Current Conditions Report

Former DuPont Works Site
Parcel One

Prepared for:

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Executive Summary

PIONEER Technologies Corporation (PIONEER) prepared this Current Conditions Report (Report) for Parcel One of the former DuPont Works Site, in DuPont, Washington (the Site). The Site was a former explosives-manufacturing plant operating from 1906 to 1976. The highest levels of contamination on the Site occurred in areas associated with former building foundations as a result of decommissioning activities, in areas where manufacturing materials were disposed, and along the narrow-gauge railroad (NGRR) tracks where arsenate herbicides were sprayed to decrease the potential for fires.

The Site was investigated for over 20 years by Weyerhaeuser and E.I. de Nemours DuPont (DuPont) and over 11,500 soil, groundwater, sediment, and surface water samples were collected and analyzed for constituents of interest. This investigation work was completed according to consent decrees with Washington State Department of Ecology (Ecology) oversight.

Surface water and sediment in Old Fort Lake and Sequalitchew Creek were not deemed to be contaminated. Groundwater contained low concentrations of trinitrotoluene (TNT) and dinitrotoluene (DNT) and groundwater monitoring ceased after it was demonstrated that concentrations were below drinking water criteria. Site soil contamination generally occurred as two distinct categories:

- Small localized occurrences of total petroleum hydrocarbons (TPH), mercury, DNT/TNT, and benzo(a)pyrene impacted soils representing less than 1% of total volume of contaminated soils.
- Arsenic (generally within 25-feet of former NGRR track beds) and lead (generally associated with lead paint and lead lining of buildings) impacted soil. The total volume of impacted soil was approximately 905,000 cubic yards, and arsenic and lead impacted soil accounted for approximately 96% of this volume.

Remedial actions in the late 1990s and early 2000s cleaned up Site to meet land use-specific cleanup levels associated with Commercial, Golf Course, Open Space, Historical, and Industrial Areas. Currently, the Site is under a consent decree with Ecology, with restrictive covenants prohibiting certain types of development (e.g., residential land use). Land use associated with the current Golf Course, Industrial Area, and Historical Areas are unlikely to change in the future. The entire Site is in compliance with the consent decree and remains protective of human health and the environment under the **current** land uses. However, there is interest in re-purposing areas that were cleaned up for commercial land use to residential land use. Therefore, the current Site conditions were evaluated assuming future unrestricted land use.

Concentrations of constituents currently in soil within the Commercial, Historical, and Open Space Areas were compared to Ecology default screening levels (SLs) appropriate for unrestricted (e.g., residential) land use. Only aldrin, arsenic, lead, monomethylamine nitrate (MMAN), and several TPH compounds are currently present in soil within the uppermost 15 feet (the unrestricted land use point-of-compliance) at concentrations greater than unrestricted land use SLs (see Figure ES-1). With the exception of arsenic, the locations of unrestricted land use SL exceedances are very limited and pose minimal risk to future potential residential receptors.

Aldrin and lead unrestricted land use SL exceedances are protected by exposure barriers (i.e., protective caps in the Historical Areas). MMAN, oil & grease, and Bunker C fuel unrestricted land use SL exceedances were collocated in the southeast corner of Site and require additional investigation and characterization if the land use were to change in the future (see Figure ES-1).

Based on the age and quality of the analytical methods, we recommend resampling the MMAN and various TPH exceedance locations to confirm unrestricted land use SL exceedances remain, if the land use in the areas where the exceedances are located is going to change. There is a potential that with increased laboratory precision, updated laboratory methods, and natural attenuation/degradation, historical MMAN and/or TPH SL exceedances may not require remediation to prepare the Site for future unrestricted land use. Additionally, TPH Method 418.1 (used to determine the presence of Bunker C fuel) is an outdated analytical method that was replaced with more modern methods (i.e., NWTPH-Gx and NWTPH-Dx). Detections and exceedances noted using Method 418.1 may be associated with wood or other organic material interfering with the results and may not be representative of true unrestricted land use SL exceedances. More modern analytical methods are able to better define exceedances of petroleum products.

The lone motor oil SL exceedance was located at a depth 14.5 to 15 feet below ground surface on the northern portion of the Site (see Figure ES-1), a depth at which it is unlikely residential land users will encounter contaminated soil (but within the residential point-of-compliance).

Lastly, arsenic SL exceedances are relatively widespread, and depending on future land use, may need further characterization and potentially remediation on portions of the Site. The size of the current commercial land use exposure units are an average of 42 acres. Confirmation sampling for arsenic (and lead) remediation was completed using five-point composite sampling patterns with 75-foot spacing. Given the size of the decision/exposure units and planned commercial/industrial use in 2003, this was deemed sufficient. However, if the Site is to be used for residential uses, the decision/exposure units (e.g., individual residential parcels) may be much smaller (e.g., less than a quarter acre), which may result in some exposure units having limited to no samples. Refined sampling may be required in any future residential exposure units that have no sample data and/or in areas with unrestricted land use SL exceedances.

If future land use plans include trails within the Historical Areas, existing exposure barriers should be maintained and restrictive covenants should remain in place to prevent breaching of the exposure barriers. If trails in Open Space Areas are constructed near areas where former Dupont Works activities occurred or in areas with known unrestricted land use SL exceedances, additional soil evaluation should be completed.

Remediation of CM-08 to meet unrestricted SLs would be more involved than other Areas of the Site due to the extent of arsenic contamination (see Figure ES-1), mature tree cover, and the presence of potential burial sites. Area-wide surface soil was not removed in CM-08; compliance with the cleanup level was obtained through selective soil remediation and statistical compliance. Remediation of other

portions of the Site for unrestricted land use SL exceedances, if needed, would be focused in specific 'hot-spot' areas.

These recommendations are based on the assumption that all land outside of the Golf Course and Industrial Areas could be used for unrestricted land uses in the future. This assumption should be revisited with the benefit of specific future land use plans so that unrestricted land use SL compliance evaluations, investigations, and potential remediation could take into account future land use and focus on areas where there will be residences (rather than on areas where there will be roads, parking lots, and other hardscapes). Additional remediation for residential land use would likely consist of soil excavation and either on-site or off-site disposal of excavated soil. If future investigation and land use plans determine that remediation is required, techniques similar to the 2003 remediation would be highly recommended (e.g., creating placement areas for contaminated soil beneath future parking lots).

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List of Acronyms

Acronym	Explanation
Albatross	Albatross Estates, LLC
Areas	Land use areas
Bgs	Below ground surface
CAP	Cleanup Action Plan
CM	Commercial Land Use Area
COPCs	Constituents of potential concern
DBD-OB sequence	Olympia Beds/Possession Drift/Whidbey Formation/Double Bluff Drift sequence
DNT	Dinitrotoluene
DuPont	E.I. DuPont de Nemours and Company
Ecology	Washington Department of Ecology
ESA	Environmental Site Assessment
FS	Feasibility Study
GC	Golf Course Land Use Area
GWM	Groundwater monitoring
HI	Historical Land Use Area
IN	Industrial Land Use Area
IRA	Interim remedial action
mg/kg	Milligrams per kilogram
MMAN	Monomethylamine nitrate
MSU	Miscellaneous small remediation unit
MTCA	Model Toxics Control Act
NGRR	Narrow-gauge railroad
Non-PA	Non-placement areas
OS	Open Space Land Use Area
PA	Placement Area
PCE	Tetrachloroethylene
PERC	Pacific Environmental Remediation Corporation
PIONEER	PIONEER Technologies Corporation
RA	Risk Assessment
Report	Current Conditions Report
RI	Remedial Investigation
RU	Remediation Unit
Site	Parcel One of the former DuPont Works Site, in DuPont, Washington
SL	Screening level
TNT	Trinitrotoluene

Acronym	Explanation
TPH	Total petroleum hydrocarbon
WAC	Washington administrative code
Weyerhaeuser	Weyerhaeuser Company

SECTION 1: INTRODUCTION

PIONEER Technologies Corporation (PIONEER) prepared this Current Conditions Report (Report) for Parcel One of the former DuPont Works Site, in DuPont, Washington (the Site) for the City of DuPont. An overview of the Site vicinity is shown on Figure 1.

1.1 Purpose

The purpose of this Report is to:

1. provide a comprehensive and detailed summary of current environmental conditions throughout the Site, and
2. identify areas that may require additional investigation and/or remediation should future land use become residential on all or portions of the Site.

Currently, all identified portions of the Site are under a consent decree between Weyerhaeuser Company (Weyerhaeuser)/E.I. DuPont de Nemours and Company (DuPont) and the Washington State Department of Ecology (Ecology), with restrictive covenants prohibiting certain types of development (e.g., residential land use). Land use of the current golf course, industrial area, and historical areas are unlikely to change in the future. The Site is currently in compliance with the consent decree and remains protective of human health and the environment under the current land uses. However, there is interest in developing the remaining portions of the Site for residential and recreational land use. Albatross Estates, LLC (Albatross) and Ecology entered into an Agreed Order in 2022 for additional cleanup, relating to potential future residential use of the Site.

1.2 Site History

Native Americans originally inhabited the Site and surrounding areas. European settlement began in 1832, when the Hudson's Bay Company established a cabin/storehouse adjacent to Puget Sound at the mouth of Sequalitchew Creek, northwest of the Site. In 1833, the Hudson's Bay Company built Fort Nisqually, which was located in the northern portion of the Site. Ten years later, a new Fort Nisqually was built at a location adjacent to, but outside the eastern edge of the Site.

DuPont acquired the Site and adjacent areas in 1906 and constructed an explosives-manufacturing plant and the Historical Village of DuPont as a company town for plant workers. The Historical Village of DuPont is approximately one mile southeast of the Site (see Figure 1). DuPont manufactured explosives until the mid-1970s, when it sold the Site and adjacent areas to Weyerhaeuser Historical Site features are shown on Figure 2. Weyerhaeuser purchased the Site with the goal of developing a master planned community (Northwest Landing). Weyerhaeuser and DuPont initiated clean-up discussions of the Site with Ecology and agreed to a consent decree in 1991 (revised in 2003). Under the consent decree, Weyerhaeuser and DuPont agreed to clean up remnants of the former manufacturing plant.

1.3 Site Geology and Hydrogeology

The major stratigraphic and hydrogeologic units located beneath the Site are summarized in the following subsections.

1.3.1 Geology

Steilacoom Gravels constitute the surficial soils of the Site and extend to a depth of about 300 feet below ground surface (bgs). The Steilacoom Gravels consist of brown and gray stratified sands and gravels, with cobbles and occasional zones of siltier sand. The Steilacoom Gravels were deposited during the retreat of the final (Vashon) glaciation in high-energy meltwater channels. Below the Steilacoom Gravels is the Vashon Till. The Vashon Till consists of a high-density, high-silt-content till that makes it a weak aquitard. The Vashon Till is underlain by the Vashon Advance Outwash, deposited by glacial rivers or streams during the advance of the Vashon glaciation. The Advance Outwash becomes finer grained with depth, typical of advance outwash deposition. Below the Advance Outwash is the Olympia Beds/Possession Drift/Whidbey Formation/Double Bluff Drift sequence (the DBD-OB sequence; URS and PIONEER 2003).

The DBD-OB sequence is a fine-grained, interglacial deposit, approximately 70 to 100 feet thick, and very heterogeneous regionally. The DBD-OB sequence is present below the Site but does not extend west of a line about 2,500 feet inland from Puget Sound. Below the DBD-OB sequence is the Salmon Springs Glaciation, which was deposited in the glacial period preceding the DBD-OB sequence interglacial. Regional information indicates that the formation is 70 to 120 feet thick and contains zones of organic silt and till.

1.3.2 Hydrogeology

Two aquifers occur beneath the Site; the shallow Water Table Aquifer extends from 20 to 105 feet bgs and the deeper Sea Level Aquifer is located between 160 and 215 feet bgs. Across most of the Site, the relatively impermeable Aquitard restricts vertical flow of groundwater and separates the Water Table Aquifer from the deeper Sea Level Aquifer. This aquitard is absent west of the “Cutoff”, which is located 500 to 2,500 feet east of Puget Sound and roughly parallel to the shoreline. The “Cutoff” is the western extent of the Water Table Aquifer and the point at which the Sea Level Aquifer becomes unconfined. Groundwater in the Water Table Aquifer flows west-northwest, with local discharge via springs to upper Sequalitchew Creek. Groundwater in the Sea Level Aquifer flows west-northwest and discharges west of the “Cutoff” as seeps to the Puget Sound (URS and PIONEER 2003).

1.4 Land Use Areas

During past remediation activities, the Site was divided into five different land use areas (Areas), which were further subdivided into remediation units for ease of discussion. The Areas are shown on Figure 3 and are as follows:

- Commercial (CM) Areas (CM-01 through CM-08): These areas cover approximately 334 acres and was originally planned for the development of offices and retail businesses, with soil

covered by building pads, parking lots, roads, and professional landscaping. The proposed land use for the CM Areas is now residential and is the impetus for the creation of this Report.

- Golf Course (GC) Areas (GC-01 through GC-08): These areas cover approximately 187 acres resulting in The Home Course Golf Course.
- Industrial (IN) Area (IN-01): This area covers approximately 36 acres of the Site north of Sequalitchew Creek and has planned end use activities from mining gravel to the development of light industrial facilities. This area is yet to be fully developed.
- Historical (HI) Areas (HI-01 through HI-04): These distinct areas cover approximately 4 acres of the Site and represent historical and culturally sensitive areas that will not be disturbed, including the 1833 Hudson Bay Company's Fort Nisqually (HI-01), Fort Nisqually Cemetery (HI-02), Native American Graves (HI-03), and a shell midden (HI-04).
- Open Space (OS) Areas (OS-01 through OS-04): These areas approximately 73 acres and includes Old Fort Lake, a portion of Sequalitchew Creek and the surrounding areas.

1.5 Current Ownership

In the late-2000s, after remediation was completed and a golf course was developed on the central portion of the Site, Weyerhaeuser divested portions of the Site to a variety of entities, some of which have changed ownership several times since the late-2000s. Current ownership of the Site is shown on Figure 4 and includes:

- The City of Dupont (OS-01 through OS-04 and HI-01)
- The Nisqually Indian Tribe (HI-02 through HI-04 and CM-06 and CM-07)
- Pacific NW Golf & PNGA/WSGA Prop Inc. (GC-01 through GC-08 and the southern portion of CM-01)
- Albatross; the northern portion of CM-01, CM-02 through CM-05, and CM-08)
- DuPont Industrial Partners LLC (southern portion of IN-01)
- Weyerhaeuser NR Company (northern portion of IN-01)

1.6 Report Organization

This Report is organized into the following sections:

- Section 2: Investigation and Remediation Chronology
- Section 3: Current Surface Water, Groundwater, and Freshwater Sediment Conditions
- Section 4: Soil Screening Levels and Identification of Constituents of Potential Concern (COPCs)
- Section 5: Current Soil Conditions
- Section 6: Discussion

SECTION 2: INVESTIGATION AND REMEDIATION CHRONOLOGY

This section summarizes the investigation and remediation actions that have taken place on the Site to date. Hyperlinks to the reports available in Ecology's data repository are provided in Appendix A.

2.1 1980s Investigations

A series of investigations into potential environmental contamination were first completed on the Site in the 1980s. In 1985, Weyerhaeuser initiated studies to determine whether hazardous substances were present. In 1986, a Phase I Environmental Site Assessment (ESA) was conducted to identify areas on Site that may be of environmental concern and soil contamination was first documented and reported to Ecology (Hart Crowser Inc. 1986). In 1987, a Phase II ESA was performed, which characterized the type, concentration, and distribution of contamination in 38 areas on the Site (Hart Crowser Inc. 1987). In 1989, a Baseline Human Health Risk Assessment was performed using results of the Phase II ESA (PIONEER 2003).

2.2 1991 Consent Decree

In 1991, Weyerhaeuser and DuPont signed a Consent Decree (No. 91-2-01703-1) with Ecology to study the Site and complete a Remedial Investigation (RI), Risk Assessment (RA), and Feasibility Study (FS). The Site was divided into two main areas: Parcel 1 (the Site; approximately 636 acres) and Parcel 2 (to the north of the Site; approximately 205 acres) (Ecology 1991) (see Figure 1).[1]

2.3 1990 to 2001 Interim Remedial Actions

Between 1990 and 2001, interim remedial actions (IRAs) were conducted to remove soil and/or debris from 21 areas of the Site. These activities occurred while studies and negotiation with Ecology were ongoing. For each IRA, complete work plans were developed, reviewed by Ecology, and revised in accordance with their comments. Prior to the initiation of any IRA, Ecology's approval to start was obtained. In addition, progress was communicated to Ecology regularly during these activities either by Site visits, telephone calls, or monthly reports. The total volume of material removed from the Site during IRAs included approximately 60,900 tons of soil, 9,700 tons of debris, 1,540 tons of soil and debris mixtures, 4,836 drums, 69,204 gallons of liquids, and 170 cubic yards of asbestos-containing material. Materials were recycled off-Site, incinerated off-Site, or sent to an approved landfill (West Shore Corporation NW and PIONEER 2000a through 2002b). A more detailed summary of the specific IRAs can be found in the Closure Report (Pacific Environmental Remediation Corporation [PERC] and PIONEER 2007). Figure 5 summarizes the IRAs that occurred on the Site.

[1] In 1997, after Parcel 2 (not part of the Site as defined in this Report) was cleaned to industrial standards, it was removed from the 1991 Consent Decree, and the deed restriction requiring institutional controls to maintain the industrial use was recorded in the Pierce County Auditor's Office.

2.4 2003 Remedial Investigation

The Final RI was completed in 2003 and characterized the nature and extent of contamination in the context of past activities at the Site. The RI report presented the analytical data for all media that were sampled at the Site. The RI investigated soil, surface water, groundwater, and sediment and determined that soil was the only medium of concern. The highest levels of contamination occurred in areas associated with former building foundations, in areas where manufacturing materials were disposed and along the narrow-gauge railroad (NGRR) tracks (URS Inc. and PIONEER 2003).

2.5 2003 Risk Assessment

The Final RA was completed in 2003 and evaluated constituent concentrations in soil detected during the RI. The RA evaluated Site conditions based on planned future land uses (as of 2003). The RA identified soil cleanup levels and presented the methods used to derive Site-specific soil cleanup levels that were protective of human health and ecological receptors.[2] These cleanup levels were compared to constituent concentrations in order to identify the areas on the Site that required additional evaluation in the FS. The RA determined that of the 213 constituents evaluated in soil, 11 (aldrin, arsenic, benzo(a)pyrene, dinitrotoluene [DNT], copper, lead, mercury, nitrobenzene, trinitrotoluene [TNT], tetrachlorethylene [PCE], and various types of petroleum) required a remedy due to significant exceedances of cleanup levels (PIONEER 2003).

2.6 2003 Feasibility Study

The Final FS was completed in 2003 and evaluated over 50 different potential cleanup alternatives designed to meet the remedial action objectives. The FS report provided information for Weyerhaeuser and DuPont to recommend alternatives for remediation of selected areas, including both no action and action alternatives. The preferred alternatives included both small- and large-scale applications:

- Large-scale excavation with on-site deposition and cap/cover for the GC and CM Areas
- No action for the OS Areas
- Small-scale cap/cover for discrete portions of the HI Areas
- Discreet excavation with off-site disposal for miscellaneous small remediation units (MSUs) (i.e., small occurrences of a single constituent, hot spots discovered during final cleanup, and debris)
- Asphalt cap for MSUs (i.e., NGRR at Sequalitchew Creek)
- Covers for fill areas of the GC Areas

Natural restoration was the preferred alternative for groundwater on the Site (West Shore Corporation NW and PIONEER 2003b).

2.7 2003 Cleanup Action Plan

In 2003, Ecology then evaluated the FS and selected the remedial measures it believed were the most appropriate. The Final Cleanup Action Plan (CAP) was then approved by Ecology. Details on the

[2] The term 'cleanup levels' is used throughout this report to simplify the various Ecology-approved screening levels, cleanup levels, and remediation levels that were applied during the remediation activities of the early 2000s on the Site.

preferred primary alternatives were discussed in detail in the FS (see above). Depending on location, different alternatives were selected for implementation at the Site. The preferred alternatives selected were on-site soil excavation and deposition with cap and cover (for large scale applications), and a combination of the remaining alternatives (for small scale applications). Site soil contamination generally occurred as two distinct categories:

- Small localized occurrences, referred to MSUs, of total petroleum hydrocarbons (TPH), mercury, DNT/TNT, and benzo(a)pyrene impacted soils representing less than 1% of total volume of contaminated soils (see Figure 5).
- Arsenic (generally within 25-feet of former NGRR track beds) and lead (Site-wide) impacted soil. The total volume of contaminated soil was approximately 905,000 cubic yards (CY), and arsenic and lead contaminated soil accounted for approximately 96% of this volume (see Figure 6).

Natural restoration was selected as the preferred alternative for groundwater remediation because the cost for active groundwater treatment would be substantial and disproportionate to the degree of risk reduction achieved. DNT concentrations (the only detected constituents) were consistently low, were not affecting the regional aquifer, were not affecting surface water, and the aquifer was not used as a drinking water source. Therefore, Ecology determined that no active remedial action was necessary, and long-term monitoring at selected wells would be sufficient (Ecology 1996).

2.8 2003 Consent Decree

In 2003, Weyerhaeuser and DuPont signed an updated consent decree (No. 03-2-10484-7) with Ecology committing to complete the remedial action identified in the 2003 CAP (Ecology 2003).

2.9 2007 Closure Report

In 2007, the Closure Report was prepared to document the completed remediation on the Site (PERC and PIONEER 2007). The remediation fulfilled the requirements of both consent decrees on file for the Site (No. 91-2-01703-1 [1991] and No. 03-2-10484-7 [2003]). As discussed in Section 1, the Site was sub-divided into five Areas, which were further subdivided into remediation units (RUs), each of which was remediated differently (see Figure 3).

2.9.1 Commercial Areas

Remediation within the CM Areas included IRAs, MSU remediation, tree root zone remediation, and large-scale excavation. The remedial actions completed within the CM Area removed elevated levels of metals (i.e., arsenic, copper, and lead), explosives (i.e., 2,4-DNT, 2,6-DNT, nitrobenzene, and 2,4,6-TNT), and TPH (specifically Bunker-C fuel oil and motor oil). Upon the completion of the remedial actions, the soil in all of the CM Area met the applicable cleanup levels. Note, CM-08 was remediated to a lesser extent than other RUs and cleanup was based on meeting statistical compliance with cleanup levels (see Figure 6). Historical information indicated that additional burial sites were potentially located in this RU, so substantial excavation and remediation activities were avoided, similar to the HI Areas.

2.9.2 Golf Course Areas

The GC Area consisted of Placement Areas (PAs; 75 acres) and Non-Placement Areas (non-PAs; 121 acres). GC Area PAs were discrete areas within the GC Area that were used to place contaminated soil from other areas of the Site (see Figure 6). After placement, the contaminated soil was capped with at least 12 inches of compacted gravel and at least six inches of clean soil.

The remedial actions completed within the eight GC Area RUs removed elevated levels of metals (i.e., arsenic, copper, and lead), explosives (i.e., 2,4-DNT, 2,6-DNT, nitrobenzene, and TNT), TPH (specifically Bunker-C fuel oil and motor oil), and PCE). The arsenic- and lead-impacted soil with constituent concentrations greater than the GC Area PA cleanup levels were placed on an asphalt pad and were either included in the arsenic and lead soil-screening program or sent off-Site for disposal. The DNT, nitrobenzene, TNT, TPH, and PCE impacted soil was excavated and disposed off-Site. Arsenic- and lead-impacted soil from other areas of the Site were then placed in the PAs, and the PAs were capped as described above. Following completion of all soil removal remedial actions, the soil in the GC Area met the cleanup levels.

2.9.3 Industrial Areas

Remediation completed within the IN Area included IRAs and MSU remediation (see Figure 5). Remedial actions completed in the IN Area removed elevated levels of arsenic, lead, 2,4-DNT, 2,6-DNT, and TNT. Following completion of all soil removal remedial actions, the soil in the IN Area met the cleanup levels.

2.9.4 Historical Areas

Remedial actions completed in the HI Areas included MSU remediation and capping (see Figure 5). Minimal remediation was done in the HI Area RUs to ensure the preservation of the historical artifacts. The remedial actions completed in the HI Areas included small-scale excavations of lead-contaminated soil in HI-01, and capping in the remaining three HI Areas. The constituents that were present above cleanup levels were aldrin, arsenic, and lead. Soil concentrations of arsenic and lead in HI-02, HI-03, and HI-04 were higher than the cleanup levels in some instances. However, a protective cap constructed in the same manner as the GC cap (see Section 2.9.2) was placed over these areas to prevent exposure by human and ecological receptors.

2.9.5 Open Space Areas

Remediation completed within the OS Areas included IRAs, MSU remediation, tree remediation, and large-scale excavation (see Figures 5 and 6). Minimal large-scale excavation was conducted in the OS Areas in an effort to protect ecological habitat. The remedial actions were completed within the four OS Areas to remove elevated levels of arsenic and lead. Following completion of the remedial actions, soil in the OS Areas met cleanup levels.

2.10 2008 to 2014 Groundwater Monitoring

Between 2008 and 2014, periodic groundwater monitoring (GWM) was completed on-Site to evaluate DNT concentrations in groundwater. GWM was required, per the CAP and Closure Report, until the total

DNT groundwater concentrations were below the applicable cleanup level for four consecutive sampling rounds. The highest DNT concentration in groundwater ever detected at the Site was 3.8 micrograms per liter in MW-27 in January of 1995. However, DNT levels at this monitoring well declined below cleanup levels during subsequent GWM events. Historical RI and post-remediation monitoring well locations are shown on Figure 7.

By 2014, 2,4-DNT was not detected and 2,6-DNT was detected below the cleanup levels presented in the Closure Report. As a result, GWM was discontinued in late 2014 and was determined to be no longer required at the Site. Restrictive covenants remain in place prohibiting the use of groundwater for drinking purposes (PIONEER 2014, Ecology 2016b). In 2015, all five monitoring wells on the Site were decommissioned.

2.11 2016 Ecology Periodic Review and Hazardous Sites List Removal

In 2016, Ecology removed the Site from the Hazardous Sites List because the Site was determined to have been cleaned up and met approved cleanup levels (Ecology 2016a). Additionally, Ecology's 2016 Periodic Review determined that the remedial actions conducted at the Site continue to be protective of human health and the environment. The Periodic Review stated that requirements of the restrictive covenants were being satisfactorily followed and no additional remedial actions were required. The restrictive covenants and a requirement for further reviews every 5 years remained (Ecology 2016b).

2.12 2022 Albatross Agreed Order

In 2022, Ecology entered into a new Agreed Order DE 21135 with Albatross for the portions of the Site currently owned by Albatross. Albatross owns the majority of the CM Areas of the Site and is the potentially liable party responsible for additional cleanup at the Site (see Figure 4). Albatross plans to remove additional contamination, thereby making areas of restricted land use suitable for unrestricted (e.g., residential) land use (Ecology 2022a). A copy of the Albatross Agreed Order is also provided in Appendix B of this Report.

SECTION 3: CURRENT SURFACE WATER, GROUND WATER, AND FRESHWATER SEDIMENT CONDITIONS

This section discusses the current conditions of surface water, groundwater, and freshwater sediment on the Site.

3.1 Surface Water

Three surface water bodies (Puget Sound, Sequalitchew Creek, and Old Fort Lake) occur within or adjacent to the Site. Puget Sound is a large saltwater body west of the Site. Puget Sound directly or indirectly receives all groundwater and surface water discharge from the Site. Sequalitchew Creek is a perennial stream that originates in Sequalitchew Lake east of the Site and discharges into Puget Sound. In the dry season, the upper and lower reaches of the creek within the Site are dry. Old Fort Lake is a small glacial kettle lake that has no inlet or outlet. The lake is fed by groundwater from the Water Table Aquifer and the lake level is an expression of the aquifer.

Of the wide range of constituents for which surface water was analyzed on-Site, only dissolved lead and dissolved copper have been detected at elevated concentrations in one or more samples collected from Old Fort Lake and Sequalitchew Creek. Dissolved copper was the only constituent with confirmed elevated detections. Dissolved lead was detected infrequently at marginally elevated concentrations in both Old Fort Lake and Sequalitchew Creek. None of the lead detections were confirmed in preceding or subsequent sampling rounds (pre-2003). In addition, the concentrations of dissolved copper and lead detected in on-Site surface water are within the range of background concentrations detected in an area background (upstream) sampling location in Sequalitchew Creek. Concentrations of dissolved copper and lead detected in on-Site surface water are also within the range of background concentrations detected in other regional rivers and streams in Pierce County (West Shore Corporation NW and PIONEER 2003a).

Based on the analytical data, Ecology provided verbal agreement that No Further Action was required for surface water at the Site, indicating that constituents detected in Site surface water do not require cleanup or any further action (Ecology 1996 and 2016b).

3.2 Groundwater

The only constituents detected at elevated concentrations in groundwater since 1996 were the isomers 2,4-DNT and 2,6-DNT. Because detected DNT concentrations were consistently low, were not affecting the regional aquifer, were not affecting surface water, and the aquifer was not used as a drinking water source, Ecology determined that no active remedial action was necessary, and long-term monitoring at selected wells was deemed sufficient. Periodic groundwater monitoring occurred at the Site until 2014 (PIONEER 2014), at which time it was deemed no longer necessary (Ecology 2016b). All groundwater concentrations were less than the Ecology's Model Toxic Control Act (MTCA) Method A surface water

cleanup levels (PIONEER 2014). Restrictive covenants remain in place to restrict the extraction of groundwater for use as drinking water (Ecology 2016b).

3.3 Freshwater Sediment

Of the wide range of constituents for which freshwater sediment samples were analyzed on-Site, no constituents were detected at elevated concentrations. Lead was detected in Old Fort Lake sediments but at relatively low concentrations. Detected concentrations of metals were comparable to available background sediment data for the Puget Sound region (West Shore Corporation NW and PIONEER 2003a).

Based on these data, Ecology provided verbal agreement that No Further Action was required for freshwater sediment at the Site, indicating that constituents detected in Site freshwater sediment do not require cleanup or any further action (Ecology 1996).

SECTION 4: SOIL SCREENING LEVELS AND IDENTIFICATION OF COPCS

This section discusses appropriate screening levels (SLs) for which to compare to constituents identified in soil and the identification of constituents of potential concern (COPCs) in soil at the Site assuming unrestricted (e.g., residential) land use.

4.1 Previous Screening/Remediation Levels

Previous cleanup levels were calculated during the RI/FS/CAP process in 2003 and varied by land use. For example, the arsenic cleanup level for the CM and GC Areas was 60 mg/kg, the arsenic cleanup level for the HI and OS Areas was 32 mg/kg, and the arsenic cleanup level for the IN Area was 90 mg/kg. The rationale and derivation for each of the cleanup levels developed for the previous remedial actions are summarized in the Final CAP (West Shore Corporation NW and PIONEER 2003a).

4.2 Unrestricted Land Use Screening Levels

As discussed in Section 2 and above, the Site was previously remediated to comply with site-specific CM, CG, HI, OS, and IN cleanup levels, which are generally higher than those SLs appropriate for unrestricted land use. Since portions of the Site may be used for residential land use in the future, MTCA Method A / B Direct Contact Cleanup Levels for Unrestricted Land Use are the most appropriate SLs to evaluate the current conditions of the Site, with modifications and adjustments as described below and in Table 1.

