
# EXPLORATION LOCATION PLAN
# SKOOKUMCHUCK COMMERCE CENTER
# LEWIS COUNTY, WASHINGTON

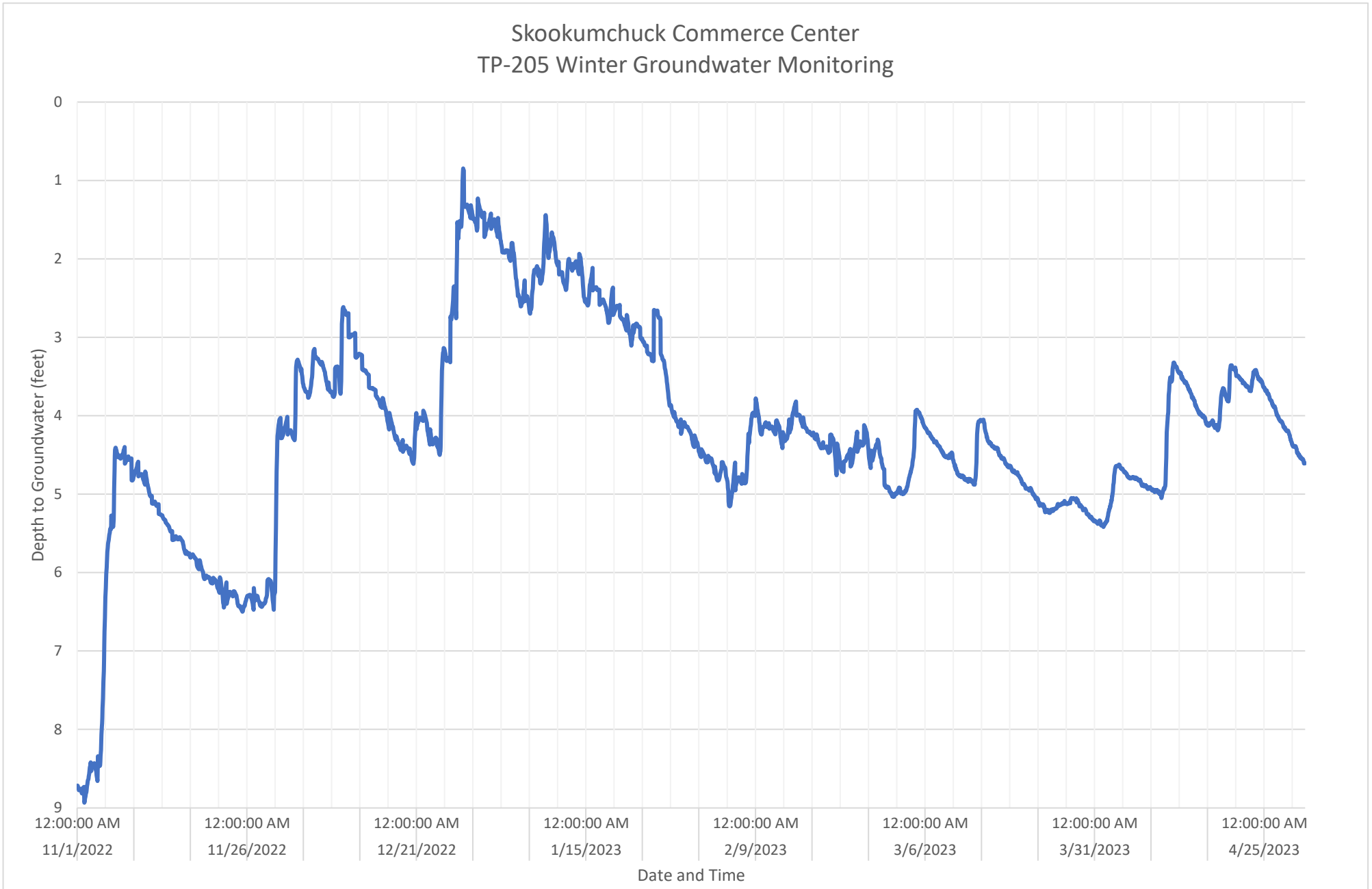
| Proj. No.T-8613 | Date FEB 2025 | Figure 1 |
|---|---|---|

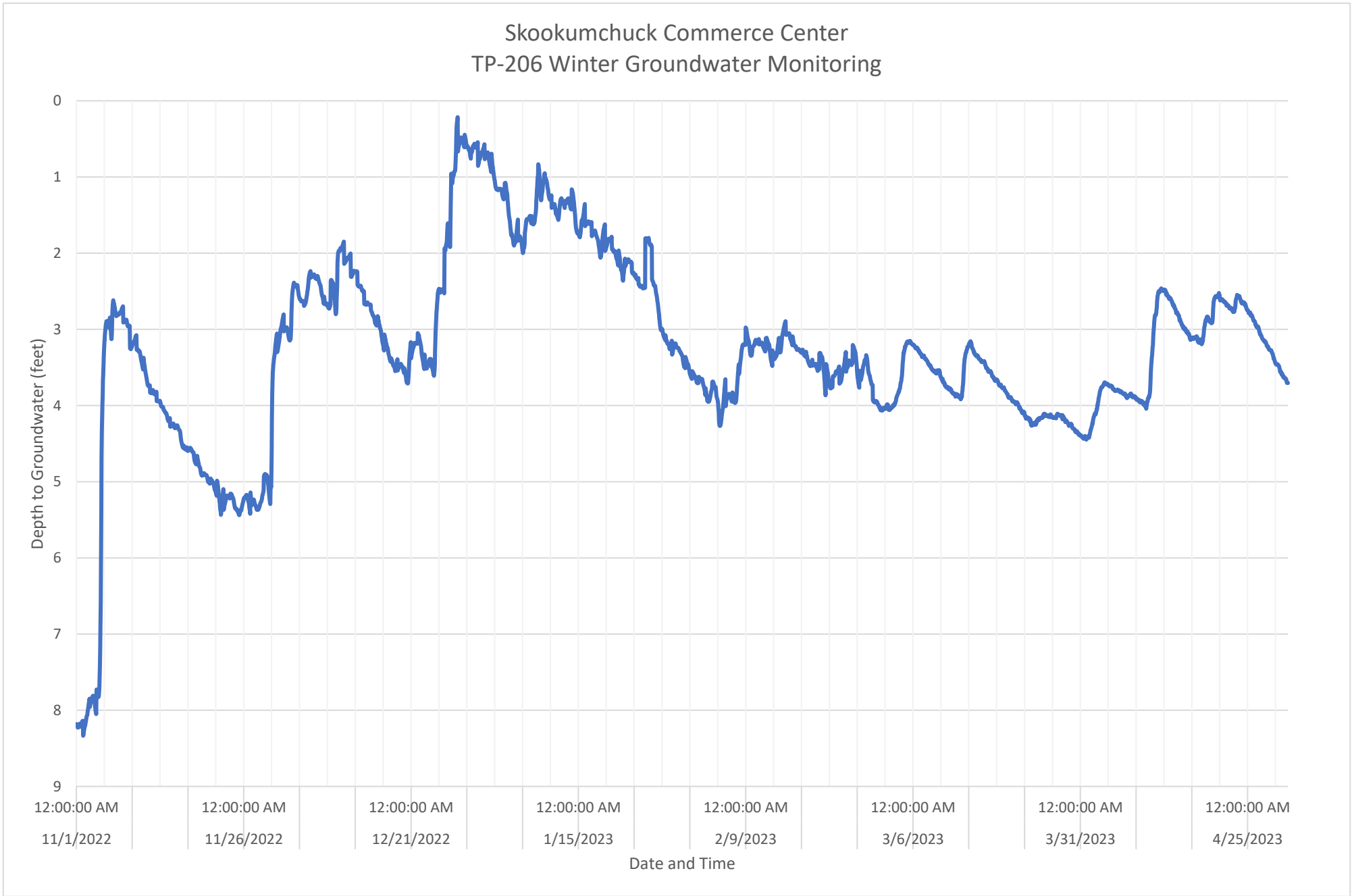

Skookumchuck Commerce Center
TP-201 Winter Groundwater Monitoring
Depth to Groundwater (feet)
0
2
4
6
8
10
12:00:00 AM
11/1/2022
12:00:00 AM
11/26/2022
12:00:00 AM
12/21/2022
12:00:00 AM
1/15/2023
12:00:00 AM
2/9/2023
12:00:00 AM
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
4/25/2023
Time and Date


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
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-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
12:00:00 AM
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
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
12:00:00 AM
3/6/2023
12:00:00 AM
3/31/2023
12:00:00 AM
4/25/2023
Date and Time


Skookumchuck Commerce Center
TP-206 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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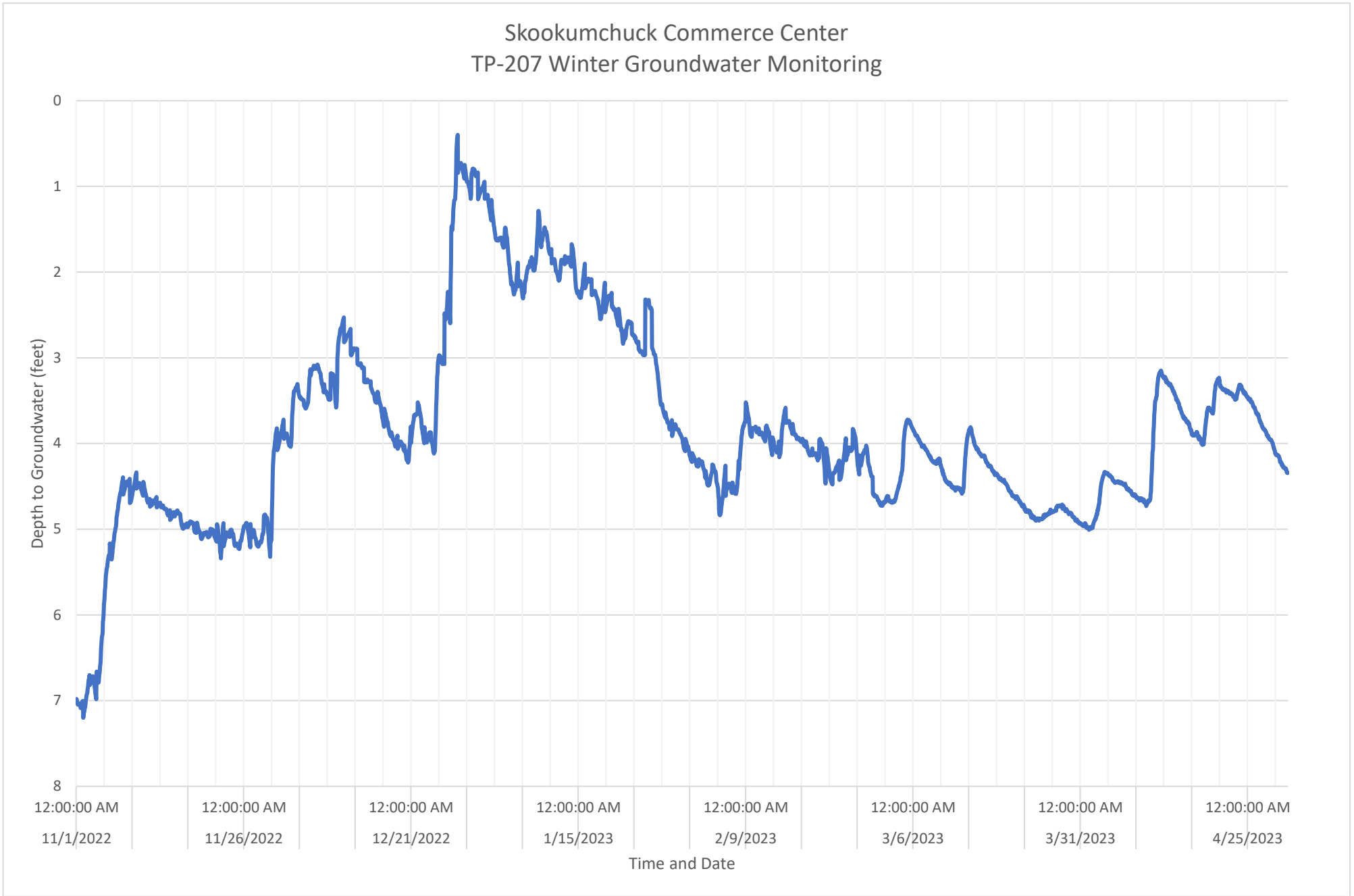
3/31/2023
12:00:00 AM
4/25/2023
Date and Time


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
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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
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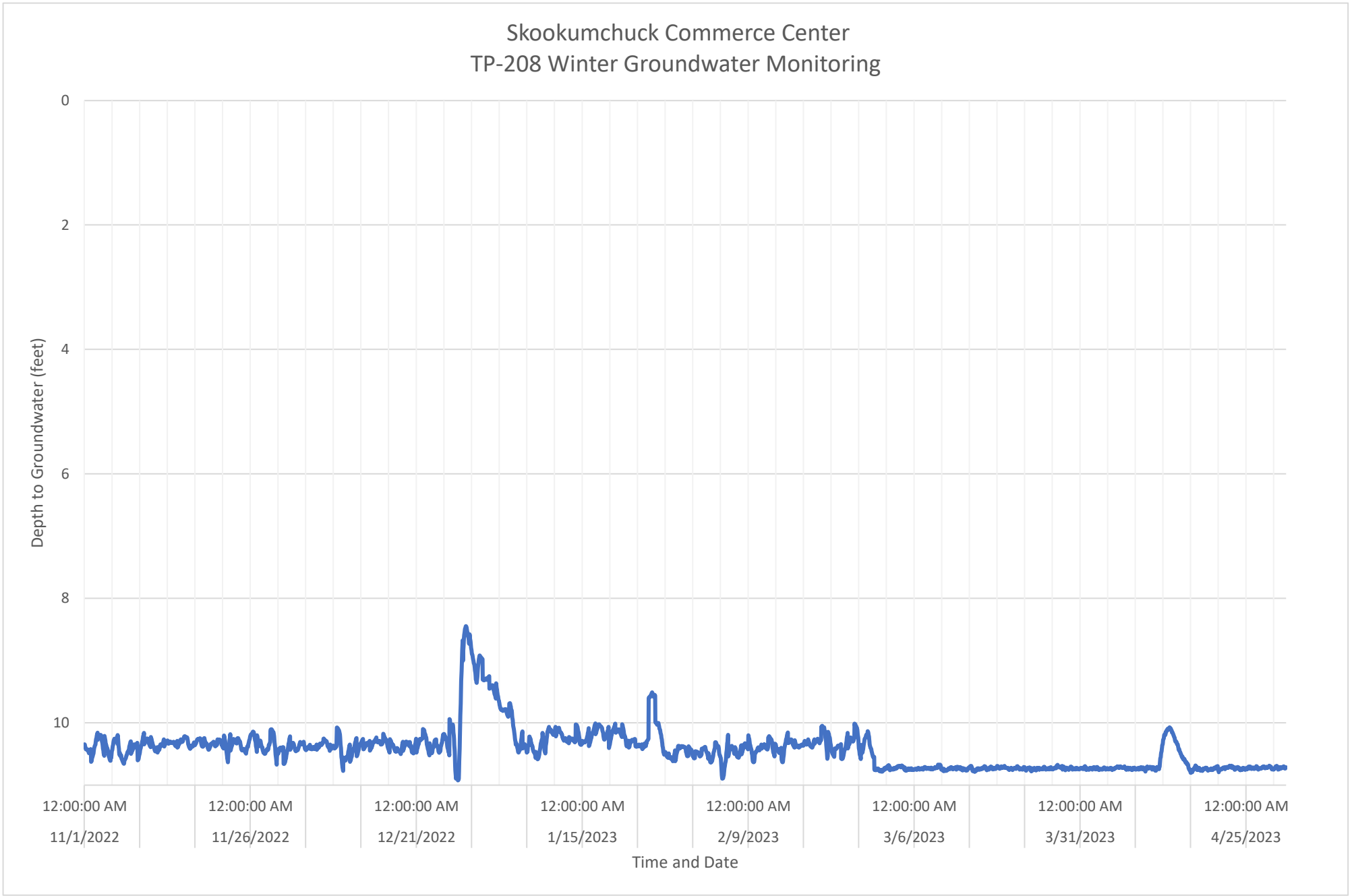
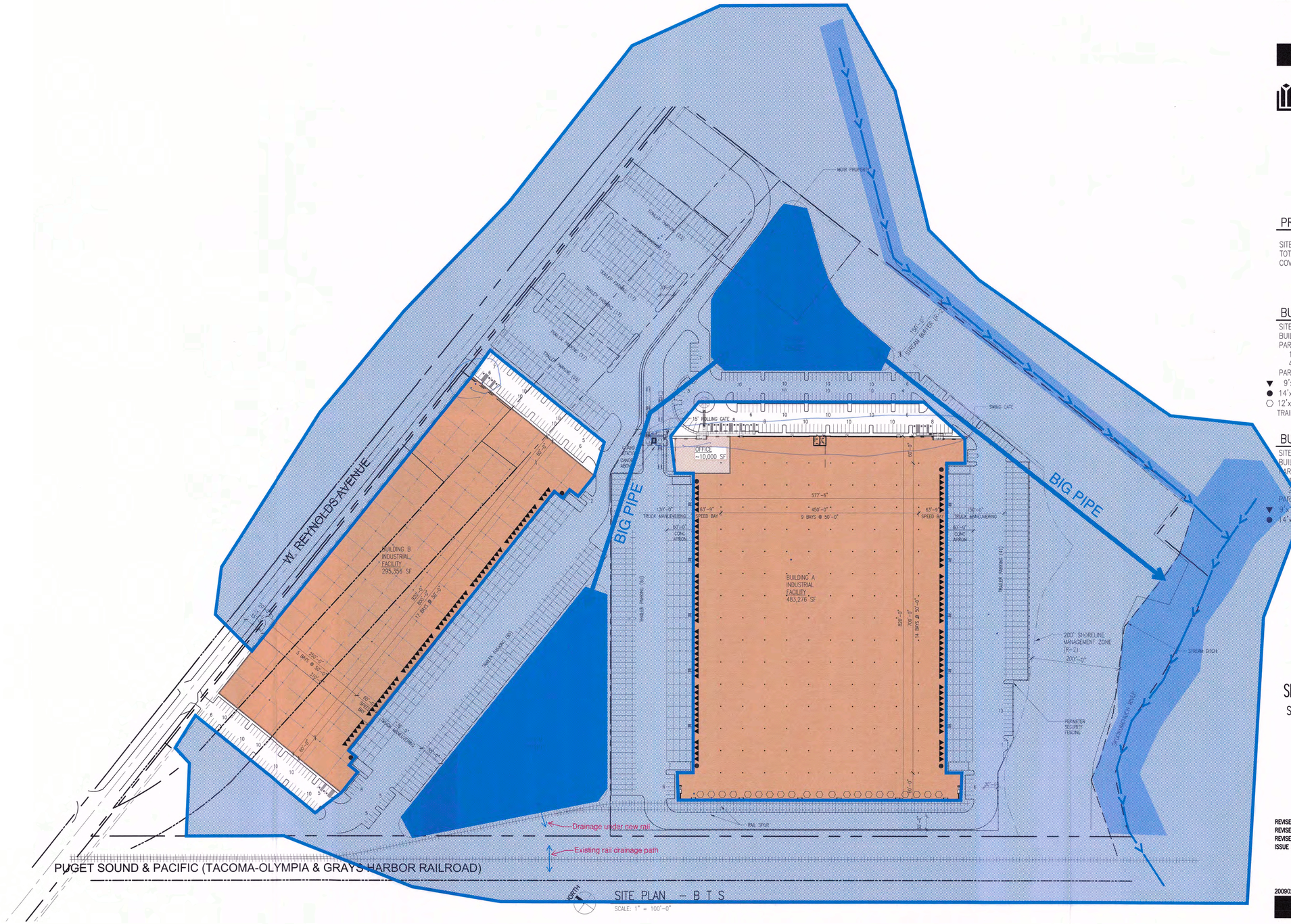
4/25/2023
Time and Date


Skookumchuck Commerce Center
TP-208 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

# SKOOCKUMCHUCK COMMERCE CENTER




SITE PLAN – B T S

SCALE: 1" = 100'-0"


SYNTHESISPLLC
THE FUSION OF ARCHITECTURE, DESIGN TECHNOLOGY & PEOPLE

12503 Bel-Red Road, Suite 101
Bellevue, WA 98005
p 425 646 1818 f 425 646 4141

PANATTONI DEVELOPMENT, LLC
1821 DOCK ST, SUITE 100
TACOMA, WA 98402


## PROJECT DATA

| | |
|---|---|
| SITE AREA | 2,466,338 SF |
| TOTAL BUILDING AREA | 777,839 SF |
| COVERAGE | 31.5% |

## BUILDING A

| | |
|---|---|
| SITE AREA | 1,115,494 SF |
| BUILDING AREA | 483,276 SF |
| PARKING REQUIRED | 256.6 |
| 10,000 SF OFFICE @ 2:1000 | 20.0 |
| 473,276 SF WHSE @ 1:2000 | 236.6 |
| PARKING PROVIDED | 258 |
| ▼ 9'x10' DOCK DOOR | 92 |
| ● 14'x16' GRADE ACCESS DOOR | 4 |
| ○ 12'x14' RAIL ACCESS DOOR | 21 |
| TRAILER PARKING | 101 |

## BUILDING B

| | |
|---|---|
| SITE AREA | 937,759 SF |
| BUILDING AREA | 295,356 SF |
| PARKING REQUIRED | 170.2 |
| 15,000 SF OFFICE @ 2:1000 | 30.0 |
| 280,356 SF WHSE @ 1:2000 | 140.2 |
| PARKING PROVIDED | 153 |
| ▼ 9'x10' DOCK DOOR | 58 |
| ● 14'x16' GRADE ACCESS DOOR | 2 |

## SINGLE RAIL SERVED BUILDING

Skookumchuck Commerce Center

CENTRALIA, WA

| | |
|---|---|
| REVISED | 02 14 2023 |
| REVISED | 02 08 2023 |
| REVISED | 01 31 2023 |
| ISSUE DATE | 01 30 2023 |

LD1

200902.26.173

www.synthesispllc.com

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# PROJECT MEMO

| | | | |
|---|---|---|---|
| **TO:** | City of Centralia | **DATE:** | May 1, 2025 |
| **FROM:** | Tyler Watkins, PE<br>Tacoma - (253) 383-2422 | **PROJECT NO.:** | 2210649.10 |
| | | **PROJECT NAME:** | Skookumchuck Commerce Center |

**SUBJECT:** Floodplain Development Permit – Proposed Flood Storage Volume

This memo accompanies the Floodplain Development Permit for the Skookumchuck Commerce Center project and describes the relationship between the proposed flood storage volume, the proposed storm drainage system, and seasonal high groundwater elevations.

This memo is supplemental to the documents listed below:

- Floodplain Development Hydraulics and Hydrology Report (9/26/2023)
- Preliminary Storm Drainage Report (10/2/2023)
- Floodplain Development Permit Memo (4/7/2023)
- Groundwater Monitoring Design Memorandum by Terra Associates, Inc. (2/10/2025)

## Proposed Flood Storage Volume

The project proposes to fill some areas of the floodplain to support the development. To compensate for all areas of fill, the project will provide compensatory storage. 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. All onsite flood storage areas will be hydraulically connected. As flood water levels rise within the Skookumchuck 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.

## Proposed Storm Drainage System

The project proposes to discharge stormwater runoff into the Skookumchuck River, which is listed on the Flow Control Exempt Receiving Waters in the 2019 Department of Ecology *Stormwater Management Manual for Western Washington (SWMMWW).* Therefore, Flow Control is not required for the project. The project proposes to collect all stormwater runoff from the site, provide oil control using coalescing plate separators, and provide enhanced treatment using stormwater treatment wetlands. The proposed stormwater treatment wetlands 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 176.5. 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 176.5 and will allow flood waters to flow freely in either direction, but will not impact the ability to provide stormwater treatment.

## Seasonal High Groundwater Elevations

Groundwater monitoring was completed during the 2022 to 2023 winter season. The results from this monitoring indicate a seasonal high groundwater elevation of about 177.5 at the northwest corner and southeast corner of the site. The central area of the site is affected by an artesian condition, with seasonal high groundwater elevations near the existing grade elevations of 182 to 183. The project proposes to install perimeter drains around the stormwater treatment wetlands at an elevation of 176.5 to intercept all groundwater above the permanent ponding elevation. Bentonite liners are also proposed to further protect the ponds from the artesian conditions.

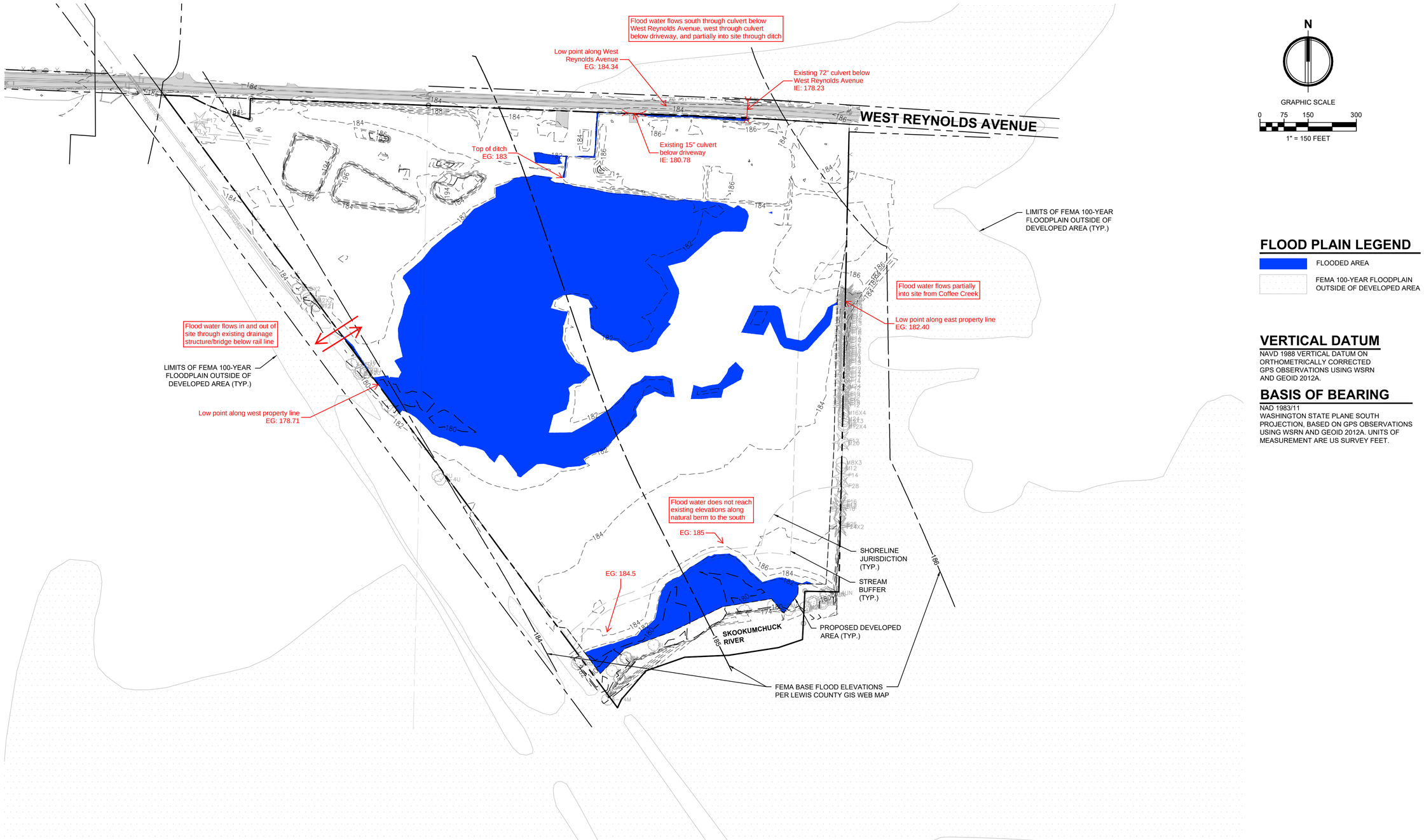
## Conclusion

The permanent ponding elevation in the stormwater treatment wetlands is limited to 176.5. Any groundwater that rises above this elevation will be captured by the proposed perimeter drains and discharge into the Skookumchuck River. The proposed flood storage volume excludes volumes below 176.5. Therefore, we do not anticipate the seasonal high groundwater elevations to negatively affect the proposed flood storage volume.