- The arsenic SL defaulted to the natural Puget Sound background concentration (20 mg/kg), per WAC 173-340-740(5)(c). A site-specific arsenic background concentration also exists and was determined by Hart Crowser in 1994, with concurrence documented by Ecology. In a letter dated March 11, 1996 to Vern Moore of Weyerhauser from Mike Blum at Ecology, Ecology concurred with the Site-specific natural background level, and stated that “Ecology will not require cleanup soil standards to be more stringent than 32 ppm, irrespective of land use.” As a result, using a site-specific background concentration of 32 mg/kg rather than the Puget Sound background concentration of 20 mg/kg as the cleanup level for unrestricted land use is likely acceptable. For clarity, we have compared in-place arsenic concentrations in soil to both the 20 mg/kg and 32 mg/kg natural background concentrations.
- The terrestrial ecological SL of 118 mg/kg for lead may apply to the HI and OS Areas, even though it is most likely overly conservative compared to the MTCA Method A SL of 250 mg/kg.
- A SL of 7,600 mg/kg for TPH as Bunker C fuel was previously approved by Ecology as part of the Final CAP. One area of the Site had TPH that did not originate as Bunker C fuel and was compared to the 2,000 mg/kg SL for heavy oil (West Shore Corporation NW and PIONEER 2003a).
- A SL of 3.0 mg/kg for Total DNT (2,4-DNT plus 2,6-DNT) was previously approved by Ecology as part of the Final CAP (West Shore Corporation NW and PIONEER 2003a).
- A Site-specific unrestricted land use SL of 1,904 mg/kg was calculated for monomethylamine nitrate (MMAN). MMAN was produced by DuPont for use as a sensitizer with water gel explosive formulations. The United States Environmental Protection Agency (EPA) has not published toxicity information or toxicity values (e.g., RfD) for MMAN; therefore, published SLs

do not exist for this constituent. However, PIONEER developed an RfD and calculated site-specific SLs, approved by Ecology, as part of the Final RA (PIONEER 2003). Using the same exposure factors but adjusting the exposure frequency to 365 days to match the MTCA residential exposure frequency, the site-specific residential SL for MMAD was calculated.

Table 1 presents the SLs appropriate for unrestricted land use on the Site.

4.3 Current Constituents of Potential Concern in Soil

As an initial screening, all constituents currently in soil on the Site (represented by in-place soil sample results) were compared to the newly calculated unrestricted land use SLs. The following constituents exceed the unrestricted land use SL in the uppermost 15 feet of soil (MTCA unrestricted land use point of compliance) in CM, HI, and OS Areas and are considered COPCs:

- Aldrin
- Arsenic
- Lead
- MMAN
- Petroleum compounds (motor oil, oil & grease, and Bunker C Fuel [via Method 418.1])

Cadmium, 2,6-DNT, mercury, polychlorinated biphenyl Aroclor 1254, and total carcinogenic polycyclic aromatic hydrocarbons including benzo(a)pyrene also exceed the unrestricted land use SLs on the Site. However, all SL exceedances of these constituents occur either beneath the GC cap or in the IN Area, neither of which will impact human health or the environment based on the current and proposed future land uses for those areas. The nature and extent of the current Site COPCs is further evaluated in the next section.

SECTION 5: CURRENT SOIL CONDITIONS

This section details current conditions of soil constituents in the CM, HI, and OS Areas of the Site. The nature and extent of constituent concentrations on the Site was extensively characterized prior to remediation. Thousands of additional confirmation samples were collected after remedial activities were completed to ensure concentrations remaining on the Site met the appropriate cleanup levels by land use. In total, over 10,900 soil samples have been collected from the Site, including approximately 7,400 in-place soil samples considered representative of current soil conditions at the Site (see Figure 8).

5.1 Areas not Evaluated for Unrestricted Land Use

Soil conditions at the following portions of the Site were not evaluated for unrestricted land use and are not discussed in terms of current soil conditions for the following reasons:

- GC Areas: No new development or change in land use is planned for the GC Areas. These areas are fully developed, contain significant contaminated material excavated from other portions of the Site within the placement areas, and were capped. Contaminated soil outside the placement areas but within the Golf Course was remediated to be protective of the current land use. Restrictions on the land require maintaining the existing protective cap, which will protect potential residents in adjacent proposed residential areas from contacting contaminated soil beneath the Golf Course.
- HI Areas: No new development or intrusive activities are planned for the HI Areas. These areas are historically and/or culturally significant and will not be disturbed. These portions of the Site will not be used for residential purposes in the future. These data are shown on the sample maps to illustrate soil conditions in case the land is used recreationally in the future (e.g., a trail through the area).
- IN Area: The IN Area has not yet been developed. However, the end use of the IN Area is still planned to be industrial. The IN Area was remediated to the approved industrial cleanup levels which are still appropriate. A land use application is expected in 2023 or shortly thereafter, with proposed industrial usage. Future residents will not be present on this portion of the Site.

5.2 Current Conditions by COPC

The subsections below detail soil conditions by COPC. A map of historical concentrations as well as a map of current soil conditions for each COPC has been created (see Figures 9 through 22).

5.2.1 Aldrin

Aldrin (an insecticide) was historically analyzed at 32 pre-remediation sample locations on the Site. The samples were collected between 1986 and 1992. Of the 32 total samples analyzed for aldrin, only one sample contained measurable amounts (i.e., concentrations greater than the laboratory reporting limit). The concentration of aldrin in this single sample (0.60 mg/kg) exceeded the aldrin unrestricted SL (0.059 mg/kg), while the remaining 31 samples were non-detect for aldrin. This sample remains in place as it was located within HI-04, which is the location of an historical shell midden (see Figure 9). No additional aldrin analyses occurred after remedial activities were completed in 2003. The majority of the 32 total samples analyzed for aldrin were removed during the remedial actions due to exceedances for other

COPCs. The lone aldrin exceedance was located at a depth of 0 to 0.5 feet bgs and was covered with 18 inches of clean gravel/soil to eliminate potential exposure as part of remedial activities.

5.2.2 Arsenic

Prior to remediation, elevated arsenic concentrations were located throughout the Site, generally aligned with NGRR locations. Arsenic was sprayed along the rail lines and building foundations to inhibit weed growth in order to prevent potential fires. The Tacoma Smelter Plume was also responsible for generating Sitewide arsenic concentrations generally between 40 and 100 mg/kg (Ecology 2022b). A site-specific background concentration for arsenic of 32 mg/kg was approved by Ecology in 1996 (see Section 4.2).

After remedial activities were completed (Sitewide removal of one foot of soil, IRAs, and MSU remediation), arsenic remains in soil at concentrations greater than 20 mg/kg and 32 mg/kg (Puget Sound natural background and Site-specific natural background, respectively). A total of 368 arsenic samples representing in-place soil exceed 20 mg/kg and 173 samples exceed 32 mg/kg (see Figure 10). The SL exceedances are generally focused

1. in CM-08 where surface soil was not removed and compliance with the cleanup level was obtained through selective soil remediation,
2. along the southeastern Site perimeter,
3. along railroad lines, and
4. in HI Areas that were not remediated.

The highest in-place arsenic concentrations are located in CM-08 and the HI Areas.

5.2.3 Lead

Prior to remediation, similar to arsenic, elevated lead concentrations were located throughout the Site. After remedial activities were completed (Sitewide scraping, IRAs, and MSU remediation), sporadic lead concentrations remained greater than 118 mg/kg and 250 mg/kg (the terrestrial ecological SL and MTCA Method A SL, respectively). A total of 14 samples representative of in-place soil contain lead at concentrations greater than 118 mg/kg, all of which are located 0 to 0.5 feet bgs. The samples are located in the CM-08 statistical compliance unit that was not scraped, HI-02, or HI-04. Only three samples representative of on-Site soil contain lead concentrations greater than the 250 mg/kg MTCA Method A SL, each located in HI-02 or HI-04 (see Figure 11). Each of the soil samples that exceed lead SLs were collected between 1999 and 2004.

5.2.4 MMAN

MMAN (an explosive) was analyzed in 180 samples Sitewide prior to remediation. Out of those 180 samples, MMAN was detected in only 19 samples. A total of 54 soil samples remain representative of in-place soil, including 5 with MMAN detections. All MMAN samples were collected between 1987 and 1992; MMAN was not analyzed in soil after remediation was completed. Only 2 samples representative of in-place soil contain MMAN at concentrations greater than the SL (1,904 mg/kg), collocated at different depths within CM-04 in the southeast portion of the Site (see Figure 12). The samples were

collected at depths of 0 to 3 feet bgs (3,600 mg/kg) and 3 to 6 feet bgs (30,000 mg/kg) from test pits advanced in a former works magazine landfill area. The remainder of samples representative of in-place soil are either non-detect for MMAN or contain concentrations significantly less than the SL.

5.2.5 Petroleum Compounds

Soil at the Site has historically been analyzed for many different petroleum compounds including Bunker C fuel, diesel fuel, Fuel Oil #6, gasoline, Kensol, kerosene, motor oil, oil & gas, Stoddard solvent, and generic TPH via Method 418.1 (generally to represent Bunker C fuel). Based on samples representative of in-place soil, there are currently only five locations with exceedances of unrestricted SLs associated with motor oil, oil & grease, or generic Method 418.1 (for Bunker C fuel). The remaining petroleum compounds were either not detected or did not exceed SLs in samples representative of in-place soil.

Motor oil was analyzed in 17 samples prior to remediation, 13 of which detected motor oil. Historically, motor oil concentrations as high as 35,800 mg/kg were present on the Site. A total of 10 soil samples analyzed for motor oil remain representative of in-place soil post-remediation, including 4 with motor oil detections. Remedial actions removed the motor oil contamination from the Site to concentrations less than the SL (2,000 mg/kg), with the exception of one soil sample containing motor oil at a concentration of 3,000 mg/kg. The sample was collected in 1992 from CM-01, at a depth of 14.5 to 15 feet bgs, which is the MTCA point of compliance for unrestricted land use (see Figure 13). All confirmation samples collected in 2003 and 2004 and representing in-place soil were less than half of the motor oil SL.

Oil & grease was analyzed in 34 samples prior to remediation, 23 of which detected oil & grease. A total of 17 soil samples analyzed for oil & grease remain representative of in-place soil post-remediation, including 7 with oil & grease detections. All oil & grease samples were collected in 1986 and 1987; oil & grease was not analyzed in soil after remediation was completed. Only 2 samples representative of in-place soil contain oil & grease at concentrations greater than the SL (2,000 mg/kg), collocated at different depths within CM-04 in the southeast portion of the Site (see Figure 14). The samples were collected at depths of 0 to 3 feet bgs (20,000 mg/kg) and 3 to 6 feet bgs (4,700 mg/kg). The remainder of samples representative of in-place soil are either non-detect for oil & grease or contain concentrations significantly less than the SL.

TPH via Method 418.1 (associated with **Bunker C fuel**) was analyzed in 491 samples prior to remediation, five of which exceeded the SL. Remedial actions removed the TPH contamination from the Site to concentrations less than the SL (7,600 mg/kg), with one exception. One soil sample representative of in-place soil contained TPH at a concentration of 36,000 mg/kg. The sample was located in CM-04 at a depth of 3 to 5.5 feet bgs (see Figure 15). A second sample representative of in-place soil, also located within CM-04, contained TPH at a concentration of 3,600 mg/kg, from 3 to 6 feet bgs. If the TPH in this second sample is not Bunker C, TPH SLs would be exceeded at this location (2,000 mg/kg). The remaining soil samples analyzed using TPH Method 418.1 and representing in-place soil are less than 2,000 mg/kg. All TPH via Method 418 soil samples were collected in 1992 and 1993.

SECTION 6: DISCUSSION

This section discusses the soil unrestricted (e.g., residential) land use SL exceedances, identifies additional areas to investigate and potentially remediate, and discusses how the SL exceedances may affect future redevelopment. It should be noted that the Site is currently in compliance with the consent decree and remains protective of human health and the environment under the **current** land uses.

6.1 Evaluation of Current Soil SL Exceedances

The lone aldrin unrestricted land use SL exceedance is located within a historical area (HI-04) where land use is unlikely to change (see Figure 16). Remedial activities at HI-04 included the placement of a cap to protect archeological artifacts and to be an exposure barrier. The cap consisted of gravel and is 18 inches thick. Assuming this cap remains in place and maintained (per the restrictive covenants), there is no human health or ecological risk posed by aldrin in soil at the Site.

Arsenic unrestricted land use SL exceedances are relatively widespread compared to other COPCs, which is not unexpected given the sources of the contamination and that previous remedial activities were designed for future commercial usage of the Site (see Figure 16). If the land use were to change to residential, the extent of arsenic in soil will need further evaluation and potentially additional samples to characterize these SL exceedances.

Lead unrestricted land use SL exceedances are located in HI-02 and HI-04 (see Figure 16). Lead concentrations exceeding the more restrictive terrestrial ecological SL are also present in CM-08, but this is allowed under MTCA (Ecology 1992), since the area is in statistical compliance and the “average” concentration is less than the SL. Remedial activities in HI-02 and HI-04 included the placement of an 18-inch-thick exposure barrier which eliminates human health or ecological risk posed by lead in soil at HI-02 and HI-04. Lead concentrations in CM-08 are less than the MTCA Method A SL, which is considered protective for unrestricted land use. In summary, lead SL exceedances on the Site are unlikely to pose a human health or ecological risk.

MMAN, oil & grease, and Bunker C fuel unrestricted land use SL exceedances are located in the southeast portion of CM-04 (see Figure 16). MMAN SL exceedances are present at two sample intervals in one location, surrounded by soil with MMAN concentrations less than the SL. Oil & grease SL exceedances are present at two sample intervals in one location adjacent to the location with MMAN SL exceedances. The MMAN and oil & grease SL exceedances occurred in samples 0 to 3 feet bgs and 3 to 6 feet bgs. The lone Bunker C fuel SL exceedance occurred at a depth of 3 to 5.5 feet bgs in the same vicinity. Each of the MMAN, oil & grease, and Bunker C fuel samples were analyzed approximately 30 years ago (between 1986 and 1993).

The lone motor oil SL exceedance was located at a depth 14.5 to 15 feet bgs in CM-01 in the location of the former Bunker C Pipeline and above-ground storage tank excavation (see Figure 16). Although within the MTCA 15-foot point-of-compliance for unrestricted land use, it is unlikely that this SL

exceedance will pose a significant hazard to human health or ecological receptors. Excavation work, with the exception of sewer lines, is unlikely to reach this depth.

6.2 Areas That Likely Require Additional Investigation and/or Remediation

MMAN, Oil & grease, and TPH via Method 418.1 SL exceedances are all located at CM-04 in the southeast corner of the Site and require additional investigation and characterization (see Figure 16).

Based on the age and quality of the analytical methods, we recommend resampling the MMAN and various TPH exceedance locations to confirm unrestricted land use SL exceedances remain, if the land use in the areas where the exceedances are located is going to change. There is a potential that with increased laboratory precision, updated laboratory methods, and natural attenuation/degradation, historical MMAN and/or TPH unrestricted land use SL exceedances may not require remediation to prepare the Site for future unrestricted land use.

Additionally, TPH Method 418.1 is an outdated analytical method that was replaced with more modern methods (i.e., NWTPH-Gx and NWTPH-Dx). Method 418.1 samples were collected in 1992 and 1993. Detections and exceedances noted using Method 418.1 may be associated with wood or other organic material interfering with the results and may not be representative of true unrestricted land use SL exceedances. More modern analytical methods are able to better define exceedances of petroleum products.

Confirmation sampling for arsenic and lead remediation was completed using five-point composite sampling patterns with 75-foot spacing. Given the size of the decision/exposure units and planned commercial/industrial use in 2003, this was deemed sufficient. However, if the Site is to be used for residential uses, the decision/exposure units (e.g., individual residential parcels) may be much smaller (e.g., less than a quarter acre), which may result in some exposure units having limited to no samples. Refined sampling may be required in any future residential exposure units that have no sample data and/or in areas with SL exceedances.

6.3 Recommendations

If future land use plans include trails within the HI Areas, existing exposure barriers should be maintained and restrictive covenants should remain in place to prevent breaching of the exposure barriers. If trails in OS Areas are constructed near areas where former Dupont Works activities occurred or in areas with known unrestricted land use SL exceedances, additional soil evaluation should be completed.

Remediation of CM-08 would be more involved than other Areas of the Site due to the extent of arsenic contamination (see Figure 16), mature tree cover, and the presence of potential burial sites. Area-wide surface soil was not removed in CM-08; compliance with the cleanup level was obtained through selective soil remediation and statistical compliance. Remediation of other portions of the Site for unrestricted land use SL exceedances, if needed, would be focused in specific ‘hot-spot’ areas.

These recommendations are based on the assumption that all land outside of the GC and IN Areas could be used for unrestricted land uses in the future. This assumption should be revisited with the benefit of specific future land use plans so that unrestricted land use SL compliance evaluations, investigations, and potential remediation could take into account future land use and focus on areas where there will be residences (rather than on areas where there will be roads, parking lots, and other hardscapes). Additional remediation for residential land use would likely consist of soil excavation and either on-site or off-site disposal of excavated soil. If future investigation and land use plans determine that remediation is required, techniques similar to the 2003 remediation would be highly recommended (e.g., creating placement areas for contaminated soil beneath future parking lots).

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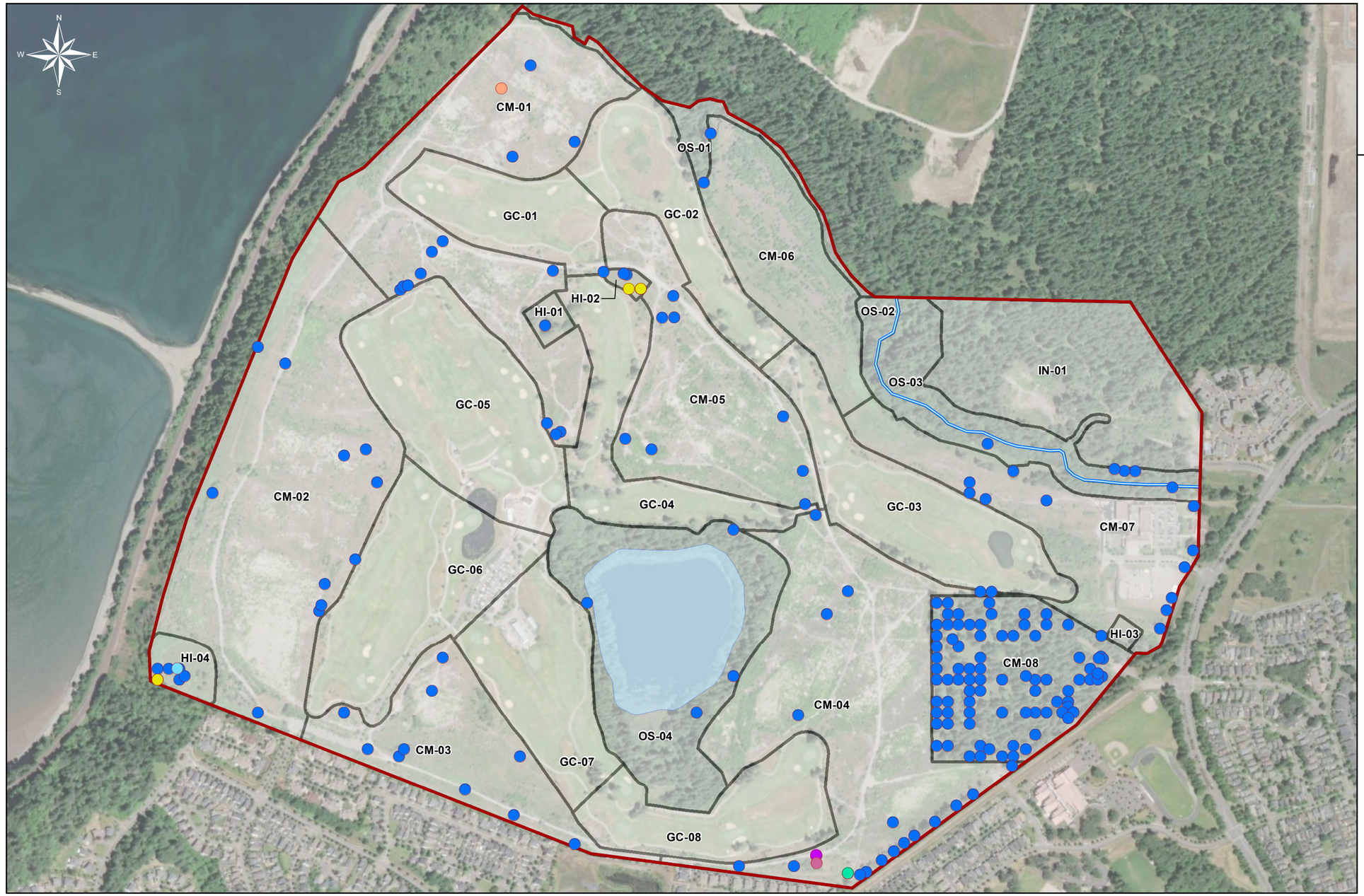
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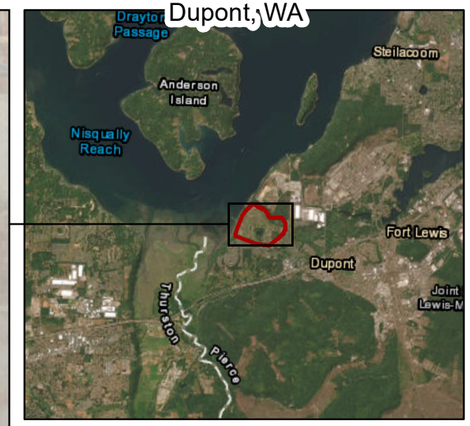
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Figures

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Exceedance Areas by Constituent

- Aldrin
- Arsenic
- Lead
- MMAN
- Motor Oil
- Oil and Grease
- Bunker C Fuel (via Method 418.1)

Other Site Features

- Sequalitchew Creek
- Old Fort Lake
- Remediation Units
- Site Boundary

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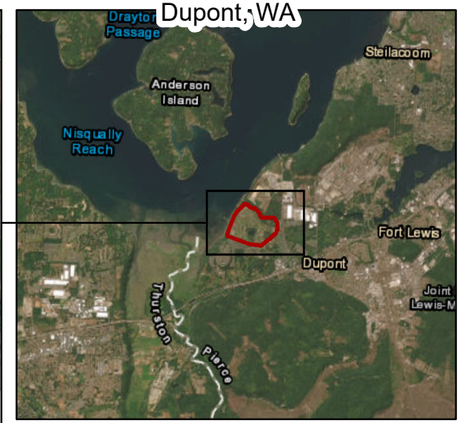
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Summary of In-Place Unrestricted Soil Screening Level Exceedances
Current Conditions Report
Former DuPont Works Site

ES-1

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- Burlington Northern Railroad
- Sequalitchew Creek
- Site Boundary (Parcel One)
- Parcel Two
- Old Fort Lake
- Historical Village of DuPont

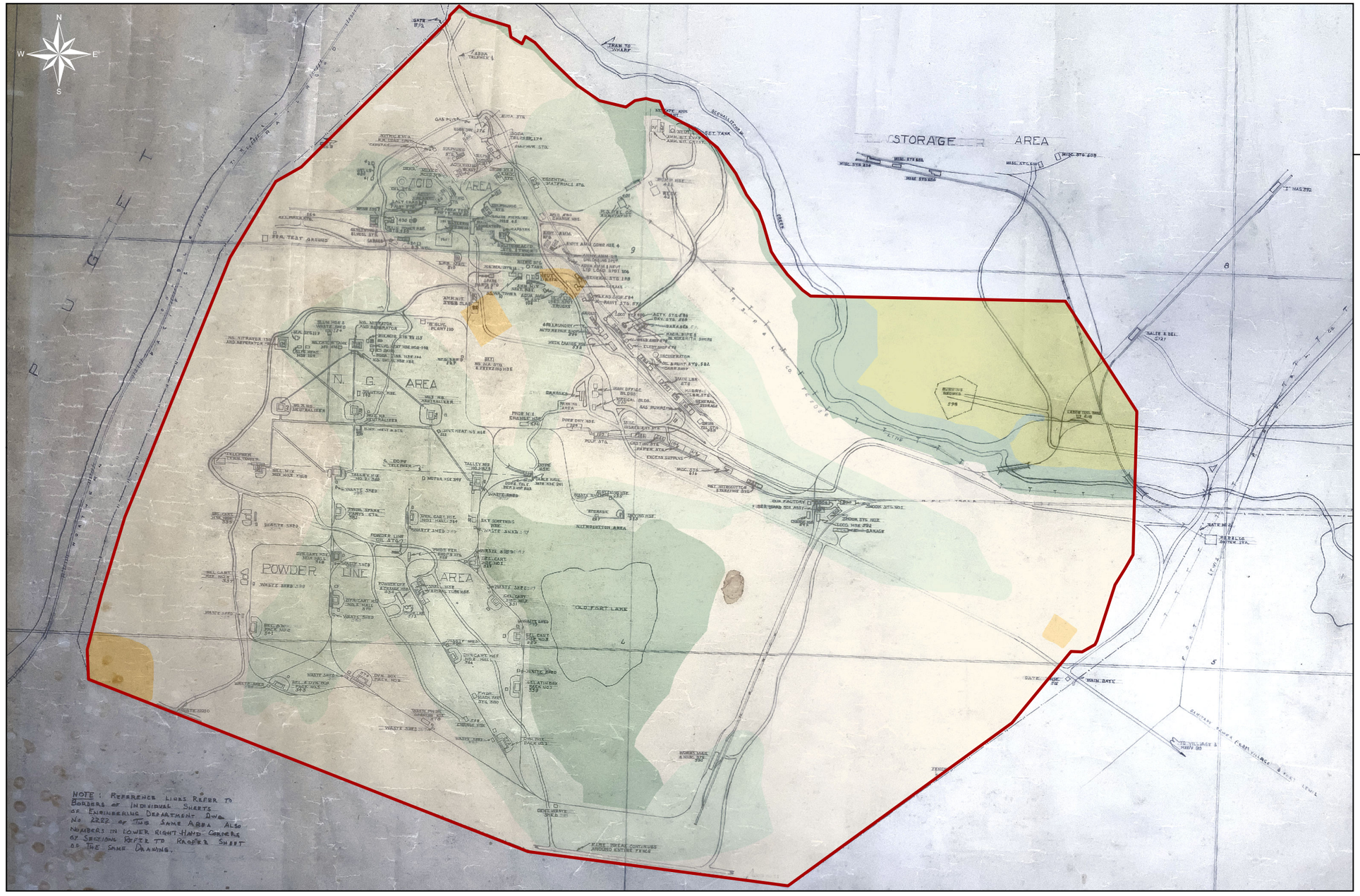
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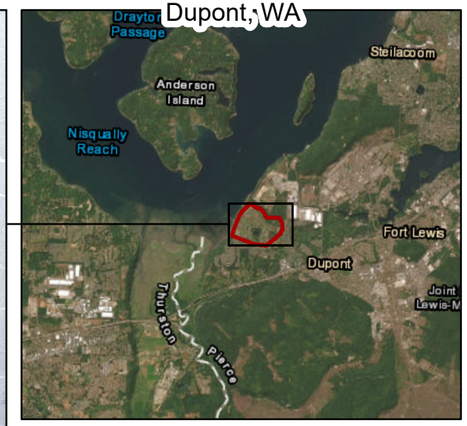
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Former DuPont Works Site Vicinity Map
Current Conditions Report
City of DuPont

Figure 1

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- Site Boundary

Land Use Areas

- Commercial
- Industrial
- Golf Course
- Historical
- Open Space

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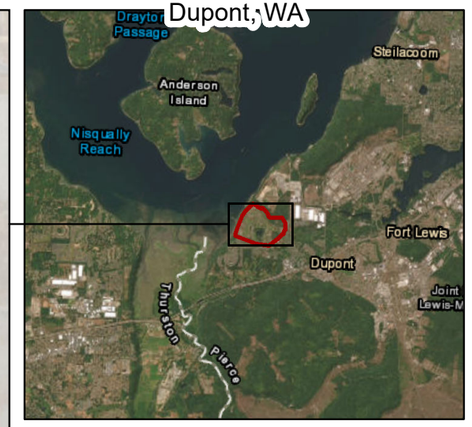
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Historical Site Features and Land Use Map
Current Conditions Report
Former DuPont Works Site

Figure 2

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Legend

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space

Other Site Features
- Sequalitchew Creek
- Old Fort Lake
- Site Boundary

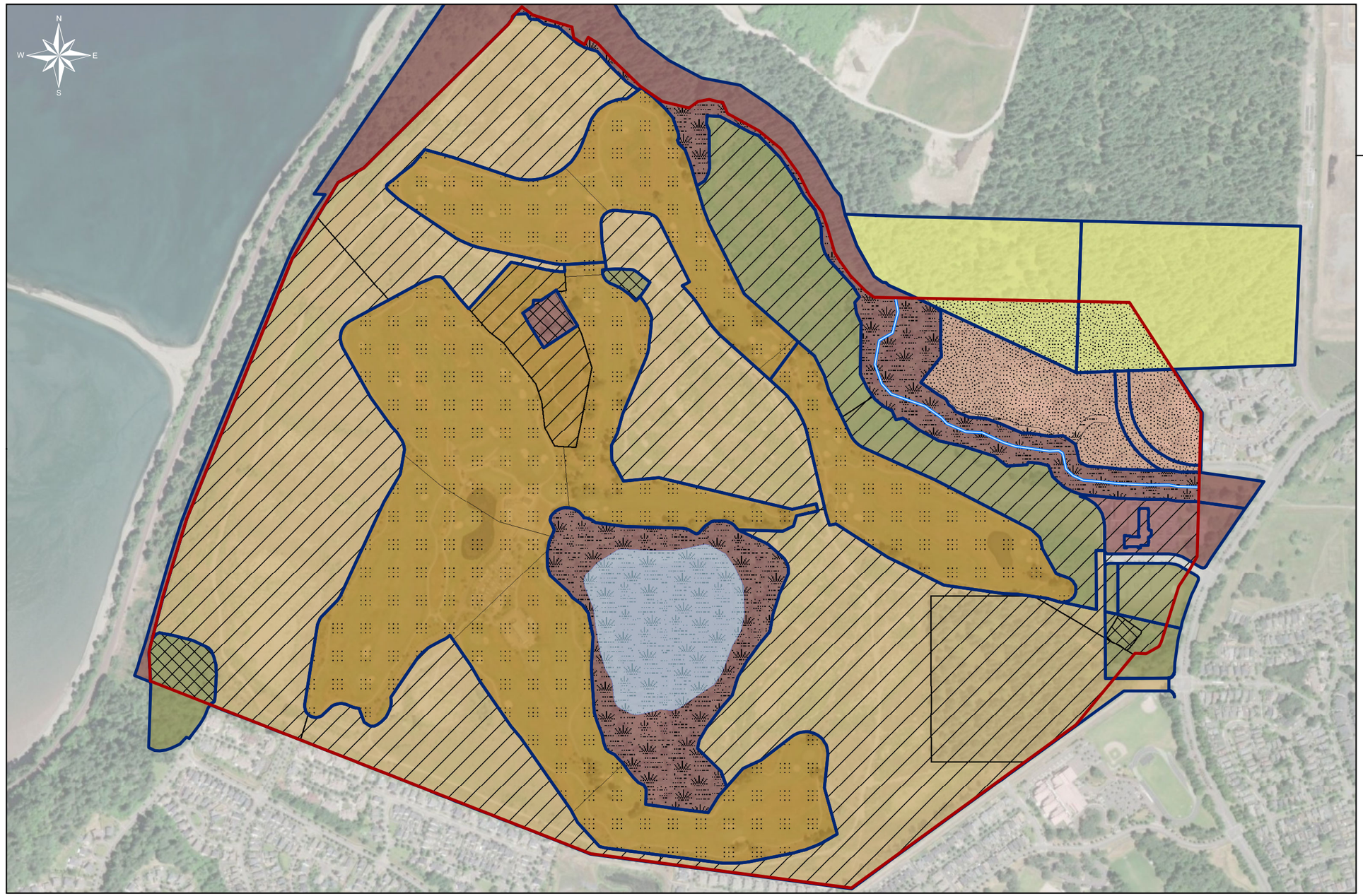
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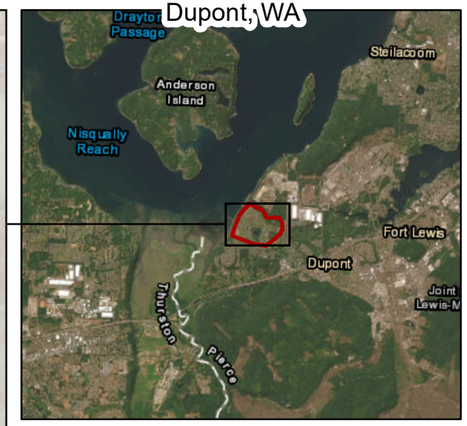
PIONEER TECHNOLOGIES CORPORATION

Land Use Areas and Historical Remediation Units
Current Conditions Report
Former DuPont Works Site

Figure 3

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 3_Land Use Areas and Historical Rem Units.mxd; Author: MCK; Date Saved: 12/16/2022





Legend

- Parcel Boundaries

Land Use
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space

Parcel Owner
- Albatross Estates LLC
- City of Dupont
- DuPont Industrial Partners LLC
- Nisqually Indian Tribe
- Pacific NW Golf & PNGA/WSGA Prop Inc.
- Weyerhaeuser NR Company

Other Site Features
- Sequalitchew Creek
- Old Fort Lake
- Site Boundary

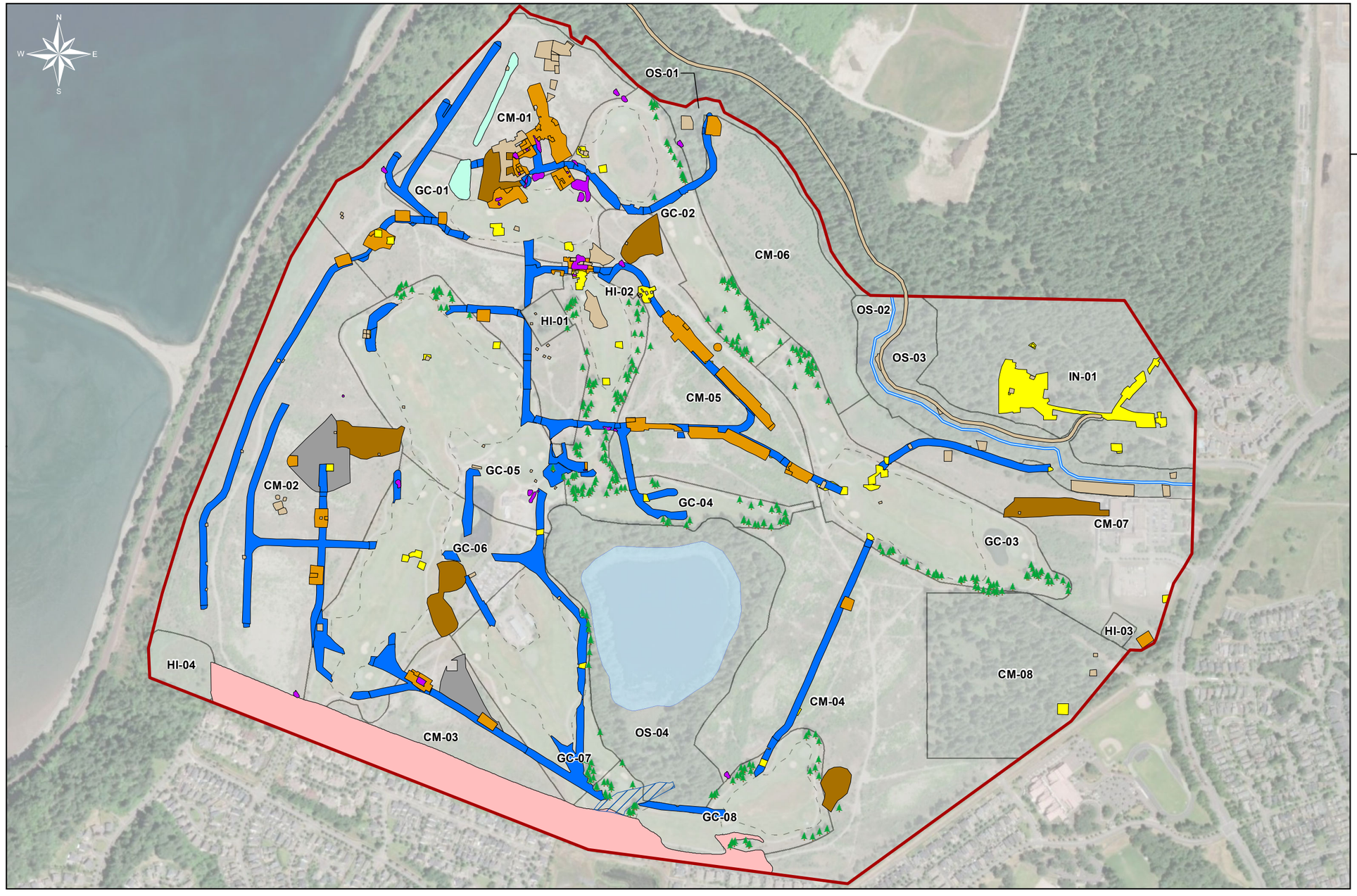
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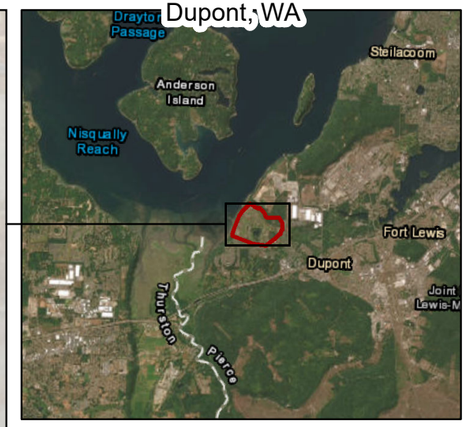
PIONEER TECHNOLOGIES CORPORATION

Current Site Ownership and Land Use Map
Current Conditions Report
Former DuPont Works Site

Figure 4

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 4_Ownership Map.mxd; Author: MCK; Date Saved: 1/5/2023





Legend

- Tree Root Zone Remediation
- Miscellaneous Small Unit Excavations
- Hotspot Excavations
- On-Site Stockpile Excavations
- Sand Laydown Area Excavations
- Soil Laydown Area Excavations
- Perimeter Soil Excavation
- Foundation Excavations
- Narrow Gauge Railroad Excavations
- Stormwater Pipeline Excavation
- Bunker-C Pipeline and Above-Ground Storage Tank Excavation
- No Further Action

Other Site Features

- Sequalitchew Creek
- Remediation Units
- Contaminated Soil Placement Areas
- Old Fort Lake
- Site Boundary

Notes:
-Several focused remedial excavations also occurred within the HI Areas but are not shown due to the large scale of this map relative to their size.

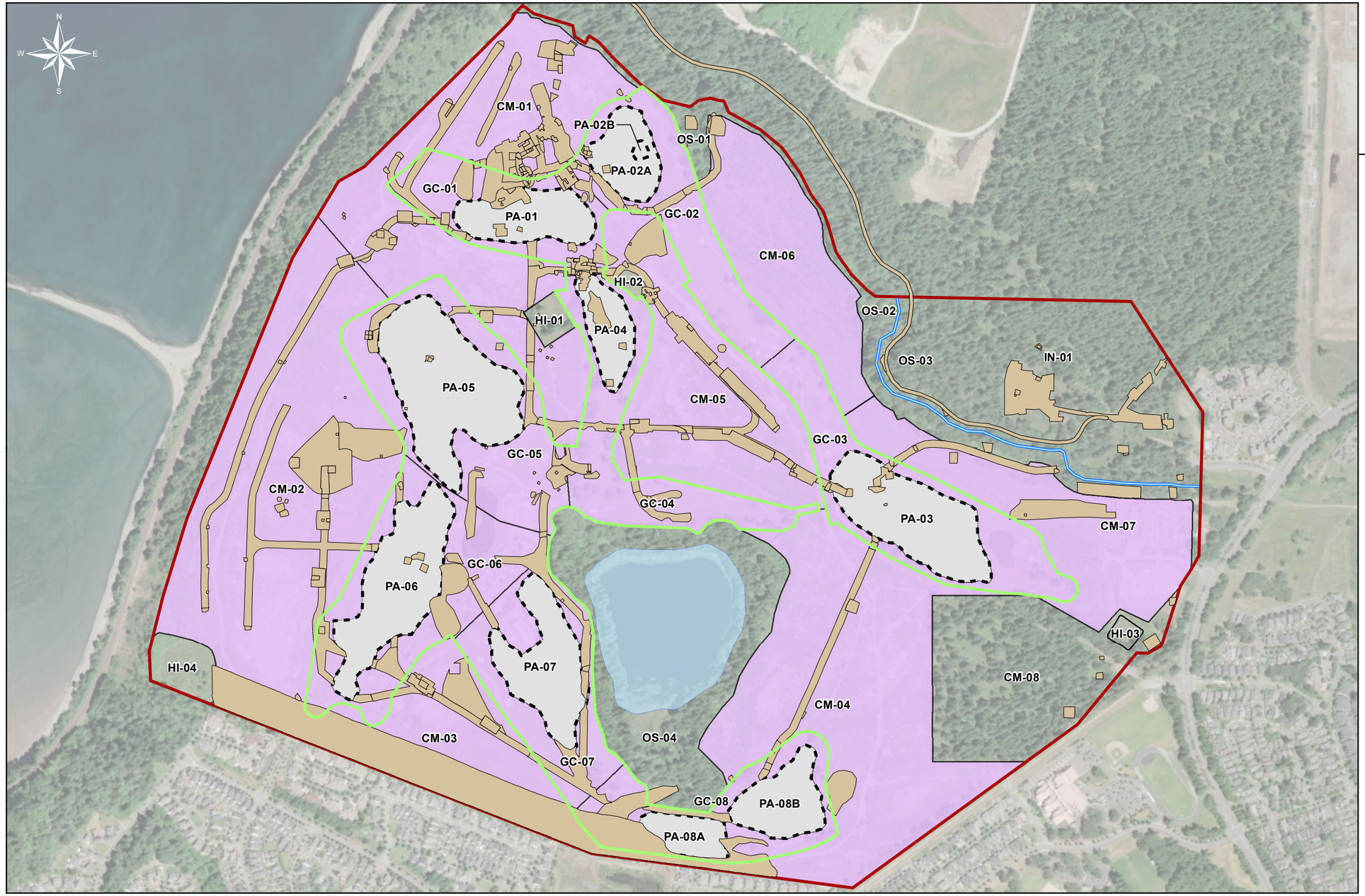
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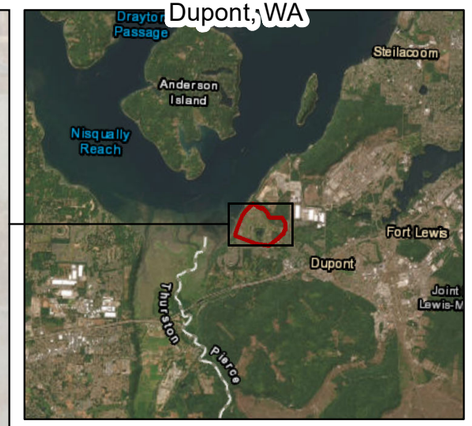
PIONEER TECHNOLOGIES CORPORATION

Interim Remedial Actions and Miscellaneous Small Unit Remediation
Current Conditions Report
Former DuPont Works Site

Figure 5

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 5_Interim Rem Units.mxd; Author: MCK; Date Saved: 12/22/2022





Legend

- Golf Course Land Use Area Boundary
- Large-Scale Excavation
- IRAs and MSUs
- Contaminated Soil Placement Areas
- Remediation Units

Other Site Features

- Sequalitchew Creek
- Old Fort Lake
- Site Boundary

Notes:
-Several focused remedial excavations also occurred within the HI Areas but are not shown due to the large scale of this map relative to their size.

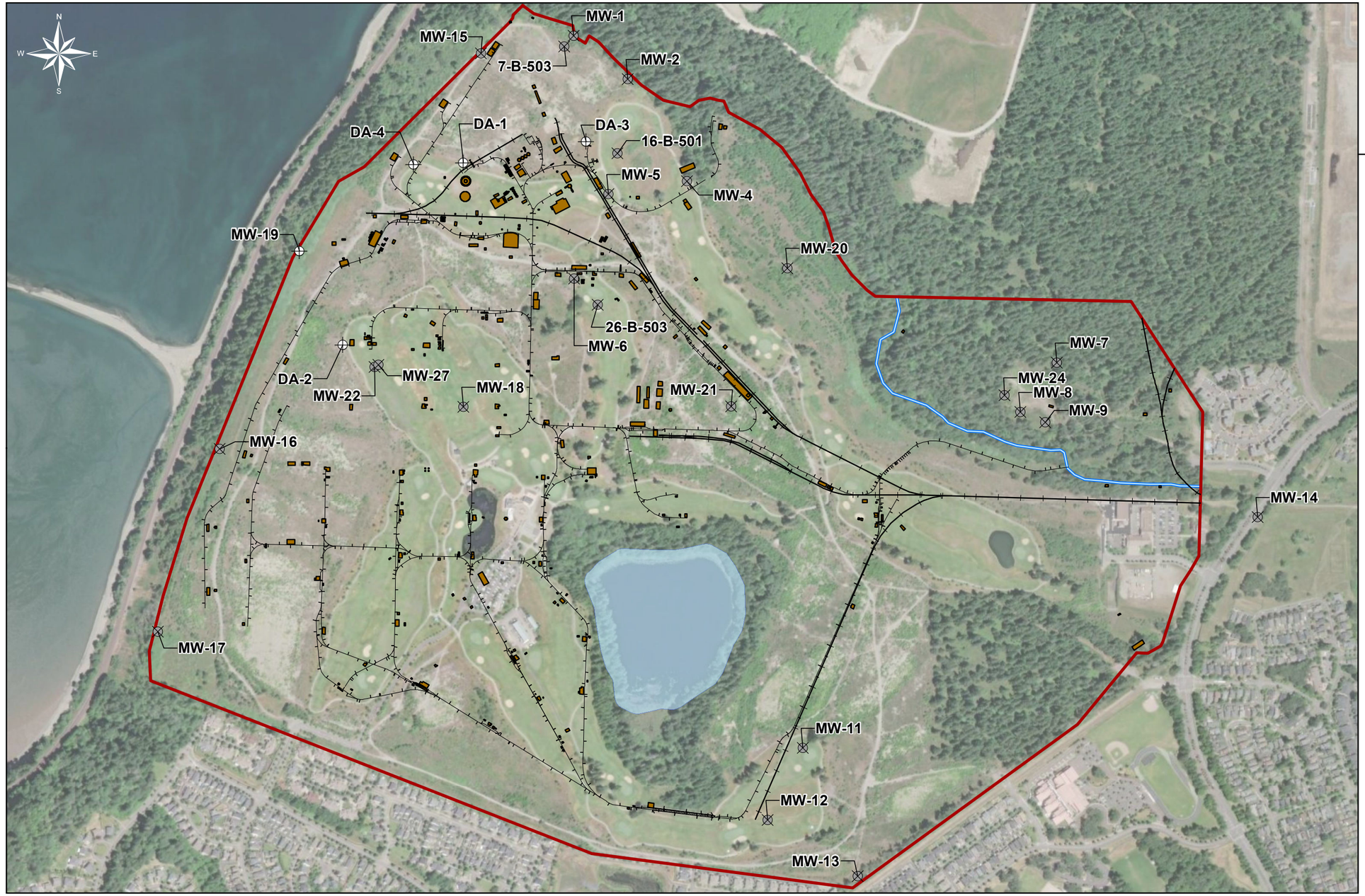
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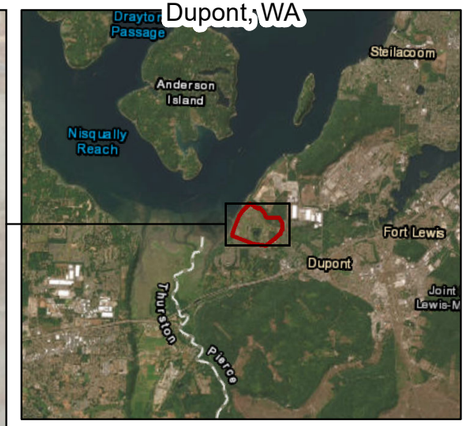
PIONEER TECHNOLOGIES CORPORATION

Large-Scale Excavation and Placement Areas
Current Conditions Report
Former DuPont Works Site

Figure 6

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 6_Large Scale Exc.mxd; Author: MCK; Date Saved: 12/22/2022





Legend

- Historical RI Monitoring Well
- Post-Remediation Monitoring Well

Other Site Features

- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-All on-site monitoring wells have been decommissioned.

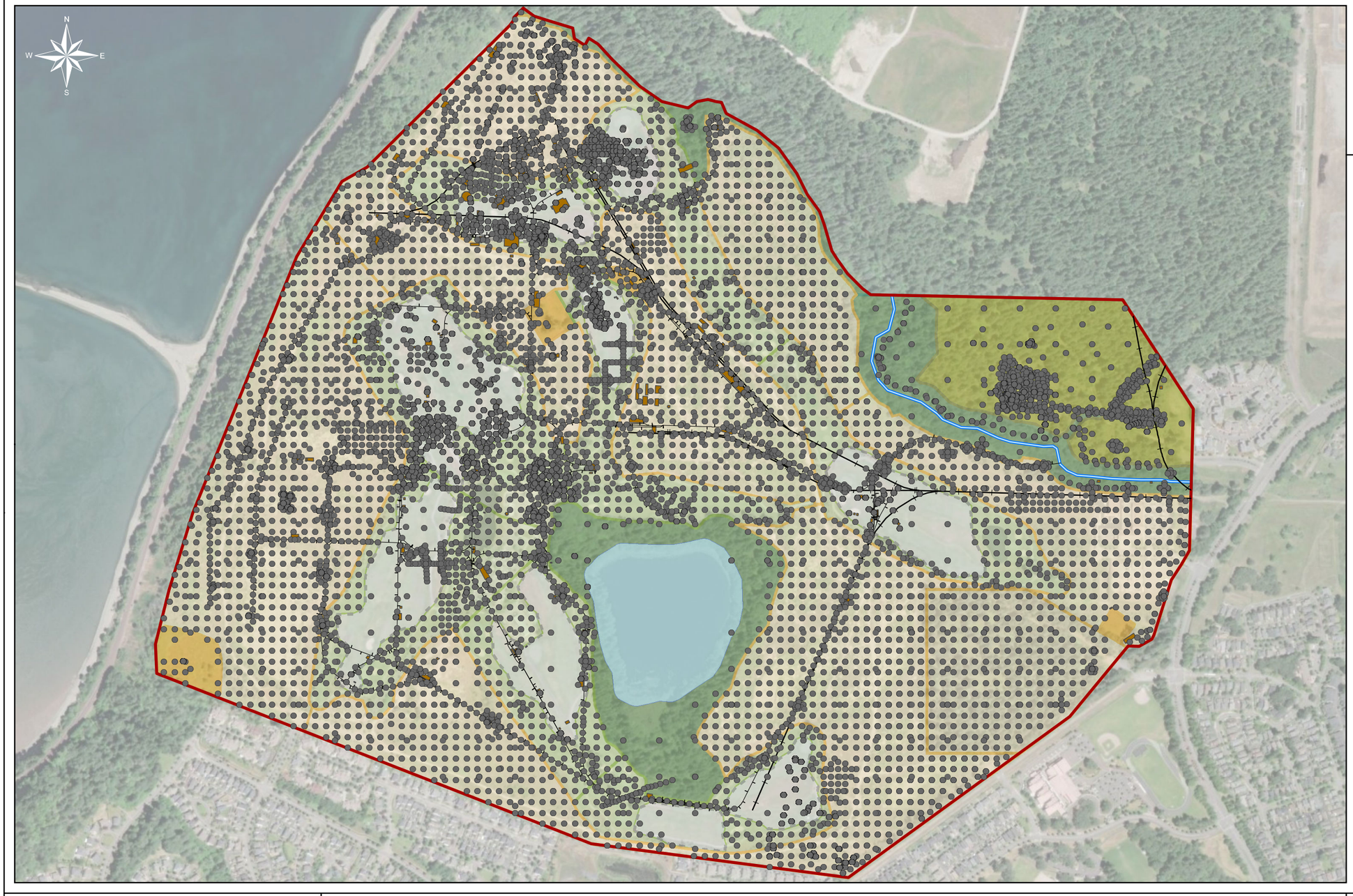
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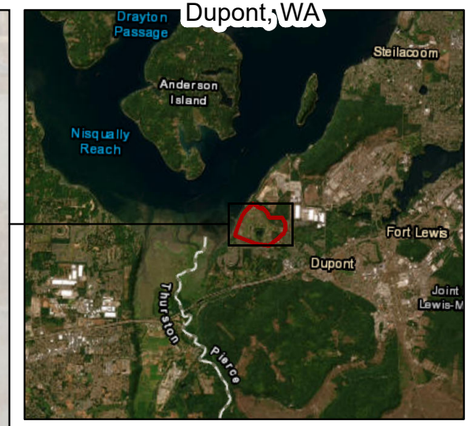
PIONEER TECHNOLOGIES CORPORATION

Former Groundwater Monitoring Well Locations
Current Conditions Report
Former DuPont Works Site

Figure 7

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 7_Former Wells.mxd; Author: MCK; Date Saved: 1/4/2023





Legend

- Soil Sample

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-All soil samples collected on the Site to date are shown, regardless of whether they are still representative of in-place soil conditions. Soil was collected from multiple intervals at many locations.

0 300 600 900 1,200 1,500 Feet

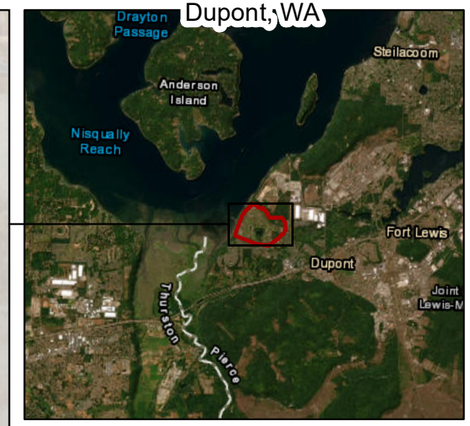
PIONEER TECHNOLOGIES CORPORATION

All Historical and In-Place Soil Sample Locations
Current Conditions Report
Former DuPont Works Site

Figure 8

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 8_All_Hist_and_In-Place.mxd; Author: MCK; Date Saved: 12/21/2022





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

Aldrin Soil Concentrations
- Aldrin ≤ 0.059 mg/kg (or Not Detected)
- 0.059 mg/kg < Aldrin ≤ 0.59 mg/kg
- 0.59 mg/kg < Aldrin ≤ 5.9 mg/kg
- Aldrin > 5.9 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (0.059 mg/kg for Aldrin).
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

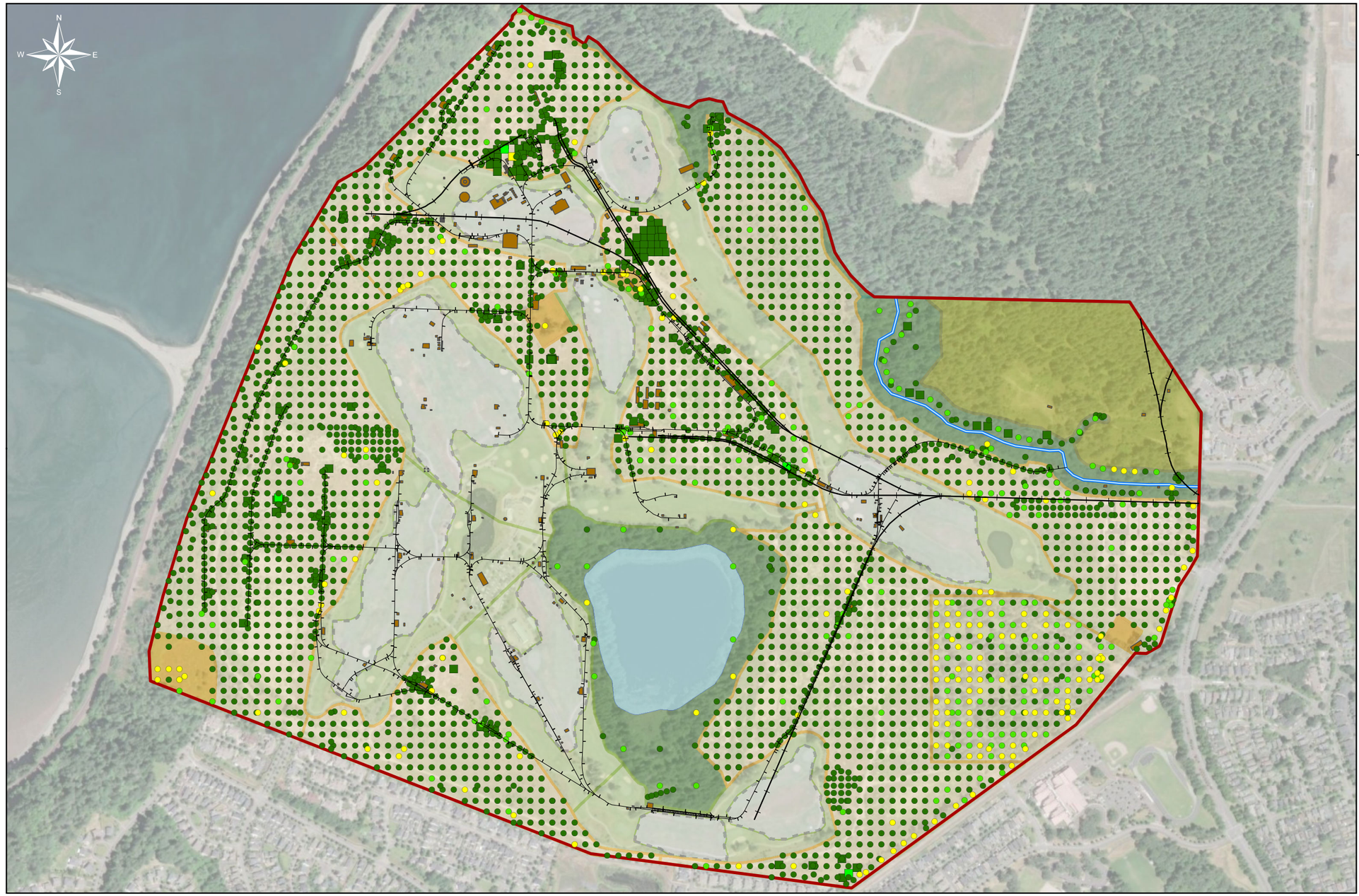
0 300 600 900 1,200 1,500
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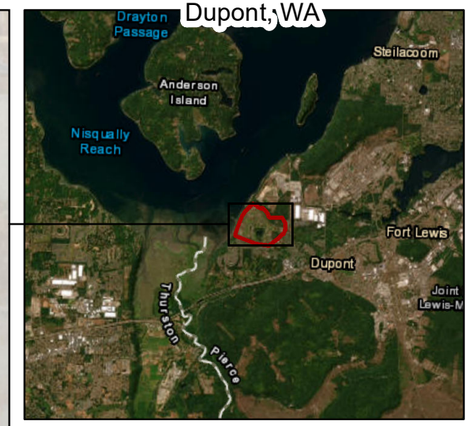
PIONEER TECHNOLOGIES CORPORATION

In-Place Aldrin Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 9

Document Path: G:\Projects\City of DuPontMaps\2022\Current Conditions Report\Fig 9_In Place Aldrin Concs.mxd; Author: MCK; Date Saved: 1/6/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

Arsenic Soil Concentrations
- As ≤ 20 mg/kg (or Not Detected)
- 20 mg/kg < As ≤ 32 mg/kg
- 32 mg/kg < As ≤ 320 mg/kg
- 320 mg/kg < As ≤ 3,200 mg/kg
- As > 3,200 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use or natural background concentrations, when applicable. Note for arsenic, the statewide background concentration is 20 mg/kg; however, a Site-specific background concentration of 32 mg/kg was approved by Ecology.
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

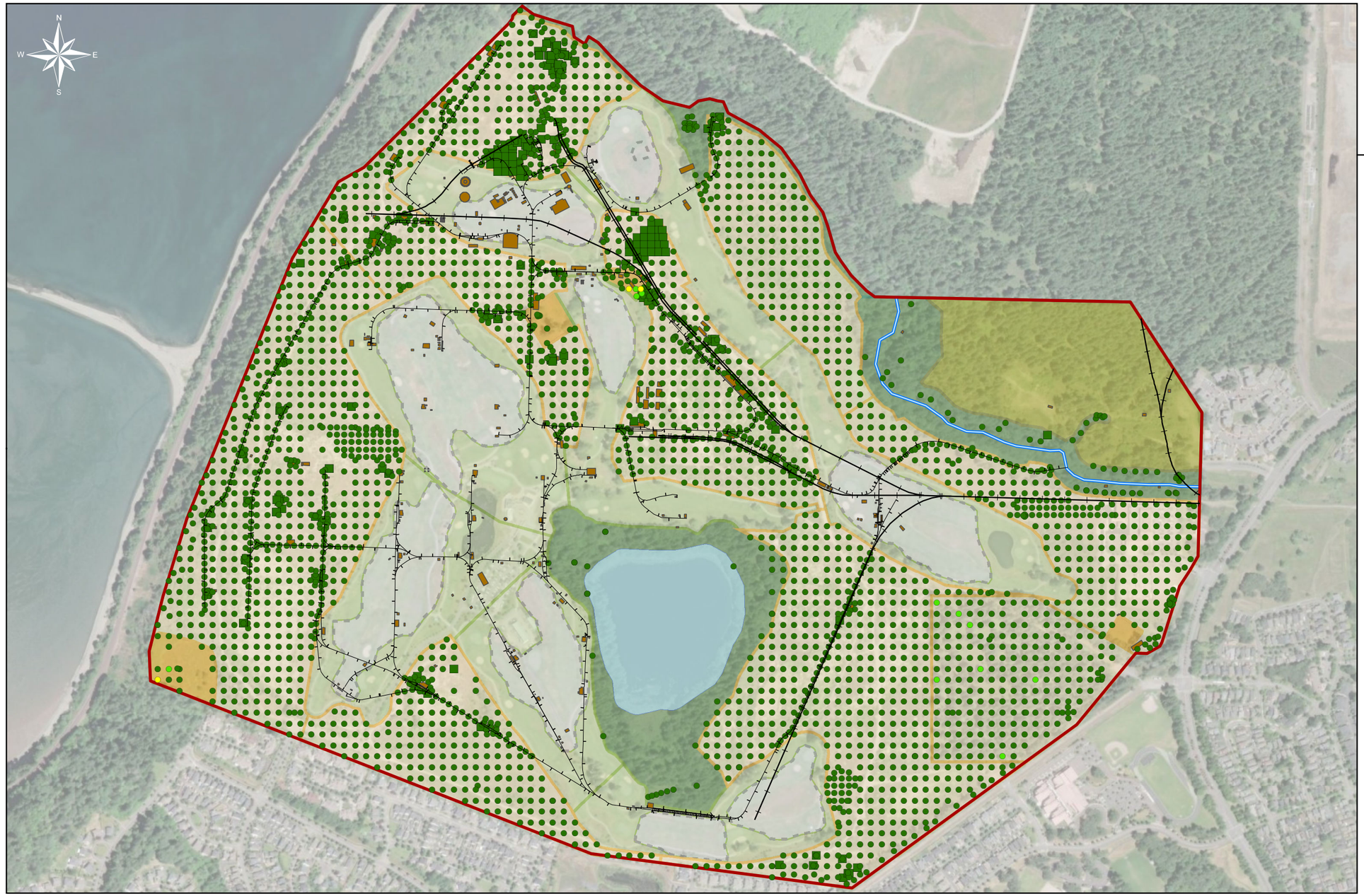
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Feet

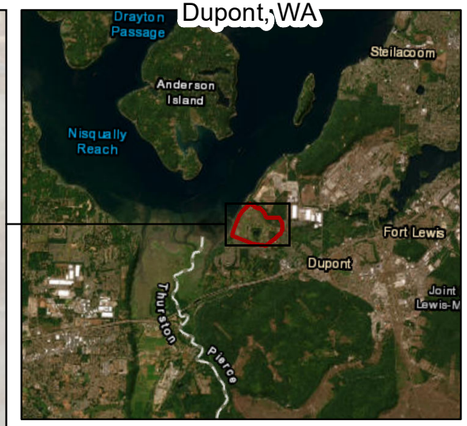
PIONEER TECHNOLOGIES CORPORATION

In-Place Arsenic Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 10

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 10_In Place As Concs.mxd; Author: MCK; Date Saved: 1/6/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

Lead Soil Concentrations
- Pb ≤ 118 mg/kg (or Not Detected)
- 118 mg/kg < Pb ≤ 250 mg/kg
- 250 mg/kg < Pb ≤ 2,500 mg/kg
- 2,500 mg/kg < Pb ≤ 25,000 mg/kg
- Pb > 25,000 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (250 mg/kg for lead). The lead Terrestrial Ecological Screening Level of 118 mg/kg may also apply to the Open Space Land Use Areas, depending on future land use.
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