---

BEB/lsk

Q:\2021\2210649\WORDPROC\Memos\20250501 Memo (Flood) 2210649.10.docx




## 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

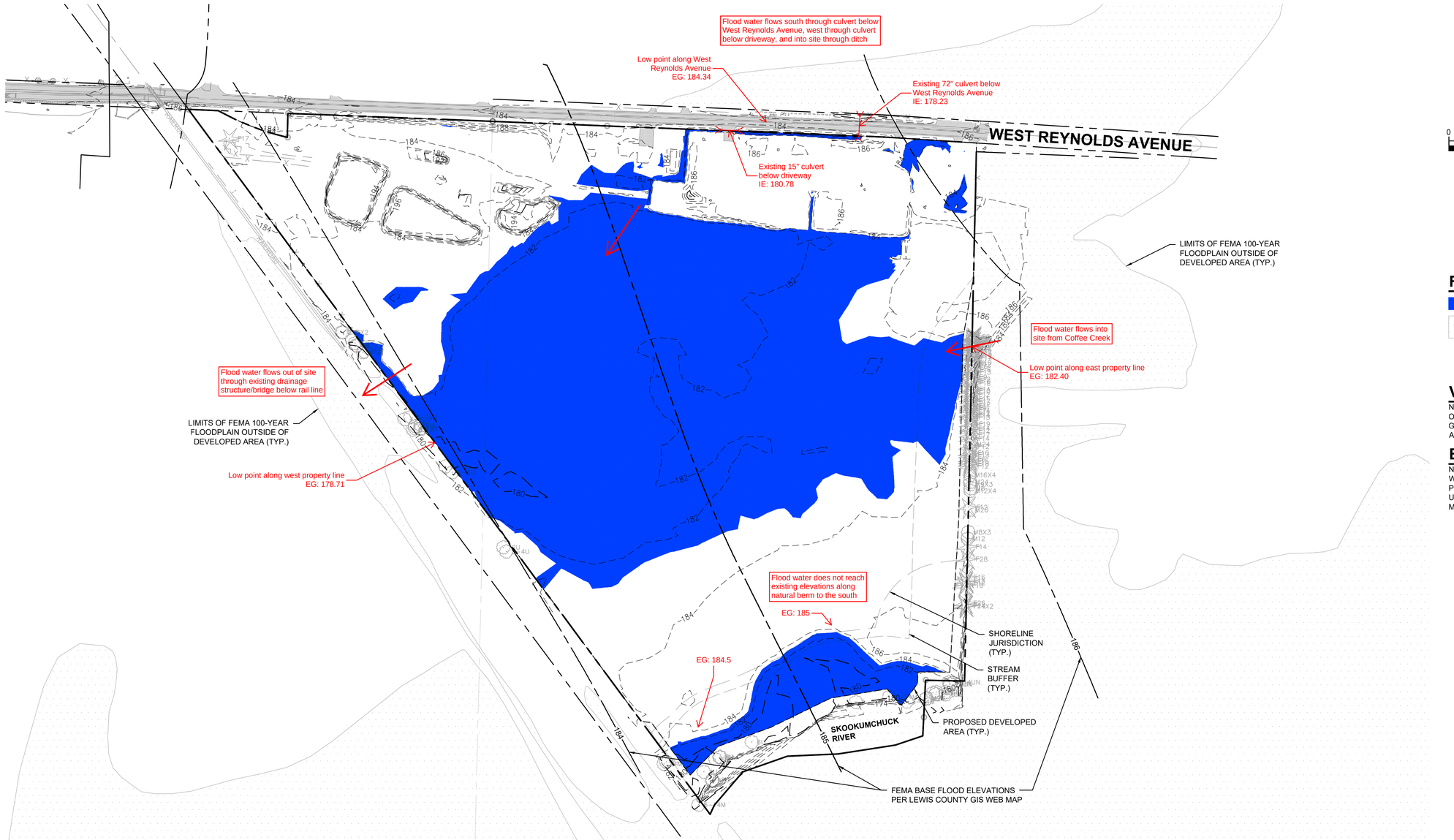
NAD 1983/11
WASHINGTON STATE PLANE SOUTH PROJECTION, BASED ON GPS OBSERVATIONS USING WSRN AND GEOID 2012A. UNITS OF MEASUREMENT ARE US SURVEY FEET.

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
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253.383.2422 TEL
253.383.2572 FAX

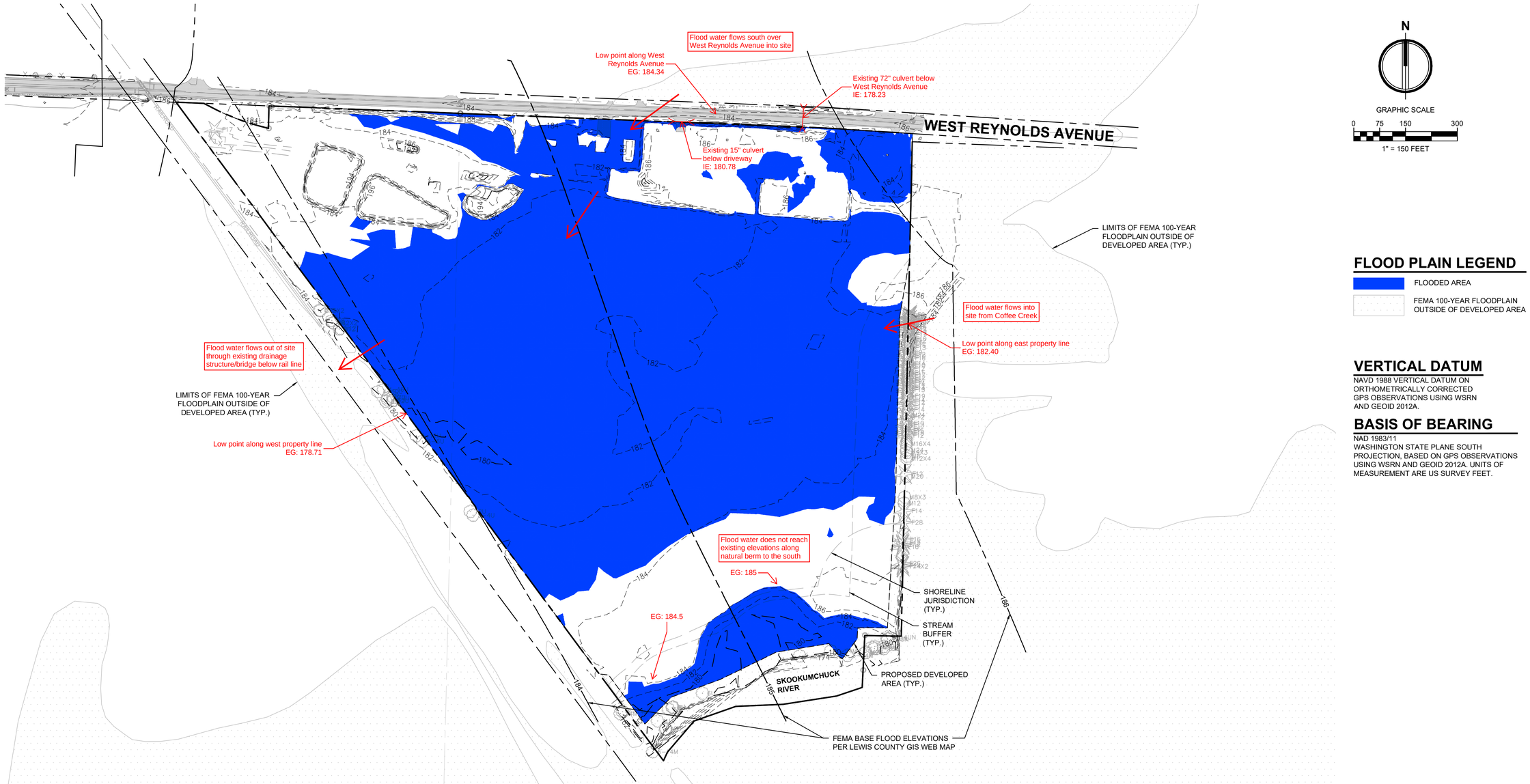
# SKOOKUMCHUCK COMMERCE CENTER

## 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.

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Tacoma, WA 98403
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253.383.2572 FAX

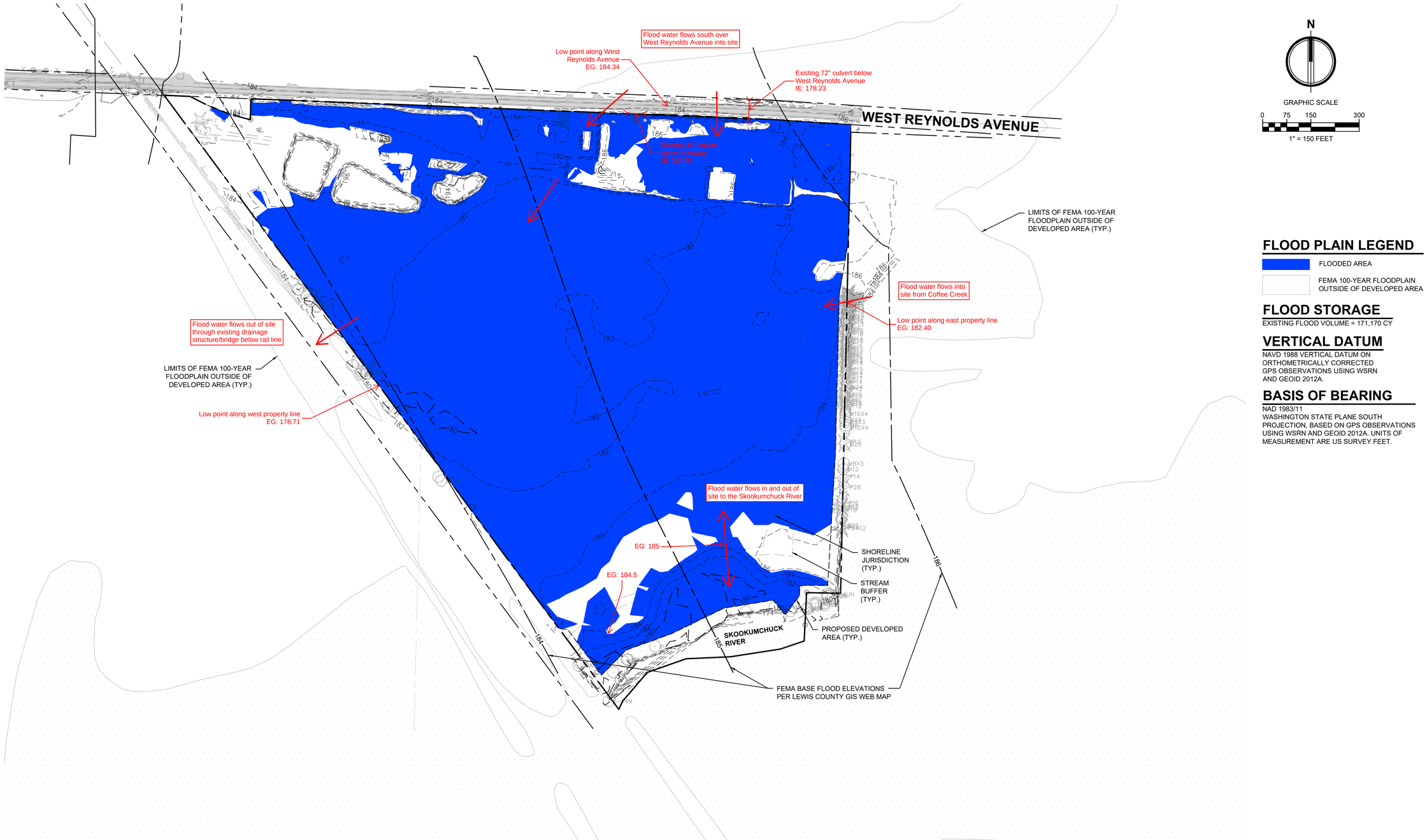
**SKOOKUMCHUCK COMMERCE CENTER**

**EXISTING FLOOD VOLUME**
**1' BELOW BASE FLOOD ELEVATION**

JOB NO. 2210649.10

DATE: 6/23/2025

**EX-3**




## 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.

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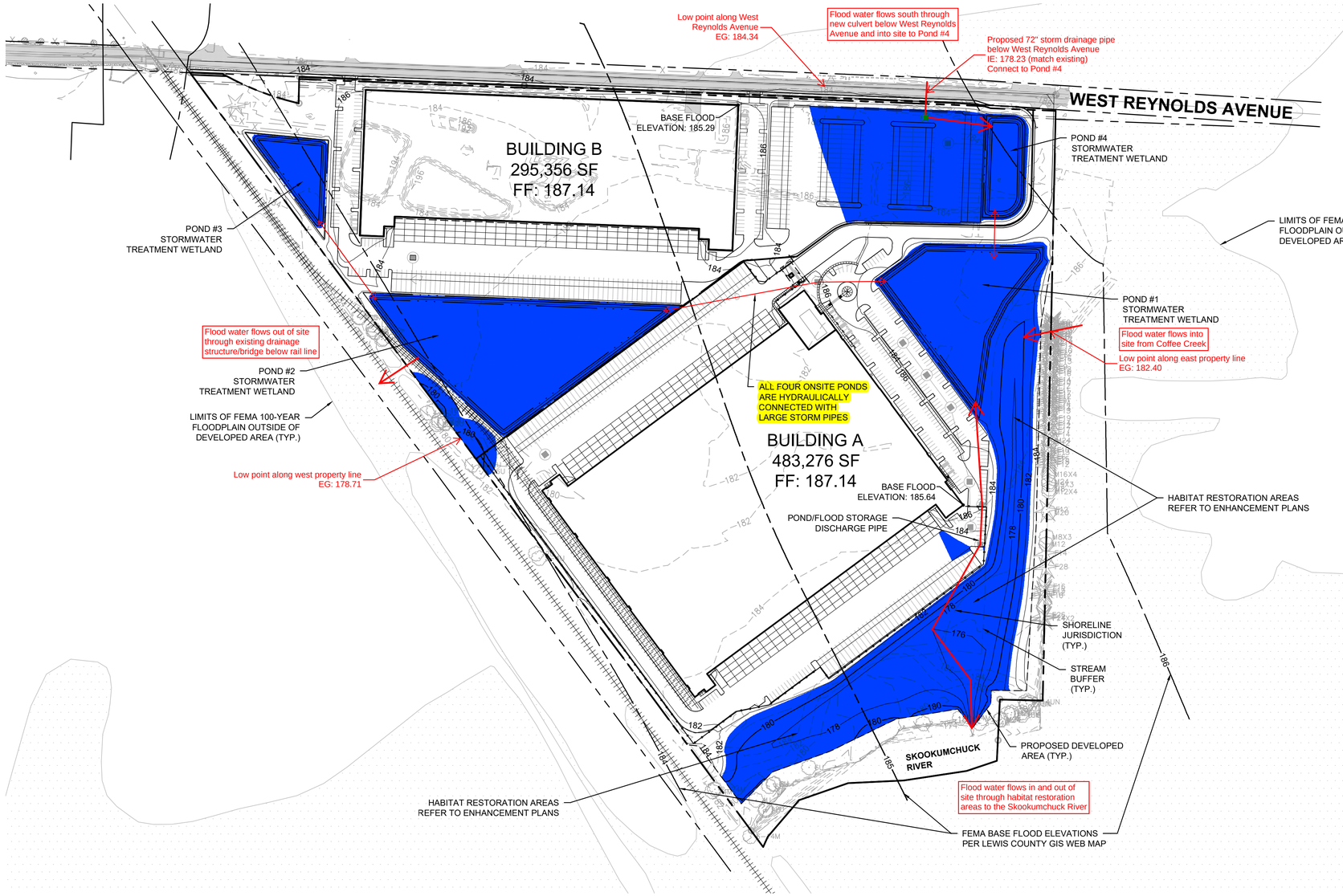
**SKOOKUMCHUCK COMMERCE CENTER**

**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

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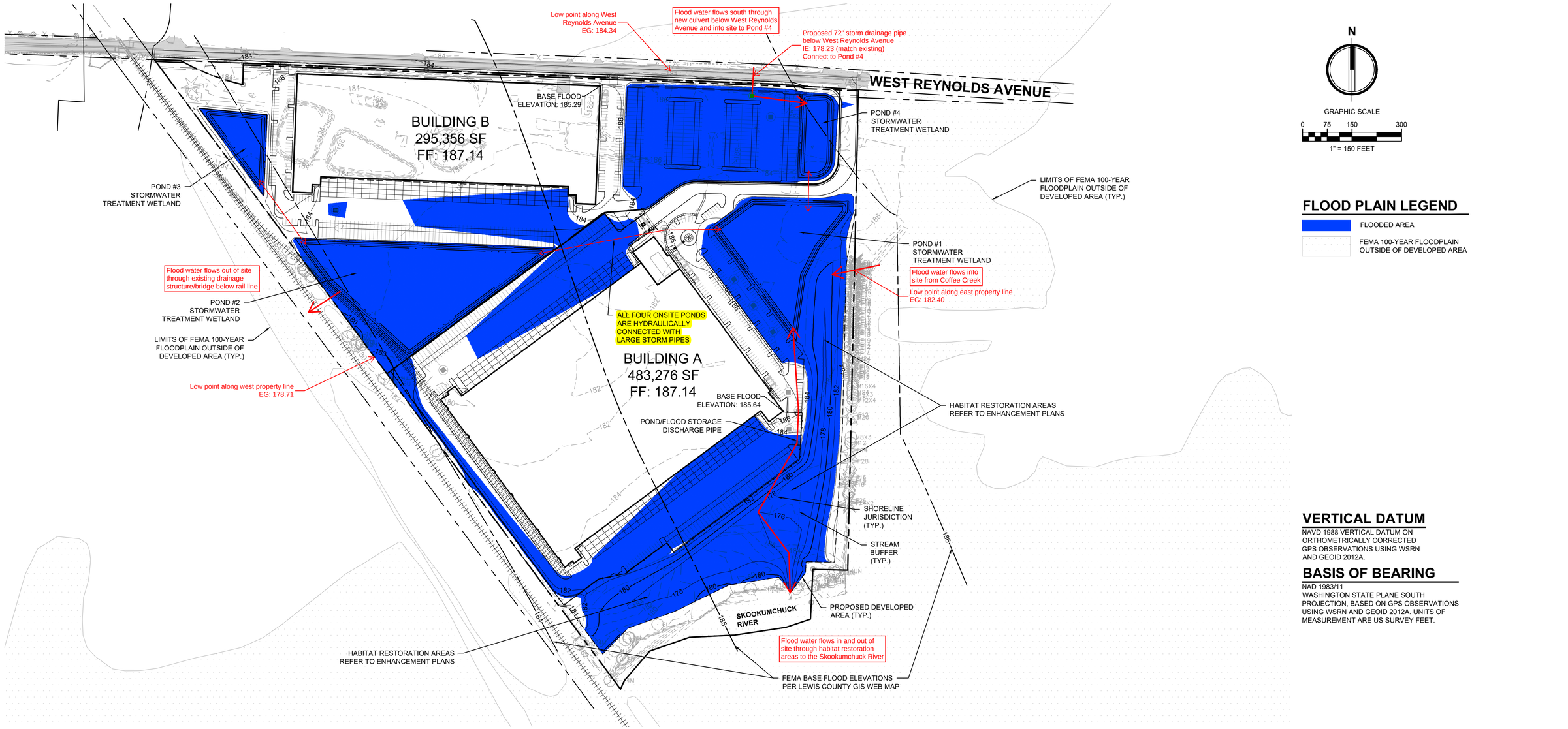
**SKOOKUMCHUCK COMMERCE CENTER**

**PROPOSED FLOOD VOLUME**
**3' BELOW BASE FLOOD ELEVATION**

JOB NO. 2210649.10

DATE: 6/23/2025

**EX-5**




## FLOOD PLAIN LEGEND

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

## VERTICAL DATUM

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## BASIS OF BEARING

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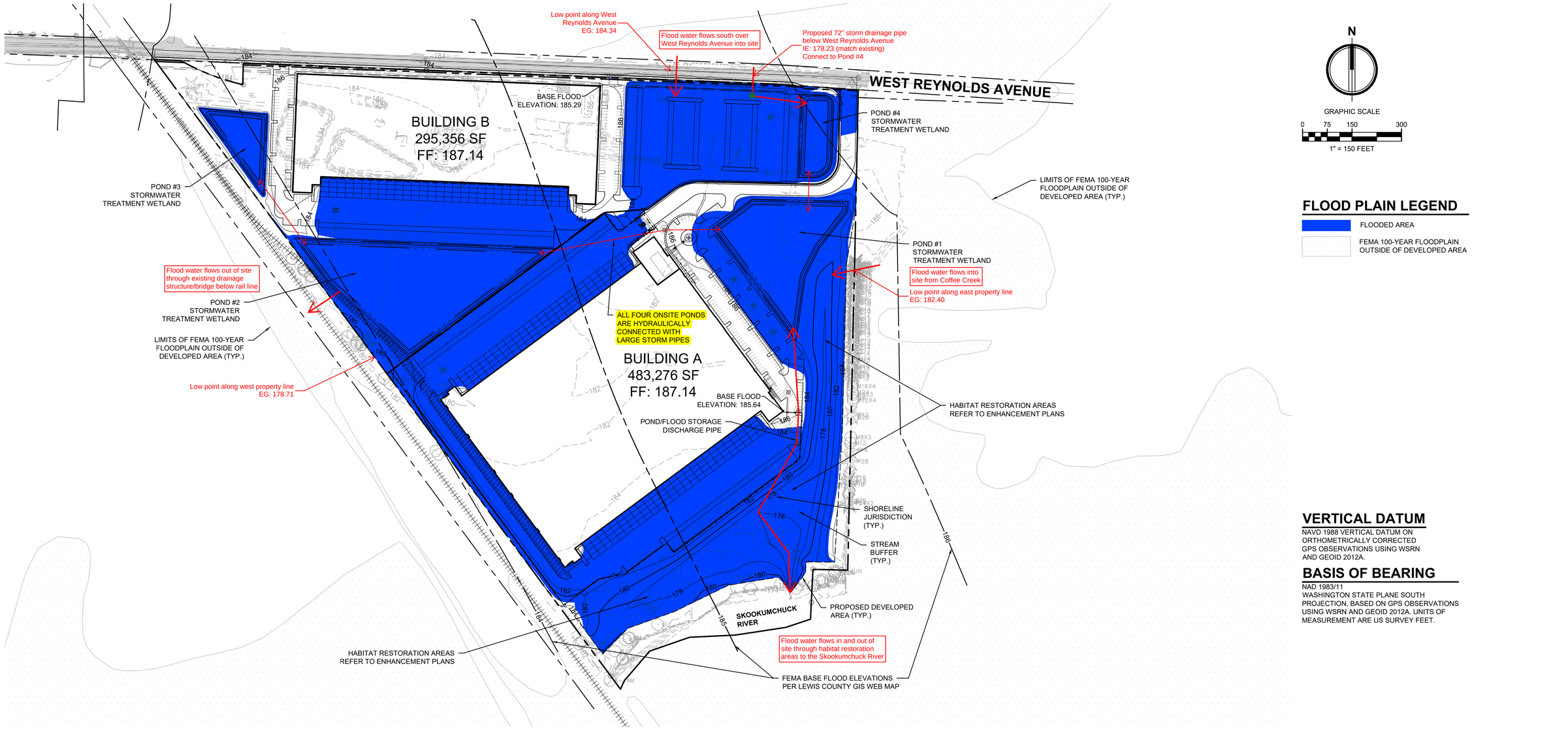
**SKOOKUMCHUCK COMMERCE CENTER**

**PROPOSED FLOOD VOLUME**
**2' BELOW BASE FLOOD ELEVATION**

JOB NO. 2210649.10
DATE: 6/23/2025

**EX-6**




## VERTICAL DATUM

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

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NAD 1983/11
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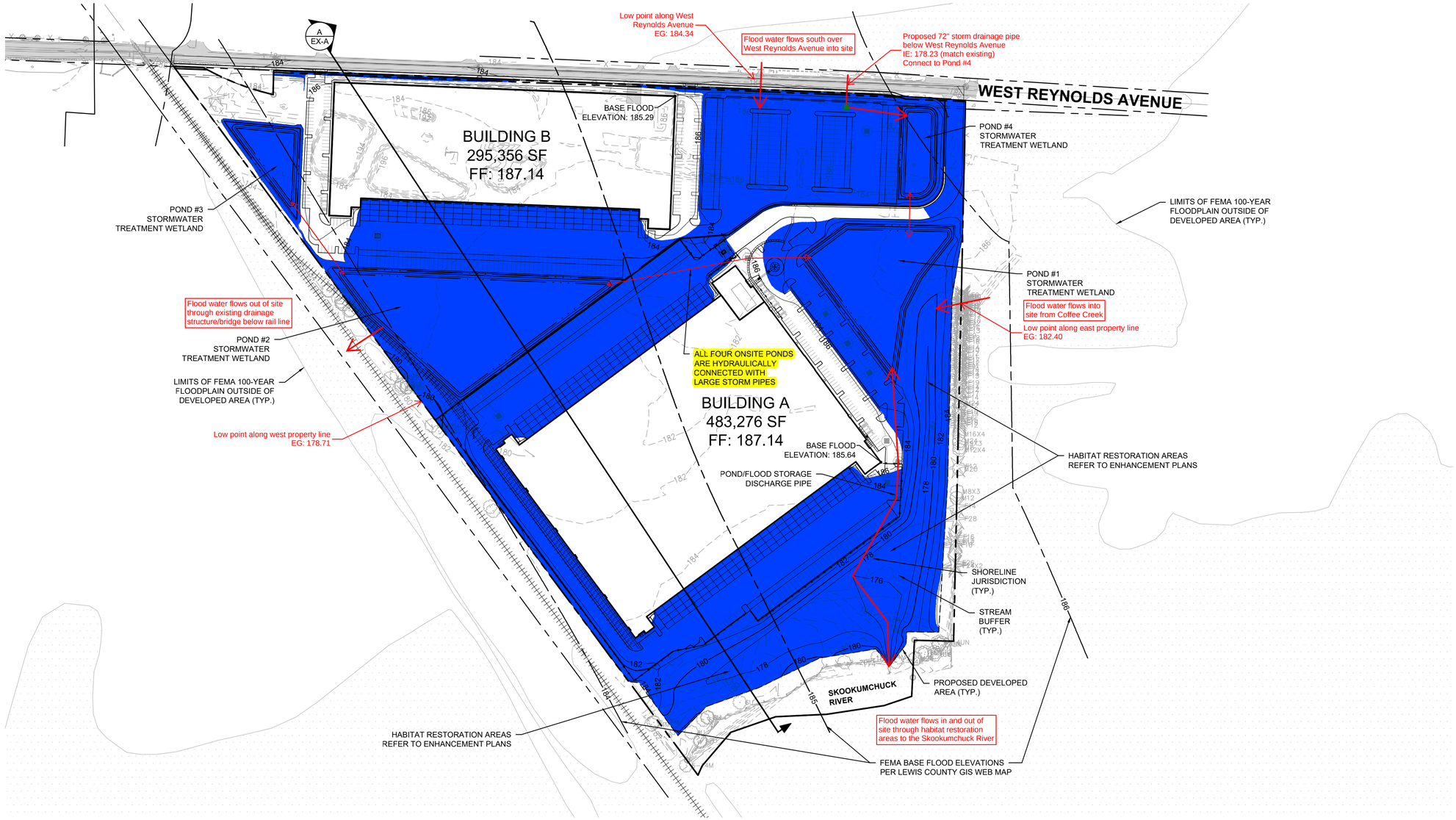
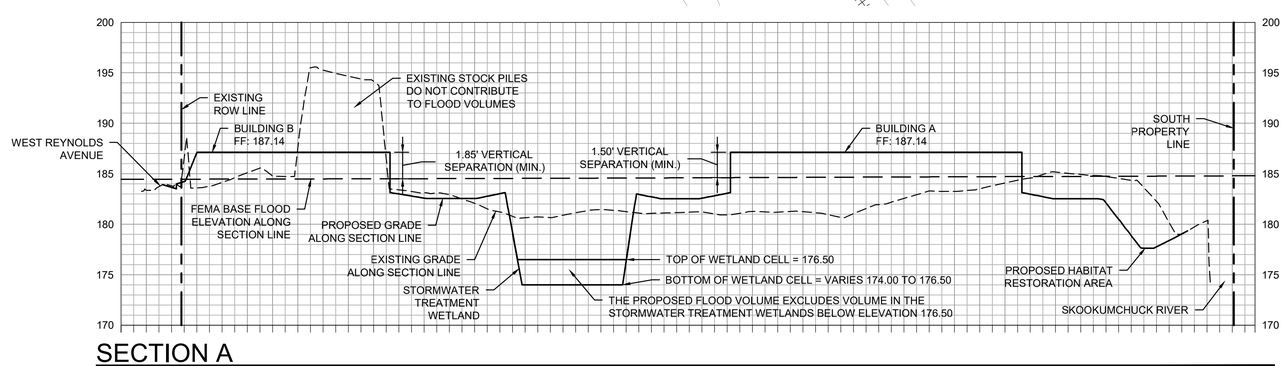
**SKOOKUMCHUCK COMMERCE CENTER**

**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

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

## BASIS OF BEARING

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

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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:*

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

*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.

# *Table of Contents*


| Section | | | Page |
|---|---|---|---|
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Terra Associates, Inc.
September 7, 2023

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**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

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# *Appendix A*

## Exhibits


A-1.....Vicinity Map
A-2.....Existing Conditions Map
A-3.....Developed Conditions Map
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A-5.....City of Centralia Zero Rise Floodplain Overlay Map
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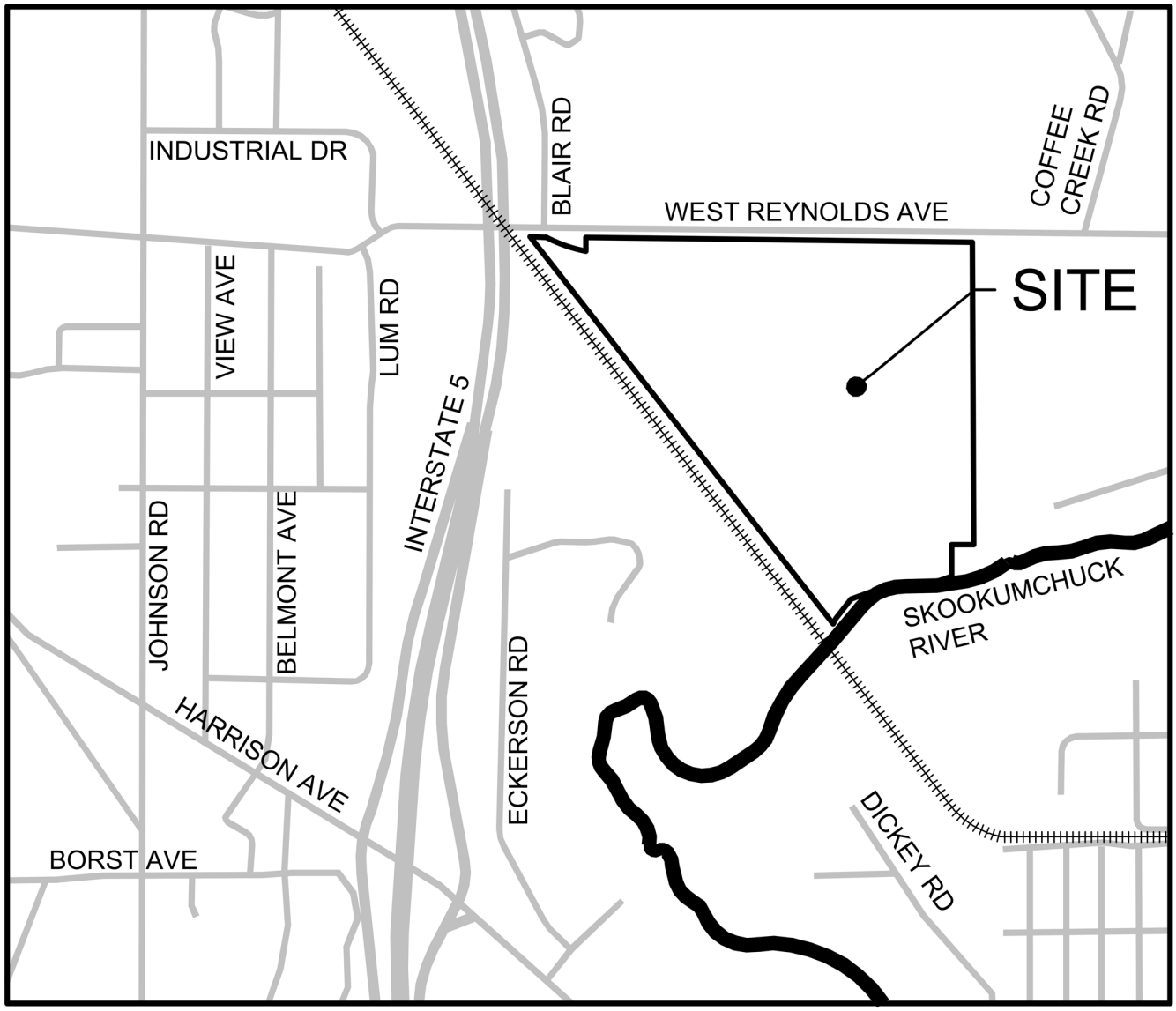
A-7.....General Stormwater Review Worksheet
A-8.....Flow Control Exempt Receiving Waters




NOT TO SCALE

AHBL

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Seattle, WA 98101
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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

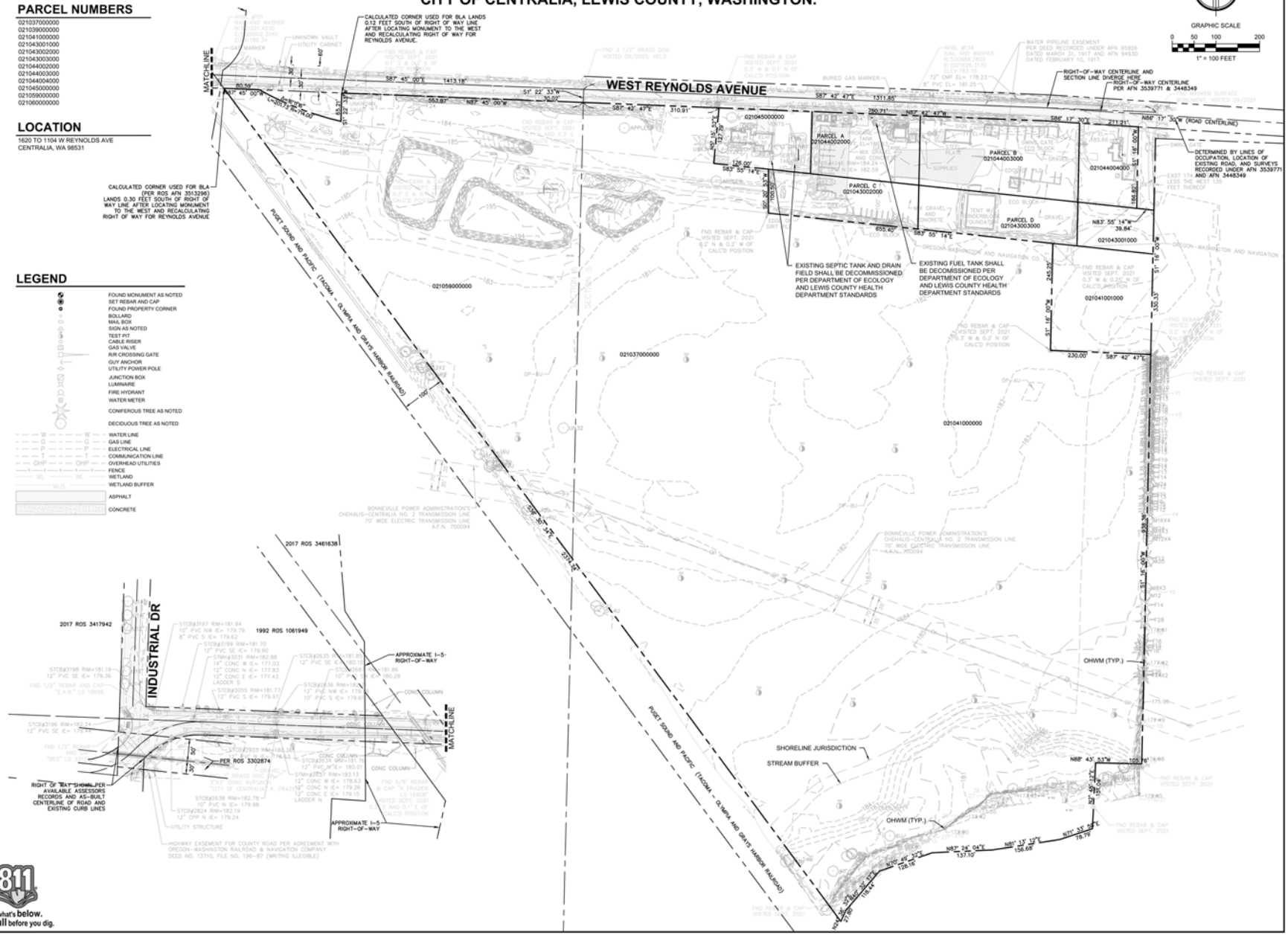
021037000000
021039000000
021041000000
021043001000
021043002000
021043003000
021044002000
021044003000
021044004000
021045000000
021059000000
021060000000

### 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
- RJR 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




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

DATE: October 2, 2023 FILENAME: Q:\2021\2210649\10_CIVICADI_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

NOTICE

Revisions:

Sheet Title:

Existing Conditions Map

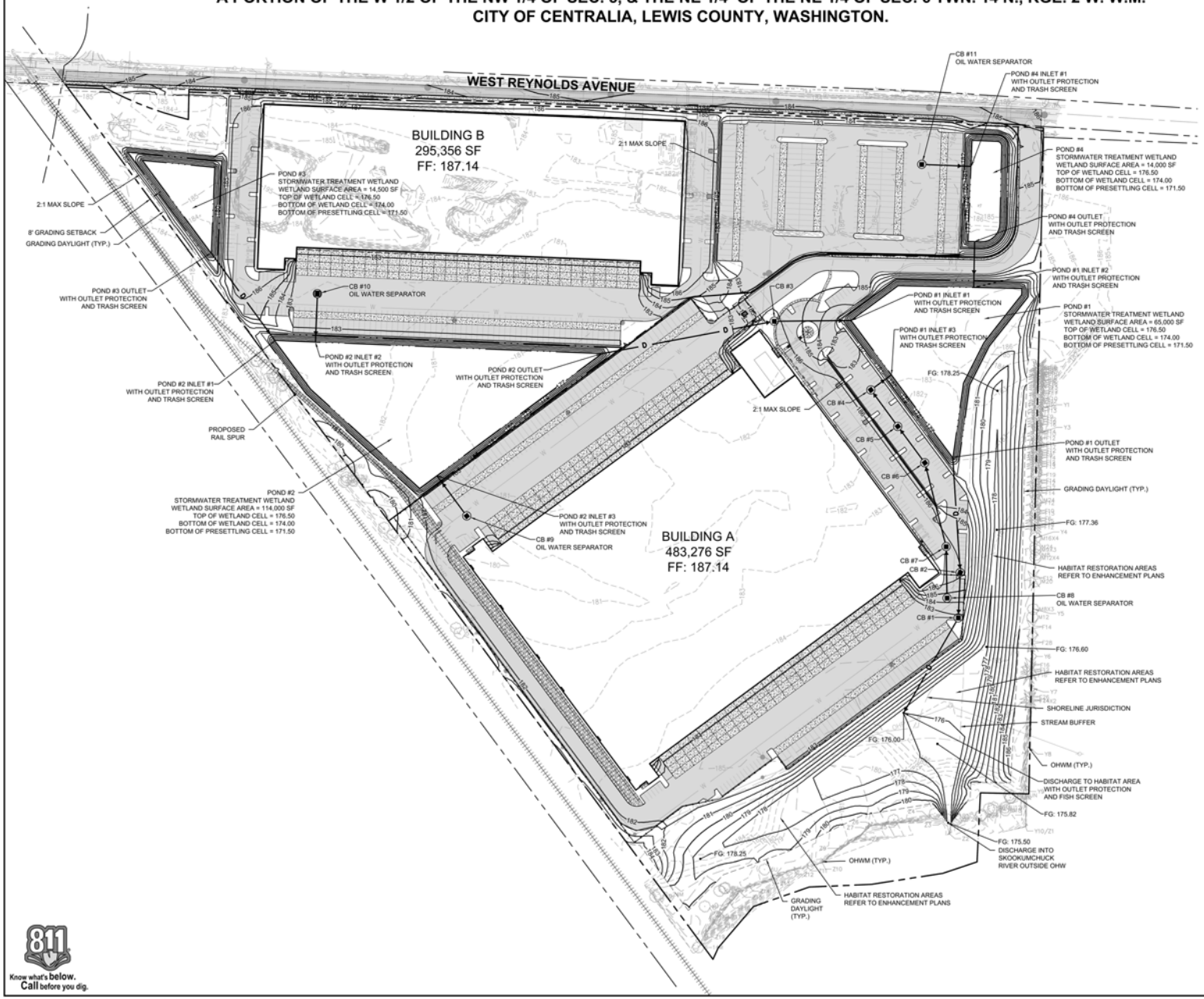
| Designed by: | Drawn by: | Checked by: |
|---|---|---|
| TDW | TDW | BEB |

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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2215 North 30th Street, Suite 300, Tacoma, WA 98403
253.383.2422 TEL 253.383.2572 FAX www.ahbl.com


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 JOHNSTAD — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

NOTICE

Revisions:

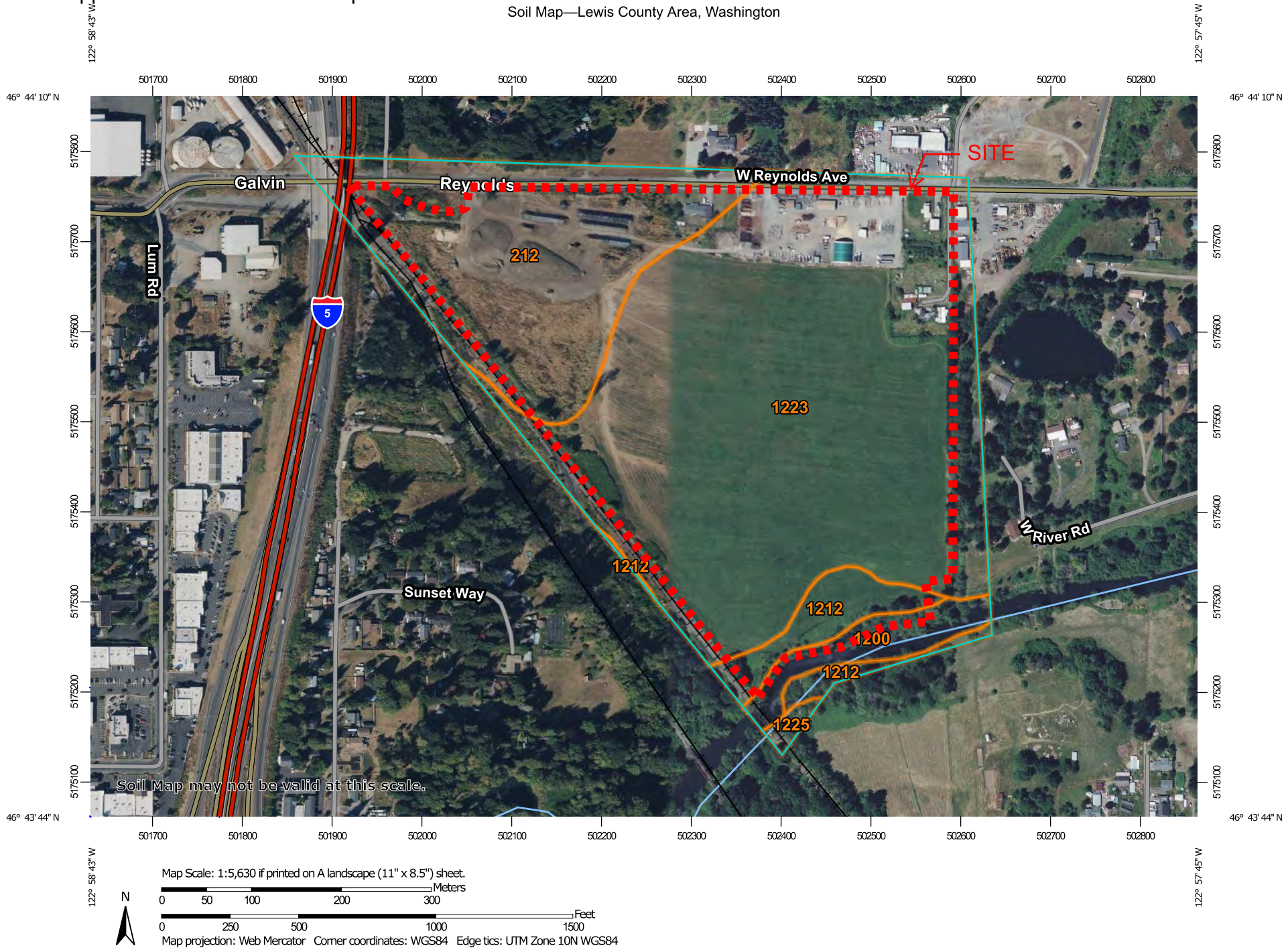
Sheet Title:
Developed Conditions Map

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

Sheet No.
Appendix A-3

# Appendix A-4 - NRCS Soil Map

Soil Map—Lewis County Area, Washington




Map Scale: 1:5,630 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

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

## MAP LEGEND

**Area of Interest (AOI)**

- Area of Interest (AOI)

**Soils**

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**

- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

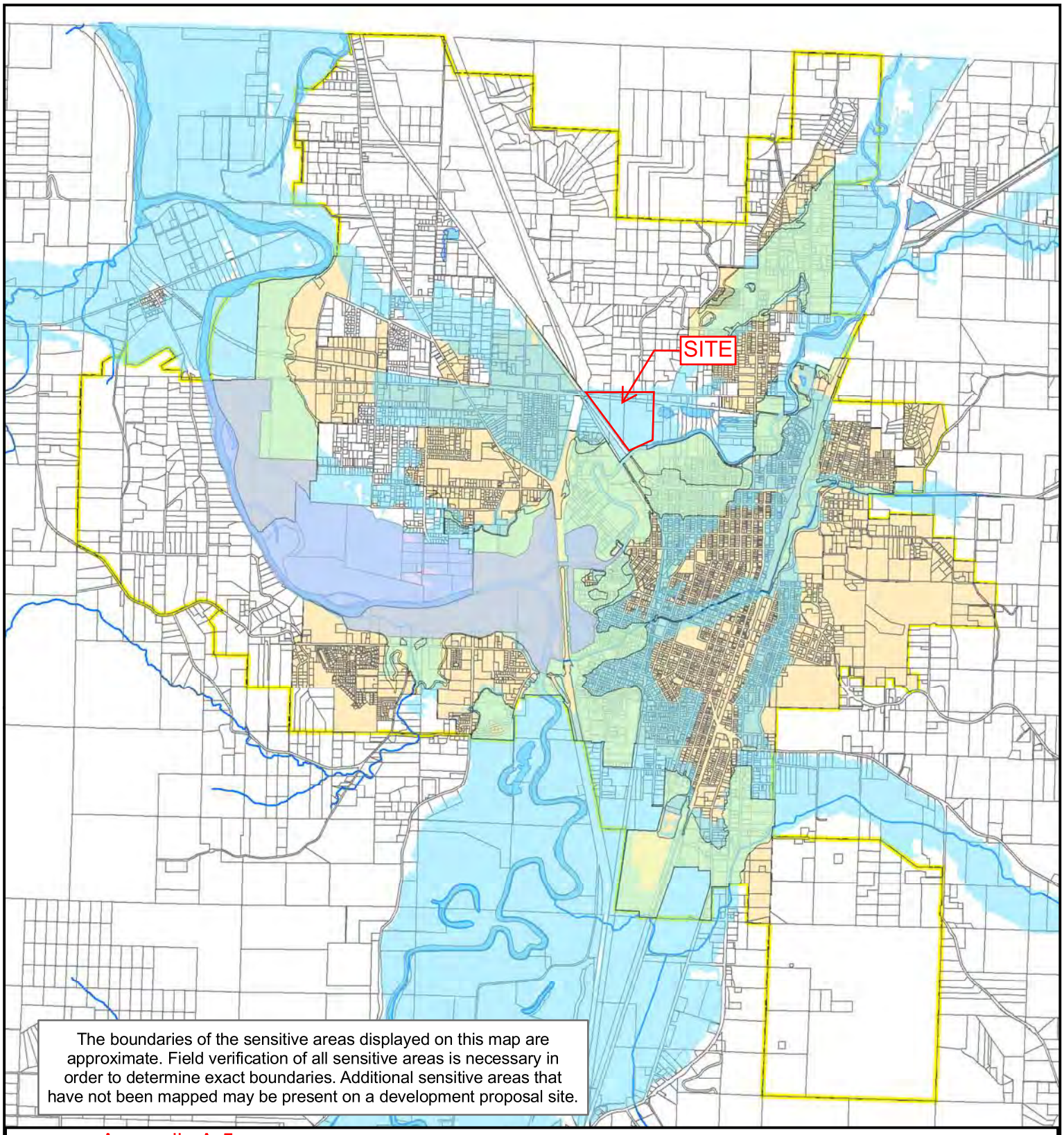
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

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

N
W E
S

0 0.2 0.4 0.8 1.2
Miles

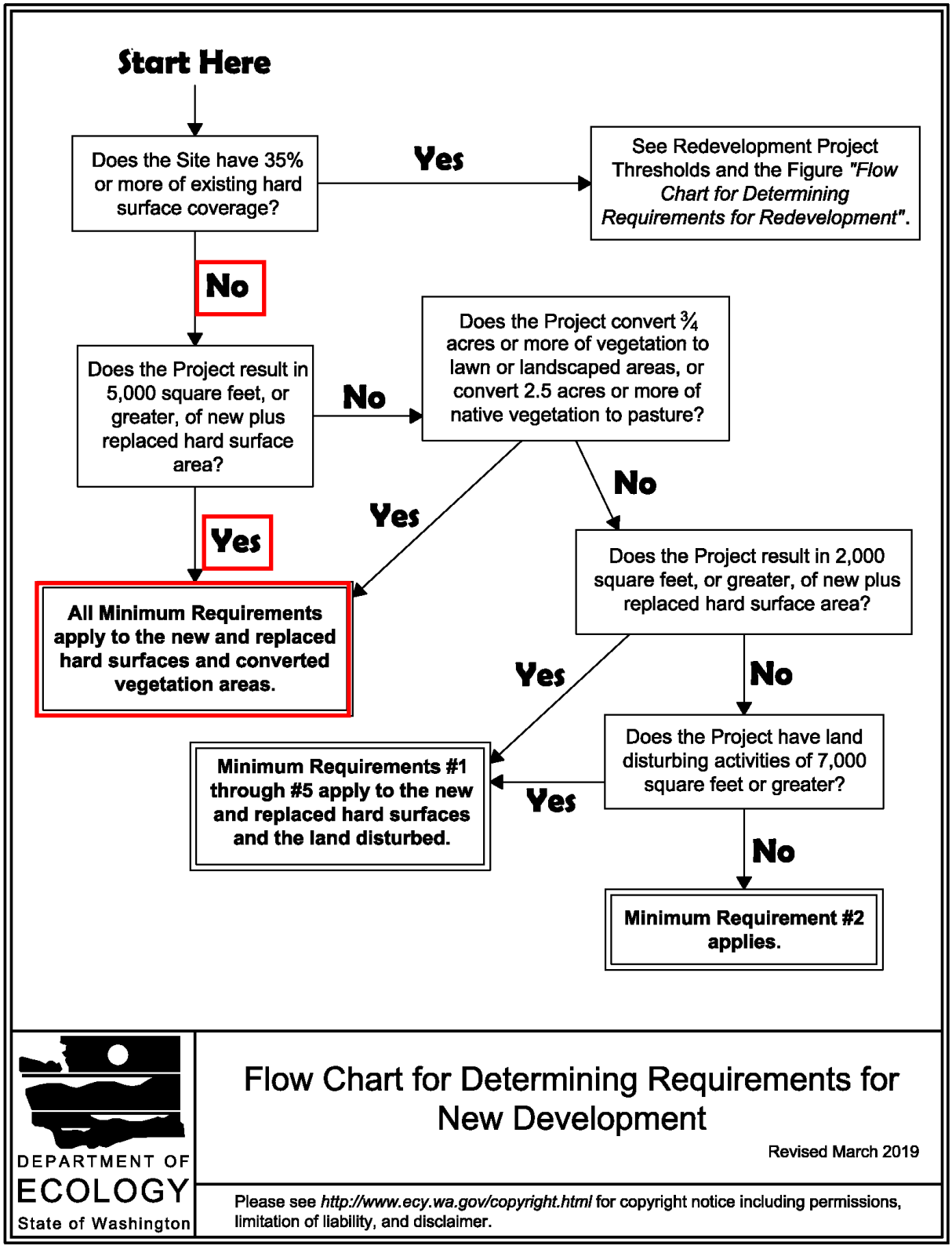
CENTRALIA
Community Development

- 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-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