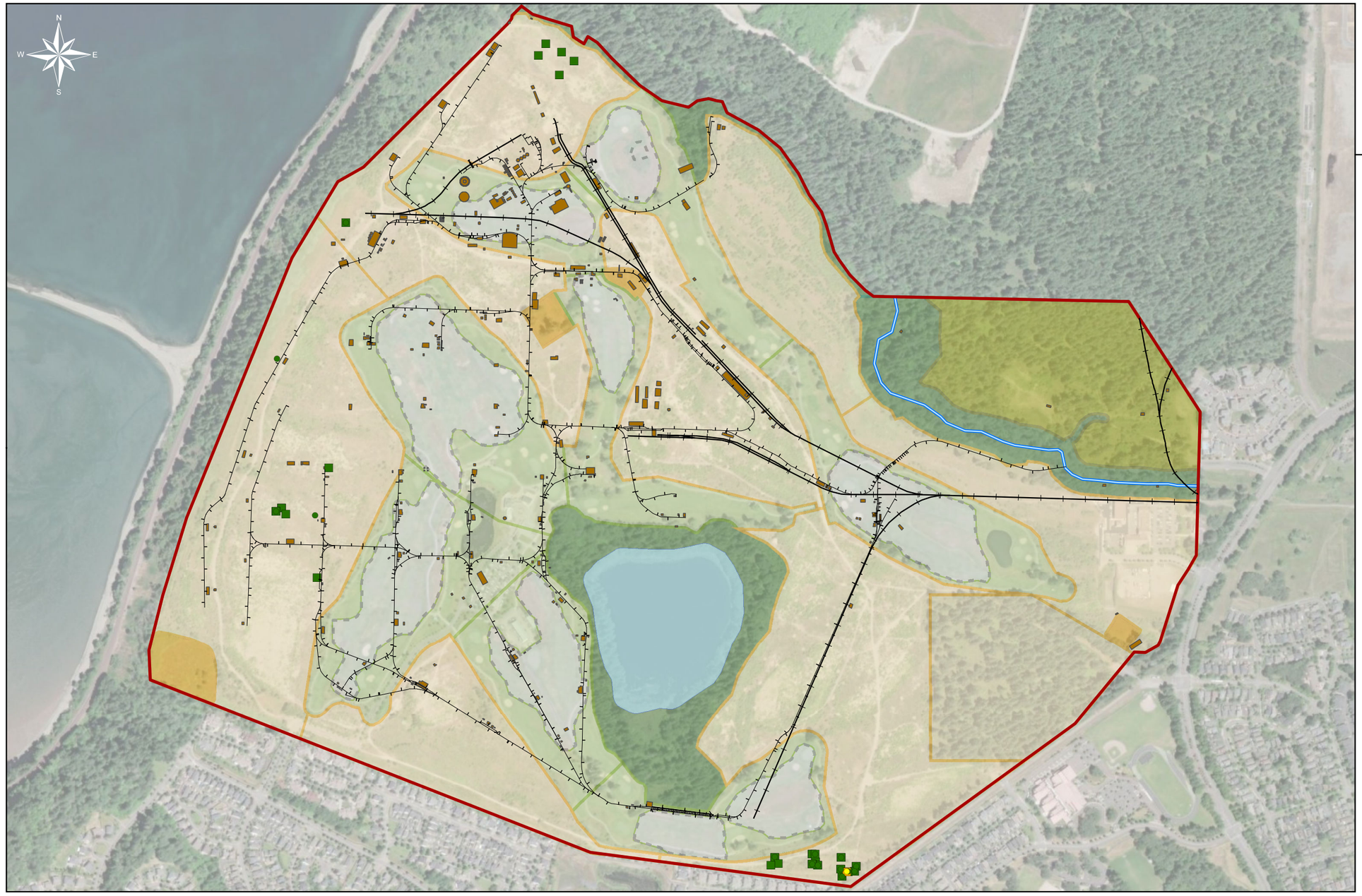
0 300 600 900 1,200 1,500 Feet

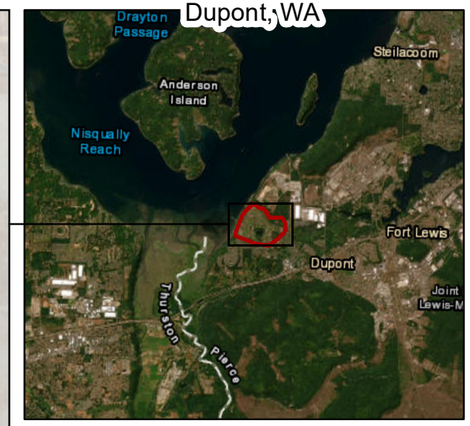
PIONEER TECHNOLOGIES CORPORATION

In-Place Lead Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 11

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 11_In Place Pb Concs.mxd; Author: MCK; Date Saved: 1/6/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

MMAN Soil Concentrations
- MMAN ≤ 1,904 mg/kg (or Not Detected)
- 1,904 mg/kg < MMAN≤ 19,040 mg/kg
- 19,040 mg/kg < MMAN ≤190,400 mg/kg
- MMAN > 190,400 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (1,904 mg/kg for MMAN).
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

0 300 600 900 1,200 1,500
Feet

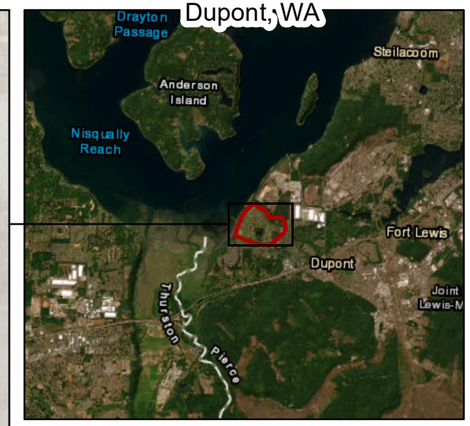
PIONEER TECHNOLOGIES CORPORATION

In-Place MMAN Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 12

Document Path: G:\Projects\City of DuPontMaps\2022\Current Conditions Report\Fig 12_In Place MMAN Concs.mxd; Author: MCK; Date Saved: 1/6/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

Motor Oil Soil Concentrations
- Motor Oil ≤ 2,000 mg/kg (or Not Detected)
- 2,000 mg/kg < Motor Oil ≤ 20,000 mg/kg
- 20,000 mg/kg < Motor Oil ≤ 200,000 mg/kg
- Motor Oil > 200,000 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (2,000 mg/kg for Motor Oil).
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

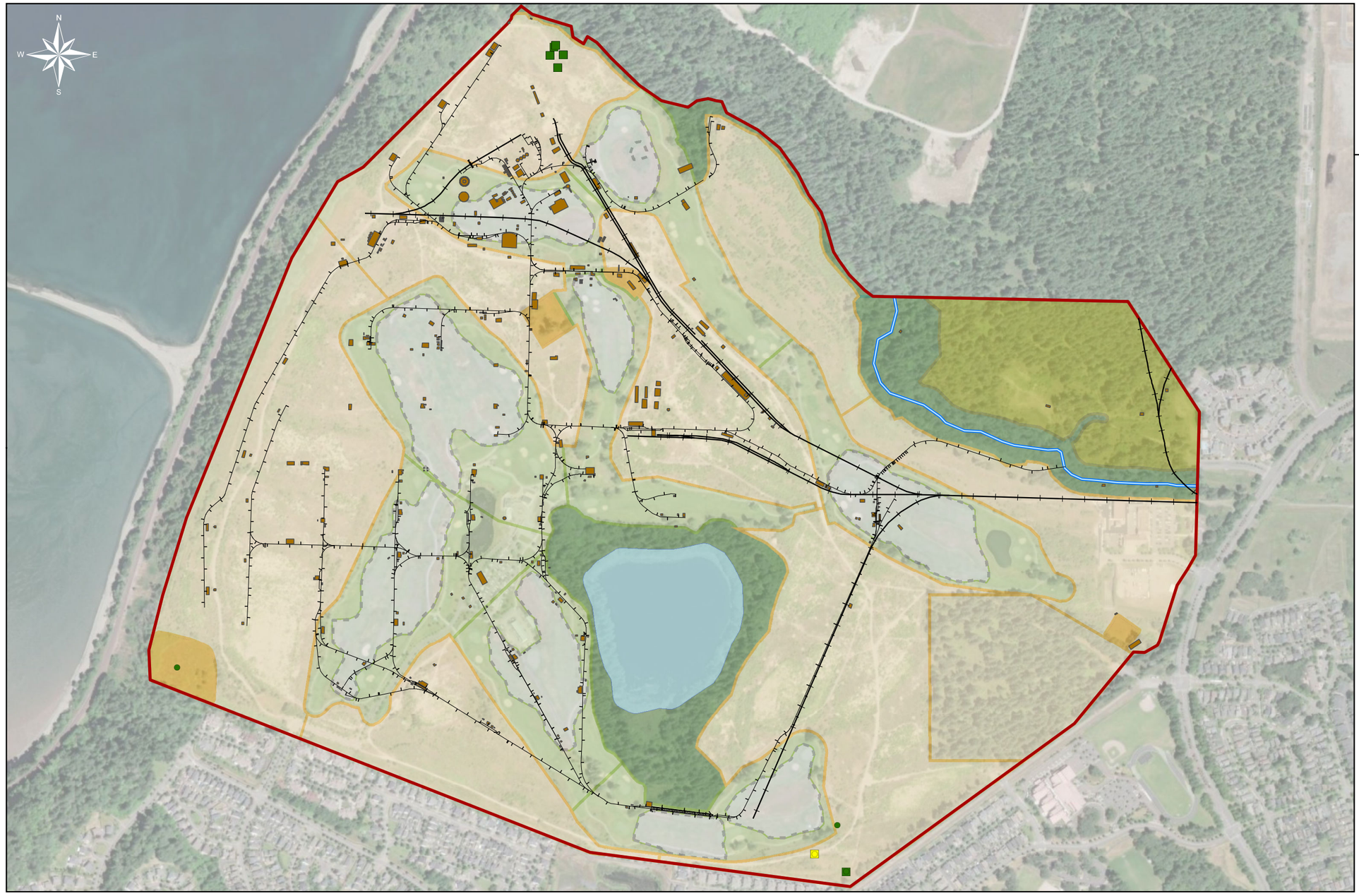
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Feet

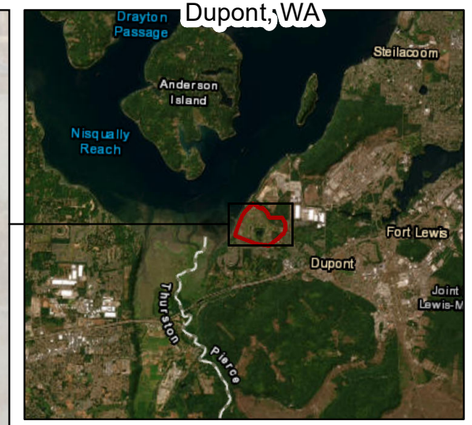
PIONEER TECHNOLOGIES CORPORATION

In-Place Motor Oil Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 13

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 13_In Place Motor Oil.mxd; Author: MCK; Date Saved: 1/5/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

Oil and Grease Soil Concentrations
- Oil & Grease ≤ 2,000 mg/kg (or Not Detected)
- 2,000 mg/kg < Oil & Grease ≤ 20,000 mg/kg
- 20,000 mg/kg < Oil & Grease ≤ 200,000 mg/kg
- Oil & Grease > 200,000 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (2,000 mg/kg for Oil and Grease).
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

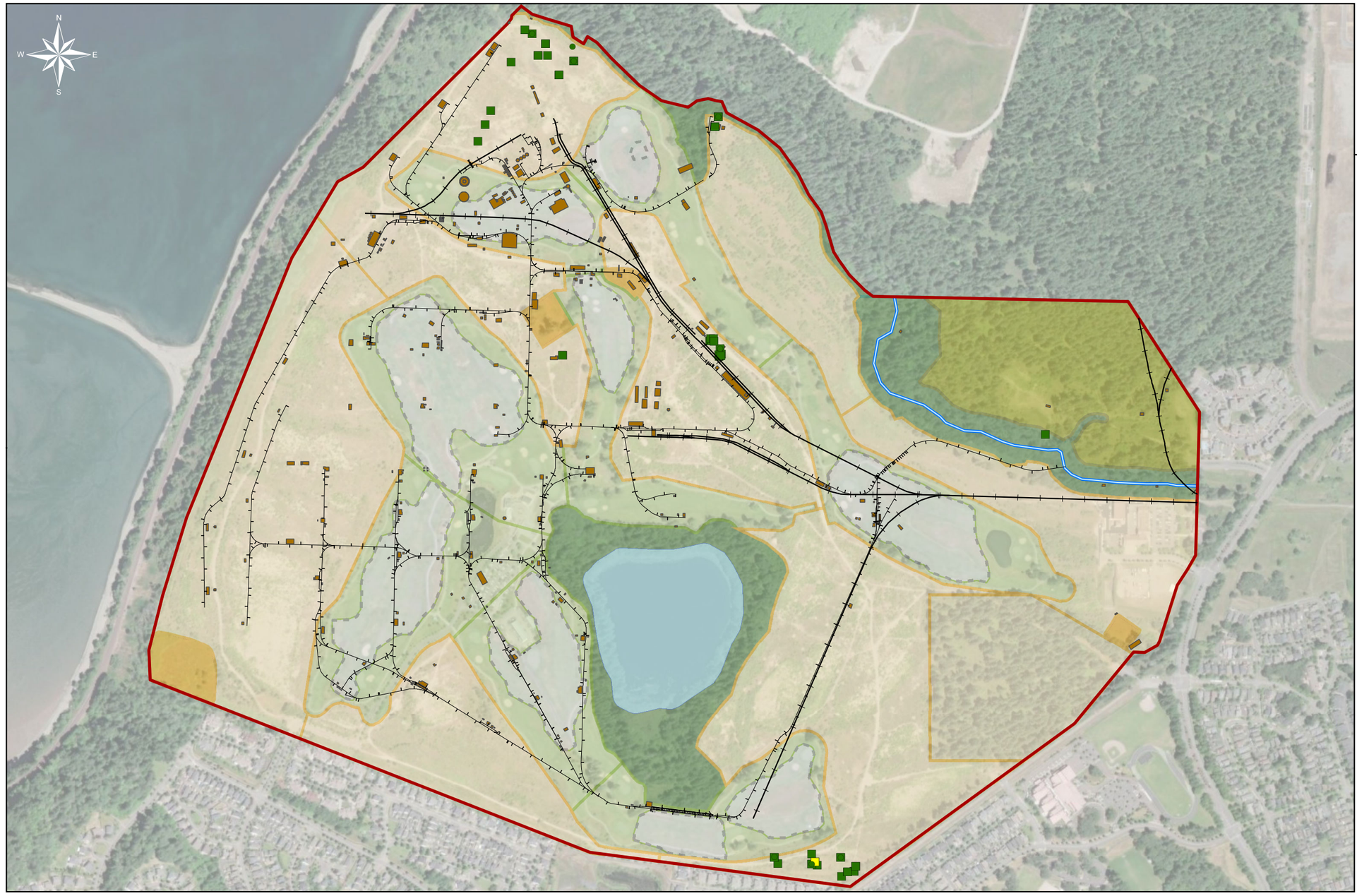
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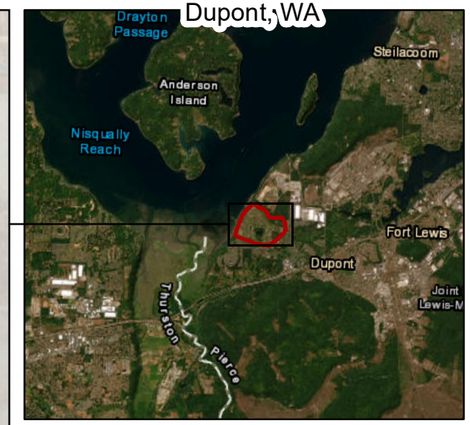
PIONEER TECHNOLOGIES CORPORATION

In-Place Oil & Grease Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 14

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 14_In Place Oil & Grease Concs.mxd; Author: MCK; Date Saved: 1/5/2023





Legend

Soil Sample Depth
- Sample Depth ≤ 2 feet
- 2 feet < Sample Depth < 15 feet

TPH Method 418 Soil Concentrations
- TPH 418 ≤ 7,600 mg/kg (or Not Detected)
- 7,600 mg/kg < TPH 418 ≤ 76,000 mg/kg
- 76,000 mg/kg < TPH 418 ≤ 760,000 mg/kg
- TPH 418 > 760,000 mg/kg

Land Use Areas
- Commercial
- Industrial
- Golf Course
- Historical
- Open Space
- Contaminated Soil Placement Areas

Other Site Features
- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

Notes:
-Sample data is compared to the lowest applicable MTCA Method A/B Soil Direct Contact Screening Level for Unrestricted Land Use (7,600 mg/kg for TPH Method 418).
-Sample locations are shown for all Commercial, Open Space, and Historical Land Use Areas. Since land use is not anticipated to change in the remainder of the Golf Course Areas and Industrial Area, sample locations and data are not displayed for those areas.

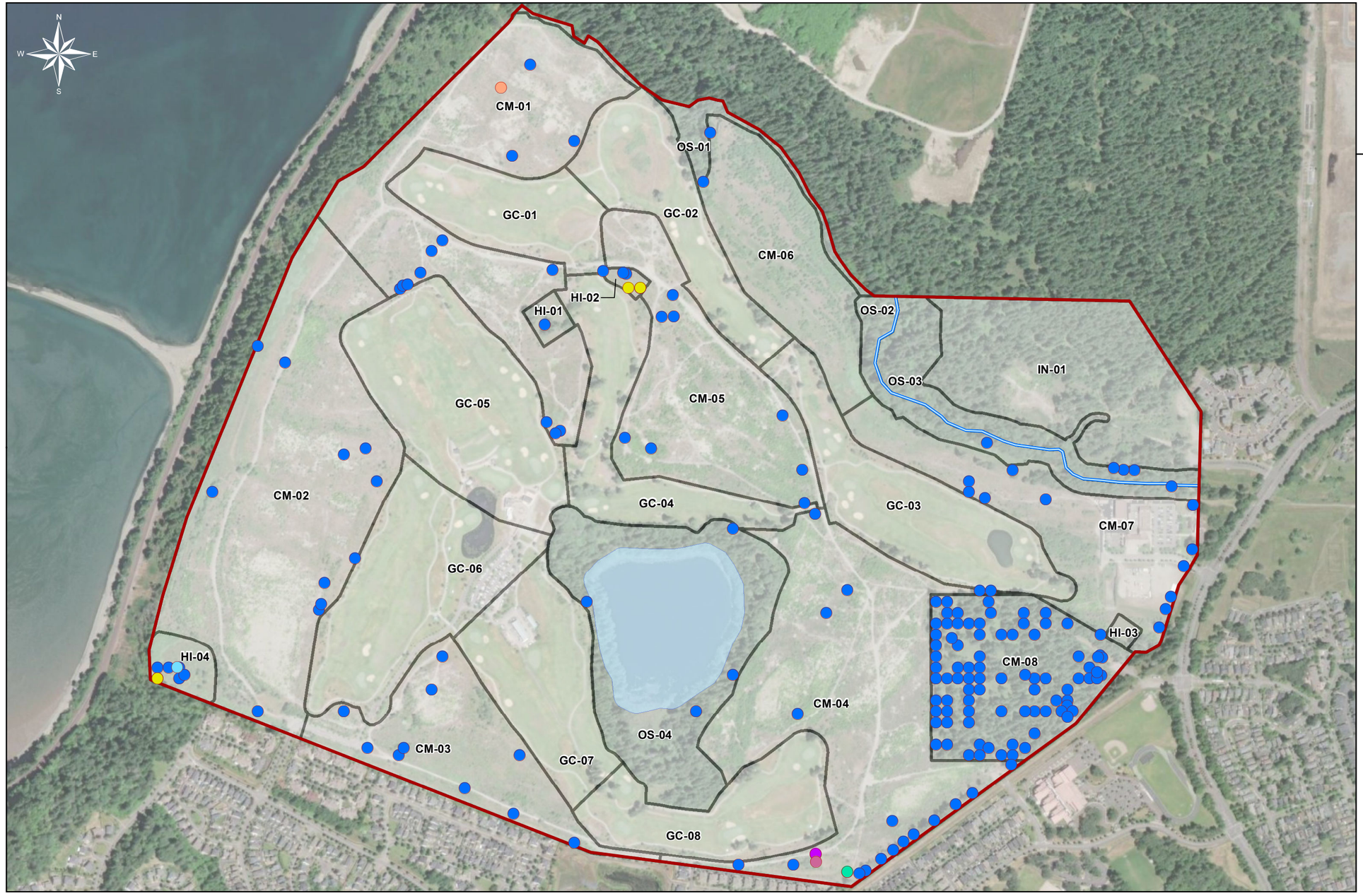
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Feet

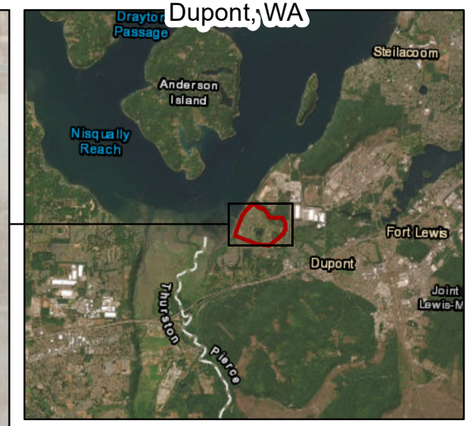
PIONEER TECHNOLOGIES CORPORATION

In-Place TPH via Method 418 (Bunker C Fuel) Concentrations in Soil
Current Conditions Report
Former DuPont Works Site

Figure 15

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 15_In Place TPH 418 Concs.mxd; Author: MCK; Date Saved: 1/5/2023





Legend

Exceedance Areas by Constituent

- Aldrin
- Arsenic
- Lead
- MMAN
- Motor Oil
- Oil and Grease
- Bunker C Fuel (via Method 418.1)

Other Site Features

- Sequalitchew Creek
- Old Fort Lake
- Remediation Units
- Site Boundary

0 300 600 900 1,200 1,500 Feet

PIONEER TECHNOLOGIES CORPORATION

Summary of In-Place Unrestricted Soil Screening Level Exceedances
Current Conditions Report
Former DuPont Works Site

Figure 16

Document Path: G:\Projects\City of DuPont\Maps\2022\Current Conditions Report\Fig 16_Summary of In-Place Soil Exceedances.mxd; Author: MCK; Date Saved: 1/6/2023

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Tables

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Table 1: Unrestricted Land Use Screening Levels and Summary Statistics for Constituents in Soil

CAS Number	Constituent	Data Group	Number of In-Place Samples	Number of In-Place Detections	Maximum In-Place Detection (mg/kg)	Number of Historical Samples	Number of Historical Detections	Maximum Historical Detection (mg/kg)	MTCA Method A Soil Unrestricted Land Use (mg/kg)	MTCA Method B Soil Direct Contact - Noncancer (mg/kg)	MTCA Method B Soil Direct Contact - Cancer (mg/kg)	Soil Natural Background (mg/kg)	Other Approved Value Presented in Risk Assessment [1] (mg/kg)	Overall Soil SL (mg/kg)
#2DIESEL	#2 Diesel	Petroleum	7.0	1.0	1,000	22	18	3,630	2,000	--	--	--	--	2,000
Fuel Oil #6	Fuel Oil #6	Petroleum	NA	NA	NA	3.0	3.0	21,900	2,000	--	--	--	--	2,000
MOTOROIL	Motor Oil	Petroleum	10.0	4.0	3,000	17	13	35,800	2,000	--	--	--	--	2,000
OILGREASE	Oil And Grease	Petroleum	17	7.0	20,000	34	23	20,000	--	--	--	--	2,000 [2]	2,000
TPH418-1	TPH (418.1) / Bunker C	Petroleum	58	20	36,000	152	77	36,000	--	--	--	--	7,600 [3]	7,600
67-64-1	Acetone	VOC	1.0	0.0	0.0	11	3.0	0.013	--	72,000	--	--	--	72,000
75-09-2	Dichloromethane	VOC	1.0	0.0	0.0	11	6.0	0.0050	0.020	480	94	--	--	0.020
127-18-4	Tetrachloroethene	VOC	2.0	1.0	0.00093	12	2.0	0.0070	0.050	480	480	--	--	0.050
1330-20-7	Xylenes (total)	VOC	1.0	0.0	0.0	11	1.0	0.0070	9.0	16,000	--	--	--	9.0
118-96-7	2,4,6-Trinitrotoluene	Explosive	77	9.0	1.6	151	26	42	--	40	33	--	--	33
121-14-2	2,4-DNT	Explosive	93	6.0	0.15	214	24	1.5	--	160	3.2	--	--	3.2
606-20-2	2,6-DNT	Explosive	93	5.0	0.14	214	14	0.49	--	24	0.67	--	--	0.67
DNT-TOTAL	DNT - Total	Explosive	93	6.0	0.29	214	24	1.9	--	--	--	--	3.0 [4]	3.0
MMAN	Monomethylamine Nitrate	Explosive	54	5.0	30,000	99	13	30,000	--	--	--	--	1,904 [5]	1,904
14797-55-8	Nitrate as Nitrogen	Explosive	19	12	2.7	38	28	3.6	--	130,000	--	--	--	130,000
98-95-3	Nitrobenzene	Explosive	99	0.0	0.0	146	4.0	0.17	--	160	--	--	--	160
55-63-0	Nitroglycerine	Explosive	47	1.0	1.1	89	3.0	1.1	--	8.0	59	--	--	8.0
120-12-7	Anthracene	PAH	23	1.0	0.0089	54	2.0	0.026	--	24,000	--	--	--	24,000
191-24-2	Benzo(g,h,i)perylene	PAH	23	1.0	0.15	54	9.0	4.9	--	--	--	--	--	--
206-44-0	Fluoranthene	PAH	23	1.0	0.087	54	2.0	0.16	--	3,200	--	--	--	3,200
86-73-7	Fluorene	PAH	23	0.0	0.0	54	1.0	0.013	--	3,200	--	--	--	3,200
91-20-3	Naphthalene	PAH	23	1.0	0.40	54	1.0	0.40	5.0	1,600	--	--	--	5.0
85-01-8	Phenanthrene	PAH	23	2.0	0.081	54	8.0	0.16	--	--	--	--	--	--
129-00-0	Pyrene	PAH	23	1.0	0.071	54	5.0	0.26	--	2,400	--	--	--	2,400
CPAH-TEQ	Total cPAHs	PAH	23	2.0	0.10	54	12	1.6	0.10	24	0.19	--	--	0.10
65-85-0	Benzoic Acid	SVOC	10.0	0.0	0.0	27	1.0	0.078	--	320,000	--	--	--	320,000
117-81-7	Bis(2-ethylhexyl)Phthalate	SVOC	10.0	3.0	0.070	27	4.0	0.070	--	1,600	71	--	--	71
84-66-2	Diethyl Phthalate	SVOC	10.0	0.0	0.0	27	2.0	2.7	--	64,000	--	--	--	64,000
117-84-0	Di-N-Octylphthalate	SVOC	10.0	3.0	0.18	27	4.0	0.18	--	800	--	--	--	800
85-68-7	n-Butyl Benzyl Phthalate	SVOC	10.0	0.0	0.0	27	2.0	0.26	--	16,000	530	--	--	530
309-00-2	Aldrin	Pesticide	6.0	1.0	0.60	18	1.0	0.60	--	2.4	0.059	--	--	0.059
72-20-8	Endrin	Pesticide	6.0	1.0	0.85	18	1.0	0.85	--	24	--	--	--	24

Table 1: Unrestricted Land Use Screening Levels and Summary Statistics for Constituents in Soil

CAS Number	Constituent	Data Group	Number of In-Place Samples	Number of In-Place Detections	Maximum In-Place Detection (mg/kg)	Number of Historical Samples	Number of Historical Detections	Maximum Historical Detection (mg/kg)	MTCA Method A Soil Unrestricted Land Use (mg/kg)	MTCA Method B Soil Direct Contact - Noncancer (mg/kg)	MTCA Method B Soil Direct Contact - Cancer (mg/kg)	Soil Natural Background (mg/kg)	Other Approved Value Presented in Risk Assessment [(1)] (mg/kg)	Overall Soil SL (mg/kg)
7429-90-5	Aluminum	Inorganic	14	14	24,000	68	68	27,000	--	80,000	--	--	--	80,000
7440-36-0	Antimony	Inorganic	14	1.0	4.0	74	16	35	--	32	--	--	--	32
7440-38-2	Arsenic	Inorganic	3,339	3,175	150	1,877	1,858	2,570	20	24	0.67	20	--	20 [(6)]
7440-39-3	Barium	Inorganic	NA	NA	NA	2.0	2.0	161	--	16,000	--	--	--	16,000
7440-41-7	Beryllium	Inorganic	13	13	0.52	55	42	0.82	--	160	--	--	--	160
7440-43-9	Cadmium	Inorganic	39	38	0.46	342	332	6.2	2.0	80	--	0.77	--	2.0
7440-47-3	Chromium	Inorganic	42	41	24	25	25	19	2,000	120,000	--	--	--	2,000
7440-48-4	Cobalt	Inorganic	NA	NA	NA	2.0	1.0	4.5	--	24	--	--	--	24
7440-50-8	Copper	Inorganic	43	43	59	149	144	170	--	3,200	--	--	--	3,200
7439-89-6	Iron	Inorganic	NA	NA	NA	1.0	1.0	2,600	--	56,000	--	--	--	56,000
7439-92-1	Lead	Inorganic	3,393	3,271	450	1,953	1,816	76,000	250	--	--	--	--	250 [(7)]
7439-96-5	Manganese	Inorganic	NA	NA	NA	1.0	1.0	4.0	--	3,700	--	--	--	3,700
7439-97-6	Mercury	Inorganic	41	2.0	0.15	282	83	87	2.0	--	--	0.070	--	2.0
7439-98-7	Molybdenum	Inorganic	1.0	0.0	0.0	1.0	1.0	2.4	--	400	--	--	--	400
7440-02-0	Nickel	Inorganic	39	36	24	116	110	31	--	1,600	--	--	--	1,600
7782-49-2	Selenium	Inorganic	13	1.0	0.30	55	10.0	7.6	--	400	--	--	--	400
7440-22-4	Silver	Inorganic	13	10.0	1.2	81	40	2.4	--	400	--	0.61	--	400
7440-31-5	Tin	Inorganic	NA	NA	NA	1.0	1.0	12	--	48,000	--	--	--	48,000
7440-62-2	Vanadium	Inorganic	NA	NA	NA	1.0	1.0	1.2	--	400	--	--	--	400
7440-66-6	Zinc	Inorganic	40	40	77	143	142	278	--	24,000	--	--	--	24,000

Notes:

Only constituents detected in one or more historical or in-place Site soil sample are shown.

Sample counts do not include samples from the GC or IN Areas, samples from off-Site, or samples at a depth of greater than 15 feet below ground surface (the MTCA unrestricted land use point-of-compliance). Total 'Site' counts are higher than the numbers displayed in this table.

NA: constituent not analyzed.

[(1)] Screening Levels for several constituents were calculated in the Final RA and subsequently approved by Ecology (PIONEER 2003).

[(2)] A SL of 2,000 mg/kg for oil & grease was used as it is most similar to heavy oil.

[(3)] A SL of 7,600 mg/kg for TPH as Bunker C fuel was previously approved by Ecology as part of the 2003 Cleanup Action Plan. One area of the Site had TPH that did not originate as Bunker C fuel and was compared to the 2,000 mg/kg SL for heavy oil (West Shore Corporation NW and PIONEER 2003a).

[(4)] A SL of 3.0 mg/kg for Total DNT (2,4-DNT plus 2,6-DNT) was previously approved by Ecology as part of the 2003 Cleanup Action Plan (West Shore Corporation NW and PIONEER 2003a).

[(5)] A site-specific residential SL of 1,904 mg/kg for MMAD was calculated by adjusting the exposure factors (from 104 days to 365 days) used to calculate the approved HI Land Use Area cleanup level in the Final RA (PIONEER 2003).