# 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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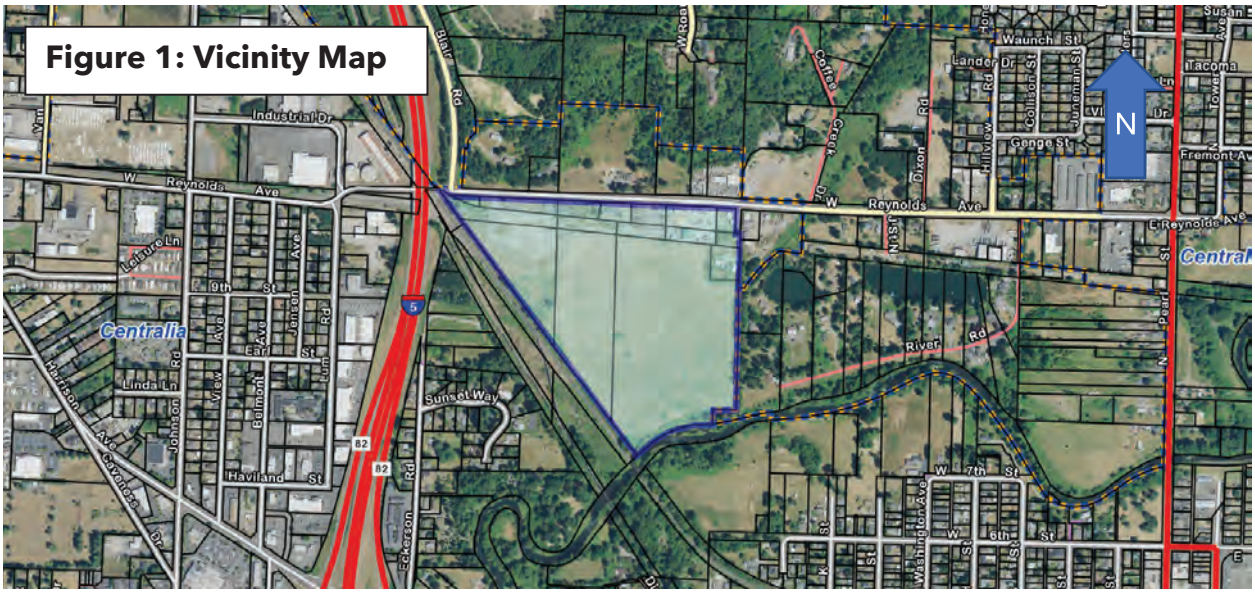
# SKOOKUMCHUCK COMMERCE
# TRAFFIC IMPACT ANALYSIS

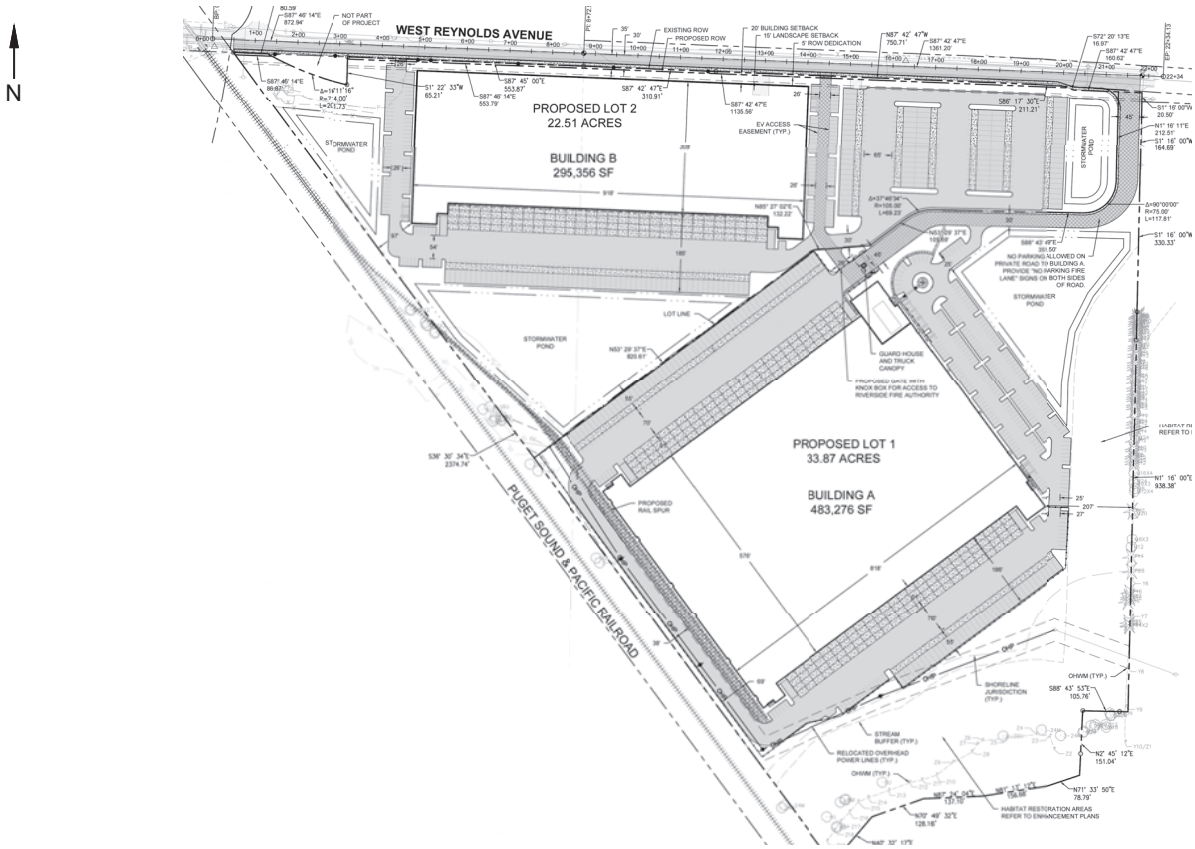
## 1. INTRODUCTION

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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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

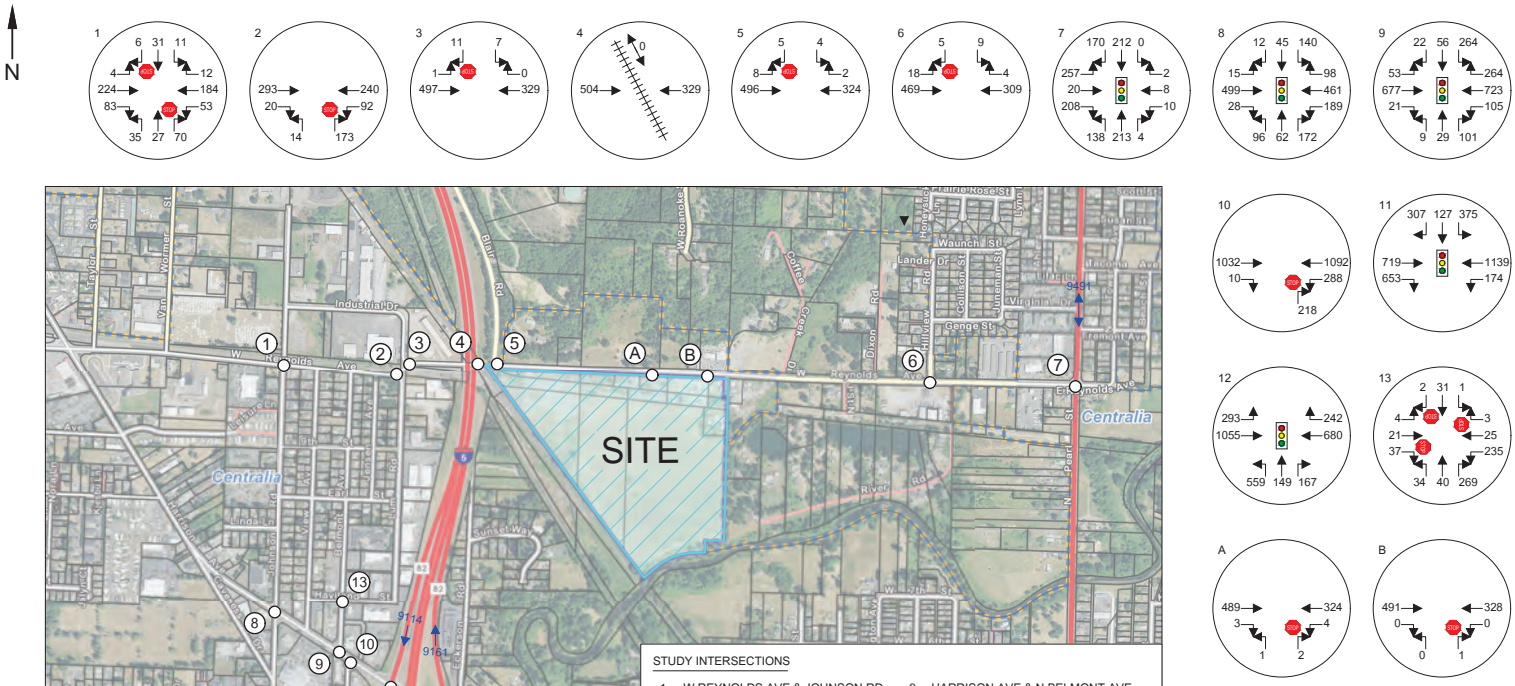
Field data for this study was collected by our firm in February of 2023. The following intersections were directed be included in analysis by the City:

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.

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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.

---

[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<br>EB R | B<br>A | 18.2<br>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).

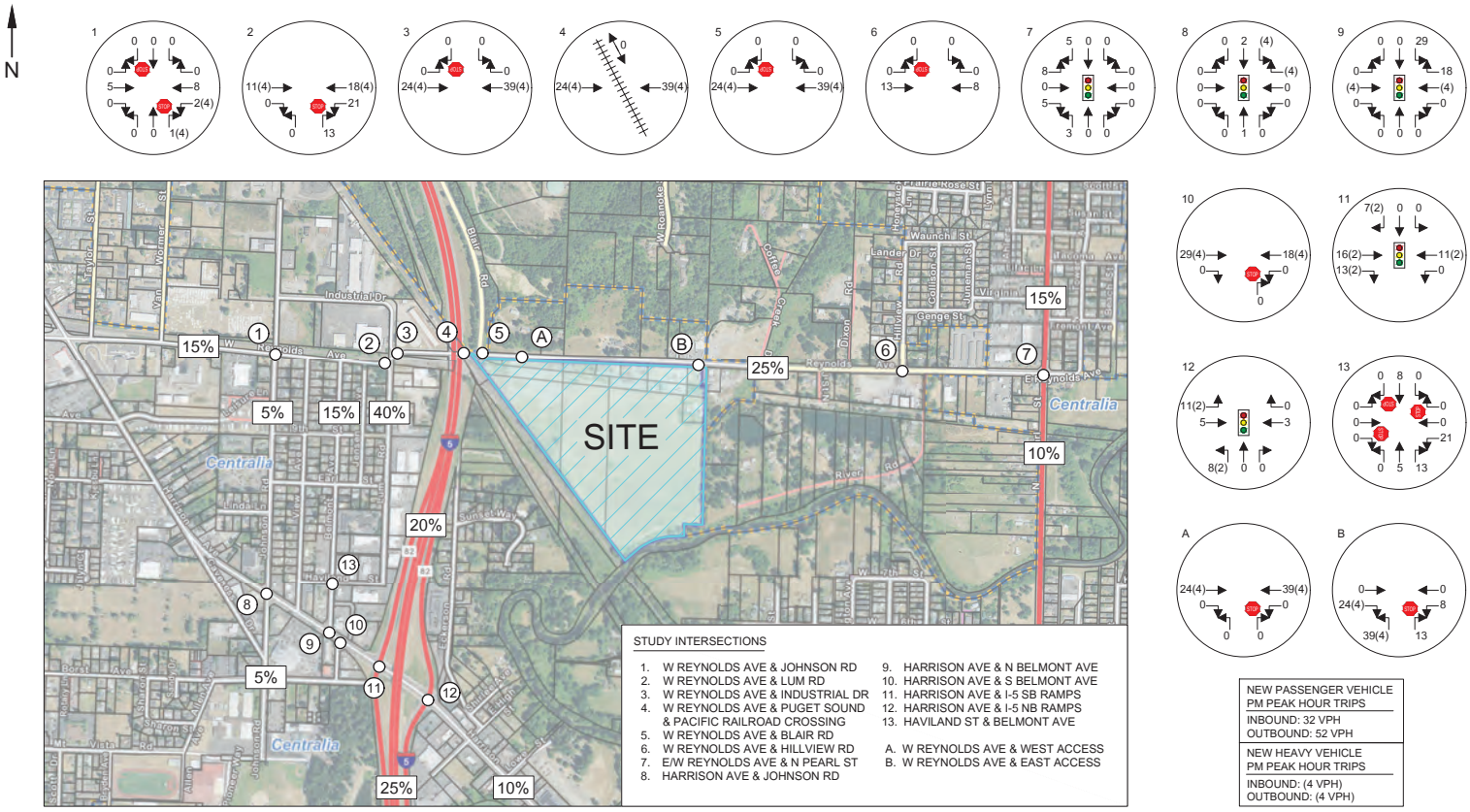
Passenger vehicles routing to the subject site to/from the south/southeast are anticipated to travel primarily via Lum Road, with a small portion of vehicles also utilizing Belmont Avenue as an alternate corridor.

## 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


N
SITE
15%
5%
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40%
20%
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25%
10%
25%
15%
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Centralia
Centralia
Centralia
W Reynolds Ave
Industrial Dr
Blair Rd
Hillview Rd
Dixon Rd
Geneva St
Waunch St
Lander Dr
Virginia St
Tacoma Ave
Fremont Ave
Harrison Ave
Sunset Way
Johnson Rd
Pearl St
Belmont Ave
Van Wormer St
Lum Rd
Linda Ln
Vista Dr
Alder Ave
Locust Ave
Maple Ave
Cedar St
Kresky Ave
Ethel St
Pacific Ave
Reynolds Ave
River Rd
Mellen St
Scenic Dr
Allen St
Pioneer Way
Johnson Rd
Honeysuckle Ln
Nelson Rd
Lyon St
Shady Ln
Tacoma Ave
Fairview Ave
Ethel St
Kresky Ave
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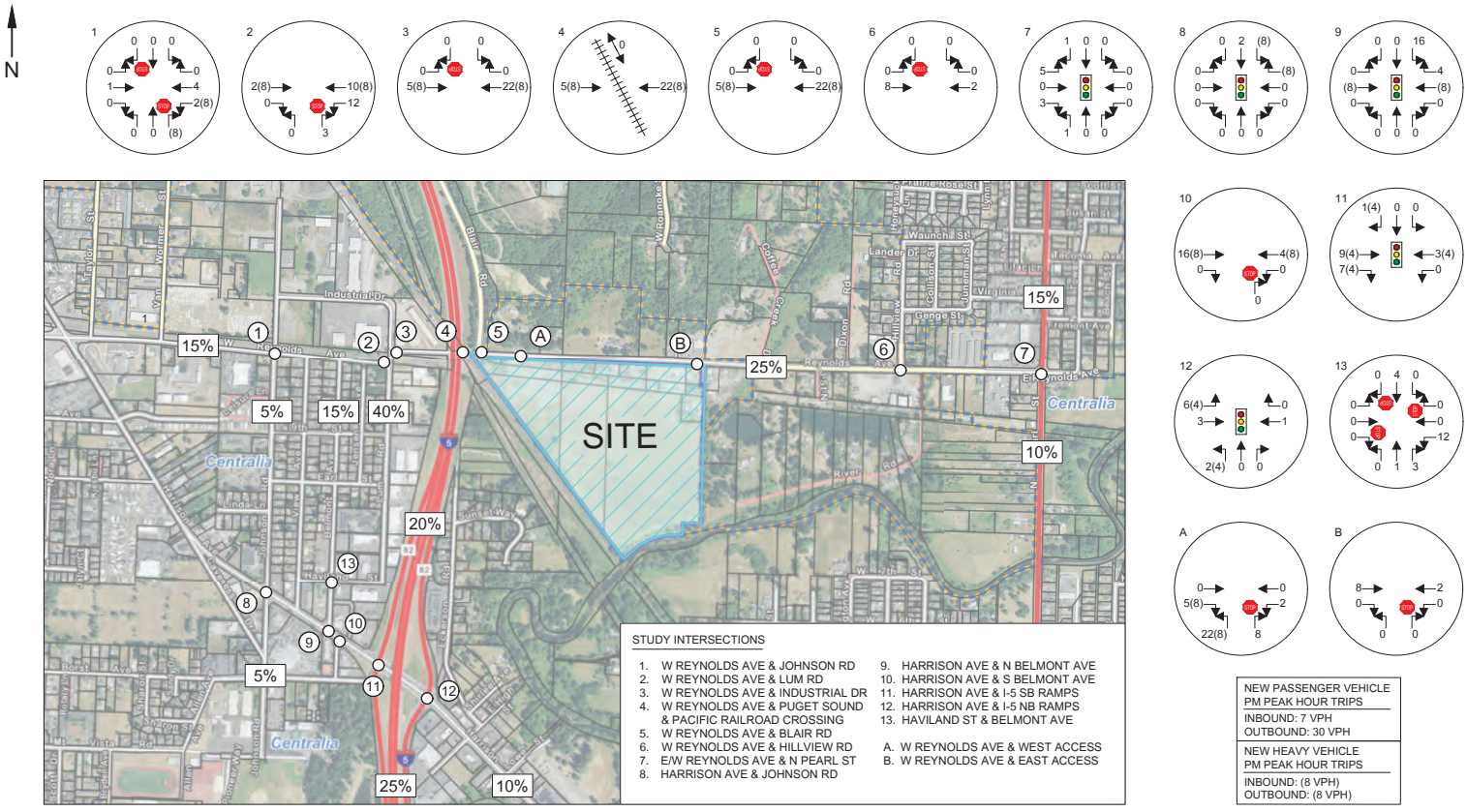


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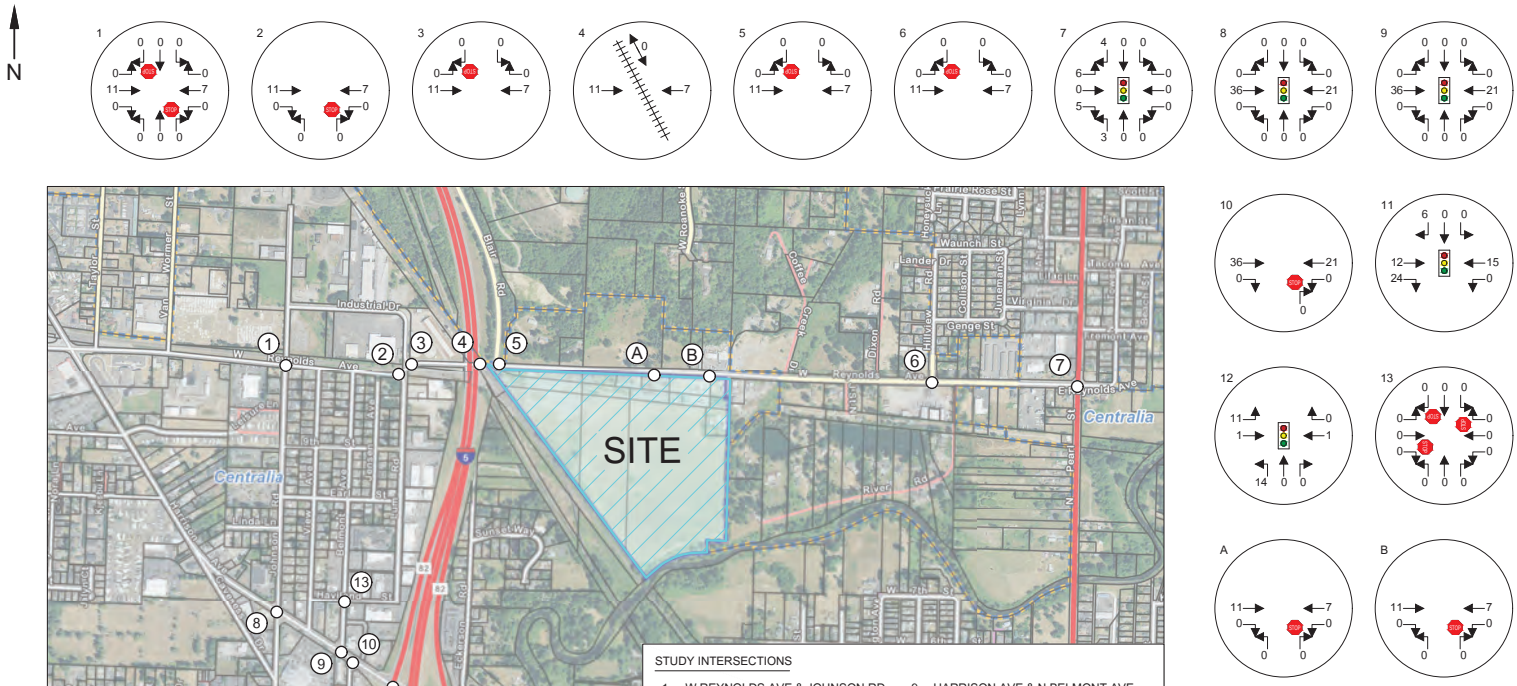
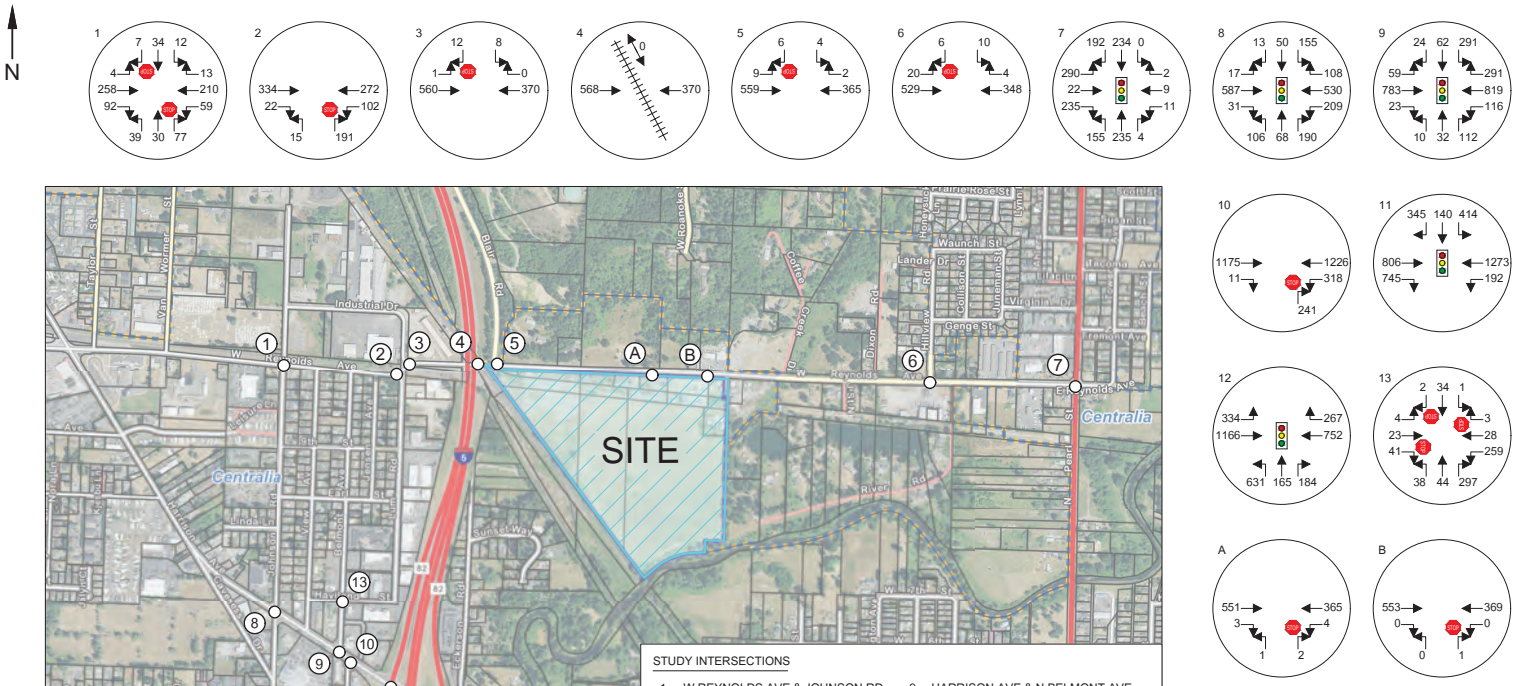
Transportation Planning & Engineering

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




HEATH&ASSOCIATES
Transportation Planning & Engineering

SKOOKUMCHUCK COMMERCE
PM PEAK HOUR PIPELINE VOLUMES
FIGURE 6

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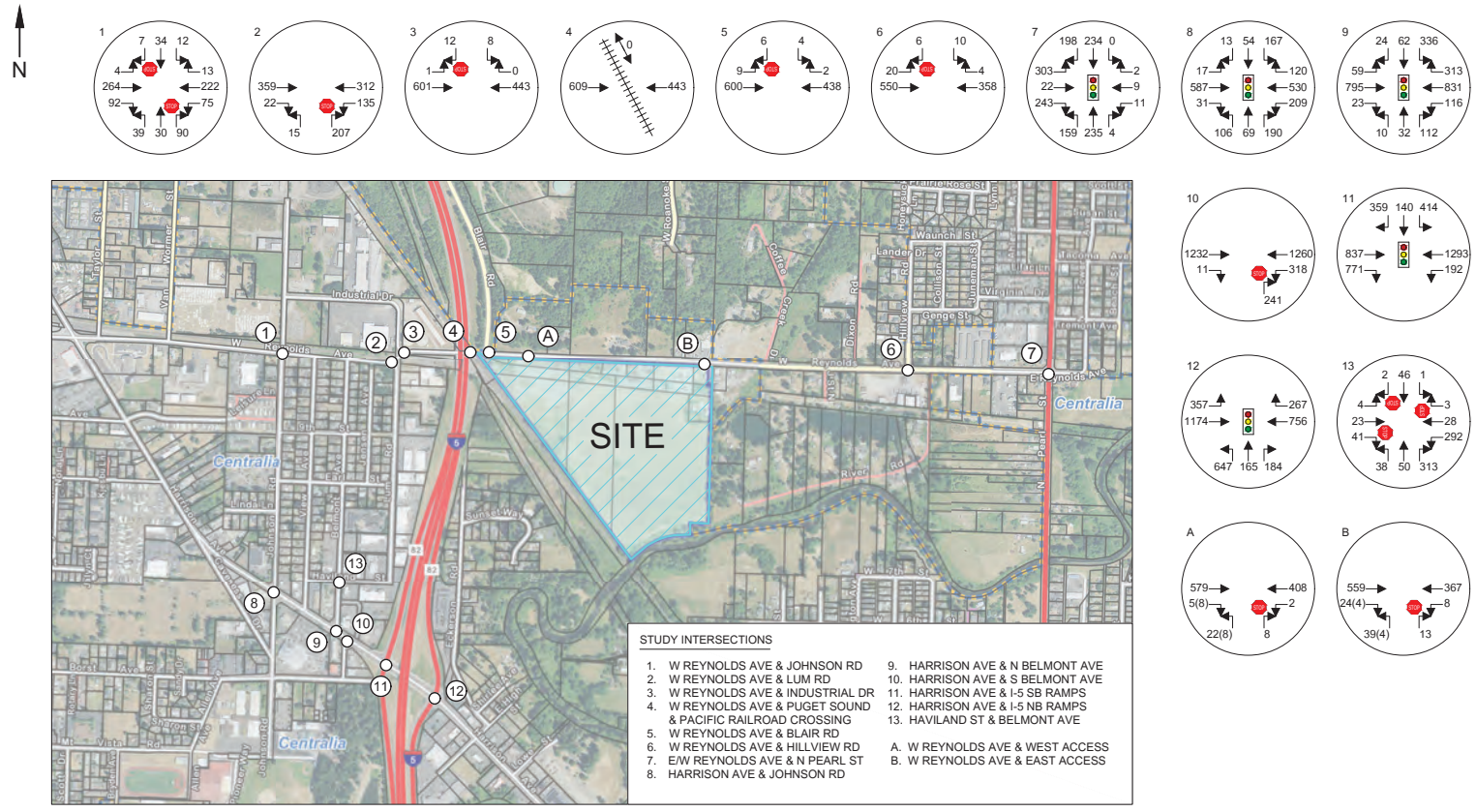
Transportation Planning & Engineering

SKOOKUMCHUCK COMMERCE
FORECAST 2028 PM PEAK HOUR BACKGROUND VOLUMES
FIGURE 7

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SKOOKUMCHUCK COMMERCE
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<br>EB R | C<br>A | 20.0<br>9.0 | C<br>B | 20.7<br>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

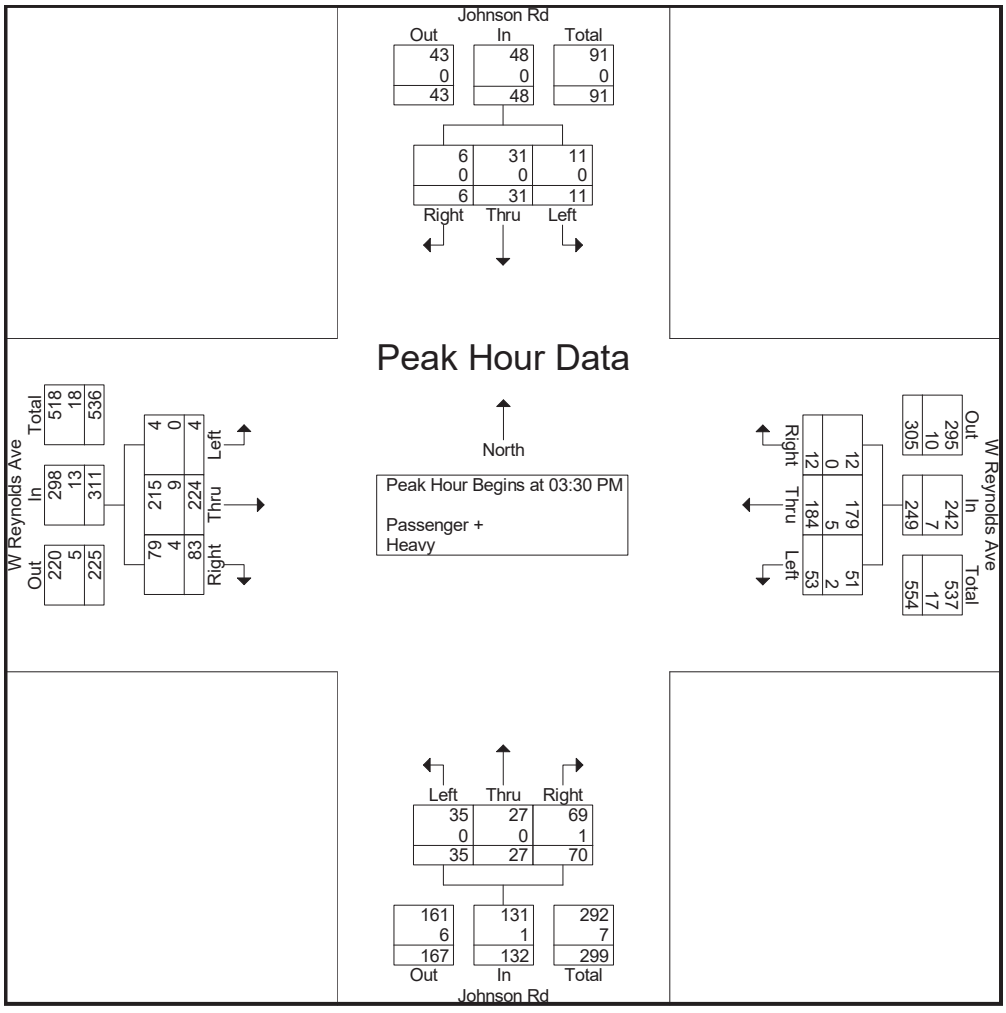
| | Johnson Rd Southbound | | | | W Reynolds Ave Westbound | | | | Johnson Rd Northbound | | | | W Reynolds Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | 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 |

# Heath & Associates

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

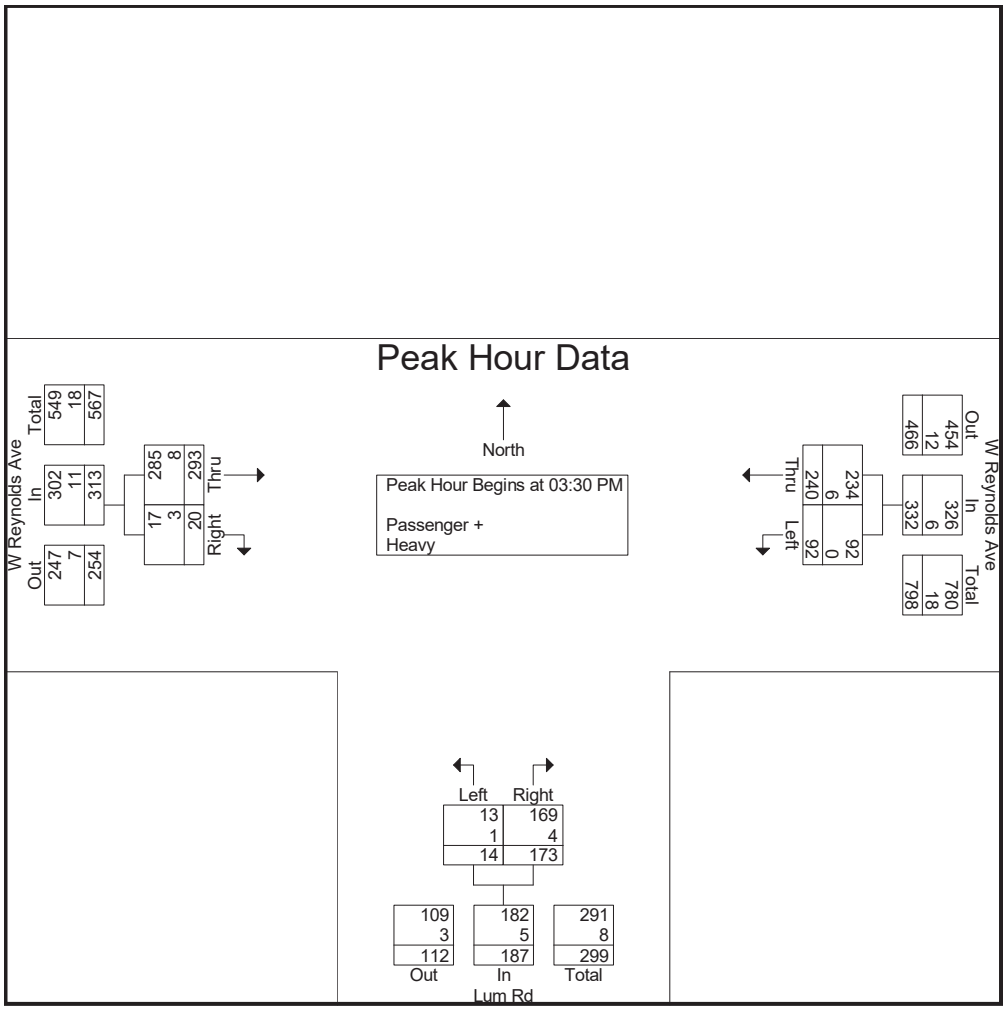
| | W Reynolds Ave Westbound | | | Lum Rd Northbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Left | App. Total | Right | Left | App. Total | Right | Thru | App. Total | Int. Total |
| 03:30 PM | 77 | 21 | 98 | 33 | 4 | 37 | 5 | 88 | 93 | 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 |

# Heath & Associates

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

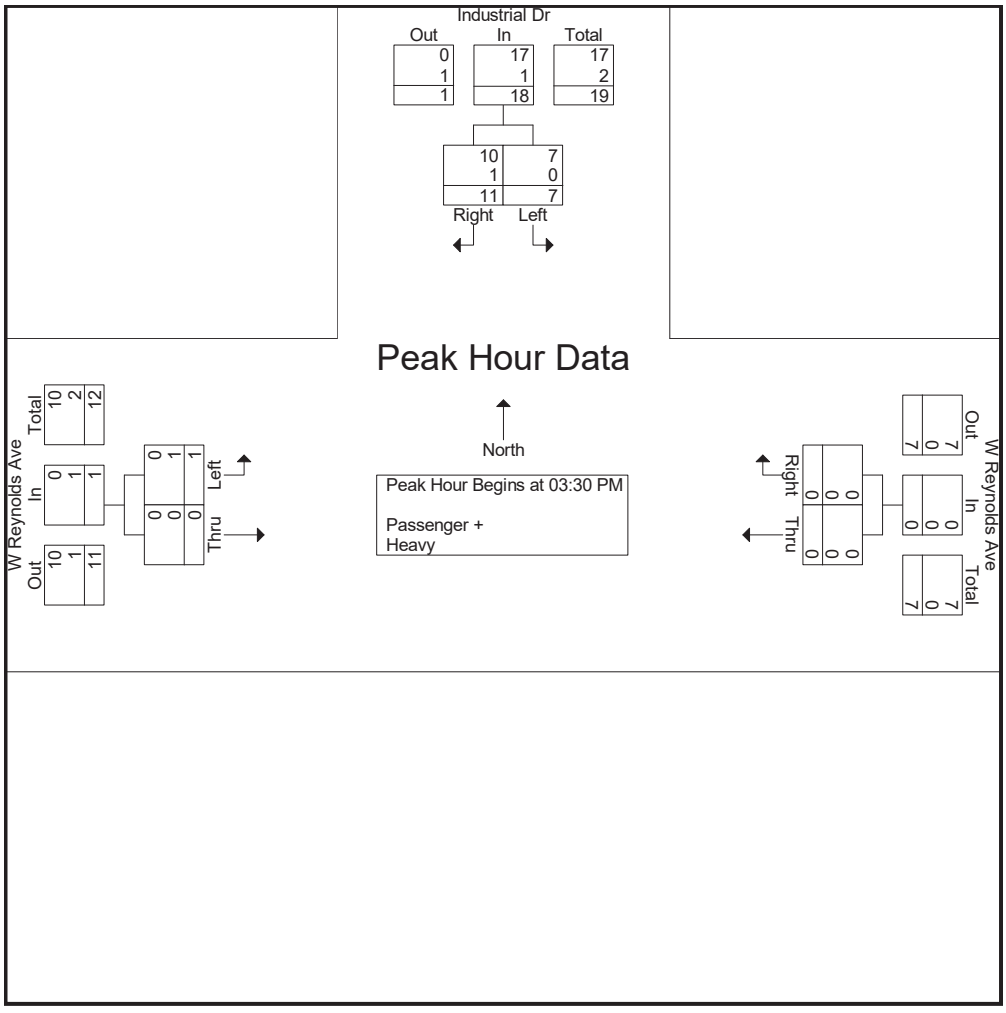
| | Industrial Dr Southbound | | | W Reynolds Ave Westbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Left | App. Total | Right | Thru | App. Total | Thru | Left | App. Total | Int. Total |
| 03:30 PM | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 1 | 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 |

# Heath & Associates

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

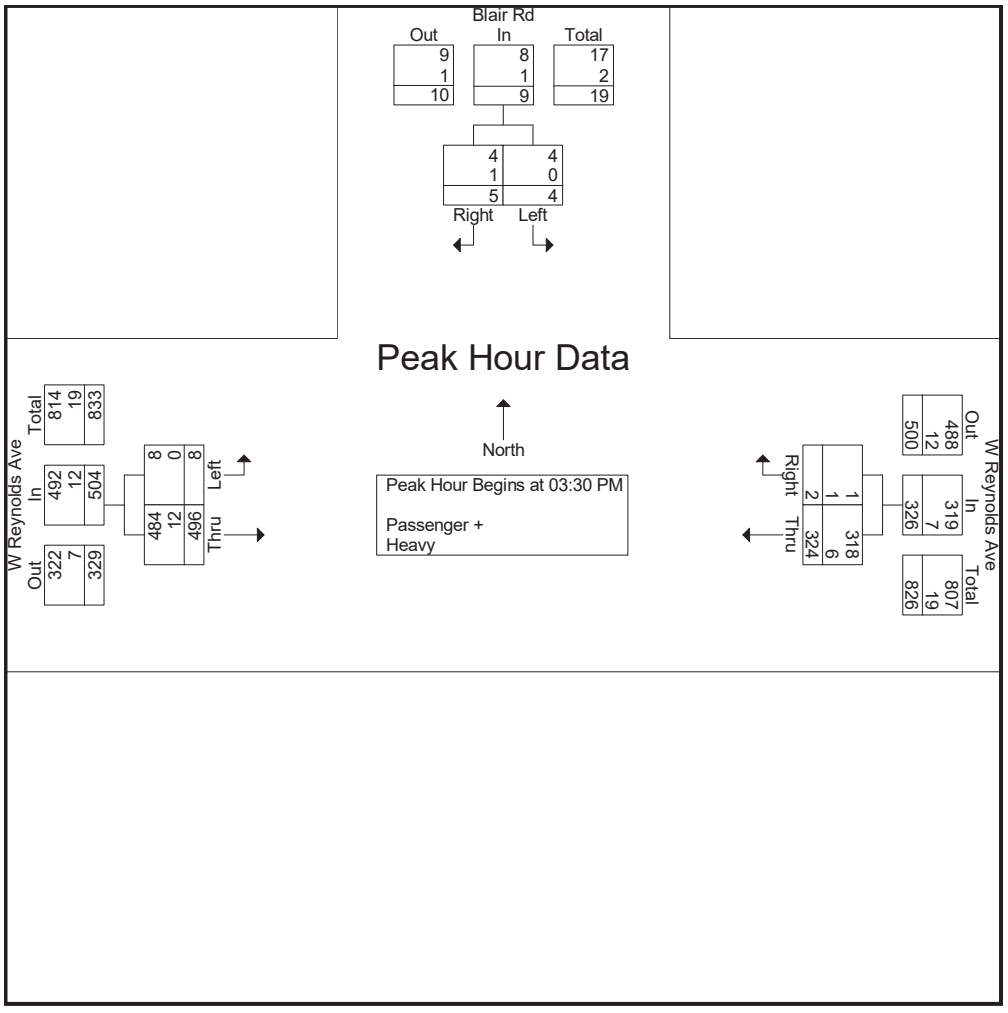
| | Blair Rd Southbound | | | W Reynolds Ave Westbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Left | App. Total | Right | Thru | App. Total | Thru | Left | App. Total | Int. Total |
| 03:30 PM | 2 | 1 | 3 | 1 | 91 | 92 | 137 | 1 | 138 | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

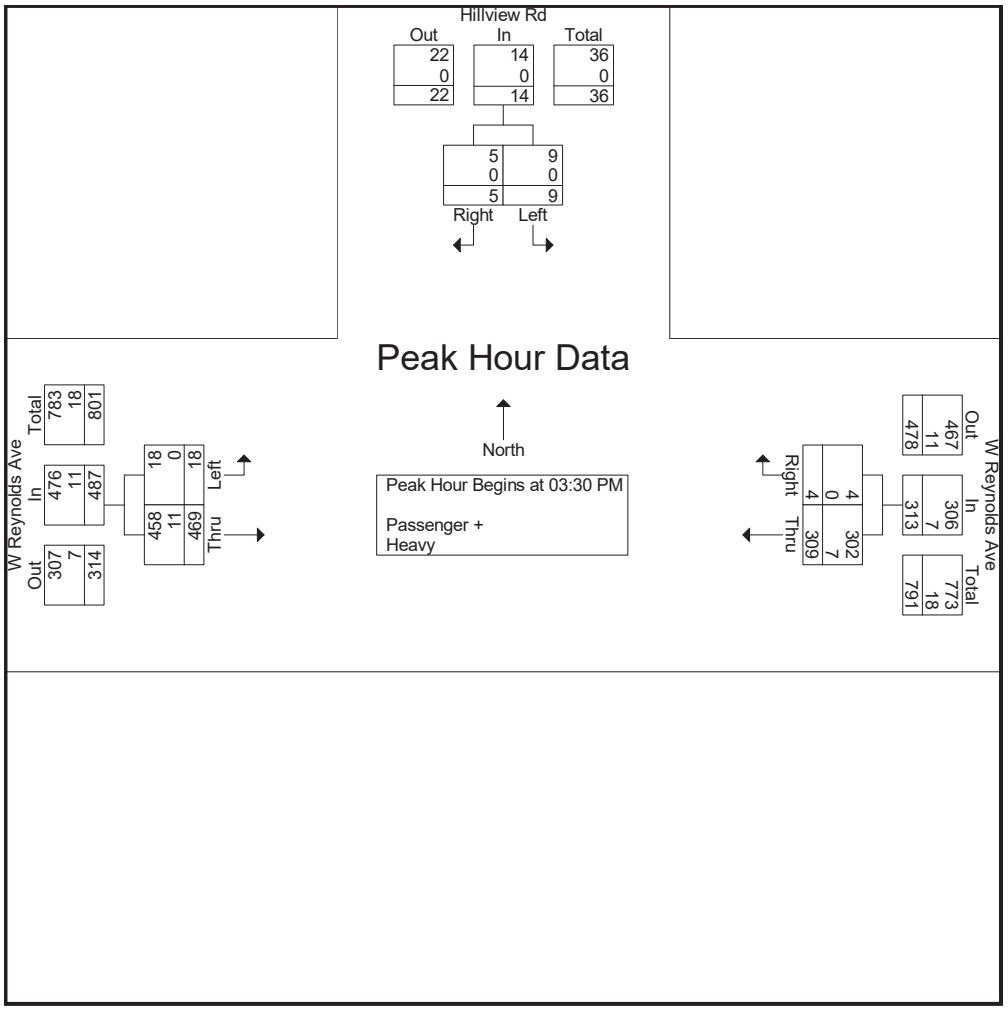
| | Hillview Rd Southbound | | | W Reynolds Ave Westbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Left | App. Total | Right | Thru | App. Total | Thru | Left | App. Total | Int. Total |
| 03:30 PM | 0 | 4 | 4 | 3 | 96 | 99 | 133 | 3 | 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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

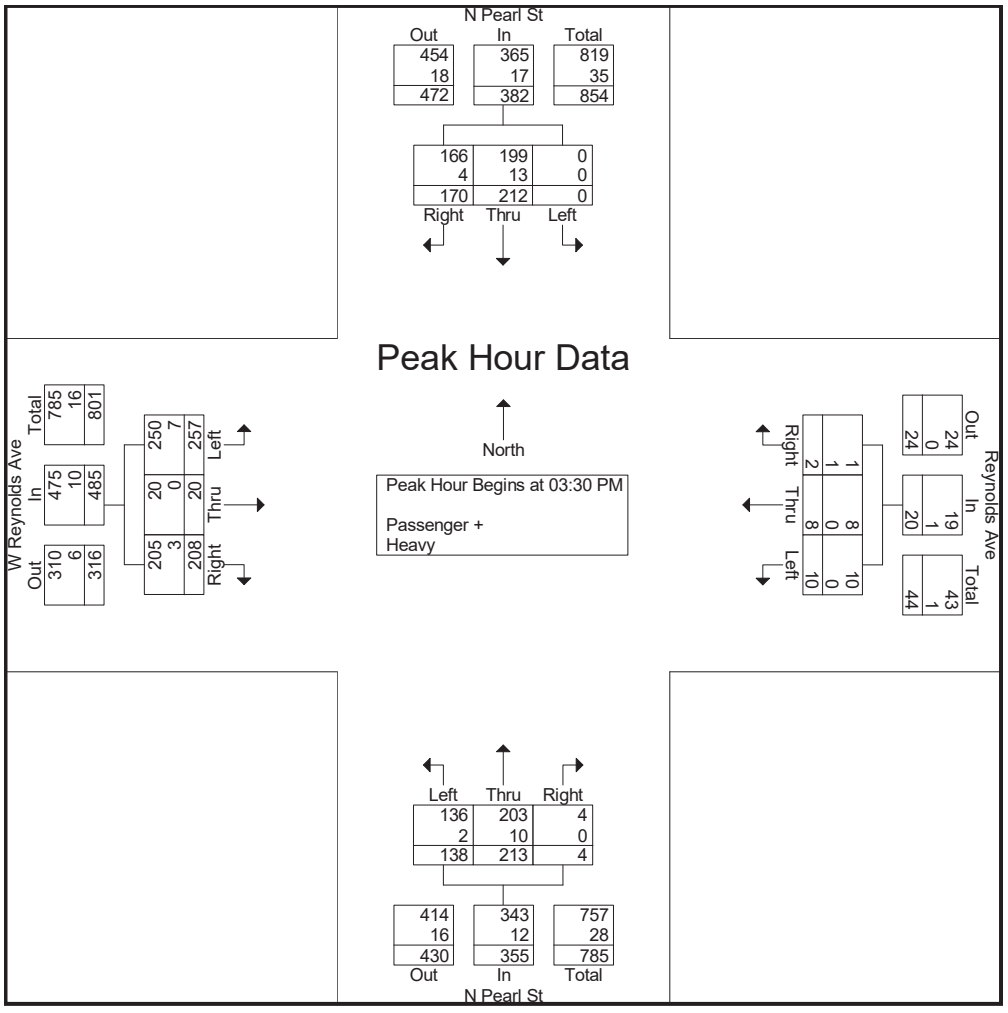
| | N Pearl St Southbound | | | | Reynolds Ave Westbound | | | | N Pearl St Northbound | | | | W Reynolds Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | 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 |

# Heath & Associates

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

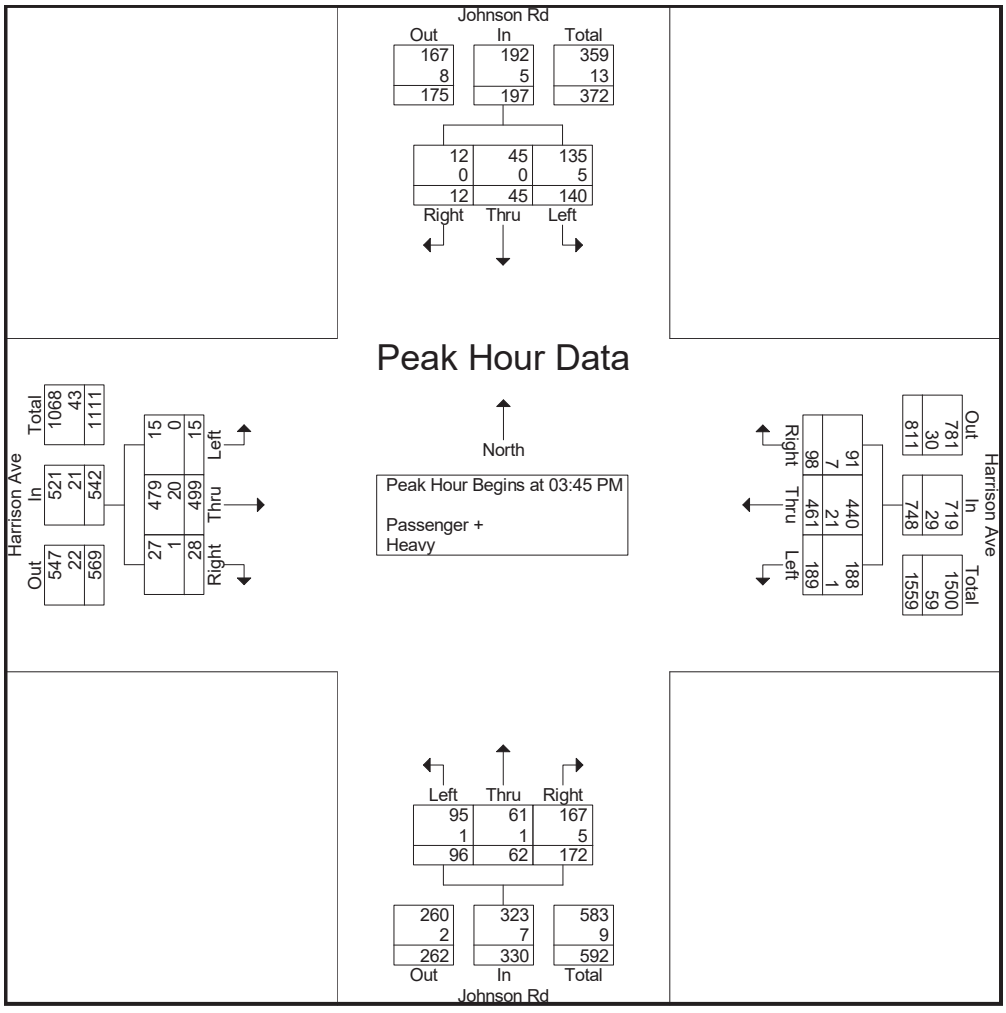
| | Johnson Rd Southbound | | | | Harrison Ave Westbound | | | | Johnson Rd Northbound | | | | Harrison Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

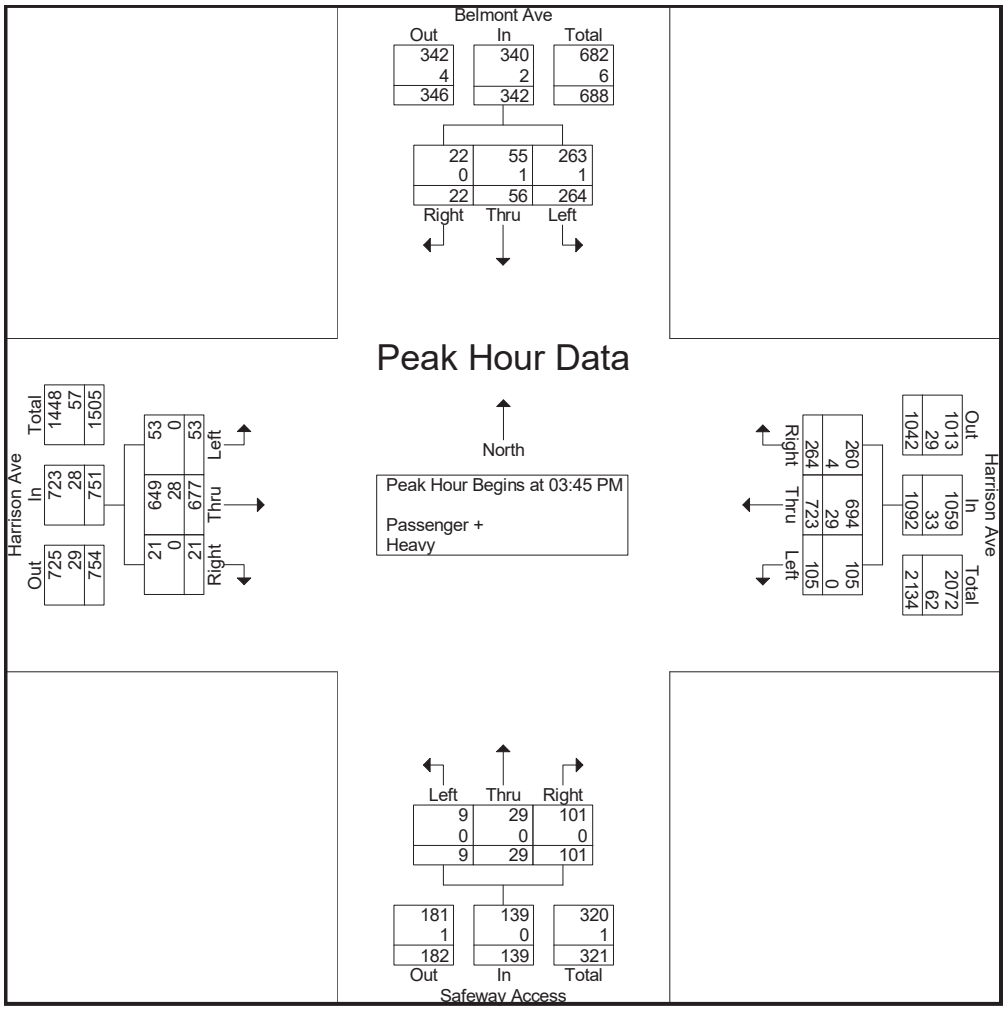
| | Belmont Ave Southbound | | | | Harrison Ave Westbound | | | | Safeway Access Northbound | | | | Harrison Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