[(6)] A site-specific arsenic background concentration was determined by Hart Crowser in 1994, with concurrence documented by Ecology in a letter dated March 11, 1996 to Vern Moore of Weyerhauser from Mike Blum at Ecology. This letter stated that Ecology concurred with the natural background level, and that "Ecology will not require cleanup soil standards to be more stringent than 32 ppm, irrespective of land use." As a result, using a site-specific background concentration of 32 mg/kg rather than the Puget Sound background concentration of 20 mg/kg as the cleanup level for unrestricted residential land use is acceptable.

[(7)] The terrestrial ecological lead cleanup level of 118 mg/kg may apply to CM, HI, and OS Areas.

Appendix A

Table A-1: Hyperlinks to Historical Reports in Ecology's Data Repository

Document Title	Document Date	Document Type
Weyerhaeuser Dupont 1 and 2 Consent Decree	7/17/1991	Consent Decree
City of Dupont Restrictive Covenant 9712230865	12/23/1997	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #9910290750	11/15/1999	Environmental Covenant
Weyerhaeuser Dupont Parcel 1 Final Environmental Impact Statement	8/4/2000	SEPA Documents
Weyerhaeuser Dupont Parcel 1 Consent Decree for Cleanup Proposed	1/1/2003	Fact Sheet\Public Notices
Weyerhaeuser Dupont Parcel 1 Responsiveness Summary	7/1/2003	Responsiveness Summary
Weyerhaeuser Dupont Parcel 1 Remedial Investigation	7/1/2003	Remedial Investigation Report
Weyerhaeuser Dupont Parcel 1 Cleanup Action Plan	7/1/2003	Cleanup Action Plan
Weyerhaeuser-DuPont Parcel 1Human Health Risk Assessment	7/31/2003	Human Health Risk Assessment
Weyerhaeuser-DuPont Parcel 1Feasibility Study	7/31/2003	Feasibility Study
Weyerhaeuser Dupont Parcel 1 Consent Decree	8/15/2003	Consent Decree
Weyerhaeuser Dupont Restrictive Covenant #200611010851	7/25/2006	Environmental Covenant
Weyerhaueser Dupont Restrictive Covenant - Golf Course #200607251023	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200611010853	7/25/2006	Environmental Covenant
Weywerhaeuser Dupont Restrictive Covenant #200607251019	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200607251020	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200607251018	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200607251021	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200607251022	7/25/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200611010854	11/1/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200611010852	11/1/2006	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200611010855	11/1/2006	Environmental Covenant
Former DuPont Works Site - Closure Report	3/1/2007	Final Cleanup Action Report
Weyerhaeuser Dupont-Active Cleanup Completion Letter	4/26/2007	Order Notice of Satisfaction/Status
Weyerhaeuser Dupont Restrictive Covenant #200710260184	10/26/2007	Environmental Covenant
Weyerhaeuser Dupont Restrictive Covenant #200710260185	10/26/2007	Environmental Covenant
Weyerhaeuser Dupont Parcel 1 Fact Sheet Final EIS	2/23/2010	Fact Sheet\Public Notices
Weyerhaeuser Dupont Environmental Covenant #201206130016	6/13/2012	Environmental Covenant
Weyerhaeuser Dupont Environmental Covenant #201208070276	8/7/2012	Environmental Covenant
Former DuPont Works Site - Groundwater Monitoring Results for 2014	7/28/2014	Groundwater Monitoring Report
Weyerhaeuser Dupont draft Periodic Reveiw Report	2/1/2016	Periodic Review (5 Year)
Weyerhaeuser DuPont Delisting Fact Sheet	5/1/2016	Fact Sheet\Public Notices
Periodic Review Report - Final	7/25/2016	Periodic Review (5 Year)
Periodic Review Report - Final	7/25/2016	Periodic Review (5 Year)
Land Use assessment for the city of DuPont Comprehensive Plan	3/20/2017	Site Specific Technical Document
Former Dupont Works - Preliminary Potentially Liable Persons Status - Albatross Estates LLC	5/25/2022	Site Specific Administrative Document
Former Dupont Works - Agreed Order DE 21135	9/19/2022	Agreed Order
Weyerhaeuser DuPont 1 aka Former DuPont Works - Public Participation Plan	9/19/2022	Public Participation Plan
Former Dupont Works - Final Potentially Liable Persons Status - Albatross	9/21/2022	Final Potentially Liable Person
Weyerhaeuser DuPont 1 - Fact Sheet Sept 2022 - AO and PPP	9/22/2022	Fact Sheet\Public Notices

Appendix B

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

In the Matter of Remedial Action by:	AGREED ORDER
Albatross Estates, LLC	No. DE 21135

TO: Rodger May
Albatross Estates, LLC.
4317 South 188th Street
SeaTac, WA 98188

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EXHIBIT A Site Location
EXHIBIT B Remedial Action Area
EXHIBIT C Statement of Work and Schedule

I. INTRODUCTION

The mutual objective of the State of Washington, Department of Ecology (Ecology), and Albatross Estates, LLC under this Agreed Order (Order) is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Order requires Albatross Estates, LLC to develop a Data Summary Report, Remedial Investigation (RI), Feasibility Study (FS) (collectively RI/FS), and preliminary DCAP for a portion of the Former DuPont Works Site planned for redevelopment. Ecology believes the actions required by this Order are in the public interest.

II. JURISDICTION

This Order is issued pursuant to the Model Toxics Control Act (MTCA), RCW 70A.305.050(1).

III. PARTIES BOUND

This Agreed Order shall apply to and be binding upon the Parties to this Order, their successors and assigns. The undersigned representative of each Party hereby certifies that he or she is fully authorized to enter into this Order and to execute and legally bind such Party to comply with this Order. Albatross Estates, LLC agrees to undertake all actions required by the terms and conditions of this Order. No change in ownership or corporate status shall alter Albatross Estates' responsibility under this Order. Albatross Estates shall provide a copy of this Order to all agents, contractors, and subcontractors retained to perform work required by this

Order, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Order.

IV. DEFINITIONS

Unless otherwise specified herein, the definitions set forth in RCW 70A.305 and WAC 173-340 shall control the meanings of the terms in this Order.

A. Site: The Site is referred to as the Former DuPont Works Site—and is located in southwestern Pierce County, within the city of DuPont, Washington as shown in the Site Location (Exhibit A). The Site is being addressed under Consent Decree No. 91-2-017031 and Consent Decree No. 03-2-10484-7. The Site constitutes a facility under RCW 70A.305.020(8). The Site is defined by where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located.

B. Remedial Action Area: A portion of the Site will be the subject of additional remedial actions under this Order. That area is generally located as shown in the Remedial Action Area Location Diagram (Exhibit B).

C. Parties: Refers to the State of Washington, Department of Ecology and Albatross Estates, LLC.

D. Potentially Liable Persons (PLPs): Refers to Albatross Estates, LLC, the Weyerhaeuser Company, and the DuPont Company.

E. Subject PLP: Refers to the PLP subject to this Order—Albatross Estates, LLC.

F. Agreed Order or Order: Refers to this Order and each of the exhibits to this Order. All exhibits are integral and enforceable parts of this Order.

V. FINDINGS OF FACT

Ecology makes the following findings of fact, without any express or implied admissions of such facts by Albatross Estates, LLC:

A. The Site location is depicted in Exhibit A. In 1906, E.I. duPont de Nemours and Company (DuPont Company) acquired the Site and adjacent properties for the construction of an explosives plant and a nearby company town known as the Village of DuPont. DuPont **Company** manufactured explosives at the Site from 1906 until the mid-1970s, when it sold the property and adjacent properties to the Weyerhaeuser Company. DuPont Company operations and decommissioning of the manufacturing plant resulted in the accumulation of hazardous substances in soil Site-wide and in groundwater. Weyerhaeuser Company and DuPont Company subsequently cleaned up the Site under Ecology oversight as outlined below. In 2020, a portion of the Site was sold to Albatross Estates, LLC.

B. Actions taken at the Site subsequent to the manufacturing shutdown in 1976 include the following:

- In 1985, studies were conducted to determine whether hazardous substances were present.

- In 1986, a Phase I Site Survey and Review was performed to identify areas of environmental concern on Site.

- In 1986, soil contamination was documented and reported Ecology.

- In 1987, a Phase II Site Characterization study was performed.

- In 1989, a Baseline Human Health Risk Assessment (RA) was conducted.

- In 1991, Weyerhaeuser and DuPont (the "Companies") signed a Consent Decree (No. 91 2 01703 1) with Ecology, in which they agreed to study the Site and complete an RI, RA, and FS.

- In 1994 and 1995, Draft RI, RA, and FS reports were submitted to Ecology.

- In 1996, Ecology approved a Cleanup Action Plan (CAP) for the northern portion of the Site to the north of Sequalitchew Creek (Parcel 2).

- In 1997, Parcel 2 was deleted from the Consent Decree, and a deed requiring institutional controls to maintain the industrial use of the parcel was recorded in the Pierce County Auditor's office.

- Between 1990 and 2002, while studies and negotiations were ongoing, the Companies undertook interim source removal actions to cleanup soil and/or debris at the Site, in accordance with MTCA and the Consent Decree.

- In 2003, to fulfill the provisions of the Consent Decree, final RI, RA, and FS reports were prepared and submitted to Ecology for approval.

- In 2003, the Companies completed the detailed design and implementation of the remedial measures selected by Ecology in the CAP (Ecology, 2003). This decision was captured in a new Consent Decree (No. 03 2 10484 7), which was agreed to by the Companies and Ecology and was entered by the Court on August 15, 2003.

- In 2006, Weyerhaeuser filed a restrictive covenant requiring that property within the Site may be used only for commercial use, and the covenant was recorded by the Pierce County Assessor's Office on November 1, 2006.

- In 2007, the Companies completed the remedial measures selected by Ecology in the CAP (Ecology, 2003).

- Ecology, by letter dated April 26, 2007, confirmed completion of all active cleanup elements under the 2003 Consent Decree.

- In 2016, Ecology removed the Site from the Hazardous Sites List. Property within the Site are subject to a restrictive covenant, and the Site will be reviewed every 5 years by Ecology in periodic reviews.

C. The Remedial Action Area contains 193 locations, averaging 75 feet by 75 feet in size, that contain arsenic, lead and/or explosives components in concentrations that exceed

MTCA residential/unrestricted land use cleanup levels. Albatross Estates, LLC plans to remediate these areas to concentrations of the contaminants of concern (COCs) that meet, or are lower than, either the published MTCA cleanup levels or other appropriate standards for residential/unrestricted land use.

VI. ECOLOGY DETERMINATIONS

Ecology makes the following determinations, without any express or implied admissions of such determinations (and underlying facts) by Albatross Estates, LLC.

A. Albatross Estates, LLC is an "owner or operator" as defined in RCW 70A.305.020(22) of a "facility" as defined in RCW 70A.305.020(8). Albatross Estates, LLC is the current owner of property within the Site.

B. Based upon all factors known to Ecology, a "release" or "threatened release" of "hazardous substance(s)" as defined in RCW 70A.305.020(32), (13), respectively, has occurred at the Site.

C. Based upon credible evidence, Ecology issued a PLP status letter to Albatross Estates, LLC dated May 25, 2022, pursuant to RCW 70A.305.040, .020(26), and WAC 173-340-500. By letter dated June 16, 2022, Albatross voluntarily waived its rights to notice and comment and accepted Ecology's determination that Albatross Estates is a PLP under RCW 70A.305.040.

D. Pursuant to RCW 70A.305.030(1), .050(1), Ecology may require PLPs to investigate or conduct other remedial actions with respect to any release or threatened release of hazardous substances, whenever it believes such action to be in the public interest. Based on the foregoing facts, Ecology believes the remedial actions required by this Order are in the public interest.

VII. WORK TO BE PERFORMED

Based on the Findings of Fact and Ecology Determinations, it is hereby ordered that Albatross Estates, LLC take the following remedial actions at the Site. These remedial actions must be conducted in accordance with WAC 173-340.

A. Albatross Estates, LLC will develop a Data Summary Report, RI/FS, and preliminary Draft CAP (DCAP) for the Remedial Action Area in accordance with the schedule and terms of the Scope of Work and Schedule (Exhibit C) and all other requirements of this Order. The following naming conventions shall be used for documents submitted to Ecology: Agency Review Draft (designation for the first time Ecology receives a document); Public Review Draft (designates a document ready for public comment); Final (designation for a document after public comment and Ecology approval); and the preliminary Draft Cleanup Action Plan (designation for the Subject PLP's version of the DCAP).

B. If Albatross Estates, LLC learns of a significant change in conditions at the Site, including but not limited to a statistically significant increase in contaminant and/or chemical concentrations in any media, Albatross Estates, LLC, within seven (7) days of learning of the

change in condition, shall notify Ecology in writing of said change and provide Ecology with any reports or records (including laboratory analyses, sampling results) relating to the change in conditions.

C. Albatross Estates, LLC shall submit to Ecology written quarterly Progress Reports that describe the actions taken during the previous quarter to implement the requirements of this Order. All Progress Reports shall be submitted by the tenth (10th) day of the month in which they are due after the effective date of this Order. Unless otherwise specified by Ecology, Progress Reports and any other documents submitted pursuant to this Order shall be sent by certified mail, return receipt requested, to Ecology's project coordinator. The Progress Reports shall include the following:

1. A list of on-Site activities that have taken place during the quarter.

2. Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests.

3. Description of all deviations from the Scope of Work and Schedule (Exhibit C) during the current quarter and any planned deviations in the upcoming quarter.

4. For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule.

5. All raw data (including laboratory analyses) received during the previous quarter (if not previously submitted to Ecology), together with a detailed description of the underlying samples collected.

6. A list of deliverables for the upcoming quarter.

D. All plans or other deliverables submitted by Albatross Estates, LLC for Ecology's review and approval under the Scope of Work and Schedule (Exhibit C) shall, upon Ecology's approval, become integral and enforceable parts of this Order. Albatross Estates, LLC shall take any action required by such deliverable.

E. Under WAC 173-340-430, an interim action is a remedial action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance, that corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed, or that is needed to provide for completion of a site hazard assessment, RI/FS, or design of a CAP. Any Party may propose an interim action under this Order. If the Parties are in agreement concerning the interim action, Albatross Estates, LLC shall prepare and submit to Ecology an Interim Action Work Plan, including a Scope of Work and Schedule, by the date determined by Ecology. Ecology will provide public notice and opportunity to comment on the Interim Action Work Plan in accordance with WAC 173-340-600(16). Albatross Estates, LLC shall not conduct the interim action until Ecology approves the Interim Action Work Plan. Upon approval by Ecology, the Interim Action Work Plan becomes an

integral and enforceable part of this Order, and Albatross Estates, LLC is required to conduct the interim action in accordance with the approved Interim Action Work Plan. If the Parties are not in agreement, Ecology reserves its authority to require interim action(s) under a separate order or other enforcement action under RCW 70A.305, or to undertake the interim action itself.

Any Party may propose an additional interim action under this Order. If the Parties are in agreement concerning the additional interim action, the Albatross Estates, LLC shall prepare and submit to Ecology an Interim Action Work Plan, including a scope of work and schedule, by the date determined by Ecology. Ecology will provide public notice and opportunity to comment on the Interim Action Work Plan in accordance with WAC 173-340-600(16). The Albatross Estates, LLC shall not conduct the interim action until Ecology approves the Interim Action Work Plan. Upon approval by Ecology, the Interim Action Work Plan becomes an integral and enforceable part of this Order, and Albatross Estates, LLC is required to conduct the interim action in accordance with the approved Interim Action Work Plan. Ecology reserves its authority to require additional interim action(s) under a separate order or other enforcement action under RCW 70A.305, or to undertake the interim action(s) itself.

F. If Ecology determines that Albatross Estates, LLC has failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to Albatross Estates, LLC, perform any or all portions of the remedial action or at Ecology's discretion allow the Albatross Estates, LLC opportunity to correct. In an emergency, Ecology is not required to provide notice to Albatross Estates, LLC or an opportunity for dispute

resolution. Albatross Estates, LLC shall reimburse Ecology for the costs of doing such work in accordance with Section VIII.A (Payment of Remedial Action Costs). Ecology reserves the right to enforce requirements of this Order under Section X (Enforcement).

G. Except where necessary to abate an emergency situation or where required by law, Albatross Estates, LLC shall not perform any remedial actions at the Site outside those remedial actions required by this Order to address the contamination that is the subject of this Order, unless Ecology concurs, in writing, with such additional remedial actions pursuant to Section VIII.J. (Amendment of Order). In the event of an emergency, or where actions are taken as required by law, Albatross Estates, LLC must notify Ecology in writing of the event and remedial action(s) planned or taken as soon as practical but no later than within twenty-four (24) hours of the discovery of the event.

VIII. TERMS AND CONDITIONS

A. Payment of Remedial Action Costs

Albatross Estates, LLC shall pay to Ecology costs incurred by Ecology pursuant to this Order and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or its contractors for, or on, the Site under RCW 70A.305, including remedial actions and Order preparation, negotiation, oversight, and administration. These costs shall include work performed both prior to and subsequent to the issuance of this Order. Ecology's costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). Ecology has accumulated $3,807.12 in remedial action costs related to

this Site as of June 30, 2022. For all Ecology costs incurred, Albatross Estates, LLC shall pay the required amount within thirty (30) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement of costs will result in interest charges at the rate of twelve percent (12%) per annum, compounded monthly.

In addition to other available relief, pursuant to RCW 19.16.500, Ecology may utilize a collection agency and/or, pursuant to RCW 70A.305.060, file a lien against real property subject to the remedial actions to recover unreimbursed remedial action costs.

B. Designated Project Coordinators

The project coordinator for Ecology is:

Andrew Smith
PO Box 47775
Lacey, WA 98504-7775
360-485-3987
andrew.smith@ecy.wa.gov

The project coordinator for Albatross Estates, LLC is:

Kimberly Seely
Coastline Law Group PLLC
4015 Ruston Way, Suite 200
Tacoma, WA 98402
253-203-6820 direct line
kseely@coastlinelaw.com

Each project coordinator shall be responsible for overseeing the implementation of this Order. Ecology's project coordinator will be Ecology's designated representative for the Site. To the maximum extent possible, communications between Ecology and Albatross Estates, LLC, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the work to be performed required by this Order.

Any Party may change its respective project coordinator. Written notification shall be given to the other Party at least ten (10) calendar days prior to the change.

C. Performance

All geologic and hydrogeologic work performed pursuant to this Order shall be under the supervision and direction of a geologist or hydrogeologist licensed by the State of Washington or under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and 18.220.

All engineering work performed pursuant to this Order shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

All construction work performed pursuant to this Order shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

Any documents submitted containing geologic, hydrogeologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and 18.220.

Albatross Estates, LLC shall notify Ecology in writing of the identity of any engineer(s) and geologist(s), contractor(s), subcontractor(s), and other key personnel to be used in carrying out the terms of this Order, in advance of their involvement at the Site.

D. Access

Ecology or any Ecology authorized representative shall have access to enter and freely move about all property at the Site that Albatross Estates, LLC either owns, controls, or has access rights to at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing Albatross Estates, LLC's progress in carrying out the terms of this Order; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by Albatross Estates, LLC. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Site property owned or controlled by Albatross Estates, LLC unless an emergency prevents such notice. All persons

who access the Site pursuant to this section shall comply with any applicable health and safety plan(s). Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Site property access.

Albatross Estates, LLC shall make best efforts to secure access rights for those properties within the Site not owned or controlled by Albatross Estates, LLC where remedial activities or investigations will be performed pursuant to this Order. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of Albatross Estates, LLC would use so as to achieve the goal in a timely manner, including the cost of employing professional assistance and the payment of reasonable sums of money to secure access and/or use restriction agreements, as required by this Section. If, within 120 days after the effective date of this Order, Albatross Estates, LLC is unable to accomplish what is required through "best efforts," they shall notify Ecology, and include a description of the steps taken to comply with the requirements. If Ecology deems it appropriate, it may assist Albatross Estates, LLC, or take independent action, in obtaining such access and/or use restrictions. Ecology reserves the right to seek payment from Albatross Estates, LLC for all costs, including cost of attorneys' time, incurred by Ecology in obtaining such access or agreements to restrict land, water, or other resource use.

E. Sampling, Data Submittal, and Availability

With respect to the implementation of this Order, Albatross Estates, LLC shall make the results of all sampling, laboratory reports, and/or test results generated by it or on its behalf

available to Ecology. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section VII (Work to be Performed), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

If requested by Ecology, Albatross Estates, LLC shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by Albatross Estates, LLC pursuant to implementation of this Order. Albatross Estates, LLC shall notify Ecology seven (7) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow Albatross Estates, LLC and/or its authorized representative to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Order, provided that doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section VIII.D (Access), Ecology shall notify Albatross Estates, LLC prior to any sample collection activity unless an emergency prevents such notice.

In accordance with WAC 173-340-830(2)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

F. Public Participation

RCW 70A.305.030(2)(a) requires that, at a minimum, this Order be subject to concurrent public notice. Ecology shall be responsible for providing this public notice and reserves the right to modify or withdraw any provisions of this Order should public comment disclose facts or

considerations which indicate to Ecology that this Order is inadequate or improper in any respect. Ecology shall maintain the responsibility for public participation at the Site. However, Albatross Estates, LLC shall cooperate with Ecology, and shall:

1. If agreed to by Ecology, develop appropriate mailing lists and prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.

2. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before meetings related to remedial action work to be performed at the Site with the interested public and/or local governments. Likewise, Ecology shall notify Albatross Estates, LLC prior to the issuance of all press releases and fact sheets related to the Site, and before meetings related to the Site with the interested public and local governments. For all press releases, fact sheets, meetings, and other outreach efforts by Albatross Estates, LLC that do not receive prior Ecology approval, Albatross Estates, LLC shall clearly indicate to its audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

3. When requested by Ecology, participate in public presentations on the progress of the remedial action at the Site. Participation may be through attendance at public meetings to assist in answering questions or as a presenter.

4. When requested by Ecology, arrange and maintain a repository to be located at:

a. **DuPont Pierce County Library**
1540 Wilmington Drive
Dupont WA 98327
253-548-3326

b. **Ecology's Southwest Region Office**
300 Desmond Drive SE
Lacey, WA 98503

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to this Site shall be maintained in the repository at Ecology's Southwest Region Office in Lacey, Washington.

G. Access to Information

Albatross Estates, LLC shall provide to Ecology, upon request, copies of all records, reports, documents, and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as "Records") within Albatross Estates, LLC's possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Order, including, but not limited to, sampling, analysis, chain of

custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the work. Albatross Estates, LLC shall also make available to Ecology, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the work.

Nothing in this Order is intended to waive any right Albatross Estates, LLC may have under applicable law to limit disclosure of Records protected by the attorney work-product privilege and/or the attorney-client privilege. If Albatross Estates, LLC withholds any requested Records based on an assertion of privilege, Albatross Estates, LLC shall provide Ecology with a privilege log specifying the Records withheld and the applicable privilege. No Site-related data collected pursuant to this Order shall be considered privileged, including: (1) any data regarding the Site, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, radiological, biological, or engineering data, or the portion of any other record that evidences conditions at or around the Site; or (2) the portion of any Record that Respondents are required to create or generate pursuant to this Order.

Notwithstanding any provision of this Order, Ecology retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under any other applicable statutes or regulations.

H. Retention of Records

During the pendency of this Order, and for ten (10) years from the date of completion of the work performed pursuant to this Order, Albatross Estates, LLC shall preserve all records, reports, documents, and underlying data in its possession relevant to the implementation of this Order and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors.

I. Resolution of Disputes

1. In the event that Albatross Estates, LLC elects to invoke dispute resolution Albatross Estates, LLC must utilize the procedure set forth below.

a. Upon the triggering event (receipt of Ecology's project coordinator's written decision or an itemized billing statement), Albatross Estates, LLC has fourteen (14) calendar days within which to notify Ecology's project coordinator in writing of its dispute (Informal Dispute Notice).

b. The Parties' project coordinators shall then confer in an effort to resolve the dispute informally. The Parties shall informally confer for up to fourteen (14) calendar days from receipt of the Informal Dispute Notice. If the project coordinators cannot resolve the dispute within those fourteen (14) calendar days, then within seven (7) calendar days Ecology's project coordinator shall issue a written decision (Informal Dispute Decision) stating: the nature of the

dispute; the Albatross Estates, LLC position with regards to the dispute; Ecology's position with regards to the dispute; and the extent of resolution reached by informal discussion.

c. Albatross Estates, LLC may then request regional management review of the dispute. Albatross Estates, LLC must submit this request (Formal Dispute Notice) in writing to the Southwest Region Toxics Cleanup Section Manager within seven (7) calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting forth: the nature of the dispute; Albatross Estates, LLC's position with respect to the dispute; and the information relied upon to support its position.

d. The Section Manager shall conduct a review of the dispute and shall endeavor to issue a written decision regarding the dispute (Decision on Dispute) within thirty (30) calendar days of receipt of the Formal Dispute Notice. The Decision on Dispute shall be Ecology's final decision on the disputed matter.

2. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used.

3. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Order, unless Ecology agrees in writing to a schedule extension.

4. In case of a dispute, failure to either proceed with the work required by this Order or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section VII.I (Work to be Performed) or initiating enforcement under Section X (Enforcement).

J. Extension of Schedule

1. Albatross Estates, LLC request for an extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least thirty (30) days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:

a. The deadline that is sought to be extended.

b. The length of the extension sought.

c. The reason(s) for the extension.

d. Any related deadline or schedule that would be affected if the extension were granted.

2. The burden shall be on Albatross Estates, LLC to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a

timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

a. Circumstances beyond the reasonable control and despite the due diligence of Albatross Estates, LLC including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by Albatross Estates, LLC.

b. A shelter in place or work stoppage mandated by state or local government order due to public health and safety emergencies.

c. Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty.

d. Endangerment as described in Section VIII.K (Endangerment).

However, neither increased costs of performance of the terms of this Order nor changed economic circumstances shall be considered circumstances beyond the reasonable control of Albatross Estates, LLC.

3. Ecology shall act upon any Albatross Estates, LLC written request for extension in a timely fashion. Ecology shall give Albatross Estates, LLC written notification of any extensions granted pursuant to this Order. A requested extension shall not be effective until approved by Ecology. Unless the extension is a substantial

change, it shall not be necessary to amend this Order pursuant to Section VIII.J (Amendment of Order) when a schedule extension is granted.

4. At Albatross Estates, LLC's request, an extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding ninety (90) days only as a result of one of the following:

a. Delays in the issuance of a necessary permit which was applied for in a timely manner.

b. Other circumstances deemed exceptional or extraordinary by Ecology.

c. Endangerment as described in Section VIII.K (Endangerment).

K. Amendment of Order

The project coordinators may verbally agree to minor changes to the work to be performed without formally amending this Order. Minor changes will be documented in writing by Ecology within seven (7) days of verbal agreement.

Except as provided in Section VIII.L (Reservation of Rights), substantial changes to the work to be performed shall require formal amendment of this Order. This Order may only be formally amended by the written consent of both Ecology and Albatross Estates, LLC. Ecology

will provide its written consent to a formal amendment only after public notice and opportunity to comment on the formal amendment.

When requesting a change to the Order, Albatross Estates, LLC shall submit a written request to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request is received. If Ecology determines that the change is substantial, then the Order must be formally amended. Reasons for the disapproval of a proposed change to this Order shall be stated in writing. If Ecology does not agree to a proposed change, the disagreement may be addressed through the dispute resolution procedures described in Section VIII.H (Resolution of Disputes).

L. Endangerment

In the event Ecology determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment on or surrounding the Site, Ecology may direct Albatross Estates, LLC to cease such activities for such period of time as it deems necessary to abate the danger. Albatross Estates, LLC shall immediately comply with such direction.

In the event Albatross Estates, LLC determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment, Albatross Estates, LLC may cease such activities. Albatross Estates, LLC shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after making such determination or ceasing such activities. Upon Ecology's direction,

Albatross Estates, LLC shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with Albatross Estates, LLC's cessation of activities, it may direct Albatross Estates, LLC to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, Albatross Estates, LLC's obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended in accordance with Section VIII.I (Extension of Schedule) for such period of time as Ecology determines is reasonable under the circumstances.

Nothing in this Order shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

M. Reservation of Rights

This Order is not a settlement under RCW 70A.305. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any of Ecology's rights or authority. Ecology will not, however, bring an action against Albatross Estates, LLC to recover remedial action costs paid to and received by Ecology under this Order. In addition, Ecology will not take additional enforcement actions against Albatross Estates, LLC regarding remedial actions required by this Order, provided Albatross Estates, LLC complies with this Order.

Ecology nevertheless reserves its rights under RCW 70A.305, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health or the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

By entering into this Order, Albatross Estates, LLC does not admit to any liability for the Site. Although Albatross Estates, LLC is committing to conducting the work required by this Order under the terms of this Order, Albatross Estates, LLC expressly reserves all rights available under law, including but not limited to the right to seek cost recovery or contribution against third parties, and the right to assert any defenses to liability in the event of enforcement.

N. Transfer of Interest in Property

No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by Albatross Estates, LLC without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to Albatross Estates, LLCs transfer of any interest in all or any portion of the Site, and during the effective period of this Order, Albatross Estates, LLC shall provide a copy of this Order to any prospective purchaser, lessee, transferee, assignee, or other successor in said

interest; and, at least thirty (30) days prior to any transfer, Albatross Estates, LLC shall notify Ecology of said transfer. Upon transfer of any interest, Albatross Estates, LLC shall notify all transferees of the restrictions on the activities and uses of the property under this Order and incorporate any such use restrictions into the transfer documents.

O. Compliance with Applicable Laws

1. *Applicable Laws.* All actions carried out by Albatross Estates, LLC pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits or approvals, except as provided in RCW 70A.305.090. At this time, no federal, state, or local requirements have been identified as being applicable to the actions required by this Order. Albatross Estates, LLC has a continuing obligation to identify additional applicable federal, state, and local requirements which apply to actions carried out pursuant to this Order, and to comply with those requirements. As additional federal, state, and local requirements are identified by Ecology or Albatross Estates, LLC, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order, and Albatross Estates, LLC must implement those requirements.

2. *Relevant and Appropriate Requirements.* All actions carried out by Albatross Estates, LLC pursuant to this Order shall be done in accordance with relevant and appropriate requirements identified by Ecology. At this time, no relevant and appropriate requirements have been identified as being applicable to the actions

required by this Order. If additional relevant and appropriate requirements are identified by Ecology or Albatross Estates, LLC, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order and Albatross Estates, LLC must implement those requirements.

3. Pursuant to RCW 70A.305.090(1), Albatross Estates, LLC may be exempt from the procedural requirements of RCW 70A.15, 70A.205, 70A.300, 77.55, 90.48, and 90.58 and of any laws requiring or authorizing local government permits or approvals. However, Albatross Estates, LLC shall comply with the substantive requirements of such permits or approvals. For permits and approvals covered under RCW 70A.305.090(1) that have been issued by local government, the Parties agree that Ecology has the non-exclusive ability under this Order to enforce those local government permits and/or approvals. At this time, no state or local permits or approvals have been identified as being applicable but procedurally exempt under this section

4. Albatross Estates, LLC has a continuing obligation to determine whether additional permits or approvals addressed in RCW 70A.305.090(1) would otherwise be required for the remedial action under this Order. In the event either Ecology or Albatross Estates, LLC determines that additional permits or approvals addressed in RCW 70A.305.090(1) would otherwise be required for the remedial action under this Order, it shall promptly notify the other Party of its determination. Ecology shall determine whether Ecology or Albatross Estates, LLC shall be responsible to contact the

appropriate state and/or local agencies. If Ecology so requires, Albatross Estates, LLC shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by Albatross Estates, LLC and on how Albatross Estates, LLC must meet those requirements. Ecology shall inform Albatross Estates, LLC in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Order. Albatross Estates, LLC shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

Pursuant to RCW 70A.305.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70A.305.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption shall not apply and Albatross Estates, LLC shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70A.305.090(1), including any requirements to obtain permits or approvals.