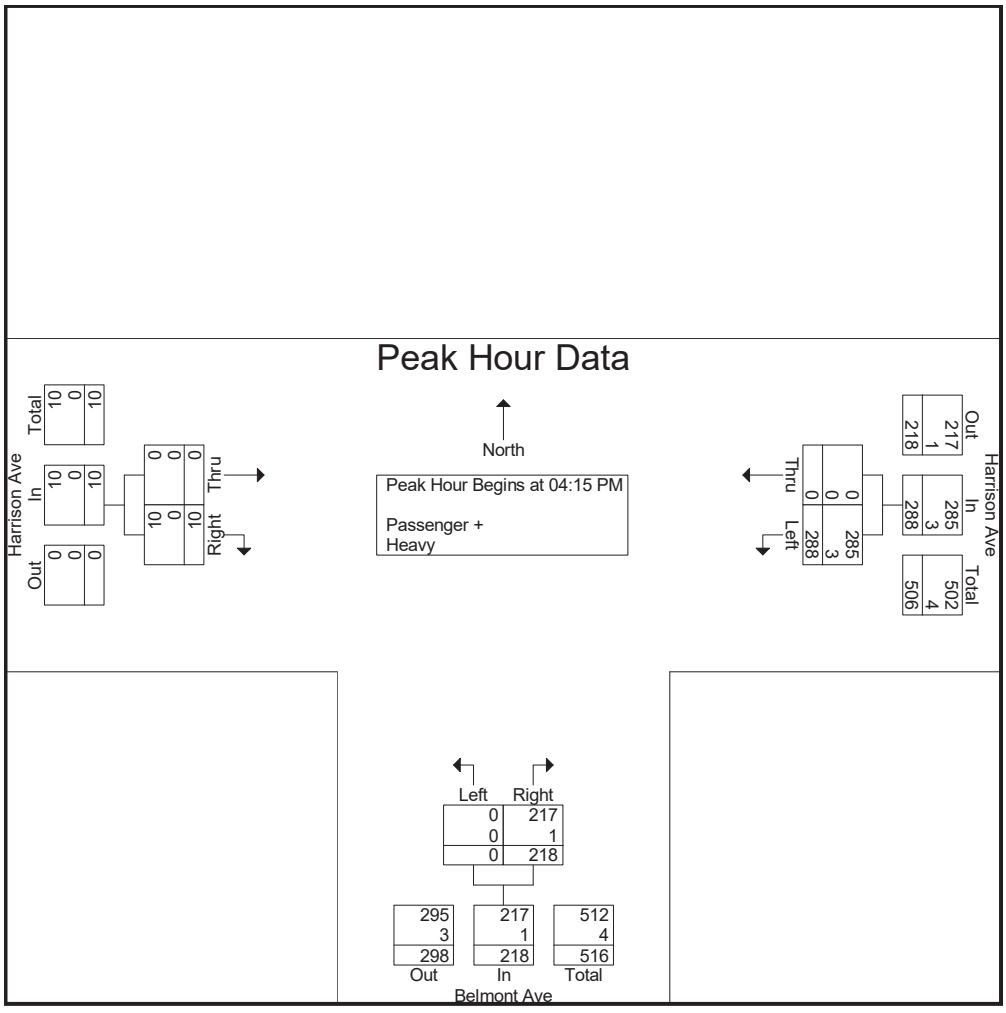
| | Harrison Ave Westbound | | | Belmont Ave Northbound | | | Harrison Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Left | App. Total | Right | Left | App. Total | Right | Thru | App. Total | Int. Total |
| 03:30 PM | 0 | 48 | 48 | 41 | 0 | 41 | 3 | 0 | 3 | 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 |

# Heath & Associates

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

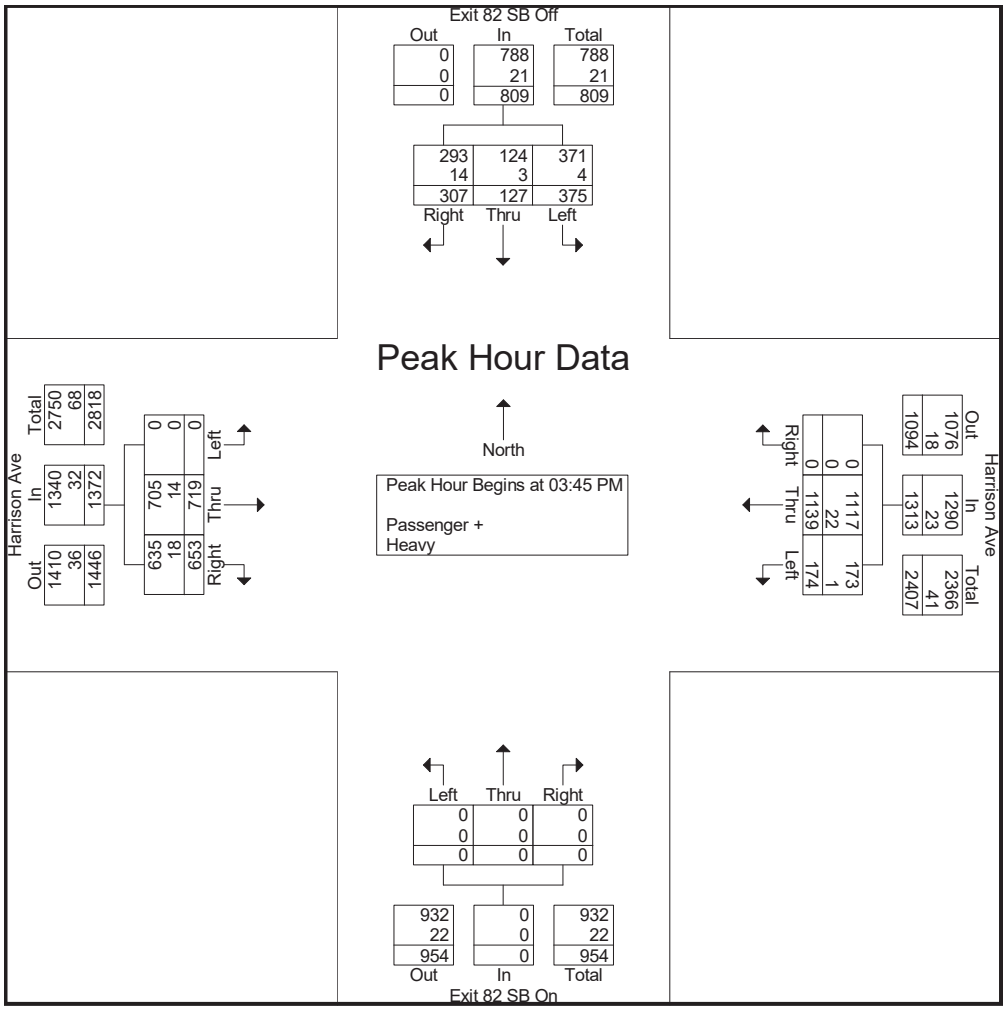
| | Exit 82 SB Off Southbound | | | | Harrison Ave Westbound | | | | Exit 82 SB On Northbound | | | | Harrison Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

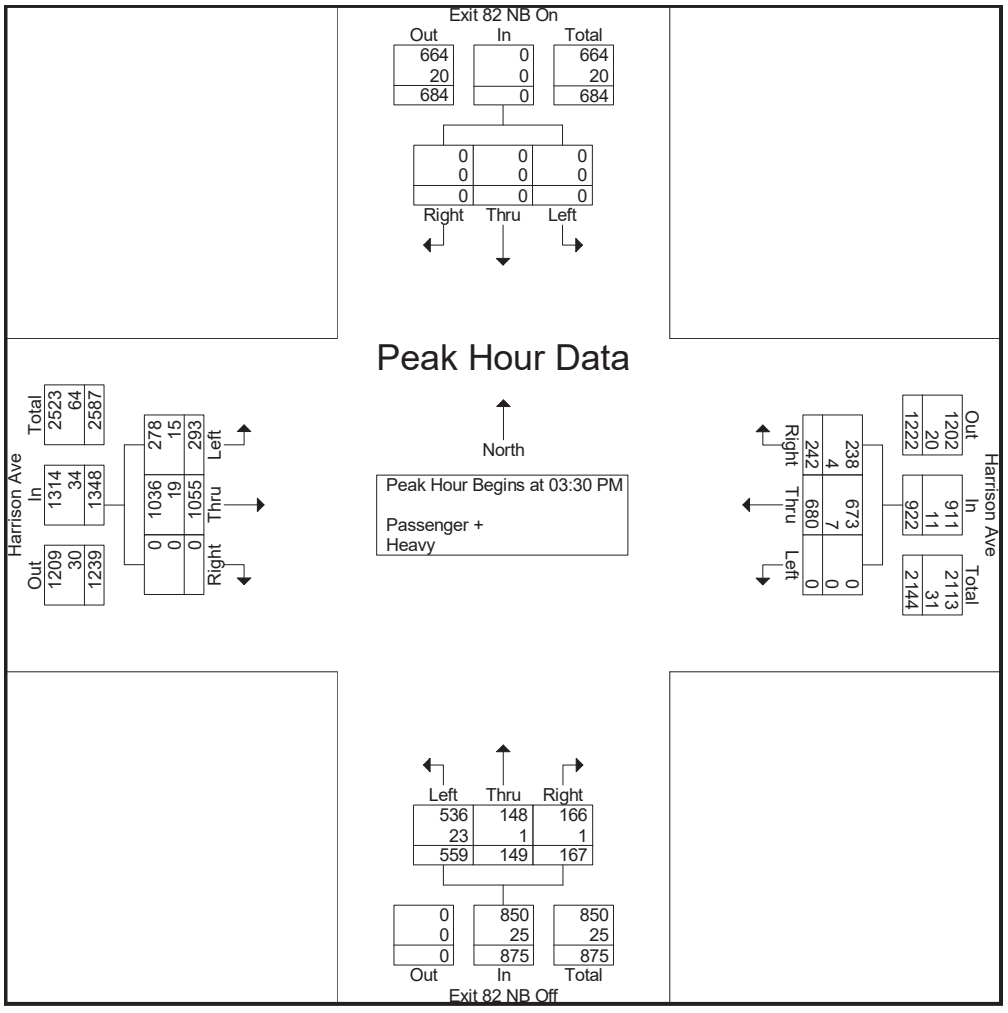
| | Exit 82 NB On Southbound | | | | Harrison Ave Westbound | | | | Exit 82 NB Off Northbound | | | | Harrison Ave Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

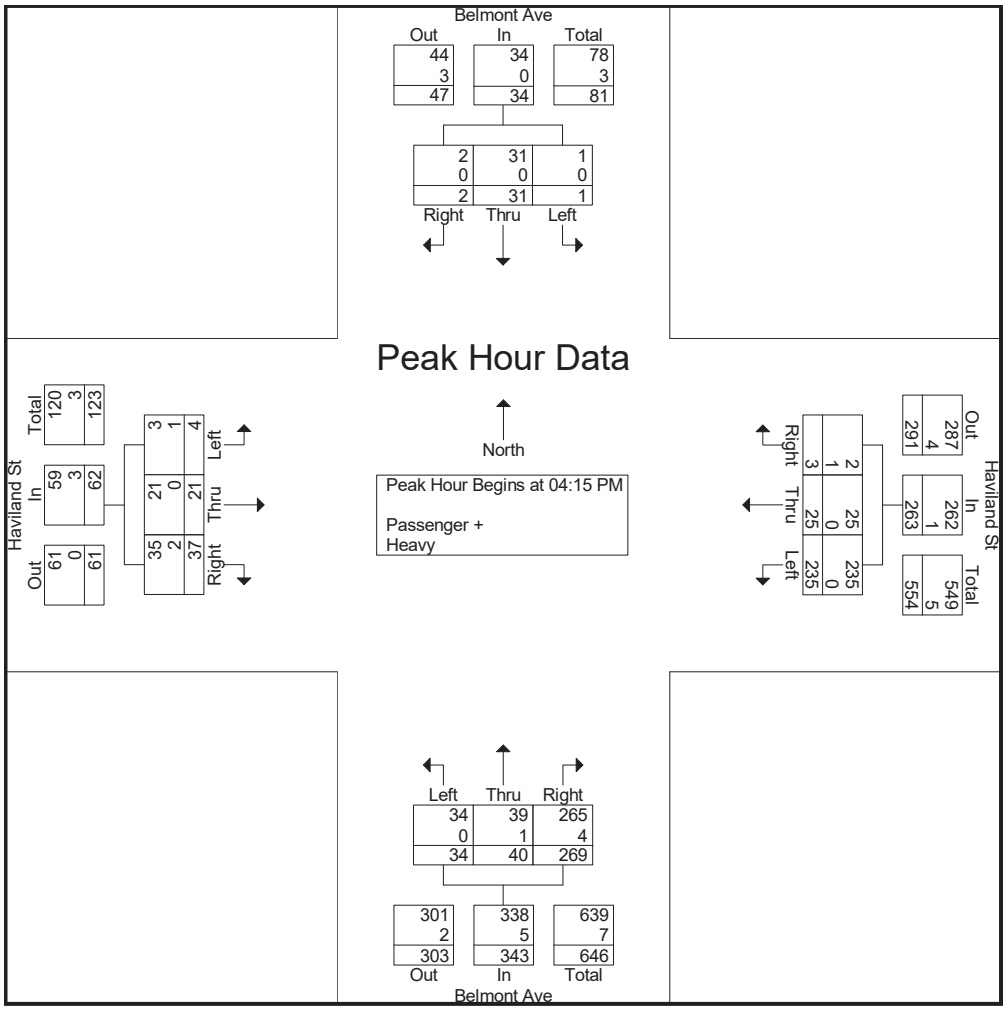
| | Belmont Ave Southbound | | | | Haviland St Westbound | | | | Belmont Ave Northbound | | | | Haviland St Eastbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Right | Thru | Left | App. Total | Right | Thru | Left | App. Total | Right | Thru | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

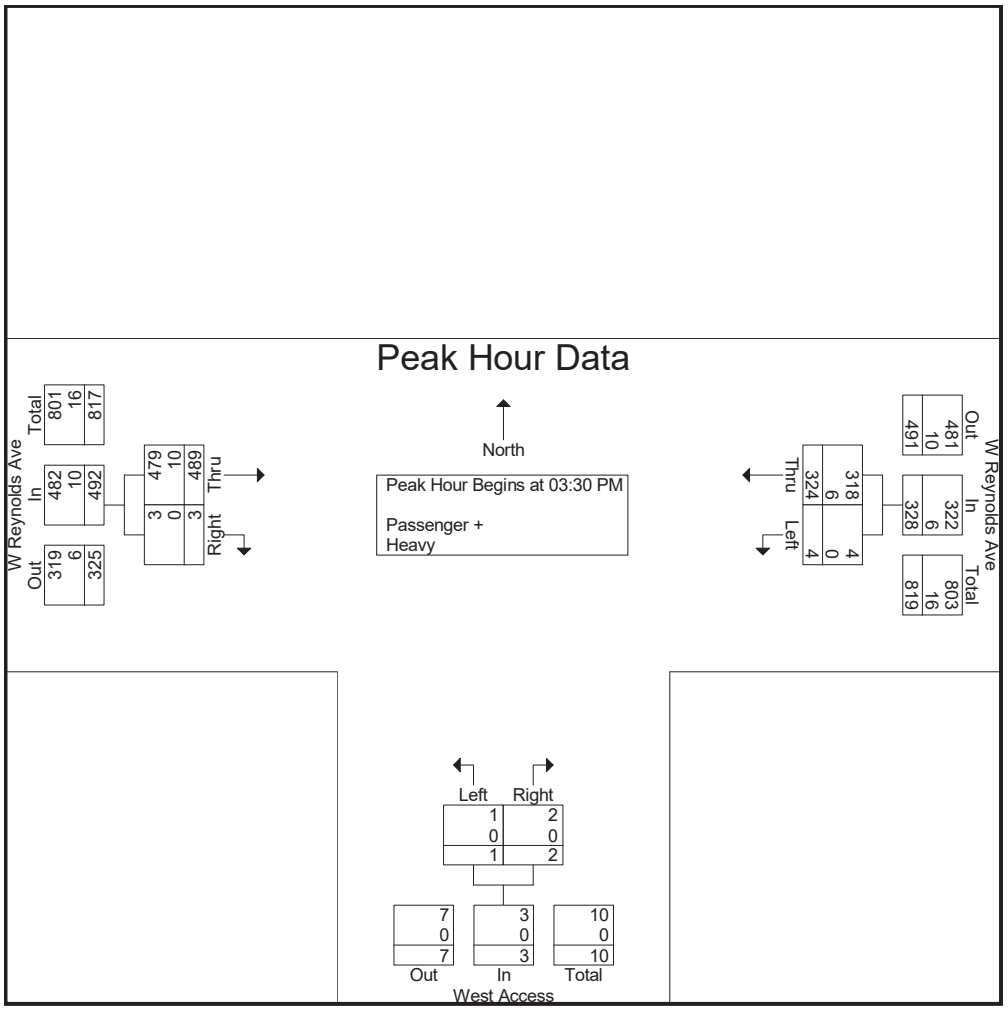
| | W Reynolds Ave Westbound | | | West Access Northbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Left | App. Total | Right | Left | App. Total | Right | Thru | App. Total | Int. Total |
| 03:30 PM | 95 | 0 | 95 | 0 | 0 | 0 | 0 | 137 | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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 |



# Heath & Associates

PO Box 397 Puyallup, WA 98371

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

Groups Printed- Passenger + - Heavy

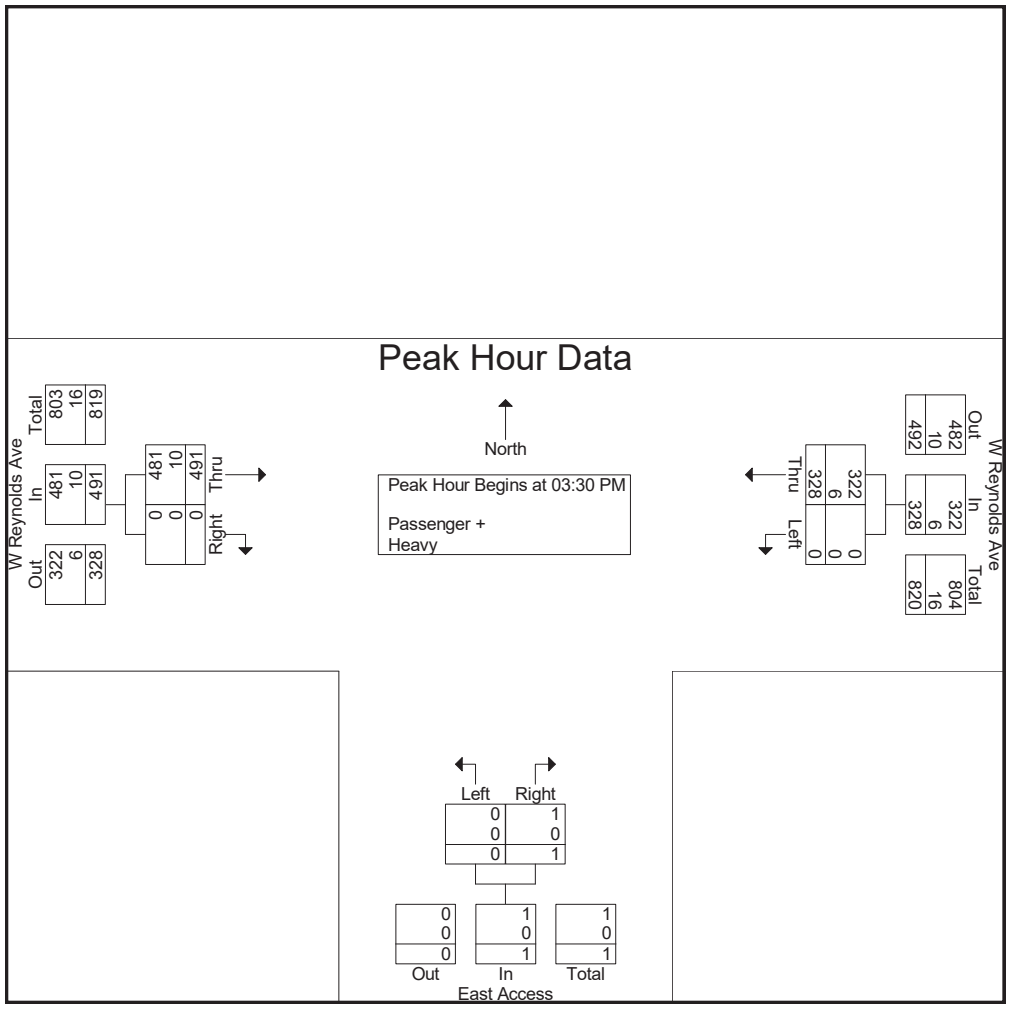
| | W Reynolds Ave Westbound | | | East Access Northbound | | | W Reynolds Ave Eastbound | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Start Time | Thru | Left | App. Total | Right | Left | App. Total | Right | Thru | App. Total | Int. Total |
| 03:30 PM | 95 | 0 | 95 | 0 | 0 | 0 | 0 | 137 | 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 |

# Heath & Associates

PO Box 397 Puyallup, WA 98371

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)

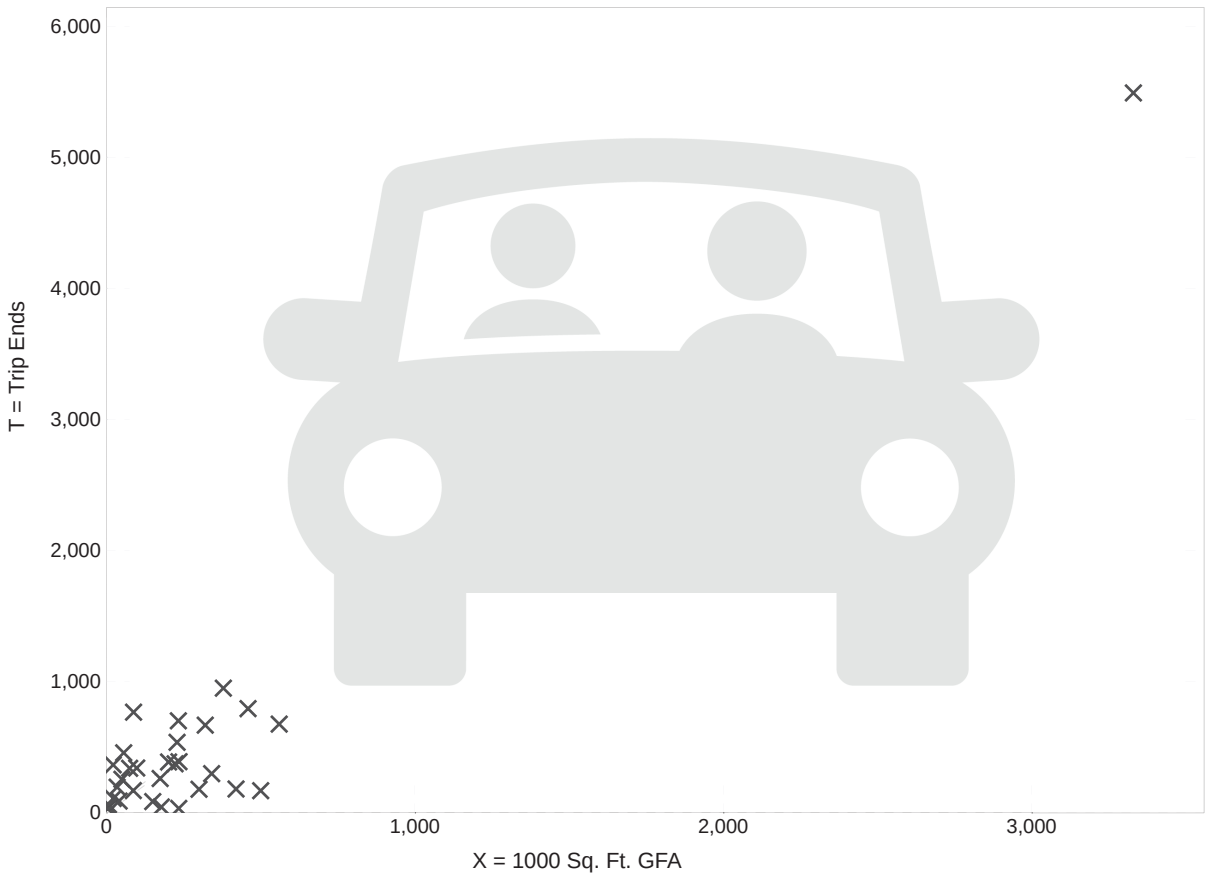
**Vehicle Trip Ends vs:** **1000 Sq. Ft. GFA**
**On a:** **Weekday**