P. Indemnification

Albatross Estates, LLC agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or

injuries to persons, or (2) for loss or damage to property, to the extent arising from or on account of acts or omissions of Albatross Estates, LLC, its officers, employees, agents, or contractors in entering into and implementing this Order. However, Albatross Estates, LLC shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Order.

IX. SATISFACTION OF ORDER

The provisions of this Order shall be deemed satisfied upon Albatross Estates, LLC's receipt of written notification from Ecology that Albatross Estates, LLC has completed the remedial activity required by this Order, as amended by any modifications, and that Albatross Estates, LLC has complied with all other provisions of this Agreed Order.

X. ENFORCEMENT

Pursuant to RCW 70A.305.050, this Order may be enforced as follows:

A. The Attorney General may bring an action to enforce this Order in a state or federal court.

B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Site.

C. A liable party who refuses, without sufficient cause, to comply with any term of this Order will be liable for:

1. Up to three (3) times the amount of any costs incurred by the State of Washington as a result of its refusal to comply.

2. Civil penalties of up to twenty-five thousand dollars ($25,000) per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under RCW 70A.305.070.

Effective date of this Order: **October 6, 2022**

ALBATROSS ESTATES, LLC

Rodger May
Albatross Estates, LLC
4317 South 188th Street
SeaTac, WA 98188
(206) 571-2900

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Rebecca S. Lawson, PE, LHG
Section Manager
Toxics Cleanup Program
Southwest Region Office
(360) 407-6241

FORMER DUPONT WORKS PROJECT

EXHIBIT A: SITE LOCATION



FORMER DUPONT WORKS PROJECT

EXHIBIT B: REMEDIAL ACTION AREA



REMEDIAL ACTION AREA

EXHIBIT C – SCOPE OF WORK AND SCHEDULE

SCOPE OF WORK

PURPOSE

The work under this Agreed Order (AO) involves conducting a Data Summary Report, focused Remedial Investigation Feasibility Study (RI/FS), conducting interim actions if required or agreed to by the Department of Ecology (Ecology), and preparing a preliminary Draft Cleanup Action Plan (DCAP) to select a cleanup alternative. The purpose of the RI/ FS, and preliminary DCAP for the Site is to provide sufficient data, analysis, and evaluations to enable Ecology to select a cleanup alternative for the Site.

This AO is focused on the Remedial Action Area portion of the Site. Due to past cleanup actions, which included an extensive soil and groundwater confirmation program and a thorough evaluation of cleanup alternatives done for the Site remedy, the creation of the RI/FS will be focused on identifying and addressing data gaps and the evaluation of reasonable cleanup alternatives in that portion of the Site only. Information from the previous Site remediation, including the review of rejected alternatives during that project's FS, will be reviewed to determine if they have become appropriate as a potential remedy.

Albatross Estates, LLC shall coordinate with Ecology throughout the development of the Data Summary Report, Interim Action (if applicable), RI/FS, and preliminary DCAP and shall keep Ecology informed of changes to any Work Plan or other project plans, and of any issues or problems as they develop.

The Scope of Work (SOW) is divided into six major tasks as follows:

Task 1. – Data Summary Report

Task 2. – RI Work Plan

Task 3. – Remedial Investigation/Feasibility Study

Task 4. – Interim Action(s) (if required)

Task 5. – SEPA Compliance

Task 6. – DCAP

TASK 1. – DATA SUMMARY REPORT

Albatross Estates, LLC shall prepare a Data Summary Report that describes general facility information, history and conditions, past investigations and cleanup actions including data collection and results, preliminary conceptual contaminant migration pathways, ecological receptors, hazardous substances sources etc. The Data Summary Report will include data in tabular and figure form, and will indicate exceedances of residential screening levels.

TASK 2. – RI WORK PLAN

Albatross Estates, LLC shall prepare a Remedial Investigation Work Plan (RI Work Plan). The RI Work Plan shall include an overall description and schedule of all RI activities. The RI Work Plan shall clearly describe the project management strategy for implementing and reporting on RI activities. The responsibility and authority of all organizations and key personnel involved in conducting the RI will be outlined.

A Key Project Meeting (RI Planning Meeting) will be held prior to submittal of the RI Work Plan. The purpose of the RI Planning Meeting is to review requirements for the RI Work Plan and plan RI field work, discuss the preliminary Conceptual Site Model, and identify project data needs and possible interim actions.

The RI Work Plan shall describe the following:

- General facility information.
- Site history and conditions, including previous operations.
- Past field investigations and cleanup actions, including any data collection and analysis of soils, air, groundwater, surface water, and sediments.
- A Conceptual Site Model showing contaminants, migration pathways in all environmental media, and potential receptors.
- Geology and groundwater system characteristics.
- Past, current, and future land use.
- Identification of natural resources and ecological receptors.
- Hazardous substances and their sources, screening levels for chemicals of concern (COCs), etc., in compliance with WAC 173-340-350 and WAC 173-204-550.

As part of the project background, existing environmental data on Site soil, groundwater, surface water, and sediments will be compiled and evaluated for data gaps. The data gaps will be used as the basis for conducting additional Site investigations, if necessary. The RI Work Plan will also identify specific data collection procedures in a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Inadvertent Discovery Plan as part of the Work Plan, in compliance with WAC 173-340-820 for defining the nature and extent of contamination. Albatross Estates, LLC will also submit a copy of the Health and Safety Plan (HASP) for the project.

The SAP identifies the proposed number and location of all environmental samples and methods, including soil borings, groundwater monitoring wells, soil, groundwater, stormwater, seep, catch basin and sediment samples, approximate depths, and includes a quality assurance project plan. The SAP will describe the sampling objectives, the rationale for the sampling approach (based upon the identified data gaps), and plans for data use, and shall provide a detailed description of sampling tasks.

The SAP shall describe the following:

- Specifications for sample identifiers.
- Sampling equipment.
- The type, number, and location of samples to be collected.
- The analyses to be performed.
- Descriptions of sampling equipment and methods to be used.
- Sample documentation.
- Sample containers, collection, and handling.
- Data and records management.
- Schedule.

The QAPP will be prepared in accordance with the Guidance for Preparation of Quality Assurance Project Plans, EPA Region 10, Quality Data Management Program, QA/R-5, and requirements of the EPA Contract Laboratory Program. The QAPP will also follow Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (July 2004)[1] and Sediment Sampling and Analysis Plan Appendix (February 2008).[2] Laboratories must meet the accreditation standards established in WAC 173-50. Data quality objectives will reflect the criteria or threshold values used for the source control evaluation.

The SAP, including the QAPP, and an Inadvertent Discovery Plan will be submitted to Ecology for review and approval. As with all environmental work at the Site, work may not begin without written approval from Ecology. The plan shall provide seven (7) days notice to Ecology prior to beginning sampling. Ecology may obtain split samples.

Albatross Estates, LLC or their contractors shall submit all new sampling data generated under this SAP and any other recently collected data to Ecology via entry of the data into the Environmental Information Management System (EIM) in accordance with WAC 173-340-840(5) and Ecology's Toxics Cleanup Program Policy 840: Data Submittal Requirements. Only validated data will be entered into the EIM database and Albatross Estates, LLC must enter the data within 30 days of submittal of the receipt of qualified data from samples collected during the RI.

Albatross Estates, LLC will provide Ecology with an Agency Review Draft RI Work Plan. Once Ecology reviews and approves the Agency Review Draft RI Work Plan, it will be considered the Final RI Work Plan. The RI Work Plan shall not be implemented until approved by Ecology. Once approved by Ecology, Albatross Estates, LLC will implement the Final RI Work Plan according to the schedule contained in this Exhibit.

---

[1] Found at http://www.ecy.wa.gov/biblio/0403030.html

[2] Found at http://www.ecy.wa.gov/biblio/qapp.html

TASK 3. – REMEDIAL INVESTIGATION/FEASIBILITY STUDY

Albatross Estates, LLC shall conduct an RI that meets the requirements of WAC 173-340-350(7) and WAC 173-204-550 according to the RI Work Plan as approved by Ecology. The RI will determine the nature and extent of contamination exceeding preliminary Model Toxics Control Act (MTCA) cleanup levels, preliminary Sediment Management Standards (SMS) cleanup standards, and other regulatory requirements. The RI must provide sufficient data and information to define the nature and extent of contamination.

Field sampling and analysis will be completed in general accordance with the SAP, QAPP, and Inadvertent Discovery Plan. Deviation(s) from the approved Plans must be communicated to Ecology immediately and documented as required by Ecology.

Albatross Estates, LLC shall provide interim data reports and updates to Ecology as new Site data and information become available. Laboratory analysis data shall also be provided in electronic format when it has been validated. Raw laboratory data will be provided to Ecology upon request.

Prior to development of the RI portion of the Agency Review Draft RI/FS Report, a Key Project Meeting (RI Pre-Report Check-In Meeting) will be held. During the RI Pre-Report Check-In Meeting, Ecology and Albatross Estates, LLC will review available data and an updated Conceptual Site Model, and discuss the content and organization of the Draft RI Report.

Albatross Estates, LLC shall use the information obtained in the RI to prepare an FS that meets the applicable requirements of WAC 173-340-350(8) according to the schedule in this Exhibit. The FS will evaluate remedial alternatives for Site cleanup, consistent with MTCA and SMS requirements to ensure protection of human health and the environment by eliminating, reducing, or otherwise controlling risk posed through each exposure pathway and migration route. The RI and FS will be consolidated to create an Agency Review Draft RI/FS Report.

Prior to beginning the FS, a Key Project Meeting (FS Planning Meeting) will be held to review Applicable Relevant and Appropriate Requirements, potential remedial alternatives, and establish points of compliance.

The Agency Review Draft RI/FS must include a detailed analysis of each remedial alternative according to the applicable requirements of WAC 173-340-350 and WAC 173-204-550. The remedial alternatives will be evaluated for compliance with the applicable requirements of WAC 173-340-360 and WAC 173-204-570.

Opportunities to perform remedial actions in an integrated manner with restoration of natural resources may be presented as a fundamental part of the description and evaluation of cleanup alternatives, including consideration of the logistics, cost effectiveness, and environmental benefits associated with combining cleanup and restoration actions.

Albatross Estates, LLC shall prepare the Agency Review Draft RI/FS and submit it to Ecology for review and comment. After addressing Ecology's comments on the Agency Review Draft RI/FS, Albatross Estates, LLC shall prepare the Public Review Draft RI/FS and submit it to Ecology for distribution and public comment. The RI/FS will not be considered Final until after a public review and comment period. The number and type of document (electronic, print copy, etc.) will be determined by the Ecology Project Coordinator.

If the data collected during this investigation is insufficient to define the nature and extent of contamination, and/or to select a cleanup action plan an additional phase of investigation shall be conducted to define the extent of contamination.

TASK 4. – INTERIM ACTIONS (if required)

Potentially Liable Persons (PLPs) will implement interim action in accordance with WAC 173-340-430 and the AO, and will be designed in a manner that will not foreclose reasonable alternatives for any final cleanup action that may be required.

As detailed in the AO, if required by Ecology, or if proposed by Albatross Estates, LLC and approved by Ecology, Albatross Estates, LLC will implement an interim action.

If an interim action is to be performed, Albatross Estates, LLC will prepare and submit for Ecology approval an Agency Review Draft Interim Action Work Plan (IAWP) with detail commensurate with the work to be performed. The Agency Review Draft IAWP shall include, as appropriate:

- Description of the interim action including its purpose, general requirements, and relationship to the (final) cleanup action (to the extent known).
- Summary of relevant RI/FS information, including at a minimum existing Site conditions and alternative interim actions considered.
- Information regarding design and construction requirements, including a proposed schedule and personnel roles and responsibilities.
- Compliance Monitoring Plan.
- SAP/QAPP/Inadvertent Discovery Plan.
- Permits required.

Albatross Estates, LLC will also submit a copy of the Health and Safety Plan for the project. Albatross Estates, LLC will be responsible for complying with the State Environmental Policy Act (SEPA) Rules (WAC 197-11) including preparing and submitting an environmental checklist for the interim action, and will assist Ecology with presentations at any additional meetings or hearings that might be necessary for SEPA compliance or as part of the Public Participation Plan.

Albatross Estates, LLC shall prepare the Agency Review Draft IAWP and submit it to Ecology for review. Albatross Estates, LLC shall incorporate Ecology's comments and then prepare the Public Review Draft IAWP and submit it to Ecology. After a public notice and comment period for the Public Review Draft IAWP (and SEPA determination), Ecology will approve the IAWP (if appropriate) and the document will be considered Final. Albatross Estates, LLC shall prepare the Final IAWP and submit it. Once approved by Ecology, Albatross Estates, LLC will implement the interim action according with the approved schedule. The number and type of document (electronic, print copy, etc.) will be determined by the Ecology Project Coordinator.

Upon successful completion of the work, an Agency Review Draft Interim Action Report will be prepared as a separate deliverable. Albatross Estates, LLC shall prepare the Agency Review Draft Interim Action Report and submit it to Ecology for review and approval. After incorporating Ecology's comments on the Agency Review Draft Interim Action Report and after Ecology approval, Albatross Estates, LLC shall prepare the Final Interim Action Report and submit it to Ecology. The number and type of document (electronic, print copy, etc.) will be determined by the Ecology Project Coordinator.

TASK 5. – SEPA COMPLIANCE

Albatross Estates, LLC shall be responsible for assisting Ecology with its compliance with the State Environmental Policy Act (SEPA) Rules (WAC 197-11-250 through 268), including preparation and submittal of a draft and final environmental checklist. If the result of the threshold determination is a determination of significance (DS), Albatross Estates, LLC may be responsible for the preparation of an agency review draft environmental impact statement. Albatross Estates, LLC shall assist Ecology with coordinating SEPA public involvement requirements with MTCA public involvement requirements whenever practicable, such that public comment periods and meetings or hearings can be held concurrently.

TASK 6. – PRELIMINARY DRAFT CLEANUP ACTION PLAN

Upon Ecology approval of the Public Review Draft RI/FS, a Key Project Meeting (Cleanup Action Plan Meeting) will be held regarding the Cleanup Action Plan. The Cleanup Action Plan Meeting will be used to review plans for developing the Agency Review preliminary DCAP.

Albatross Estates, LLC shall prepare an Agency Review preliminary DCAP in accordance with WAC 173-340-380 that provides a proposed remedial action to address the contamination present on the Site.

The preliminary DCAP shall include:

- A general description of the proposed remedial actions.
- An Inadvertent Discovery Plan.
- Cleanup Standards developed from the RI/FS and rationale regarding their selection.

- A schedule for implementation.
- Description of any institutional controls proposed.
- A summary of applicable local, state, and federal laws pertinent to the proposed cleanup actions.

Albatross Estates, LLC will submit an Agency Review preliminary DCAP for Ecology's review and approval.

After receiving Ecology's comments on the Agency Review preliminary DCAP, if any, Albatross Estates, LLC shall revise the preliminary DCAP to address Ecology's comments and submit the Public Review DCAP to Ecology. The number and type of document (electronic, print copy, etc.) will be determined by the Ecology Project Coordinator.

SCHEDULE OF DELIVERABLES

The schedule for deliverables described in the Agreed Order and the Scope of Work is presented below. If the date for submission of any item or notification required by this Schedule of Deliverables occurs on a weekend, state or federal holiday, the date for submission of that item or notification is extended to the next business day following the weekend or holiday. Where a deliverable due date is triggered by Ecology notification, comments or approval, the starting date for the period shown is the date Albatross Estates, LLC received such notification, comments or approval by certified mail, return receipt requested, unless otherwise noted below. Where triggered by Ecology receipt of a deliverable, the starting date for the period shown is the date Ecology receives the deliverable by certified mail, return receipt requested, or the date of Ecology signature on a hand-delivery form.

RI/FS Deliverables	Completion Times
Data Summary Report	60 calendar days following the effective date of the Agreed Order
Draft RI Work Plan	60 calendar days following Ecology approval of the Data Summary Report
Final RI Work Plan	30 calendar days following receipt and incorporation of Ecology comments on the Draft RI Work Plan
Completion of RI Field Work	12 months following completion of the Final RI Work Plan
Agency Review Draft RI/FS Report	120 calendar days following receipt of qualified laboratory data from the RI field work
Public Review Draft RI/FS Report	90 calendar days following receipt and incorporation of Ecology comments on Agency Review Draft RI/FS Report
Agency Review preliminary DCAP	120 calendar days following completion of the Public Review Draft RI/FS

Appendix C

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Memo

PIONEER TECHNOLOGIES CORPORATION
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com

To: Barb Kincaid, City of DuPont

From: Joel Hecker, PIONEER Technologies Corporation

Date: January 19, 2023

Subject: Appendix C: Additional Information and Evaluation Relevant to the Redevelopment of the Former DuPont Works Site, DuPont, Washington

---

Dear Ms. Kincaid,

This Appendix provides additional context and background information relevant to the current conditions of Site but beyond the initial scope of work for the Current Conditions Report to which it is attached. The purpose of this memorandum is to provide information to support the future development of the Site. Five figures (C-1 through C-5) were prepared to assist with interpreting data presented in the Current Conditions Report.

Arsenic Thiessen Polygons

Arsenic concentrations in soil are presented on Figure 11 in the Current Conditions Report. Given the significant number of sampling locations, it is more valuable to interpret the data using geostatistical analysis. Using the same dataset shown on Figure 11, we created Thiessen polygons to provide estimates of the area of the Site that exceed the arsenic Site-specific background concentration of 32 milligrams per kilogram (mg/kg). Thiessen polygons are generated from a set of sample points such that each polygon defines an area of influence around its sample point, in effect filling in the space between sample points. Figure C-1 presents arsenic Thiessen polygons for the uppermost two feet of soil on the Site and Figure C-2 presents arsenic Thiessen polygons for soil at depths of two to 15 feet below ground surface (i.e., the MTCA point of compliance) on the Site. Based on the Thiessen polygons, approximately 18 acres of surficial soil exceed the arsenic Site-specific background concentration (**less than three percent of the total land area of the Site**) and may require cleanup if used for unrestricted (e.g., residential) land use.

Composite Grid for Remediation Sampling

After large-scale excavation and grading was completed to remove the uppermost foot of arsenic- and lead-contaminated soil from the Site, confirmation samples were collected to confirm arsenic and lead concentrations met the commercial land use cleanup levels. Confirmation samples were collected as five-point composite samples. Only the location of the centermost subsample, of the five-point composite, is shown on Figures 10 and 11 in the Current Conditions Report. In other words, there are actually five times more confirmation sample locations than shown on these figures. Analytical results for these subsamples were averaged (i.e., composited) and the resulting concentration was applied to the center point of the five subsamples. Figure C-3 illustrates the 75-foot by 75-foot grid with the five subsamples used for the majority of composite sampling. Surficial miscellaneous small unit (MSU) remediation confirmation samples were collected on a smaller 50-foot by 50-foot grid.

Current Zoning Uses Compared to Unrestricted Soil SL Exceedances

The land use areas presented in the Current Conditions Report differ slightly from the approved uses presented on the City's current zoning map. Figure C-4 plots soil samples with unrestricted screening level (SL) exceedances on the City's current zoning map, including Mixed-Use Village 1 through 9, Community Park, Mixed-Use, Manufacturing and Research, and Open Space designations. According to DuPont Municipal Code (DMC) Chapter 25, specific uses are permitted within each of the areas shown on Figure C-4. Based on the concentrations of constituents present in soil, certain uses will require cleanup before the zoned uses are permissible. The paragraphs below discuss the acceptable uses and whether cleanup will be required prior to implementing those uses.

MUV-1: This area is intended to support commercial/restaurant usage, hotels, housing, public/community uses, office, light manufacturing, and research/development (DMC 24.41). Residential and public/community uses will require cleanup related to arsenic concentrations in soil exceeding the unrestricted soil SL. Given the depth of the motor oil concentration, it is unlikely cleanup will be required.

MUV-2: This area is intended to support commercial/restaurant usage, hotels, housing, office, light manufacturing, and research/development (DMC 24.41). Residential uses will require cleanup related to arsenic concentrations in soil exceeding the unrestricted soil SL.

MUV-3: This area is intended to support commercial/restaurant usage, hotels, multifamily housing, public/community uses, office, light manufacturing, and research/development (DMC 24.41). Residential and public/community uses will require cleanup related to arsenic concentrations in soil exceeding the unrestricted soil SL.

MUV-4: This area is intended to support commercial/restaurant usage (DMC 24.41). No cleanup actions would technically be required for commercial usage, as the Site was previously remediated to commercial cleanup levels. However, given the presence of mature trees, duff (surficial vegetation mat), and potential tribal burial sites on the eastern portion of MUV-4, significant earthwork would likely be required prior to development.

MUV-5: This area is intended to support office, light manufacturing, and research/development (DMC 24.41). No cleanup actions would technically be required for commercial/industrial usage, as the Site was previously remediated to commercial cleanup levels. However, given the presence of mature trees, duff (surficial vegetation mat), and potential tribal burial sites on the eastern portion of MUV-5, significant earthwork would likely be required prior to development.

MUV-6: This area is intended to support specialty commercial/restaurant usage, office, light manufacturing, and research/development (DMC 24.41). No cleanup actions would be required for commercial usage, as the Site was previously remediated to commercial cleanup levels.

MUV-7: This area is intended to support commercial/restaurant usage, community/cultural uses, office, light manufacturing, and research/development (DMC 24.41). Depending on the specifics of the community/cultural uses, this area will require cleanup related to arsenic concentrations in soil exceeding the unrestricted soil SL.

MUV-8: This area is intended to support multifamily housing, community/cultural uses, office, light manufacturing, and research/development (DMC 24.41). Depending on the placement of multifamily residences and community/cultural

uses, cleanup may be required related to arsenic concentrations in soil exceeding the unrestricted soil SL. The only known arsenic unrestricted soil SL exceedances are on the very western fringe of MUV-8.

MUV-9: This area is intended to support active recreation (e.g., existing golf course), commercial/restaurant usage, administrative offices, and hotels (DMC 24.41). No cleanup actions would be required for golf course/commercial usage, as the Site was previously remediated to golf course/commercial cleanup levels.

CP: This area is intended to support a community park. In general, community park facilities are designed for organized activities and sports. Community parks may provide indoor facilities to meet a wider range of recreation interests. Community parks often offer amenities such as parking, restrooms, covered play areas, sports fields, water bodies, gardens, and/or nature trails (DMC 25.10). Specific planned uses for this area are unknown at this time. This area lies beyond the former DuPont Works Site boundary and therefore, no soil investigation has been completed on this area. It is unknown if cleanup will be required prior to use as a community park.

MXD: This area allows all uses permitted in the commercial district, office district, residential districts (noted exception within the consent decree area), public uses, and quasi-public uses (DMC 25.35). Residential use will require cleanup related to arsenic concentrations in soil exceeding the unrestricted soil SL. The area was previously remediated to commercial cleanup levels.

MRP: This area is intended for light manufacturing, office, research, warehousing/distribution, and service providers (DMC 25.45). No cleanup actions would be required for manufacturing/warehouse usage on the portion of the MRP within the Site boundary, as this portion of the Site was previously remediated to industrial cleanup levels. DMC 25.45 lists child day care centers as examples of permissible service providers. Should a day care center or similar non-industrial use be constructed on the portion of the MRP within the Site boundary, additional cleanup will be required.

OS (Old Fort Lake): This area is permitted for nature preserves; historic and cultural preserves; passive recreation when in a park, greenbelt, open space, or tree preservation area; active recreation when in a park or part of a trail; and utilities, utility structures, and associated buildings. This area is not intended to be developed due to the presence of wetlands, steep slopes, or other sensitive areas and their buffers. A network of trails is intended to link open spaces with one another and other community facilities (DMC 25.55). Based on the limited number of samples collected in the OS area, additional soil sampling should occur prior to placement of a trail network or other public use areas. Trails and public use areas could be placed away from any identified contamination to limit potential remediation (or covered with the trail and/or parking lots).

Community Park North-Adjacent to Site Boundary

As stated in the section above, no investigative actions have occurred on the proposed community park area north-adjacent to the Site boundary. Although no industrial activities likely occurred in this area based on historical Site usage, the Tacoma smelter plume has likely impacted surficial soil with arsenic at concentrations ranging between 40 and 100 mg/kg, which exceeds the arsenic Site-specific background concentration (32 mg/kg). Since the City owns this land, a sampling plan could be prepared consistent with Washington Department of Ecology Smelter Plume Guidance and soil samples for arsenic and lead analysis could be collected. The western portion of the proposed community park slopes

significantly towards the Puget Sound, but there is an approximately three-acre area that is usable park land before steep slopes occur (see Figure C-5). Any future sampling should be focused on the usable park space.

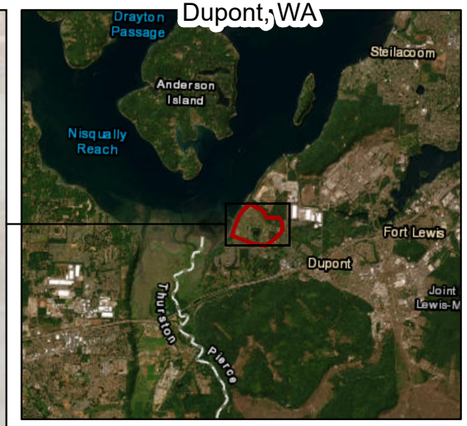
Enclosures

Figure C-1	In-Place Detected Arsenic Concentrations in Soil: 0-2 Feet
Figure C-2	In-Place Detected Arsenic Concentrations in Soil: 2-15 Feet
Figure C-3	DuPont Work Site Composite Sample Sampling Grid
Figure C-4	City of DuPont Current Zoning Uses Compared to Unrestricted Soil SL Exceedances
Figure C-5	Topographic Contours of Community Park Area

Figures

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Legend

Thiessen Polygon Concentration Bins

- As ≤ 7 mg/kg
- 7 mg/kg < As ≤ 20 mg/kg
- 20 mg/kg < As ≤ 32 mg/kg
- 32 mg/kg < As ≤ 320 mg/kg
- 320 mg/kg < As ≤ 3,200 mg/kg
- As > 32,000 mg/kg

Other Site Features

- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

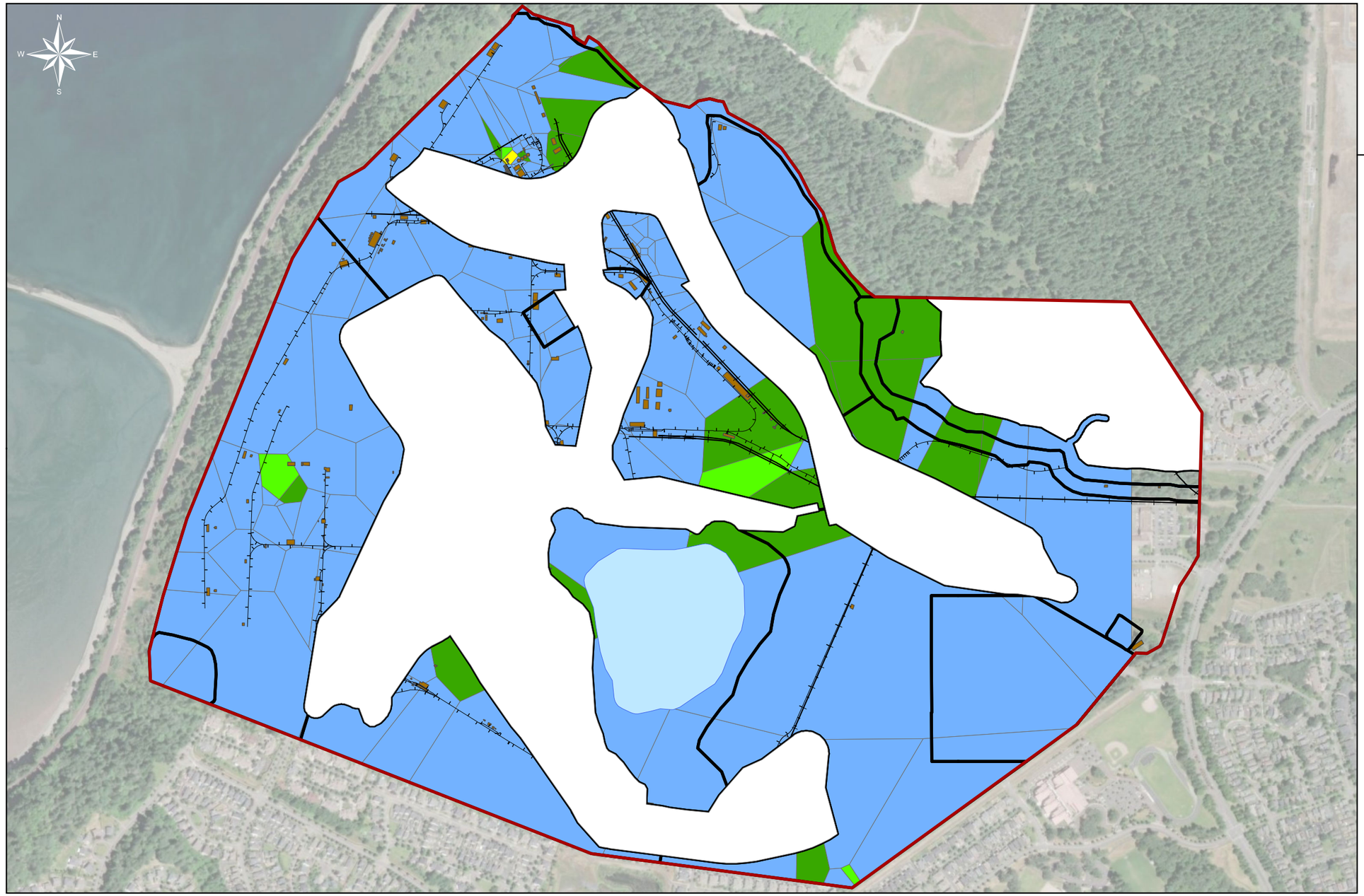
0 300 600 900 1,200 1,500 Feet

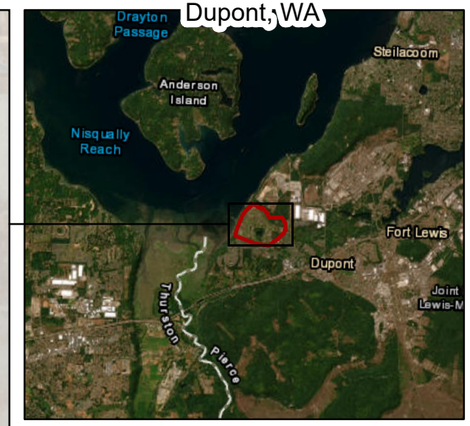
PIONEER TECHNOLOGIES CORPORATION

In-Place Detected Arsenic Concentrations in Soil: 0-2 Feet
Current Conditions Report
Former DuPont Works Site

Figure C-1

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Legend

Thiessen Polygon Concentration Bins

- As ≤ 7 mg/kg
- 7 mg/kg < As ≤ 20 mg/kg
- 20 mg/kg < As ≤ 32 mg/kg
- 32 mg/kg < As ≤ 320 mg/kg
- 320 mg/kg < As ≤ 3,200 mg/kg
- As > 32,000 mg/kg

Other Site Features

- Former Standard Gauge Railroad
- Former Narrow Gauge Railroad
- Sequalitchew Creek
- Historical Buildings
- Old Fort Lake
- Site Boundary