**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**

*Trip Gen Manual,* 11th Edition ● Institute of Transportation Engineers

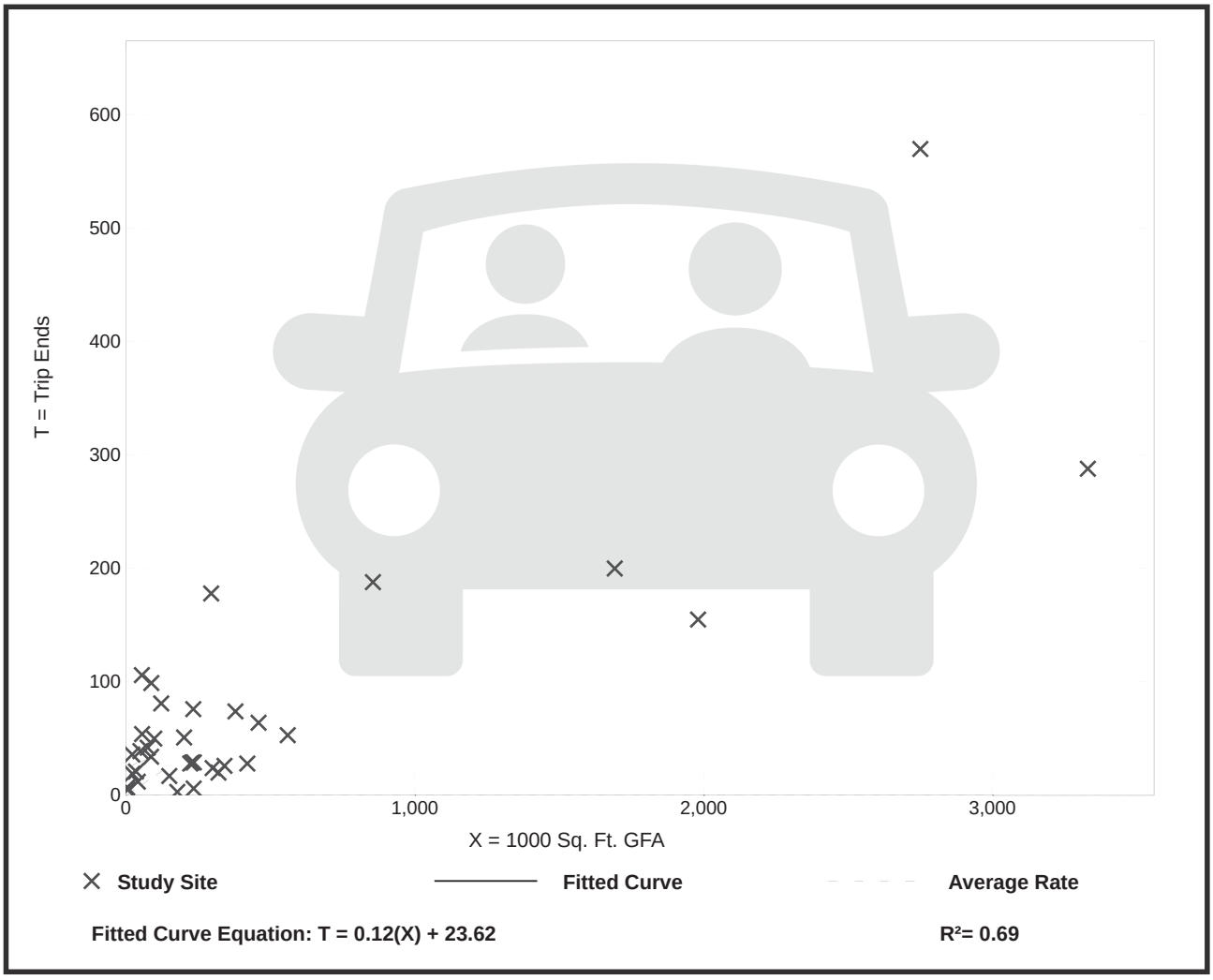
# Warehousing
(150)

**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




*Trip Gen Manual,* 11th Edition ● Institute of Transportation Engineers

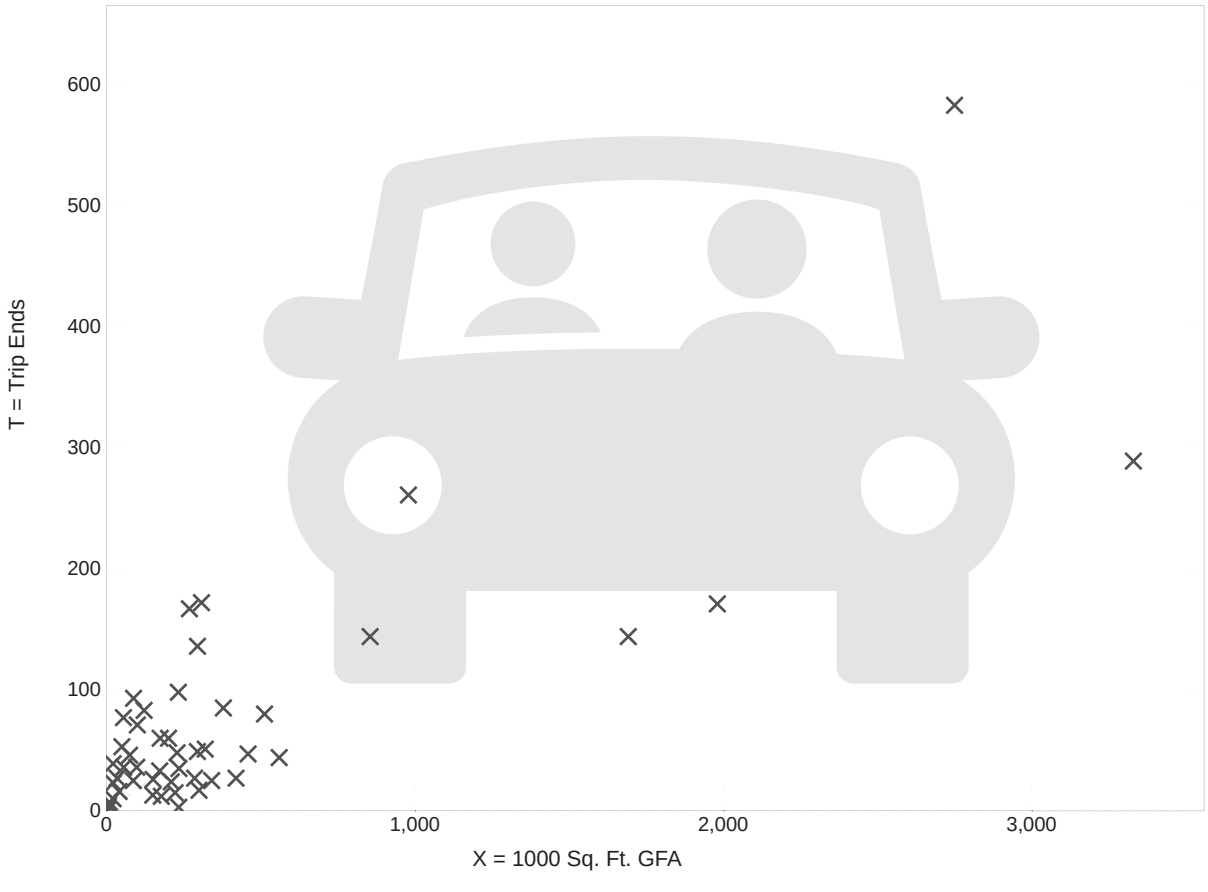
# Warehousing
(150)

**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

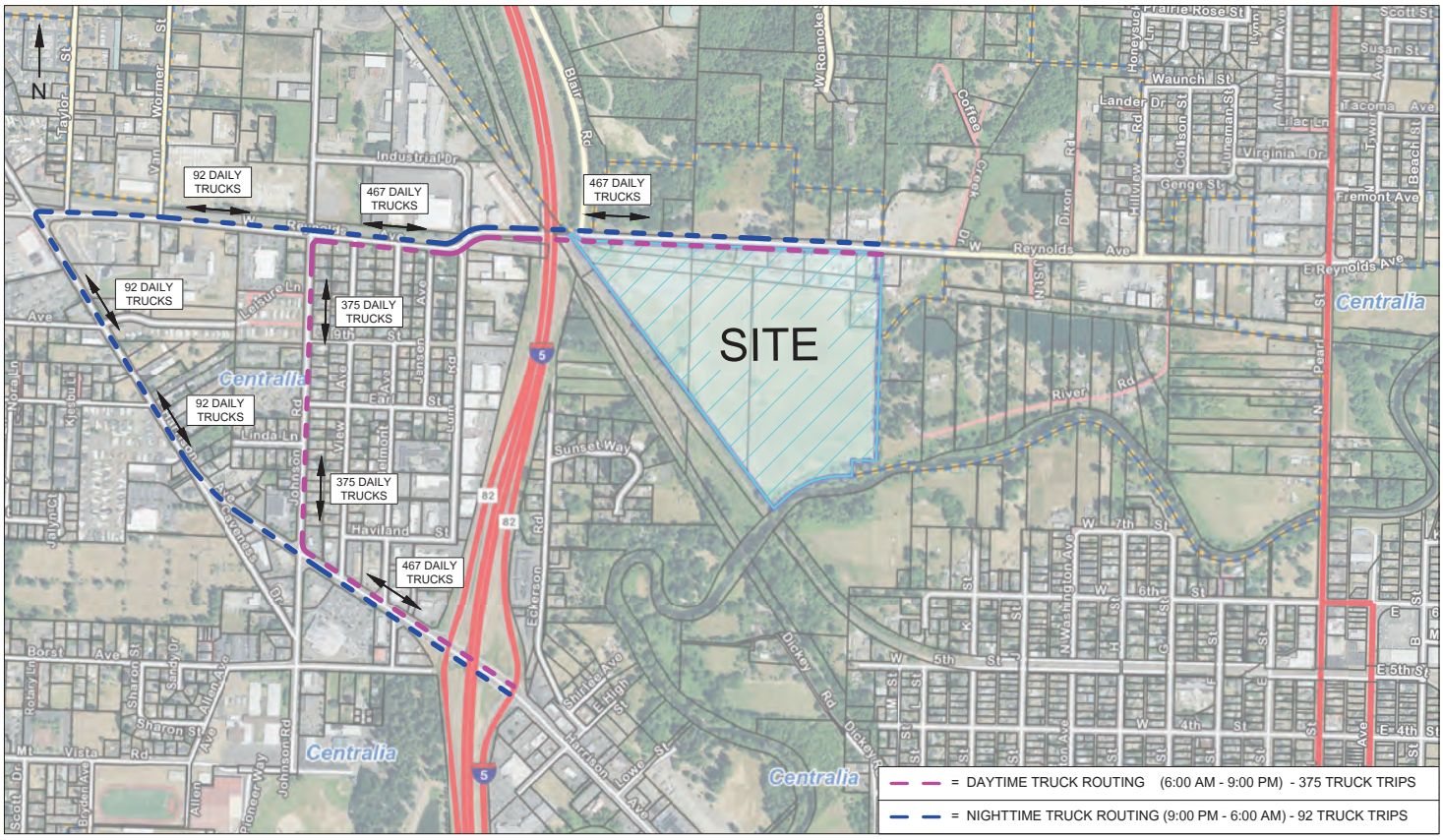
| **Use** | Warehouse (Tenant Data) - Building A | | Warehouse (LUC 150) - Building B | | Sum of Truck Trips |
|---|---|---|---|---|---|
| **Size** | 483.276 | KSF | 295.356 | KSF | |
| **ITE AWDT Truck Trip Rate** | - | | 0.6 | | |
| **AWDT Truck Trip Generation** | 290 | trips | 177 | trips | 467 trips |
| 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

64

# 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 |

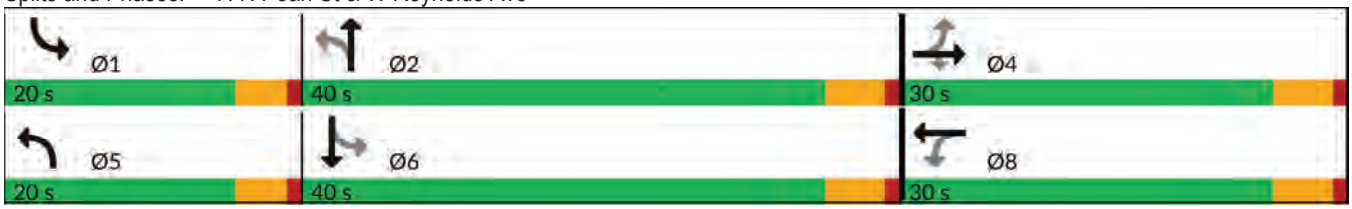
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 67 | - | - | - | 353 |
| HCM Lane V/C Ratio | 0.018 | - | - | - | 0.047 |
| HCM Control Delay (s/veh) | 8.1 | 0 | - | - | 15.7 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.1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

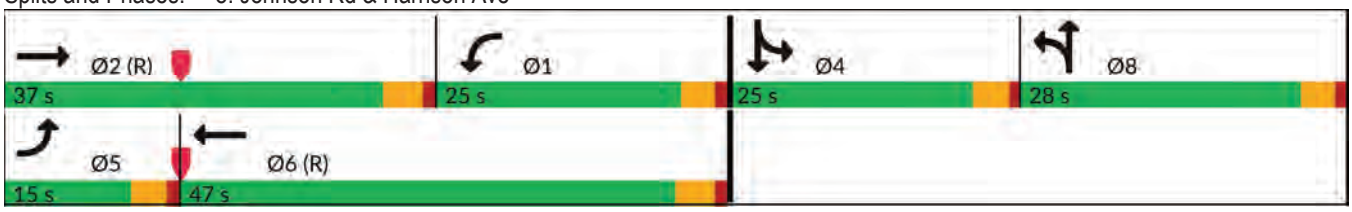


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 15 | 499 | 28 | 189 | 461 | 96 | 96 | 62 | 172 | 140 | 45 | 12 |
| Future Volume (vph) | 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

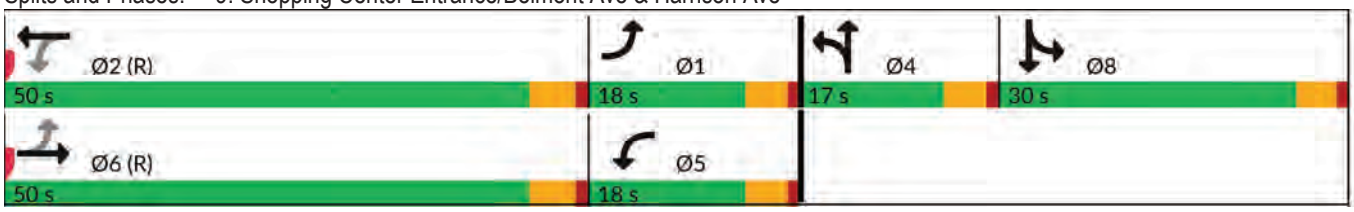


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 53 | 677 | 21 | 105 | 723 | 264 | 9 | 29 | 101 | 264 | 56 | 22 |
| Future Volume (vph) | 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 |

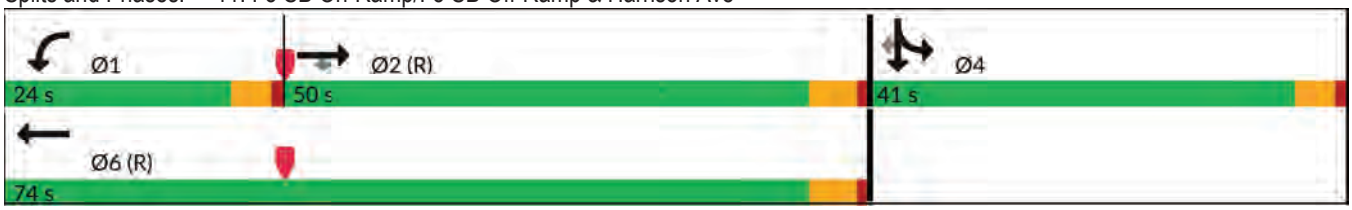
| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 487 | - | - | 644 | - |
| HCM Lane V/C Ratio | 0.467 | - | - | 0.466 | - |
| HCM Control Delay (s/veh) | 18.7 | - | - | 15.4 | - |
| HCM Lane LOS | C | - | - | C | - |
| HCM 95th %tile Q(veh) | 2.4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

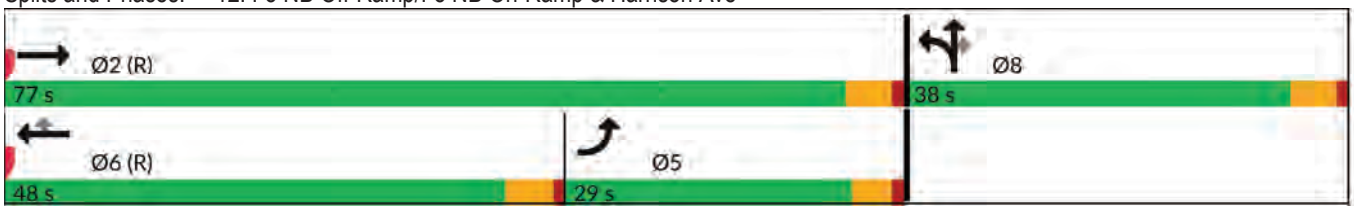


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 293 | 1055 | 0 | 0 | 680 | 242 | 559 | 149 | 167 | 0 | 0 | 0 |
| Future Volume (vph) | 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 |

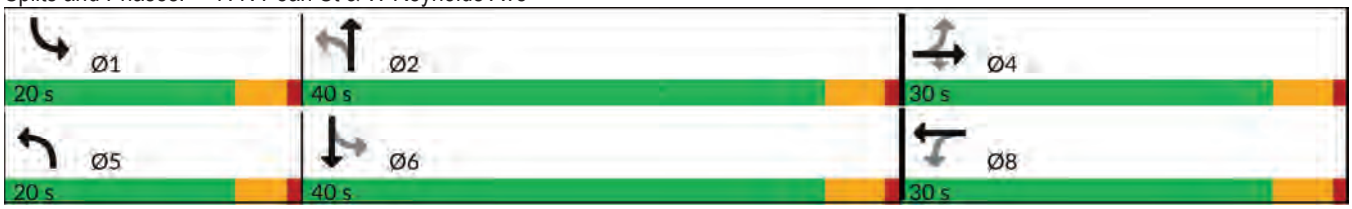
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 66 | - | - | - | 308 |
| HCM Lane V/C Ratio | 0.02 | - | - | - | 0.061 |
| HCM Control Delay (s/veh) | 8.2 | 0 | - | - | 17.5 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.1 |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

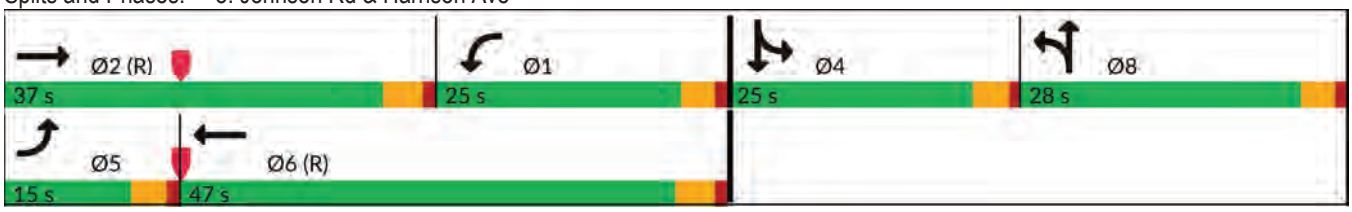


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 17 | 587 | 31 | 209 | 530 | 108 | 106 | 68 | 190 | 155 | 50 | 13 |
| Future Volume (vph) | 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

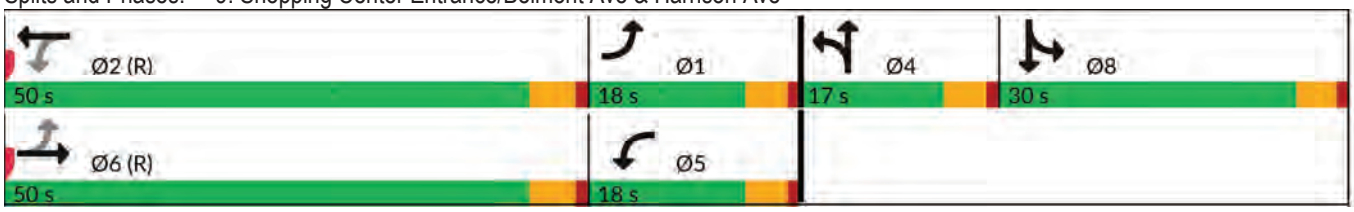


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 59 | 783 | 23 | 116 | 819 | 291 | 10 | 32 | 112 | 291 | 62 | 24 |
| Future Volume (vph) | 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 | | | | | | | |

| 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 |

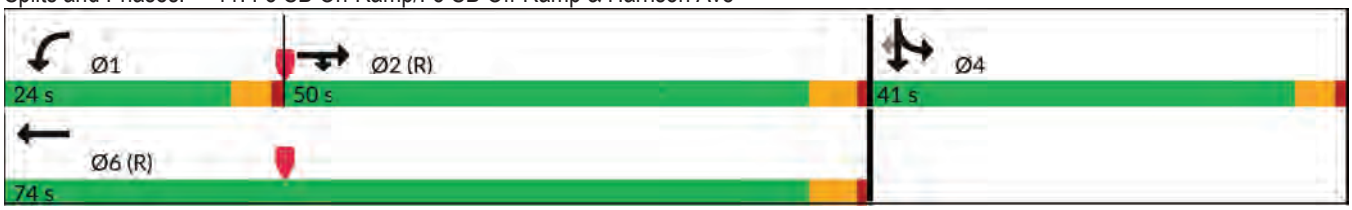
| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 435 | - | - | 565 | - |
| HCM Lane V/C Ratio | 0.577 | - | - | 0.586 | - |
| HCM Control Delay (s/veh) | 24 | - | - | 20 | - |
| HCM Lane LOS | C | - | - | C | - |
| HCM 95th %tile Q(veh) | 3.5 |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

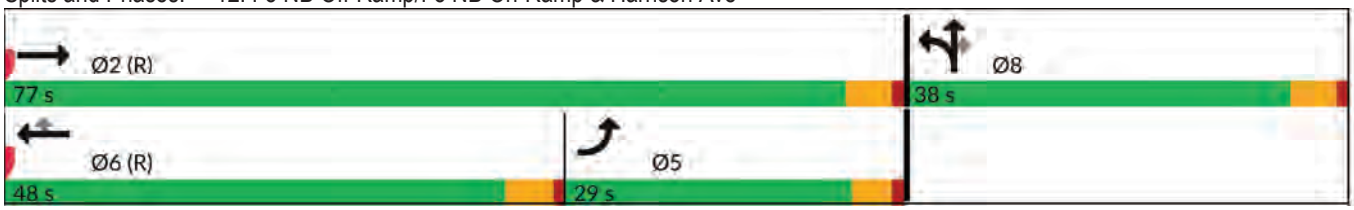


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 334 | 1166 | 0 | 0 | 752 | 267 | 631 | 165 | 184 | 0 | 0 | 0 |
| Future Volume (vph) | 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 |

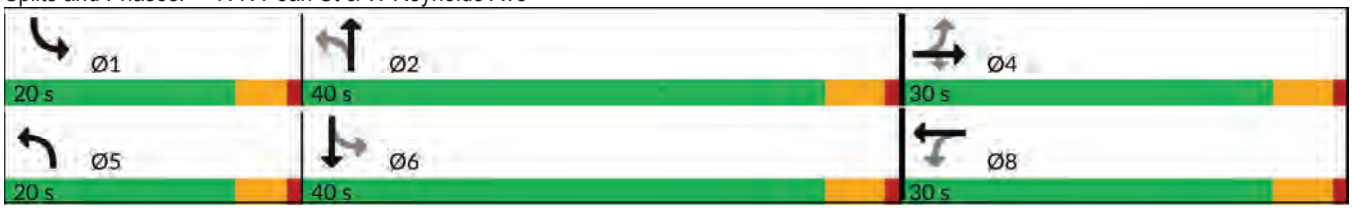
| Minor Lane/Major Mvmt | EBL | EBT | WBT | WBR | SBLn1 |
|---|---|---|---|---|---|
| Capacity (veh/h) | 63 | - | - | - | 294 |
| HCM Lane V/C Ratio | 0.021 | - | - | - | 0.064 |
| HCM Control Delay (s/veh) | 8.2 | 0 | - | - | 18.1 |
| HCM Lane LOS | A | A | - | - | C |
| HCM 95th %tile Q(veh) | 0.1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

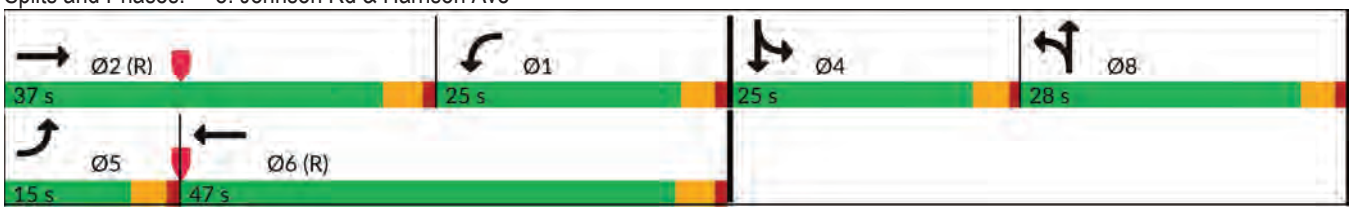


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 17 | 587 | 31 | 209 | 530 | 120 | 106 | 69 | 190 | 167 | 54 | 13 |
| Future Volume (vph) | 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



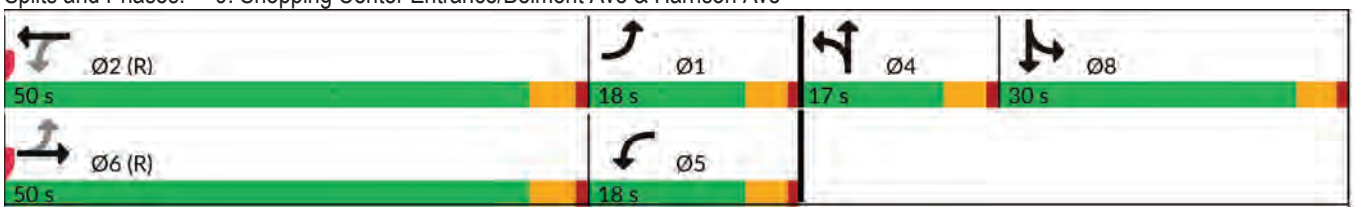
| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 59 | 795 | 23 | 116 | 831 | 313 | 10 | 32 | 112 | 336 | 62 | 24 |
| Future Volume (vph) | 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 | | | | | | | |

## 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) | 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 |

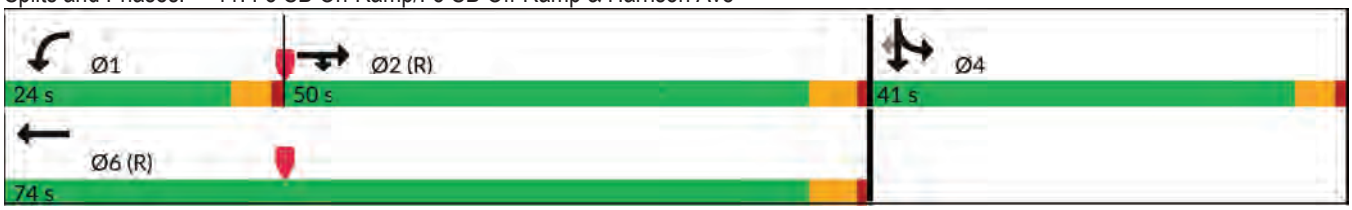
| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 416 | - | - | 537 | - |
| HCM Lane V/C Ratio | 0.604 | - | - | 0.617 | - |
| HCM Control Delay (s/veh) | 26 | - | - | 21.9 | - |
| HCM Lane LOS | D | - | - | C | - |
| HCM 95th %tile Q(veh) | 3.9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