0 300 600 900 1,200 1,500 Feet

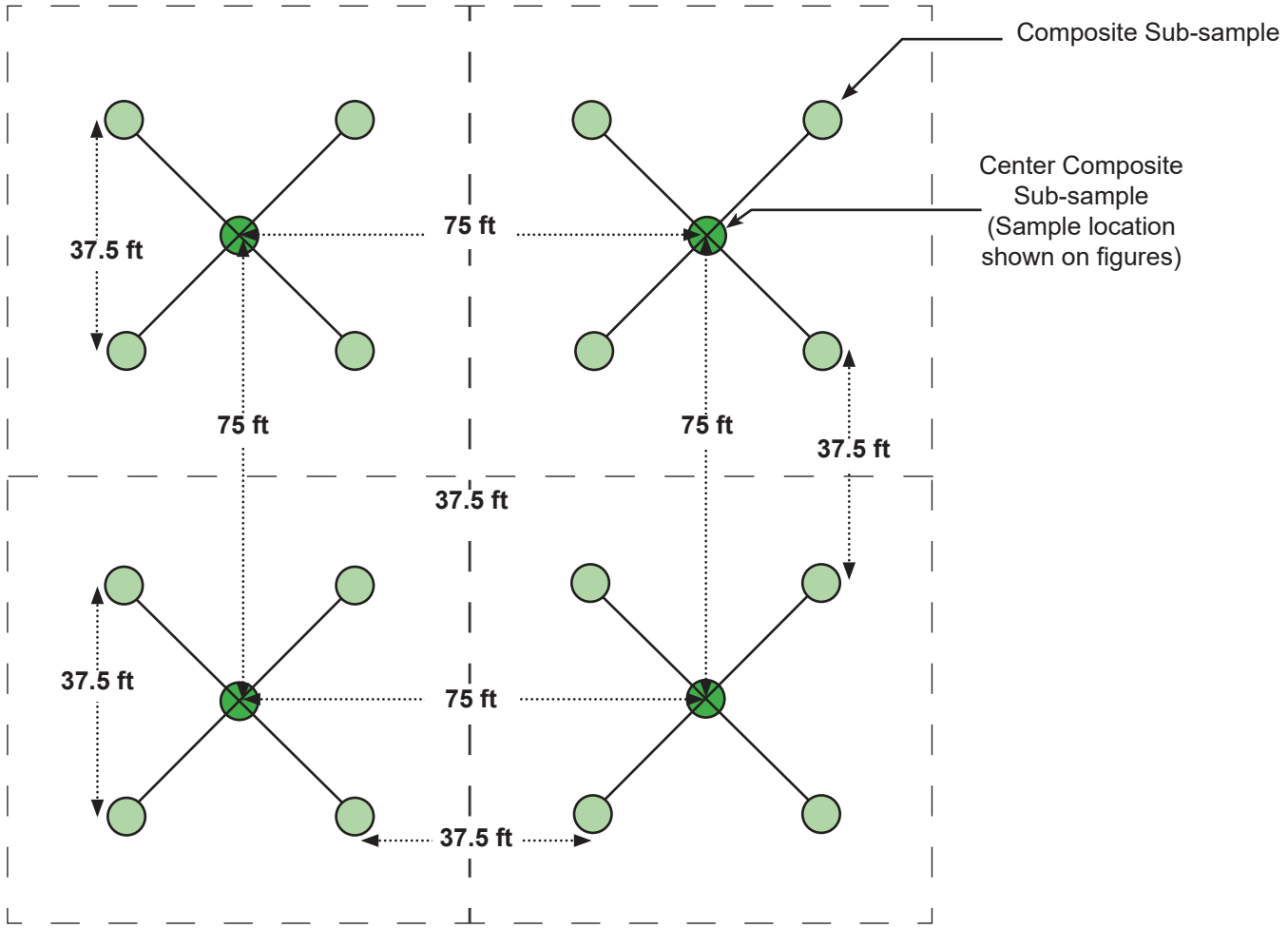
PIONEER TECHNOLOGIES CORPORATION

In-Place Detected Arsenic Concentrations in Soil: 2-15 Feet
Current Conditions Report
Former DuPont Works Site

Figure C-2

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DuPont Works Site Composite Sample Sampling Grid



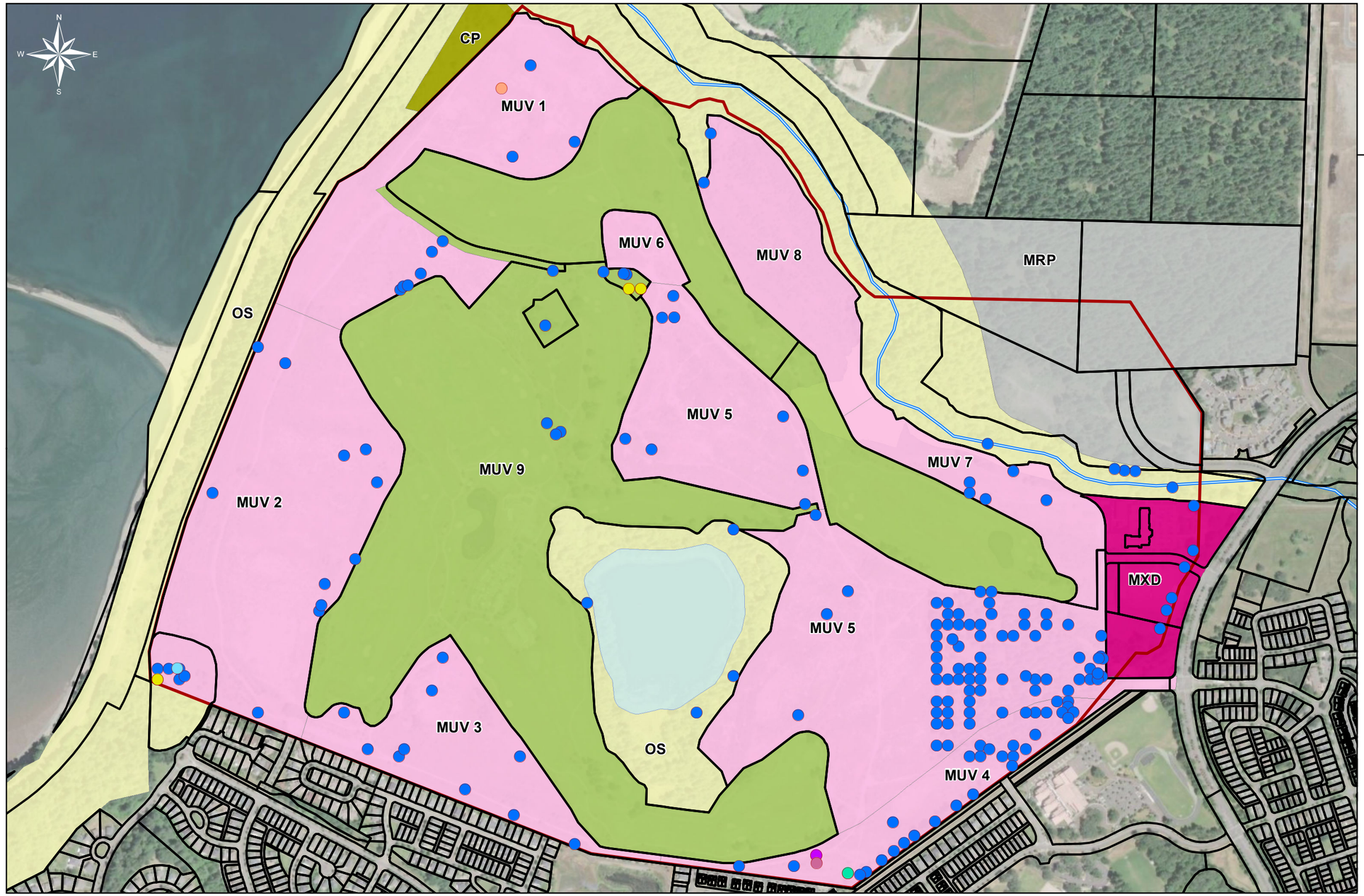
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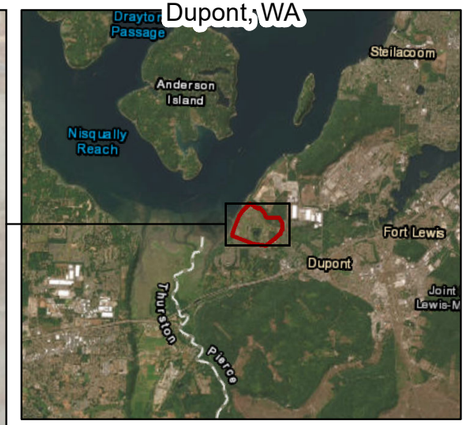
Notes:
-Compliance verification samples were collected on 75-foot centers after the contaminated soil had been removed. Five-point composite samples were collected from 0 to 6 inches below ground surface and the area represented by the sample was considered to be in compliance when the resulting concentrations were less than the cleanup level.
-The point of compliance for surficial MSUs (i.e, 0 to 1 foot BGS) and debris areas was 50 x 50 foot grid. One five-point composite confirmation sample (0 to 6 inches BGS) was collected in every 50 x 50 foot area.
-The point of compliance for MSUs at a depth greater than one foot BGS was a 15 x 15 foot grid and samples were collected from each sidewall and the bottom of the excavation. The area represented by the sample was considered to be in compliance when the resulting concentrations were less than the cleanup level.

Figure C-3

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Legend

- Parcel Boundaries

City of DuPont Zoning Designation

- MUV - Mixed Use Village 1-8
- MUV - Mixed Use Village 9
- CP - Community Park
- MXD - Mixed Use
- MRP - Manufacturing and Research
- OS - Open Space/Sensitive Areas

Exceedance Areas by Constituent

- Aldrin
- Arsenic
- Lead
- MMAN
- Motor Oil
- Oil and Grease
- Bunker C Fuel (via Method 418.1)

Other Site Features

- Sequalitchew Creek
- Old Fort Lake
- Site Boundary

Notes:
-Boundaries are approximate and are based on the City of DuPont's Zoning map, certified February 13th, 2019.

0 300 600 900 1,200 1,500
Feet

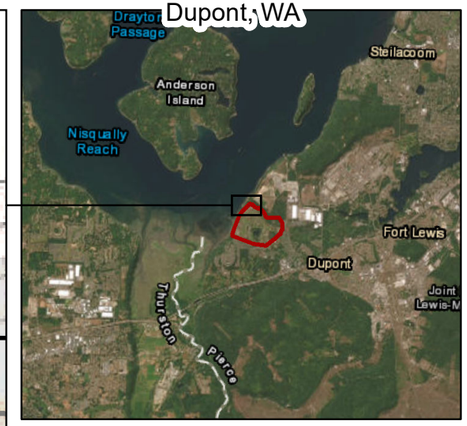
PIONEER TECHNOLOGIES CORPORATION

City of DuPont Current Zoning Uses Compared to Unrestricted Soil SL Exceedances
Current Conditions Report
Former DuPont Works Site

Figure C-4

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Legend

- Parcel Boundaries
- Site Boundary

City of DuPont Zoning Designation

- MUV - Mixed Use Village 1-8
- MUV - Mixed Use Village 9
- CP - Community Park
- MXD - Mixed Use
- MRP - Manufacturing and Research
- OS - Open Space/Sensitive Areas

Notes:
-Boundaries are approximate and are based on the City of DuPont's Zoning map, certified February 13th, 2019.
-The 2020 topographic map of the Nisqually Quadrangle was provided by the United States Geological Survey; Countour Interval = 20 feet,

0 100 200 300 400 500 Feet

PIONEER TECHNOLOGIES CORPORATION

Topographic Contours of Community Park Area
Current Conditions Report
Former DuPont Works Site

Figure C-5

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Draft
Noise Existing Conditions Report
Proposed Founder's Ridge Project
DuPont, Washington

January 27, 2023

Prepared for

City of DuPont, Washington
and
EA Engineering, Science, and Technology, Inc.

LANDAU ASSOCIATES

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Noise Existing Conditions Report
Proposed Founder's Ridge Project
DuPont, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

Document prepared by: _____ Amy Maule
Primary Author

Document reviewed by: _____ Kristen Wallace
Quality Reviewer

Date: January 27, 2023
Project No.: 0878011.010
File path: P:\878\011\R\Noise
Project Coordinator: Christopher C. Young

LANDAU ASSOCIATES

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FIGURE

Figure	Title
1	Project Area and Monitoring Locations

TABLES

Table	Title
1	Common Sources of Noise
2	City of DuPont Maximum Permissible Noise Levels
3	Short-Term Sound Level Measurements
4	Long-Term Sound Level Measurements

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1.0 INTRODUCTION

At the request of the City of DuPont, Washington (City), Landau Associates, Inc. (Landau) under contract with EA Engineering, Science, and Technology, Inc. prepared this report to support the Noise section of the Supplemental Environmental Impact Statement for the proposed Founder's Ridge Project in DuPont, Pierce County, Washington.

The proposed Founder's Ridge project (the Project) is located on an approximately 101-acre site and would include the construction of four buildings for light manufacturing use, grading, addition of stormwater management facilities, roadway improvements, landscaping, open space, and pedestrian amenities.

This report describes the existing conditions and current regulatory environment of the study area, which is defined as the 101-acre project site, adjacent and nearby noise-sensitive receiver locations, and existing residential land uses.

2.0 CHARACTERISTICS OF SOUND AND NOISE

For the purposes of this analysis, noise can be described as sound that is undesired, in terms of its loudness (amplitude) and frequency (pitch). Magnitudes of typical noise levels are presented below.

Table 1: Common Sources of Noise

Noise Source	Decibel Level	Notes
Jet takeoff at 50 feet	140	Physical pain and immediate injury
Chain saw, sirens at close range	120	Uncomfortably loud
Loud entertainment venue	105-110	
Motorcycle at 50 feet	95	Very loud
Noisy urban street	85	
Washing machine or dishwasher	70	Possible annoyance
Range of normal human speech	50-70	
Average office	50	Quiet
Refrigerator hum	40	
Whisper, ticking watch	20-30	Barely audible

Sources: HUD 2009; CDC 2019.

Since the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating relates noise to human hearing sensitivity. This is called the A-weighted decibel (dBA) scale. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dBA. Therefore, a 70-dBA sound level will sound twice as loud as a 60-dBA sound level. People generally cannot detect differences of 1 to 2 dBA between noise sources of a similar nature (e.g., an increase in traffic noise compared to existing traffic noise); however, under ideal listening conditions, differences of 2 or 3 dBA can be detected by some people. Most people under normal listening conditions would probably perceive a 5-dBA change in noise of a similar nature. However, if an intruding noise is of a different nature than background noise (e.g., backup alarms in a quiet neighborhood), many people can perceive the intruding noise even if it increases the overall dBA noise level by less than 1 dBA.

A measure used to represent the average sound energy occurring over a specified time period is the equivalent sound level (L_{eq}). L_{eq} is the steady-state sound level that would have the same acoustical energy as the time-varying sound that actually occurs during the monitoring period. The 1-hour A-weighted equivalent sound level (L_{eq} 1 h) is the energy average of A-weighted sound levels occurring during a 1-hour period.

When distance is the only factor considered, sound levels from isolated point sources of noise typically decrease by about 6 dBA for every doubling of distance from the noise source. When the noise source is a continuous line, sound levels decrease by about 3 dBA for every doubling of distance.

Attenuation of noise at a distance is also affected by the type of intervening ground, with hard/reflective surfaces (e.g., pavement, water) resulting in less attenuation at a distance and soft/absorbent surfaces (e.g., vegetation, fluffy snow), resulting in greater attenuation.

Noise levels at different distances can also be affected by several factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can affect the decreasing noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) can also affect the degree to which sound is attenuated over distance.

Echoes off topographical features or buildings can sometimes result in higher sound levels (lower sound attenuation rates) than normally expected. Temperature inversions and altitudinal changes in wind conditions can also refract and focus sound waves toward a location at considerable distance from the noise source. As a result, the existing noise environment can be highly variable depending on local conditions.

3.0 REGULATORY FRAMEWORK

The project site is within DuPont, in Pierce County, and is subject to the noise regulations established by the DuPont Municipal Code (DMC). DMC Section 9.09.040 specifies noise limits based on the limits set in the Washington Administrative Code (Chapter 173-60 WAC) and establishes limits on sounds crossing property boundaries based on the environmental designation for noise abatement (EDNA) of the noise source and receiving property. Section 9.09.040(b) of the DMC identifies Class A EDNAs as residential areas, Class B EDNAs as commercial areas, and Class C EDNAs as industrial areas. The maximum permissible noise levels are shown in Table 2.

Table 2: City of DuPont Maximum Permissible Noise Levels

EDNA of Noise Source	EDNA of Receiving Property (dBA)		
	Class A	**Class B**	**Class C**
Class A (Residential)	55	57	60
Class B (Commercial)	57	60	65
Class C (Industrial)	60	65	70

Between the hours of 10 p.m. and 7 a.m. (nighttime), the noise limitations in Table 2 are reduced by 10 dBA for the receiving property within Class A EDNAs.

At any hour of the day or night, the applicable noise limitations may be exceeded for any receiving property for certain periods of time:

- 5 dBA for no more than 15 minutes in any hour
- 10 dBA for no more than 5 minutes of any hour
- 15 dBA for no more than 1.5 minutes of any hour

These allowed sound level exceedances can be described in terms of the percentage of time a certain level is exceeded, using statistical noise descriptors (L_ns). For example, L_{25} represents a sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, $L_{8.33}$ and $L_{2.5}$ are the sound levels that are exceeded 8.33 and 2.5 percent of the time, or 5 and 1.5 minutes in an hour, respectively. At no time can the allowable sound level be exceeded by more than 15 dBA, represented by the L_{max}.

DMC Section 9.09.040(c) identifies a map that specifically designates the EDNAs for various properties within the city (Appendix A of Ordinance 208). DuPont Ordinance 208 and the associated map were adopted in 1978; they are no longer representative of current zoning and comprehensive land use plan designations. Furthermore, the 1978 map of EDNA designations does not adequately represent the basic uses identified in DMC Section 9.09.040(b) that define EDNAs. It is, therefore, unclear

whether the EDNA designations shown in the 1978 map or the EDNA identifications based on land uses in DMC Section 9.09.040(b) should apply.

For this noise analysis, land use zones (as identified in Dupont's Zoning Map) and current land use were used to determine the appropriate noise limits for the various receiving properties. This approach is consistent with the more modern language and identification of EDNA designations based on actual uses and represents a more accurate reflection of current and expected future conditions.

DMC Section 9.09.050 exempts the following sources from the above-noted noise limits:

- Temporary construction noise, except when received by Class A EDNA properties between the hours of 10 p.m. and 7 a.m. (nighttime)
- Sounds created by motor vehicles when regulated by the state noise limit (Chapter 173-62 WAC), adopted by reference in DMC Section 9.09.040
- Sounds created by motor vehicles, licensed or unlicensed, when operated off public highways, except when such sounds are received by Class A EDNAs.

3.1 Traffic Noise

The Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC) has been adopted by the Washington State Department of Transportation (WSDOT) to ensure equitable treatment of citizens seeking relief from highway traffic noise. The FHWA NAC are not applicable to this project; however, they are presented here as quantitative noise thresholds for evaluating the impacts of traffic noise on receivers within the study area.

The NAC establish absolute noise levels for various land-use categories to determine whether traffic noise impacts occur. The NAC for residential areas, schools, active sport areas, parks, and trails is 67 dBA at exterior use locations, reflected in WSDOT's peak-hour traffic noise level threshold of 66 dBA. Consistent with the NAC, WSDOT defines a traffic noise impact as either of the following:

- Peak-hour traffic noise level of 66 dBA (L_{eq}) or greater at the exterior outdoor use area of any existing or future dwelling
- Increase in peak-hour traffic noise of 10 dBA L_{eq} or greater (future project level minus existing level) at the exterior outdoor use area of any existing dwelling (considered a "substantial increase").

4.0 EXISTING NOISE ENVIRONMENT

The project site is located within the city limits of DuPont. Surrounding land uses, zoning, and existing noise sources in the study area are described below.

4.1 Land Use and Zoning

The project site is currently zoned Mixed Use Village (MUV) 4, 5, and 6. MUV zoning "is intended to provide a location for a spectrum of future services, recreation, employment, and living options arranged in a mixed use village" (DMC Section 25.41.010).

The southern portion of the project site is zoned MUV-4, a subdistrict intended to support smaller-scale employment and neighborhood-oriented commercial/restaurant uses. The rest of the project site is zoned MUV-5 or MUV-6, subdistricts that allow office, light manufacturing, and research and development. The project site is currently undeveloped and covered by trees and other vegetation.

A golf course occupies adjacent land to the north, northeast, and west, zoned MUV-9 (active recreation and supporting land uses). Old Fort Lake, zoned open space (OS) and surrounded by undeveloped and forested land, is immediately west of the central portion of the project site. The DuPont Police Department and other City offices are located east of the project site. A greenbelt surrounding Sequalitchew Creek, located north and northwest of the golf course, is zoned OS and has a hiking trail.

Land adjacent to the south and southeast of the project site is developed with single-family homes and Pioneer Middle School. A multi-use trail (Yehle Village/Palisades Village Connector Trail) runs along the southeastern edge of the project site, northwest of Pioneer Middle School and residences.

The project site is currently accessible from the east, from Center Drive at Palisades Boulevard, and future site access is proposed to be from the same location. An Amazon Fulfillment Center is currently located approximately 0.5 miles northeast of the project site. Truck traffic entering and leaving the fulfillment center is required to use Center Drive between Bronson Avenue and DuPont Steilacoom Road rather than proceeding west and south on Center Drive through residential areas. Truck traffic entering and exiting the project site is also expected to use the northern and eastern portion of Center Drive rather than proceeding south on Center Drive.

4.2 Baseline Sound Level Measurements

Four 1-hour short-term (ST) and two 24-hour long-term (LT) sound level measurements (SLMs) were collected on December 13 and December 14, 2022 at the following locations in or near the study area. The locations of each SLM are shown on Figure 1. Measured sound levels are shown in Tables 3 and 4.

4.2.1 Short-Term Sound Level Measurement Locations

- SLM-ST1 was located in the right-of-way nearest the property line of the residence northeast of the corner of Center Drive and Palisade Boulevard. Based on observed noise levels during the monitoring event, traffic noise was the predominant noise source at this location.
- SLM-ST2 was located along the eastern boundary of the project site, adjacent to the golf course and near the city of Dupont.
- SLM-ST3 was located along the southern boundary of the project site, adjacent to a residential area and a middle school.
- SLM-ST4 was the only SLM that was not located along the proposed project site boundary; it was located approximately 0.5 miles northeast, adjacent to the entrance of an Amazon Fulfillment Center. This location was selected to capture noise associated with large truck traffic entering and exiting the facility on Center Drive. Noise related to roofing work being done on an adjacent house was noted during the measurement at SLM-ST4 during an approximately 20-minute period. Average noise levels with and without roofing noise were calculated to be equal so the 20-minute period was not removed from the data.

4.2.2 Long-Term Sound Level Measurement Locations

- SLM-LT1 was located near the southern boundary of the project site, at a property line shared with residents and Pioneer Middle School, to represent the nearest receivers potentially affected by onsite noise.
- SLM-LT2 was located northwest of the intersection of Center Drive and Palisade Boulevard, near the southeast boundary of the project site, to represent the nearest receivers potentially affected by offsite (traffic) noise. Based on observed noise levels during setup and retrieval of the monitoring equipment, existing traffic noise was the predominant noise source at this location.

As shown in Table 3, the measured sound levels at SLM-ST1 and SLM-ST4 were higher than the noise limits defined in DMC Section 9.09.040 for residential receiving properties. Both of these SLMs were taken along Center Drive. As shown in Table 4, measured sound levels at SLM-LT2 were higher than the nighttime noise limit for residential receiving properties. Based on observed noise levels during the monitoring event at the SLM-ST locations and during setup and take-down of meters at the SLM-LT locations, traffic noise was the predominant noise source. As described in Section 3, traffic noise on public roadways (including public parking areas) is not subject to the noise limits defined in DMC Section 9.09.040. Traffic noise on private land (for example, access roadways and parking areas within a commercial or industrial facility) is also exempt from noise limits except when received by Class A EDNAs.

Table 3: Short-Term Sound Level Measurements

SLM ID	Description	Land Use/Zoning	Measured Noise Levels (dBA)				
			L_{eq}	L_{25}	$L_{8.33}$	$L_{2.5}$	L_{max}
SLM-ST1	NE corner of the intersection of Center Drive and Palisade Boulevard	Residential 5 (R-5, Class A EDNA)	66	66	72	74	76
SLM-ST2	Eastern boundary of golf course	MUV-5, Class B EDNA	49	50	51	51	52
SLM-ST3	Southern boundary of golf course	MUV-4, Class B EDNA	46	48	51	53	54
SLM-ST4	SE corner of the intersection of Center Drive and Bronson Avenue, adjacent to the Amazon Fulfillment Center	R-5, Class A EDNA	60	61	66	68	69
Applicable noise limits for Class A EDNAs				60 (50)	65 (55)	70 (60)	75 (65)
Applicable noise limits for Class B EDNAs				65	70	75	80

1. Noise limit for an industrial noise source on residential (EDNA Class A) or commercial (EDNA Class B) receiving properties. For EDNA Class A, value in parentheses represents the nighttime limit. Note that the primary noise source observed during measurements was traffic noise on Center Drive, which is exempt from the noise limits.

Table 4: Long-Term Sound Level Measurements

SLM ID	Description	Land Use/Zoning	Period	Measured Noise Levels (dBA)				
				L_{eq}	L_{25}	$L_{8.33}$	$L_{2.5}$	L_{max}
SLM-LT1	SE boundary of golf course	MUV 4 (Class B EDNA)	Daytime (7 a.m.to 10 p.m.)	48	47	51	56	74
			Nighttime (10 p.m. to 7 a.m.)	40	41	42	43	48
SLM-LT2	NW corner of the intersection of Center Drive and Palisade Boulevard	R-5 (Class A EDNA)	Daytime (7 a.m. to 10 p.m.)	58	58	64	65	76
			Nighttime (10 p.m. to 7 a.m.)	**52**	53	56	60	66
Applicable noise limits for Class A EDNAs					60 (50)	65 (55)	70 (60)	75 (65)
Applicable noise limits for Class B EDNAs					65	70	75	80

1. Noise limit (L_{eq}) for an industrial noise source on residential (EDNA Class A) or commercial (EDNA Class B) receiving properties. For EDNA Class A, value in parentheses represents the nighttime limit. Note that the primary noise source observed during measurements was traffic noise on Center Drive, which is exempt from the noise limits.

5.0 CONCLUSIONS

The study area surrounding the proposed Founder's Ridge Project includes residences, a school, a golf course, open space, and trails. State and local noise regulations govern noise sources in the area, including noise associated with future uses of the project site. Based on baseline sound level measurements collected on and adjacent to the project site, the primary existing noise source in the study area is traffic along Center Drive.

6.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of the City of DuPont, EA Engineering, Science, and Technology, Inc, and applicable regulatory agencies for specific application to the proposed Founder's Ridge Project. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

7.0 REFERENCES

CDC. 2019. "Loud Noise Can Cause Hearing Loss." Centers for Disease Control and Prevention. https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html.

HUD. 2009. HUD Noise Guidebook. Chapter 4: Noise Attenuation. US Department of Housing and Urban Development. March. https://www.hudexchange.info/resource/313/hud-noise-guidebook/.

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Legend

- SLM Locations
- Project Area

DRAFT

0 1,000 2,000

Scale in Feet

Source: Esri World Imagery.

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

LANDAU ASSOCIATES

Founder's Ridge
Noise Existing Conditions
Pierce County, Washington

Project Area and Monitoring Locations

Figure 1

LANDAU ASSOCIATES

DRAFT
Noise Analytical Report

DuPont Old Fort Lake Subarea
Dupont, Pierce County, Washington

August 30, 2024

Prepared for

The City of DuPont
DuPont, Washington

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Draft
Noise Analytical Report
DuPont Old Fort Lake Subarea
DuPont, Pierce County, Washington

This document was prepared by, or under the direct supervision of, the technical professionals noted below.

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FIGURES

Figure	Title
1	Project Area and Monitoring Locations
2	Modeled Roadways and Nearest Sensitive Receivers

LIST OF ABBREVIATIONS AND ACRONYMS

City ..... DuPont, Washington
dBA ..... A-weighted decibel
DE Sherrard ..... DE Sherrard & Associates, LLC
DMC ..... DuPont Municipal Code
EDNA ..... environmental designation for noise abatement
F&P ..... Fehr & Peers
FHWA ..... Federal Highway Administration
Landau ..... Landau Associates, Inc.
LT ..... long-term
MUV ..... Mixed-use Village
NAC ..... Noise Abatement Criteria
NEPA ..... National Environmental Policy Act
OFL ..... Old Fort Lake
OS ..... zoned open space
project ..... proposed Founder's Ridge project
SLM ..... sound level measurement
ST ..... short-term
WAC ..... Washington Administrative Code
WSDOT ..... Washington State Department of Transportation

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1.0 INTRODUCTION

At the request of the City of DuPont, Washington (City), Landau Associates, Inc. (Landau) under contract with AHBL, Inc. prepared this report to support the Noise section of the Supplemental Environmental Impact Statement for the proposed DuPont Old Fort Lake (OFL) Subarea Project in DuPont, Pierce County, Washington.

The proposed Founder's Ridge project (the project) is located on a 618-acre site and would include the development of the following:

- Single family housing: approximately 70 acres
- Middle-housing: approximately 94 acres of attached housing types from two to six units
- Multi-family housing: approximately 70 acres of housing greater than 6 units
- Entertainment district: approximately 20-acres of entertainment district including hotels, commercial recreation, retail, restaurants, community and cultural centers
- General commercial: approximately 8 acres of higher intensity commercial uses such as retail spaces, restaurants, commercial recreation
- Neighborhood business: approximately 7 acres of smaller scale commercial uses such as retail and restaurants, personal service uses, light manufacturing buildings no greater than 50,000 SF, professional and medical offices and banks and credit unions
- Civic: approximately 10 acres of public and quasi-public uses such as schools, public parks, convention centers, community and cultural centers, churches and public utilities
- Parks, recreation and open space: approximately 329 acres including the existing golf course, existing open spaces and trails
- The proposal would also include grading, addition of stormwater management facilities, roadway improvements, landscaping, open space, and pedestrian amenities.

Approximately 46 acres of Nisqually Tribe Land are not included in the subarea plan or city regulations. Impacts of potential future development of this land are not included in this analysis.

This report describes the existing conditions, current regulatory environment of the study area (which is defined as the 101-acre project site, adjacent and nearby noise-sensitive receiver locations, and existing residential land uses), and potential noise impacts of the project to receivers within the study area.

2.0 CHARACTERISTICS OF SOUND AND NOISE

For the purposes of this analysis, noise can be described as sound that is undesired, in terms of its loudness (amplitude) and frequency (pitch). Magnitudes of typical noise levels are presented below.

Table 1: Common Sources of Noise

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Jet takeoff at 50 feet	140	Physical pain and immediate injury
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Sources: HUD 2009 and CDC 2019

Since the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating relates noise to human hearing sensitivity. This is called the A-weighted decibel (dBA) scale. This scale accounts for the human perception of a doubling of loudness as an increase of 10 dBA. Therefore, a 70-dBA sound level will sound twice as loud as a 60-dBA sound level. People generally cannot detect differences of 1 to 2 dBA between noise sources of a similar nature (e.g., an increase in traffic noise compared to existing traffic noise); however, under ideal listening conditions, differences of 2 or 3 dBA can be detected by some people. Most people under normal listening conditions would probably perceive a 5-dBA change in noise of a similar nature. However, if an intruding noise is of a different nature than background noise (e.g., backup alarms in a quiet neighborhood), many people can perceive the intruding noise even if it increases the overall dBA noise level by less than 1 dBA.

A measure used to represent the average sound energy occurring over a specified time period is the equivalent sound level (L_{eq}). L_{eq} is the steady-state sound level that would have the same acoustical energy as the time-varying sound that actually occurs during the monitoring period. The 1-hour A-weighted equivalent sound level (L_{eq} 1 h) is the energy average of A-weighted sound levels occurring during a 1-hour period.

When distance is the only factor considered, sound levels from isolated point sources of noise typically decrease by about 6 dBA for every doubling of distance from the noise source. When the noise source is a continuous line, sound levels decrease by about 3 dBA for every doubling of distance. Attenuation of

noise at a distance is also affected by the type of intervening ground, with hard/reflective surfaces (e.g., pavement, water) resulting in less attenuation at a distance and soft/absorbent surfaces (e.g., vegetation, fluffy snow), resulting in greater attenuation.

Noise levels at different distances can also be affected by several factors other than the distance from the noise source. Topographic features and structural barriers that absorb, reflect, or scatter sound waves can affect the decreasing noise levels. Atmospheric conditions (wind speed and direction, humidity levels, and temperatures) can also affect the degree to which sound is attenuated over distance.

Echoes off topographical features or buildings can sometimes result in higher sound levels (lower sound attenuation rates) than normally expected. Temperature inversions and altitudinal changes in wind conditions can also refract and focus sound waves toward a location at considerable distance from the noise source. As a result, the existing noise environment can be highly variable depending on local conditions.