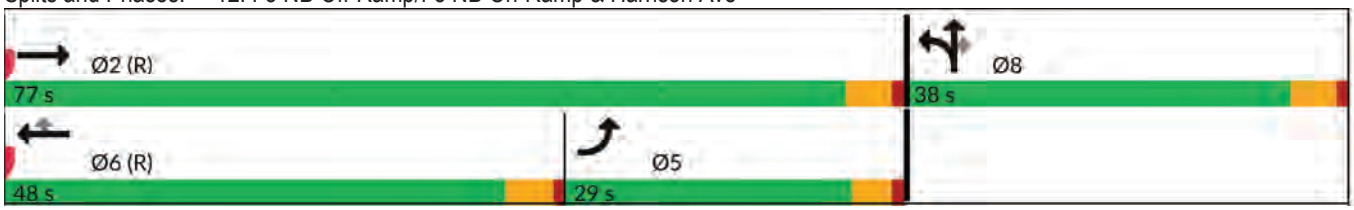


| Lane Group | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 357 | 1174 | 0 | 0 | 756 | 267 | 647 | 165 | 184 | 0 | 0 | 0 |
| Future Volume (vph) | 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 |

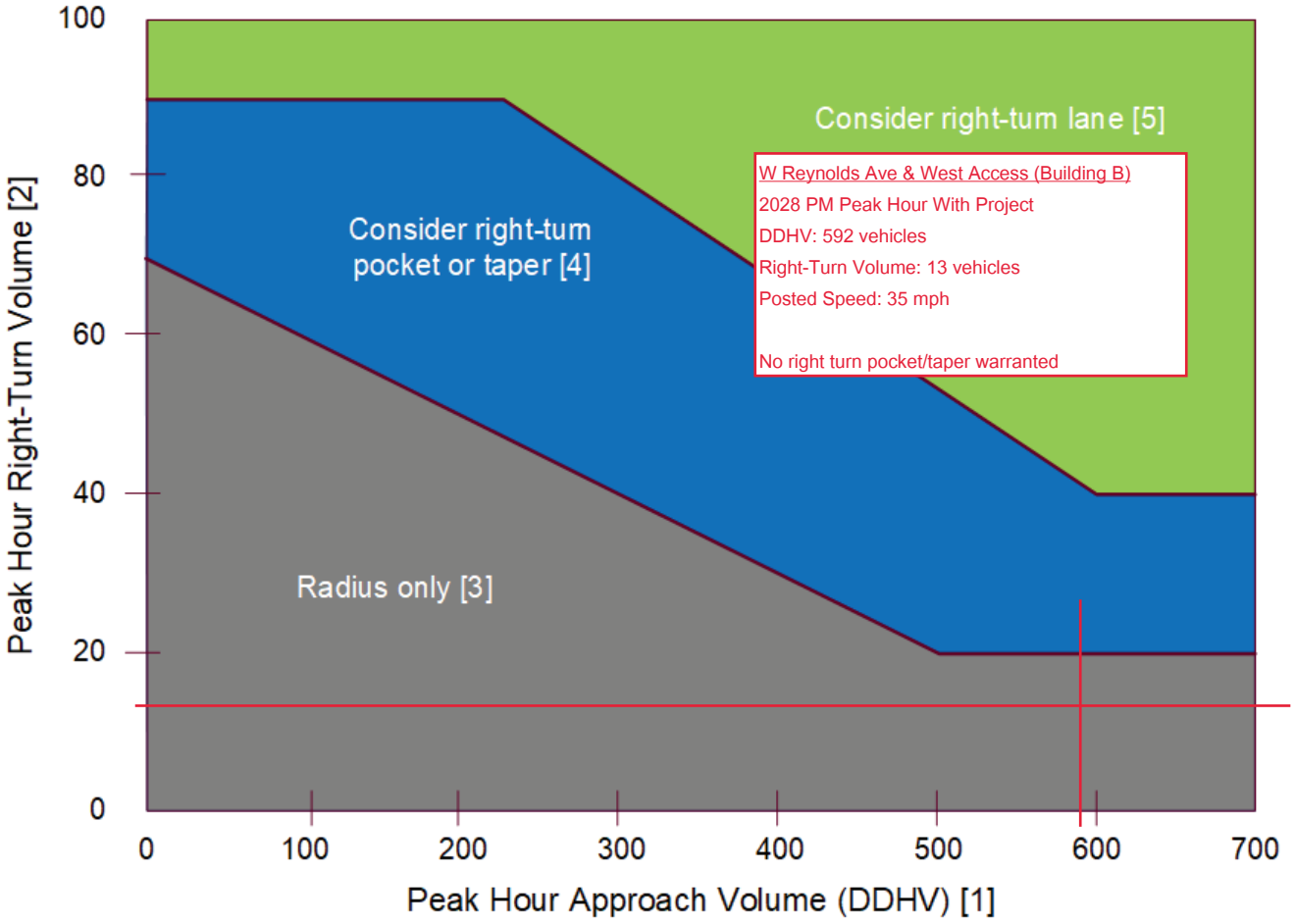
| Minor Lane/Major Mvmt | NBLn1 | EBT | EBR | WBL | WBT |
|---|---|---|---|---|---|
| Capacity (veh/h) | 276 | - | - | 38 | - |
| HCM Lane V/C Ratio | 0.221 | - | - | 0.009 | - |
| HCM Control Delay (s/veh) | 21.7 | - | - | 8.8 | 0 |
| HCM Lane LOS | C | - | - | A | A |
| HCM 95th %tile Q(veh) | 0.8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

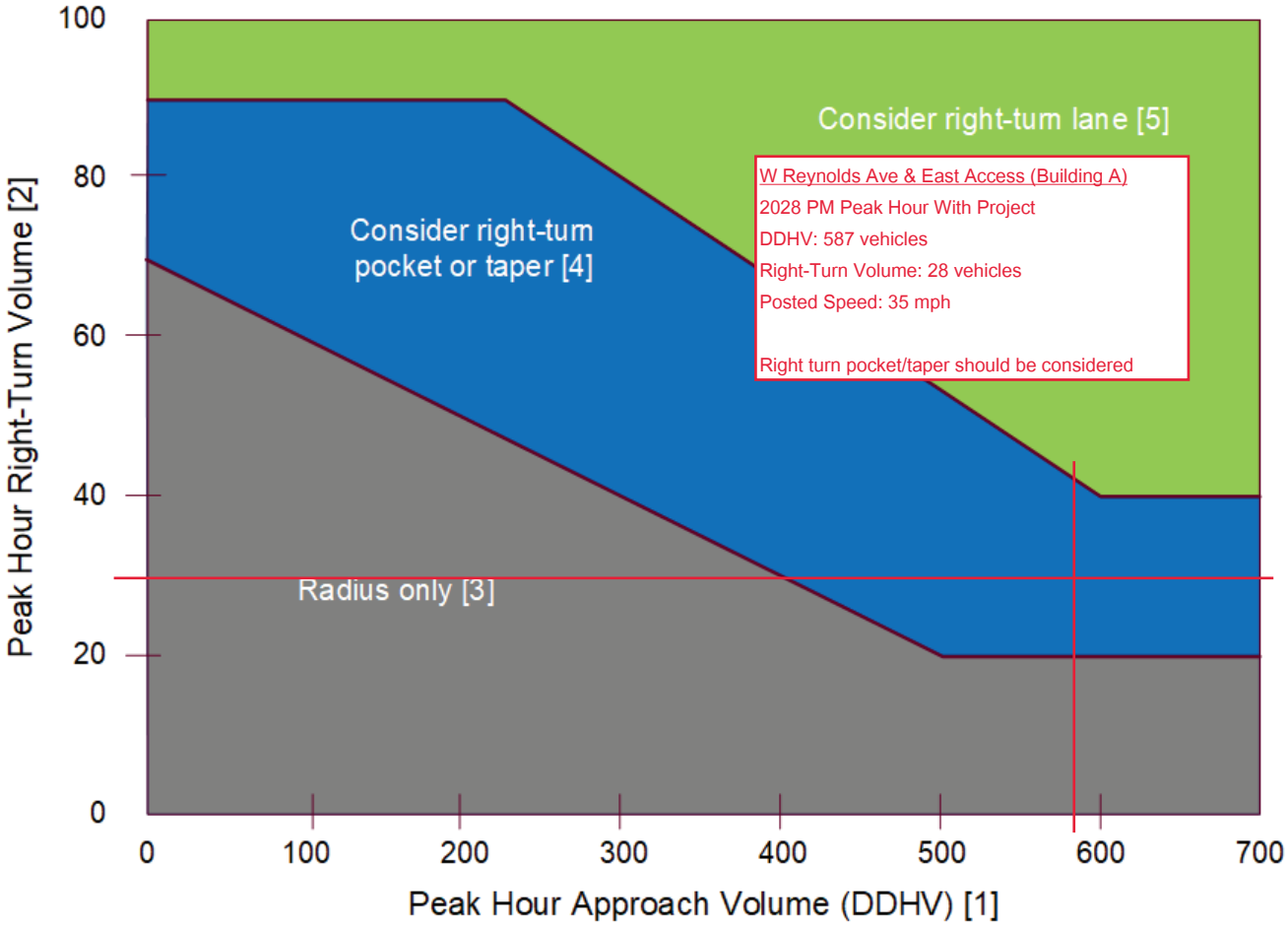
[2] When all three of the following conditions are met, reduce the right-turn DDHV by 20:
- The posted speed is 45 mph or below
- The right-turn volume is greater than 40 VPH
- The peak hour approach volume (DDHV) is less than 300 VPH

[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.

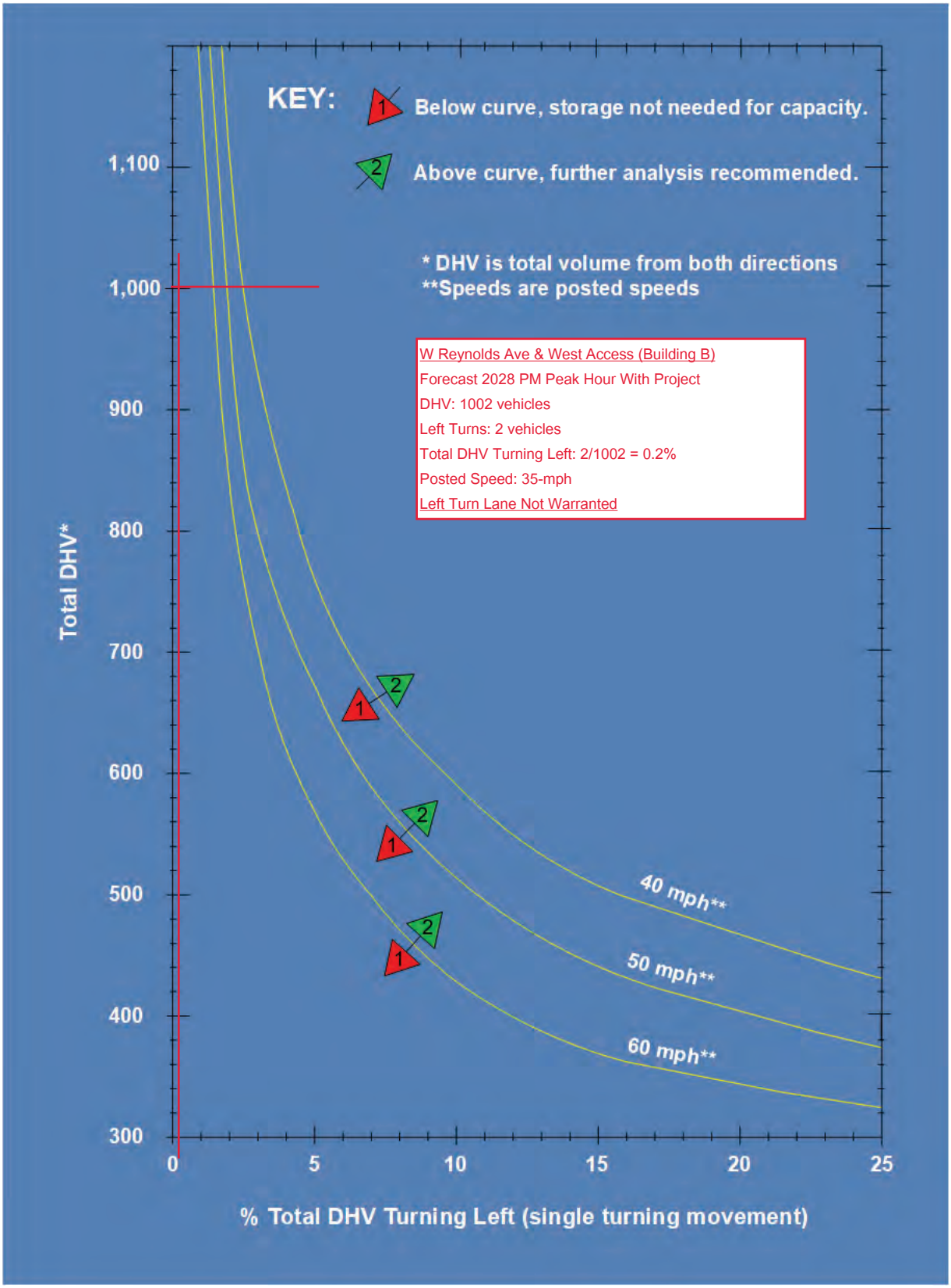
[5] For right-turn lane design, see Exhibit 1310-21.

# SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

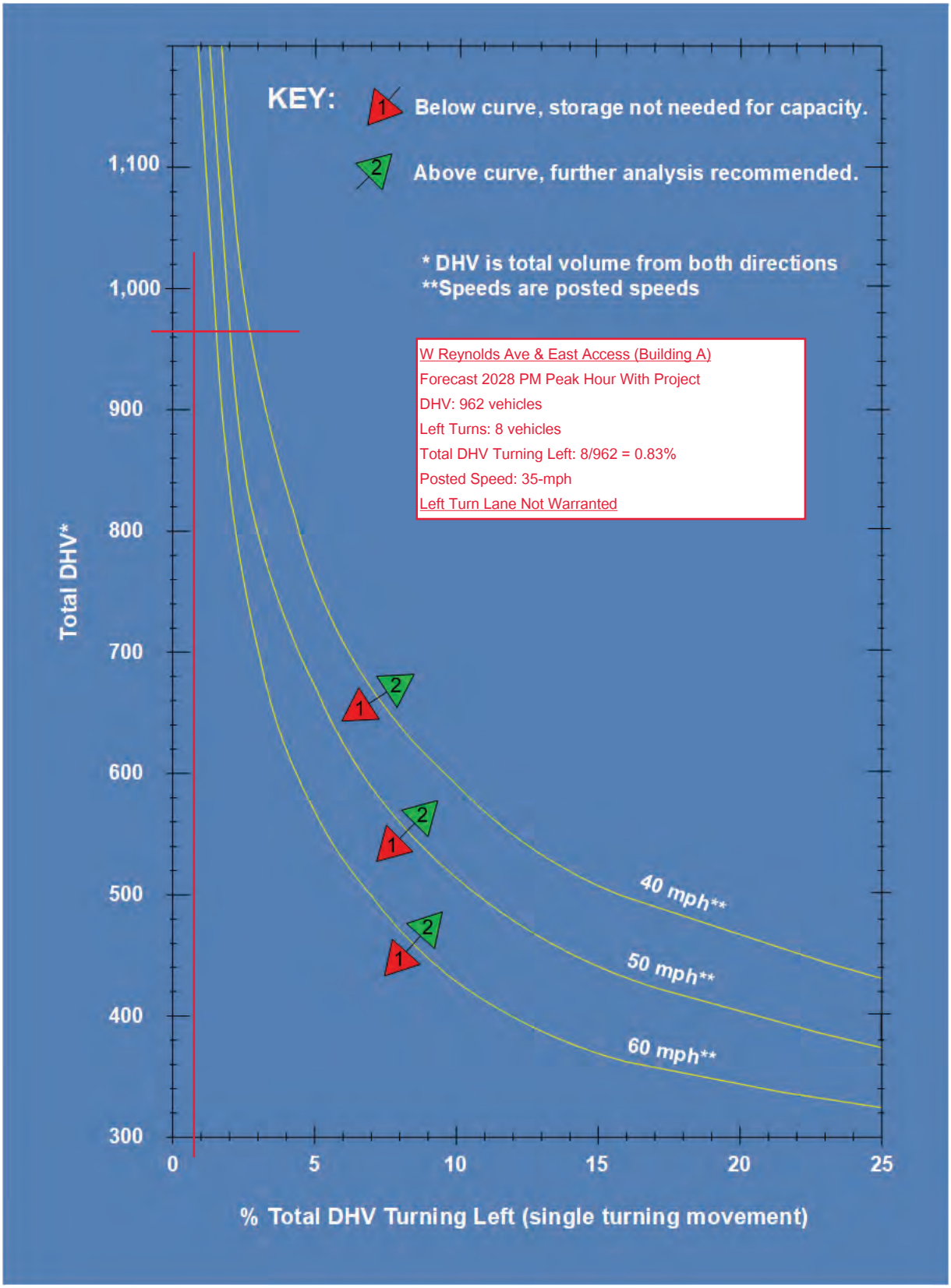
*APPENDIX*

LEFT TURN LANE WARRANTS

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



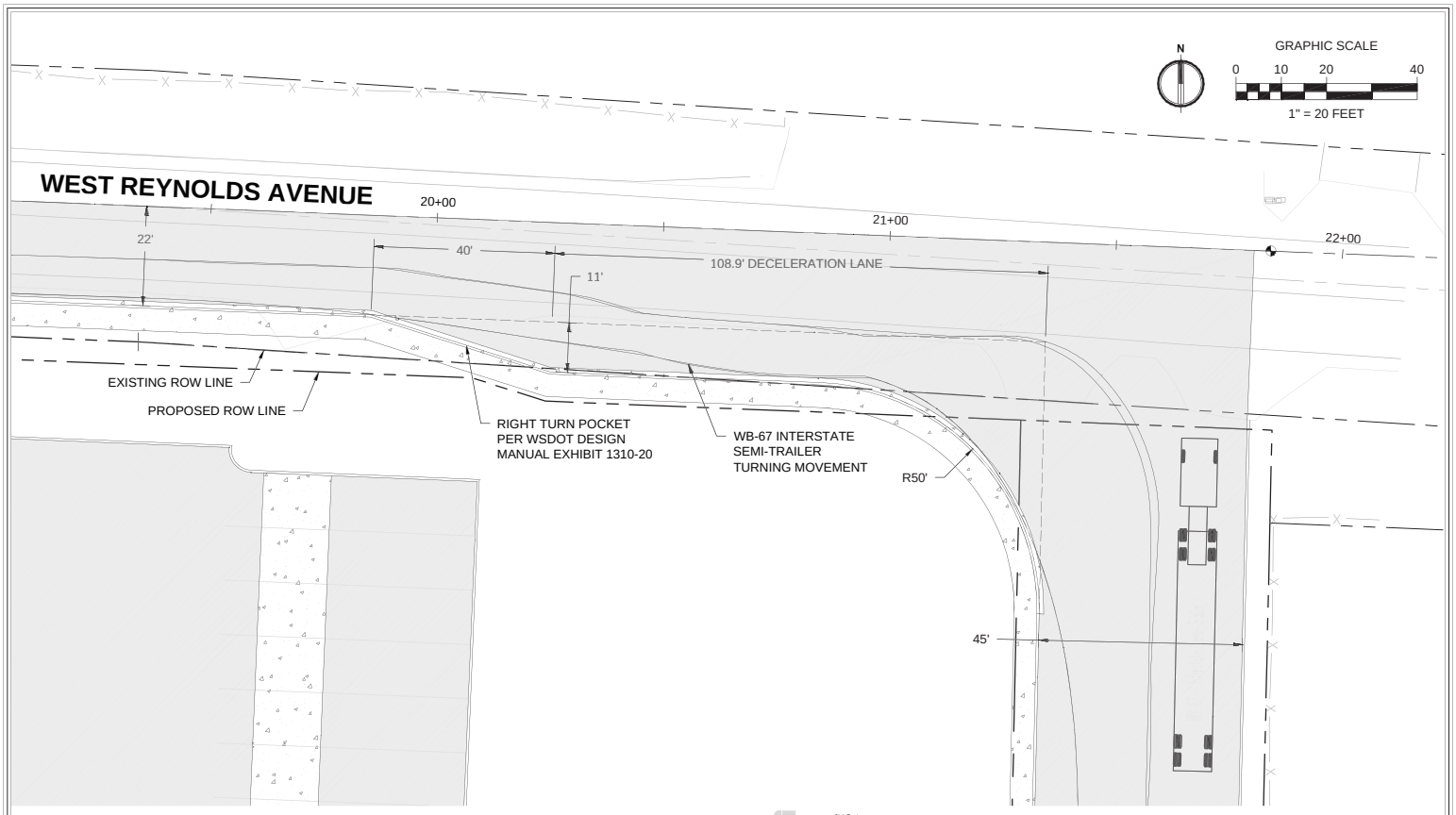
## Exhibit 1310-7 Left-Turn Storage Guidelines: Two-Lane, Unsignalized



# SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

*APPENDIX*

AUTOTURN EXHIBITS




AHBL
TACOMA SEATTLE
Civil Engineers
Structural Engineers
Landscape Architects
Community Planners
Land Surveyors
Neighbors
2215 North 30th Street, Suite 300, Tacoma, WA 98403 253.383.2422 TEL
316 Occidental Avenue South, Suite 320, Seattle, WA 98104 206.267.2425 TEL

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) |
|---|---|---|---|
| | **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) | 0.000 | 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) |
|---|---|---|---|
| | **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) | 0.839 | 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) |
|---|---|---|---|
| | **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) | 0.707 | 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) |
|---|---|---|---|
| **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) | 0.690 | 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 |

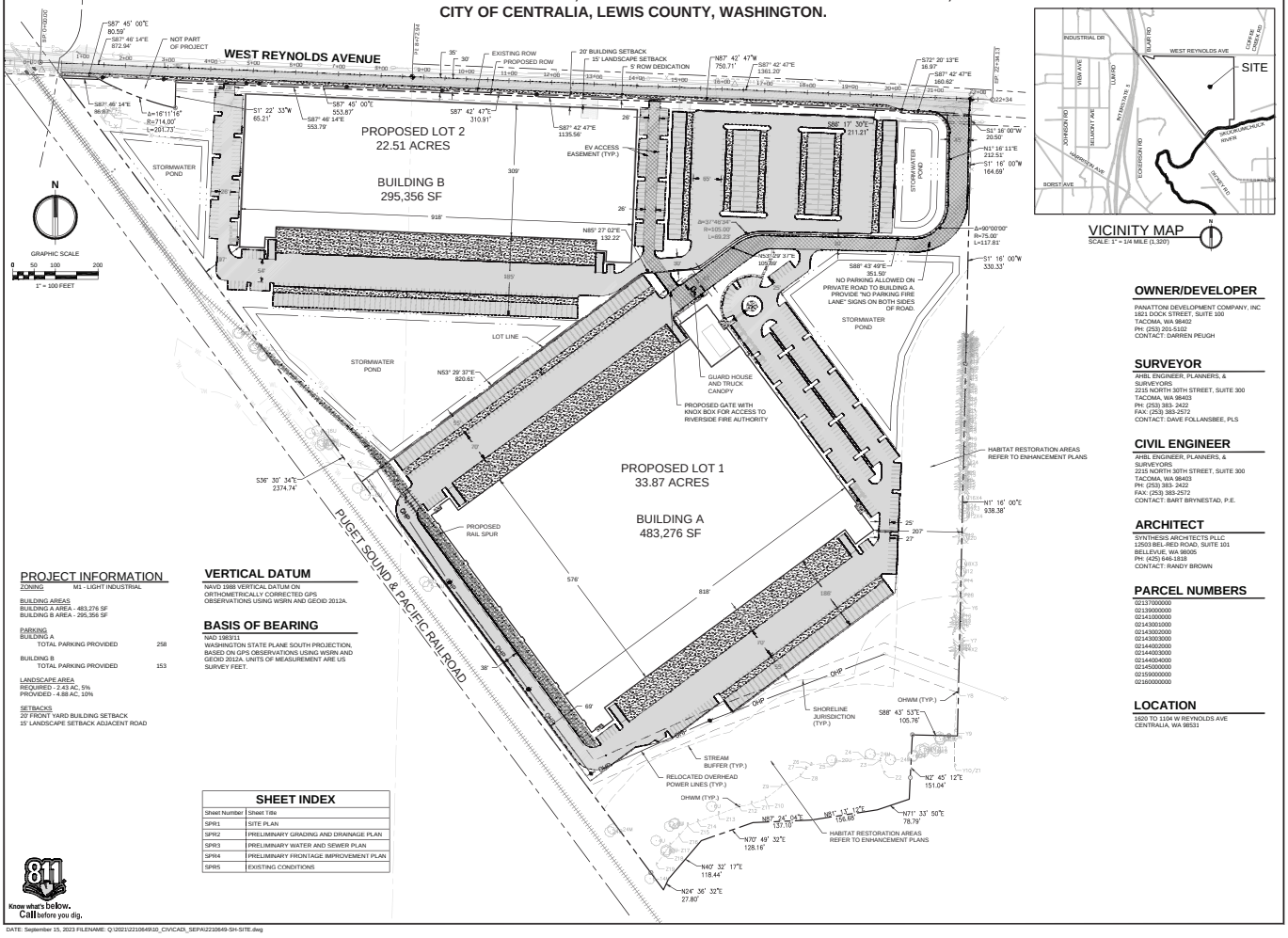
# SKOOKUMCHUCK COMMERCE TRAFFIC IMPACT ANALYSIS

*APPENDIX*

CONCEPTUAL SITE PLAN

# 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
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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
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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
9/15/2023

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Revisions:

Sheet Title:
**SITE PLAN**

| Designed by: | Drawn by: | Checked by: |
|---|---|---|
| TDW | TDW | BEB |

Sheet No.
**SPR1**
1 of Sheets



DATE: September 15, 2023 FILENAME: Q:\2021\2210649\10_CIVICADS_SEPA\2210649-SH-SITE.dwg

HEATH & ASSOCIATES
Transportation Planning & Engineering

**Date:** September 30, 2025

**To:** Nicole De Leon
Cairncross & Hempelmann

**From:** Aaron Van Aken, P.E. PTOE
Heath & Associates

**Subject:** Skookumchuck Commerce – Response to Hearing Information Request

In response to the two intersections raised during the September 24, 2025 Public Hearing for Skookumchuck Commerce, we conducted additional research into the City's DRAFT 2025-2045 Transportation Plan for Harrison Avenue/Belmont Avenue and Harrison Avenue/Johnson Road. Based on the available information, a summary for each intersection is provided below.

**Harrison Avenue/Belmont Avenue:** Upon further review and coordination with the City, it was determined that the City's 2025–2045 Draft Transportation Plan had incorrectly listed this intersection as LOS D. After consultation with the City's consultant, it was confirmed that this was a typographical error; the intersection is operating at LOS C, consistent with the Heath & Associates Skookumchuck Commerce TIA (Sept. 2023).

**Harrison Avenue/Johnson Road:** Both the City's Transportation Plan and the Heath & Associates TIA identify this intersection as LOS D under existing conditions. While the City's report reflected a higher average delay, the City's 2045 forecast shows improved operations relative to existing conditions, reflecting the benefits of long-term citywide improvements. These forecasts should account for both the Skookumchuck Commerce development and other planned growth, while still projecting acceptable LOS D under 2045 conditions.

**Conclusion:** Based on this review, the findings of the Heath & Associates TIA are consistent with the City's Transportation Plan. Both analyses confirm that the study intersections are projected to operate at acceptable levels of service with the proposed development.

Please let me know if you have any questions or require further information.

Respectfully,

Aaron Van Aken, PE, PTOE
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