3.0 REGULATORY FRAMEWORK

The project site is within DuPont, in Pierce County, and is subject to the noise regulations established by the DuPont Municipal Code (DMC). DMC Section 9.09.040 specifies noise limits based on the limits set in the Washington Administrative Code (Chapter 173-60 WAC) and establishes limits on sounds crossing property boundaries based on the environmental designation for noise abatement (EDNA) of the noise source and receiving property. Section 9.09.040(b) of the DMC identifies Class A EDNAs as residential areas, Class B EDNAs as commercial areas, and Class C EDNAs as industrial areas. The maximum permissible noise levels are shown in Table 2.

Table 2: City of DuPont Maximum Permissible Noise Levels

EDNA of Noise Source	EDNA of Receiving Property (dBA)		
	Class A	Class B	Class C
Class A (Residential)	55	57	60
Class B (Commercial)	57	60	65
Class C (Industrial)	60	65	70

Between the hours of 10 p.m. and 7 a.m. (nighttime), the noise limitations in Table 2 are reduced by 10 dBA for the receiving property within Class A EDNAs.

At any hour of the day or night, the applicable noise limitations may be exceeded for any receiving property for certain periods of time:

- 5 dBA for no more than 15 minutes in any hour
- 10 dBA for no more than 5 minutes of any hour
- 15 dBA for no more than 1.5 minutes of any hour

These allowed sound level exceedances can be described in terms of the percentage of time a certain level is exceeded, using statistical noise descriptors (L_ns). For example, L_{25} represents a sound level that is exceeded 25 percent of the time, or 15 minutes in an hour. Similarly, $L_{8.33}$ and $L_{2.5}$ are the sound levels that are exceeded 8.33 and 2.5 percent of the time, or 5 and 1.5 minutes in an hour, respectively. At no time can the allowable sound level be exceeded by more than 15 dBA, represented by the L_{max}.

DMC Section 9.09.040(c) identifies a map that specifically designates the EDNAs for various properties within the city (Appendix A of Ordinance 208). DuPont Ordinance 208 and the associated map were adopted in 1978; they are no longer representative of current zoning and comprehensive land use plan designations. Furthermore, the 1978 map of EDNA designations does not adequately represent the basic uses identified in DMC Section 9.09.040(b) that define EDNAs. It is, therefore, unclear whether the EDNA designations shown in the 1978 map or the EDNA identifications based on land uses in DMC Section 9.09.040(b) should apply.

For this noise analysis, land use zones (as identified in Dupont's Zoning Map) and current land use were used to determine the appropriate noise limits for the various receiving properties. This approach is consistent with the more modern language and identification of EDNA designations based on actual uses and represents a more accurate reflection of current and expected future conditions.

DMC Section 9.09.050 exempts the following sources from the above-noted noise limits:

- Temporary construction noise, except when received by Class A EDNA properties between the hours of 10 p.m. and 7 a.m. (nighttime)
- Sounds created by motor vehicles when regulated by the state noise limit (Chapter 173-62 WAC), adopted by reference in DMC Section 9.09.040
- Sounds created by motor vehicles, licensed or unlicensed, when operated off public highways, except when such sounds are received by Class A EDNAs.

Compression brakes are not allowed to be used within the corporate limits of the City of DuPont (DMC 9.09.042).

3.1 Traffic Noise

Although DuPont has no noise limits applicable to general traffic noise on public roadways, the Federal Highway Administration (FHWA) Noise Abatement Criteria (NAC) and Washington State Department of Transportation (WSDOT)'s implementation of these criteria provide a means to consider traffic noise. The FHWA NAC are not applicable to this project; however, they are presented here as quantitative noise thresholds for evaluating the impacts of traffic noise on receivers within the study area.

The NAC identify noise levels for various land-use categories to determine whether traffic noise impacts occur. The NAC for residential areas, schools, active sport areas, parks, and trails is a level "approaching or exceeding" 67 dBA at exterior use locations, and WSDOT defines a peak-hour traffic noise level threshold of 66 dBA. Consistent with the NAC, WSDOT defines a traffic noise impact as either of the following:

- Peak-hour traffic noise level of 66 dBA (L_{eq}) or greater at the exterior outdoor use area of any existing or future dwelling
- Increase in peak-hour traffic noise of 10 dBA L_{eq} or greater (future project level minus existing level) at the exterior outdoor use area of any existing dwelling (considered a "substantial increase").

4.0 EXISTING NOISE ENVIRONMENT

The project site is located within the city limits of DuPont. Surrounding land uses, zoning, and existing noise sources in the study area are described below.

4.1 Land Use and Zoning

The project site is currently zoned Mixed-use Village (MUV) 4, 5, and 6. MUV zoning "is intended to provide a location for a spectrum of future services, recreation, employment, and living options arranged in a mixed use village" (DMC Section 25.41.010).

The southern portion of the project site is zoned MUV-4, a subdistrict intended to support smaller-scale employment and neighborhood-oriented commercial/restaurant uses. The rest of the project site is zoned MUV-5 or MUV-6, subdistricts that allow office, light manufacturing, and research and development. The project site is currently undeveloped and covered by trees and other vegetation.

A golf course occupies adjacent land to the north, northeast, and west, zoned MUV-9 (active recreation and supporting land uses). OFL, zoned open space (OS) and surrounded by undeveloped and forested land, is immediately west of the central portion of the project site. The DuPont Police Department and other City offices are located east of the project site. A greenbelt surrounding Sequalitchew Creek, located north and northwest of the golf course, is zoned OS and has a hiking trail.

Land adjacent to the south and southeast of the project site is developed with single-family homes and Pioneer Middle School. A multi-use trail (Yehle Village/Palisade Village Connector Trail) runs along the southeastern edge of the project site, northwest of Pioneer Middle School and residences.

The project site is currently accessible from the east and from Center Drive at Palisade Boulevard, and future site access is proposed to be from the same location. An Amazon Fulfillment Center is currently located approximately 0.5 mile northeast of the project site. Truck traffic entering and leaving the fulfillment center is required to use Center Drive between Bronson Avenue and DuPont Steilacoom Road rather than proceeding west and south on Center Drive through residential areas. Truck traffic entering and exiting the project site is also expected to use the northern and eastern portion of Center Drive rather than proceeding south on Center Drive.

4.2 Baseline Sound Level Measurements

Four 1-hour short-term (ST) and two 24-hour long-term (LT) sound level measurements (SLMs) were collected on December 13 and December 14, 2022, at the following locations in or near the study area. The location of each SLM is shown on Figure 1. Measured sound levels are shown in Tables 3 and 4 below.

4.2.1 Short-term Sound Level Measurement Locations

- SLM-ST1 was located in the right-of-way nearest the property line of the residence northeast of the corner of Center Drive and Palisade Boulevard. Based on observed noise levels during the monitoring event, traffic noise was the predominant noise source at this location.

- SLM-ST2 was located along the eastern boundary of the project site, adjacent to the golf course and near the City offices.
- SLM-ST3 was located along the southern boundary of the project site, adjacent to a residential area and Pioneer Middle School.
- SLM-ST4 was the only SLM that was not located along the proposed project site boundary; it was located approximately 0.5 mile northeast, adjacent to the entrance of an Amazon Fulfillment Center. This location was selected to capture noise associated with large truck traffic entering and exiting the facility on Center Drive. Noise related to roofing work being done on an adjacent house was noted during the measurement at SLM-ST4 during an approximately 20-minute period. Average noise levels with and without roofing noise were calculated to be equal so the 20-minute period was not removed from the data.

4.2.2 Long-term Sound Level Measurement Locations

- SLM-LT1 was located near the southern boundary of the project site, at a property line shared with residents and Pioneer Middle School, to represent the nearest receivers potentially affected by onsite noise.
- SLM-LT2 was located northwest of the intersection of Center Drive and Palisade Boulevard, near the southeast boundary of the project site, to represent the nearest receivers potentially affected by offsite (traffic) noise. Based on observed noise levels during setup and retrieval of the monitoring equipment, existing traffic noise was the predominant noise source at this location.

As shown in Table 3, the measured sound levels at SLM-ST1 and SLM-ST4 were higher than the noise limits defined in DMC Section 9.09.040 for residential receiving properties. Both of these SLMs were taken along Center Drive. As shown in Table 4, measured sound levels at SLM-LT2 were higher than the nighttime noise limit for residential receiving properties. Based on observed noise levels during the monitoring event at the SLM-ST locations and during setup and take-down of meters at the SLM-LT locations, traffic noise was the predominant noise source. As described in Section 3, traffic noise on public roadways (including public parking areas) is not subject to the noise limits defined in DMC Section 9.09.040. Traffic noise on private land (for example, access roadways and parking areas within a commercial or industrial facility) is also exempt from noise limits except when received by Class A EDNAs.

Table 3: Short-term Sound Level Measurements

SLM ID	Description (approximate start time)	Land Use/Zoning	Measured Noise Levels (dBA)				
			L_{eq}	L_{25}	$L_{8.33}$	$L_{2.5}$	L_{max}
SLM-ST1	NE corner of the intersection of Center Drive and Palisade Boulevard (11 a.m.)	Residential 5 (R-5, Class A EDNA)	66	66	72	74	76
SLM-ST2	Eastern boundary of golf course (10 a.m.)	MUV-5, Class B EDNA	49	50	51	51	52
SLM-ST3	Southern boundary of golf course (1:20 p.m.)	MUV-4, Class B EDNA	46	48	51	53	54
SLM-ST4	SE corner of the intersection of Center Drive and Bronson Avenue, adjacent to the Amazon Fulfillment Center (11:30 a.m.)	R-5, Class A EDNA	60	61	66	68	69
Applicable noise limits for Class A EDNAs				60 (50)	65 (55)	70 (60)	75 (65)
Applicable noise limits for Class B EDNAs				65	70	75	80

1. Noise limit for an industrial noise source on residential (EDNA Class A) or commercial (EDNA Class B) receiving properties. For EDNA Class A, value in parentheses represents the nighttime limit. Note that the primary noise source observed during measurements was traffic noise on Center Drive, which is exempt from noise limits.

Table 4: Long-term Sound Level Measurements

SLM ID	Description	Land Use/Zoning	Period	Measured Noise Levels (dBA)				
				L_{eq}	L_{25}	$L_{8.33}$	$L_{2.5}$	L_{max}
SLM-LT1	SE boundary of golf course	MUV 4 (Class B EDNA)	Daytime (7 a.m.to 10 p.m.)	48	47	51	56	74
			Nighttime (10 p.m. to 7 a.m.)	40	41	42	43	48
SLM-LT2	NW corner of the intersection of Center Drive and Palisade Boulevard	R-5 (Class A EDNA)	Daytime (7 a.m. to 10 p.m.)	58	58	64	65	76
			Nighttime (10 p.m. to 7 a.m.)	**52**	53	56	60	66
Applicable noise limits for Class A EDNAs					60 (50)	65 (55)	70 (60)	75 (65)
Applicable noise limits for Class B EDNAs					65	70	75	80

1. Noise limit (L_{eq}) for an industrial noise source on residential (EDNA Class A) or commercial (EDNA Class B) receiving properties. For EDNA Class A, value in parentheses represents the nighttime limit. Note that the primary noise source observed during measurements was traffic noise on Center Drive, which is exempt from noise limits.

Tables 3 and 4 show that measured noise levels at the short-term location SLM-ST1 were approximately 8 to 9 dBA higher than measured noise levels at long-term measurement location SLM-LT2, with the exception of the L_{max}. The difference in noise levels is expected based on the distance from the roadway (SLM-LT2 was more than 80 feet from the nearest travel lane while SLM-ST1 was less than 30 feet from the nearest travel lane). Because the L_{max} is the highest sound level measured during any single event, brief but loud noise events have a significant impact on measured levels. Hourly data indicates that three exceptionally loud noise events occurred at SLM-LT2 outside of the SLM-ST1 measurement period. These events could have been emergency vehicle sirens, honking horns, unmuffled vehicles, or loud noises unrelated to traffic. The majority of the daytime L_{max} measurements recorded at both locations were consistent with the other metrics.

5.0 PROPOSED PROJECT

The proposed project would allow for redevelopment of the OFL Subarea with residential, commercial, light industrial, and civic uses and OS as detailed in Section 1. The following sections describe the potential future noise associated with construction and operation of the project to the existing noise sensitive receivers located to the south and east of the project area.

5.1 Construction Noise

Construction noise associated with clearing and grading, building construction, and public and private access roadways will be intermittent and limited in duration. All construction will comply with the City's noise regulations. As described in Section 3.0, sounds originating from temporary construction sites as a result of construction activities are required to comply with DMC 9.09.040 during nighttime hours (10 p.m. to 7 a.m.) at Class A EDNAs. Any construction work conducted outside of daytime hours that results in noise levels above the maximum permissible noise levels described above will require a variance issued by the City Council.

In addition to onsite construction noise, construction work on the site will temporarily increase traffic on surrounding roadways, including employee vehicles and truck traffic turning west into the project site from Center Drive at Palisade Boulevard. Noise associated with construction-related vehicles entering and exiting the site would be intermittent and limited in duration. Section 5.2 describes noise associated with heavy trucks stopping, starting, and turning from signalized intersections. Section 5.3 addresses noise associated with increased traffic along Center Drive.

5.2 Operational Noise

Long-term operational noise at the project will consist of onsite noise associated with residential, commercial, light-industrial, and recreational uses, as well as onsite and offsite vehicle traffic, as described in the following sections.

5.2.1 Onsite Noise

Onsite noise includes noise created within the project area, such as vehicles on public roads within the project, vehicles operating on private property within the project area, and other sources of noise created within the project area.

Sounds created by motor vehicles (resident and employee vehicles and semi-trucks associated with commercial and light-industrial deliveries and maintenance of public facilities) are exempt from the noise limits described in DMC Section 9.09.040 when operating on public roadways, which includes new public roadways added as part of the project. Section 5.2.2 describes traffic noise on existing roadways outside the project area but within the study area. Section 5.3 describes quantitative modeling of onsite and offsite traffic noise. Sounds created by motor vehicles operated off public roadways (e.g., private access roadways, parking areas, and loading areas) are subject to the noise limits described in DMC Section 9.09.040 when sounds are received by Class A EDNAs.

In addition to vehicular traffic noise, sounds associated with onsite uses are as follows (also subject to the noise limits described in DMC Section 9.09.040):

- Residential development: Noise sources associated with residential and outdoor uses include human voices and activity and maintenance work. The types and overall levels of noise would be similar to levels produced at existing residences to the south and east of the project area, would be controlled by the residential zoning noise limits applied to the site, would be consistent with the current zoning, and would result in less than significant noise impacts.
- Commercial, light-industrial, and civic development: Potential commercial and light-industrial uses may include smaller-scale businesses that serve the subarea and City residents, such as retail and restaurants, personal services, light manufacturing buildings no greater than 50,000 square feet, professional and medical offices, and banks and credit unions. Civic uses could include schools, public parks, convention centers, community and cultural centers, churches, and public utilities. Noise sources associated with such uses generally include a greater amount of vehicle traffic (employees, customers, and delivery truck traffic), discussed separately below, in addition to mechanical equipment (such as commercial boilers and heating or cooling units).
- Parks and open spaces: Public parks can produce noise associated with maintenance activities and human voices and activity. Noises associated with neighborhood parks would be similar to noise produced at the existing Home Course Golf Course, Pioneer Middle School's sports fields, and DuPont Powderworks Park, which are considered consistent with and appropriate for residential land uses, and any noise impacts would be less than significant.

5.2.2 Offsite Noise

Offsite noise would be produced by project-related vehicles operating on existing public roadways outside of the project area (arriving and leaving residences and non-residential uses within the project area). The following offsite traffic noise is considered in this study:

- Vehicle traffic traveling on Center Drive between the project area and DuPont Steilacoom Road or Interstate 5.
- Vehicles turning into the project area or leaving the project area at the intersection of Center Drive at Palisade Boulevard (a discussion of noise associated with truck traffic is included in Section 5.3.1).

5.3 Screening-level Traffic Noise Analysis

A screening-level traffic noise analysis was conducted to quantitatively assess the potential traffic noise impacts to existing residences and Pioneer Middle School caused by increased traffic from the project on the following road segments (shown on Figure 1):

- Center Drive at Palisade, representing existing residences to the south and east of Center Drive.
- OFL East-West Road West of Center Drive (primary entrance to the project area), representing Pioneer Middle School. Receivers were located near the sports field and at the nearest school building.
- Wren Road at Charles Street, representing existing residences and school buildings along Wren Road. A similar entrance to the project area is planned for Hoffman Hill Boulevard, in the

southwestern portion of the project area. Forecasted project traffic volumes at Hoffman Hill Boulevard are expected to be similar to those at Wren Road, so Wren Road was considered to be representative of Hoffman Hill Boulevard, as discussed below.

- OFL East-West Road, representing existing residences to the south of the project area. A representative receiver was located at the residence nearest the planned roadway.

A screening-level traffic noise analysis consists of modeling a "straight-line" roadway design, consistent with WSDOT's 2020 Noise Policy, "Screening Projects for Noise Impacts" (WSDOT 2020). Use of federal funds for roadway or intersection improvements would trigger the WSDOT requirement to model traffic noise impacts and evaluate traffic noise abatement, and to present the results of the noise abatement analysis in National Environmental Policy Act (NEPA) environmental documentation for any roadway projects. However, no federal funds are currently anticipated for roadway/intersection improvements for the proposed project.

Peak-hour traffic volumes along these streets in the project vicinity, projected for existing, construction and future project traffic, are listed in Table 5 below. Peak-hour traffic volume forecasts were provided by David Sherrard from DE Sherrard & Associates, LLC (DE Sherrard 2024) and Fehr & Peers (F&P 2024). Existing truck traffic on Center Drive was assumed to be 2.4 percent of existing vehicles, based on future construction and project truck percentages provided by F&P. All haul trucks were assumed to be heavy trucks. The distribution of all other heavy vs. medium trucks was based on "Vehicle Volume Distributions by Classification" (Washington State Transportation Center [TRAC] 1997). Center Drive was assumed to be an "urban principal arterial" and all other roadways were assumed to be "urban minor arterials." No existing truck traffic was assumed for Wren Road.

Traffic noise associated with construction is not commonly modeled because of the intermittent and temporary nature of construction; however, it has been included in this analysis due to the 10-year proposed build-out period. The modeled construction-related vehicle volumes below would not be consistent throughout the build-out period, but could be expected during periods of active grading, demolition, and construction of non-residential buildings.

Table 5: Peak-hour Automobile and Heavy Truck Traffic Volumes

Road Segment	Automobile Volume (Truck Volume)			
	Existing	Baseline (Future No-Build)	Construction	Project (Full Build-Out)
Center Drive North of Palisade	704 (18)	805 (20)	704 (41)	1835 (44)
Center Drive South of Palisade	704 (18)	805 (20)	704 (18)	2338 (29)
OFL East-West Road West of Center Drive	None	None	0 (23)	2477 (14)
Wren Road at Charles Street	15 (0)	18 (0)	15 (0)	797 (17)
OFL East-West Road West of OFL North-South Road (Wren Road)	None	None	0 (23)	689 (5)

Sources: DE Sherrard 2024 and F&P 2024

The FHWA Traffic Noise Model Version 3.2 (FHWA 2023) was used to predict existing and future noise levels during peak hours under the screening-level assumptions listed below. The model was configured as follows for the roads listed above:

- No field measurements were collected for this screening-level noise study. Baseline Sound Level Measurements (Section 4.2) have been provided for informational purposes only and do not correspond with specific modeled receiver locations.
- It was assumed that all receivers have a direct line of sight to impacted roadways; barrier analysis was not conducted.
- Traffic was assumed to travel at the posted speed of 35 miles per hour on Center Drive and at 25 miles per hour on all other roadways, in compliance with DMC 16.01.020.
- The ground surface type was conservatively defined as “hard soil.”
- The nearest sensitive receiver of each type (residence and/or school) to each roadway segment was selected as the representative receiver for that roadway.
- The roadway lane width of new project roadways was assumed to equal 12 feet and all traffic was conservatively assumed to be traveling on the lane nearest the receiver. For the existing roadway, Center Drive, all traffic was assumed to be traveling in the center of the multi-lane roadway.
- All roads were modeled as straight lines; the model was not configured to account for existing or proposed topography, roadway improvements, or configuration changes resulting from the project.
- All roads were conservatively modeled as extending a minimum of 1,500 feet beyond the receivers perpendicular to the roadway on either side of the project.
- Road segments 1, 2 and 3 (receivers R1, R2, R3) were modeled in a single model, to include noise contribution from both roadways at all receivers.

Table 6 below lists the modeled daytime L_{eq} at each representative receiver location for the existing, construction, baseline (no-build), and project (full build-out) scenarios. As discussed in Section 3.1, the FHWA NAC are not applicable to this project; however, they are useful as quantitative noise thresholds for evaluating the impacts of traffic noise on receivers within the study area.

Modeled project (full build-out) L_{eq} was compared to the higher of the existing measured ambient or modeled L_{eq}. Where the existing ambient is higher than modeled, other noise sources are assumed to be present in the area, such as other roadways, commercial, or industrial noises.

Table 6: Measured and Modeled L_{eq} at Sensitive Receivers

Modeled Receiver Location (representative SLM)(a)	Existing Ambient (dBA) (b)	Modeled L_{eq} (dBA)(c)				Project Increase over Existing (e)
		Existing	Baseline (Future No-Build)	Construction	Project (Full Build-Out)(d)	
R1 - Residence at Center Drive and Palisade (SLM-ST1)	66	60	60	62	64	-2
R2 - Sports Field Near OFL East-West Road West of Center Drive (SLM-LT2)	58	52	52	58	64	6
R3 - School Building Near OFL East-West Road, West of Center Drive (SLM-LT1)	48	47	48	50	54	6
R4 - Residence Near Wren Road at Charles Street (SLM-LT1)	48	43	44	43	62	**14**
R5 - School Building Near Wren Road at Charles Street (SLM-LT1)	48	39	39	39	58	**10**
R6 - Residence South of OFL East-West Road (SLM-ST3)	46	None	None	57	58	**12**

a. Nearest SLM location to each modeled receiver. SLM-ST are short-term measurements (15 minutes); SLM-LT are long-term measurements (48 hours)
b. Measured daytime noise level, including non-traffic background noise not included in modeled noise levels
c. Modeled noise levels represent worst-case PM hour traffic counts (daytime)
d. Bold values represent noise levels meeting or exceeding 66 dBA or a 10 dBA increase over existing
e. Project minus the higher of existing modeled or ambient

The modeled peak-hour traffic noise at full buildout at the nearest residences to Center Drive at Palisade (represented by R1) and the nearest corner of the Pioneer Middle School sports field (R2) are both 64 dBA, which would not be considered a noise impact under the FHWA NAC. Measured existing ambient noise levels were 66 dBA at SLM-ST1 and 58 dBA at SLM-LT2, so no significant increase over existing (defined as 10 dBA) would be expected at either location. The modeled peak-hour traffic noise at the nearest school building (R3) is 54 dBA, with an increase of 7 dBA over existing, which would not be considered a noise impact under the FHWA NAC.

The modeled increase in peak-hour traffic noise from existing to full buildout at the nearest residences to Wren Road at Charles Street (R4) and the school building at Wren Road (R5) are 14 dBA, which is greater than the FHWA NAC threshold of 10 dBA. This represents a substantial increase and the potential for a significant noise impact on the residences and the school building near Wren Road. A similar increase in traffic noise could be expected at the Hoffman Hill Boulevard entrance to the project area.

The modeled increase in peak-hour traffic noise from existing to full buildout at the nearest residences south of the future OFL East-West Road (R6) is 10 dBA, which equals the FHWA NAC threshold. This represents a substantial increase and the potential for a significant noise impact on the residences located south of the project area.

See Section 7.0 for further discussion of modeled noise impacts.

Modeled peak-hour traffic volumes occur during daytime hours, when higher noise levels are expected and generally less obtrusive. Traffic volumes during nighttime hours, when people are more sensitive to noise, would be lower than the traffic volumes modeled, resulting in lower noise levels.

5.3.1 Truck Traffic

Truck traffic will enter the project area at the intersection of Center Drive and Palisade Boulevard. Trucks will be required to access the project area from the northeast and will not be allowed to travel on Center Drive or Palisade Boulevard south of the project area; therefore, all truck traffic will be turning right into the site or left out of the site at this intersection.

A large logistics center is currently operating north of Center Drive, accessed through the intersection of Center Drive and Bronson Avenue. Short-term noise measurements taken at that intersection at approximately 11:30 a.m. on Tuesday, December 13, 2022, shown as SLM-ST4 in Table 3 and Figure 1, are an example of potential noise levels associated with trucks accelerating out of a left turn. The measured L_{eq} at that intersection was 60 dBA, at a distance of approximately 60 feet from the center of the roadway (compared to a measured L_{eq} of 66 dBA at SLM-ST1, also located approximately 60 feet from the center of Center Drive at Palisade Boulevard).

Landau conducted screening-level modeling of truck traffic at Center Drive east of Bronson Avenue, based on existing traffic data for the section of roadway between Civic Drive and Steilacoom Dupont Road Southwest (F&P 2024). Peak-hour truck traffic noise at SLM-ST4 was modeled at 62 dBA (70 trucks) or 64 dBA (70 trucks and 716 automobiles).

Though not directly comparable, measured and modeled noise levels near the Bronson Avenue intersection support the results shown in Table 6 for the intersection of Center Drive and Palisade Boulevard, indicating that predicted noise levels associated with project-related truck traffic is not expected to approach or exceed 66 dBA or 10 dBA over existing, resulting in no significant impacts at that location.

6.0 MITIGATION MEASURES

The following mitigation measures are proposed to address the potential noise from construction and operation of the project.

6.1 Construction and Grading

Construction noise could be reduced by using enclosures or walls to surround noisy stationary equipment, installing mufflers on engines, substituting quieter equipment or construction methods, minimizing time of operation, and locating equipment as far as practicable from sensitive receivers. To reduce construction noise at nearby receivers, the following mitigation measures could be incorporated into construction plans and contractor specifications:

- Locate stationary equipment away from receiving properties
- Erect portable noise barriers around loud stationary equipment located near sensitive receivers
- Turn off idling construction equipment
- Require contractors to rigorously maintain all equipment
- Train construction crews to avoid unnecessarily loud actions (e.g., dropping bundles of rebar onto the ground or dragging steel plates across pavement) near noise-sensitive areas.

Local regulations require limiting construction activities require construction noise to comply with applicable noise regulations when received by Class A EDNA properties between the hours of 10 p.m. and 7 a.m. (nighttime).

All construction vehicles will be required to access the project from the north, via Center Drive, turning right (west) at Palisade Boulevard to enter the project area and left (north) on Center Drive to exit.

6.2 Operation

Most noise sources related to operation would be relatively insignificant and typical and appropriate of residential and mixed-use communities.

Noise associated with vehicle traffic is positively correlated with vehicle speed. Roadway design and traffic-calming measures within the project site and on approaching roadways could reduce vehicle speed and associated noise. All heavy trucks will be required to access the project from the north, via Center Drive, turning right (west) on Palisade Boulevard to enter the project area and left (north) on Center Drive to exit.

Some non-residential uses associated with commercial or civic uses may introduce mechanical equipment that could potentially exceed local noise limits. Such uses may require a focused noise study to ensure that all activities and equipment on the site demonstrate compliance with the local noise limits, thereby minimizing the potential for significant noise impacts.

7.0 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Compared to pre-development noise levels, noise levels will likely increase in the study area from short-term clearing/grading, demolition and construction noise, as well as long-term vehicle traffic and human noise sources.

Non-vehicle operational noise associated with residential development and non-residential uses is expected to be minimal and no significant impacts are expected.

The increase in noise levels near the intersection of Center Drive and Palisade Boulevard is not expected to be significant due to the existing traffic noise levels at that location.

As described in section 5.3, the screening modeling performed for this investigation indicates the potential for substantial increases in traffic noise at residences along Wren Road, the school building at Wren Road, the residences along Hoffman Hill Boulevard, and the residences bordering the southern portion of OFL East-West Road. These increases in traffic noise represent potential adverse impacts. A detailed traffic noise assessment should be completed for the project once roadway design and project area access locations have been finalized. The detailed traffic noise assessment could consider whether noise barriers (walls) or changes to site access locations could be used to mitigate adverse impacts, or whether those impacts are unavoidable.

8.0 USE OF THIS REPORT

This Noise Analytical Report has been prepared for the exclusive use of the City of DuPont, AHBL, Inc., and applicable regulatory agencies for specific application to the proposed Founder's Ridge project. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.

9.0 REFERENCES

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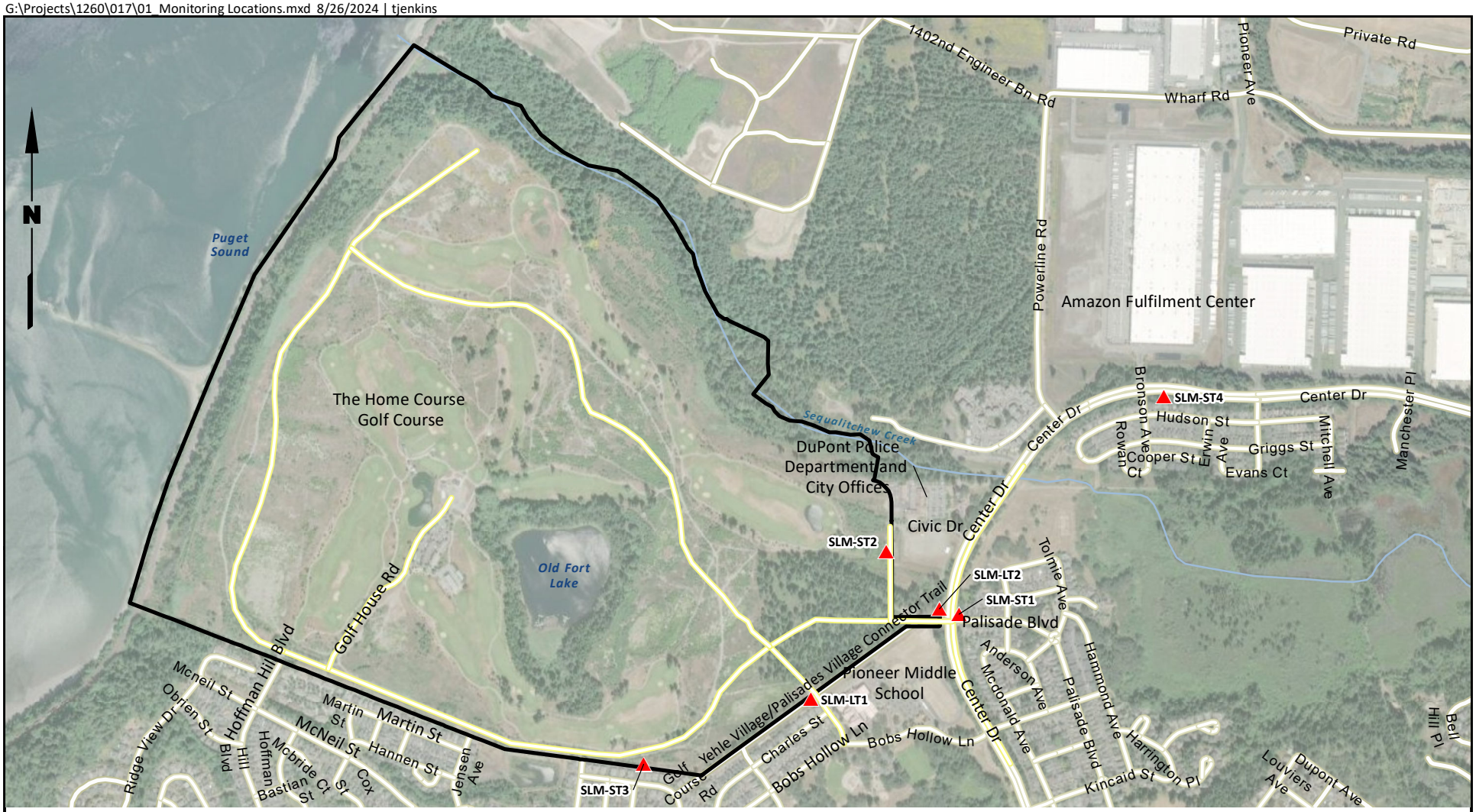
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Legend

- SLM Locations
- Project Area

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: Pierce County GIS, Esri World Imagery.

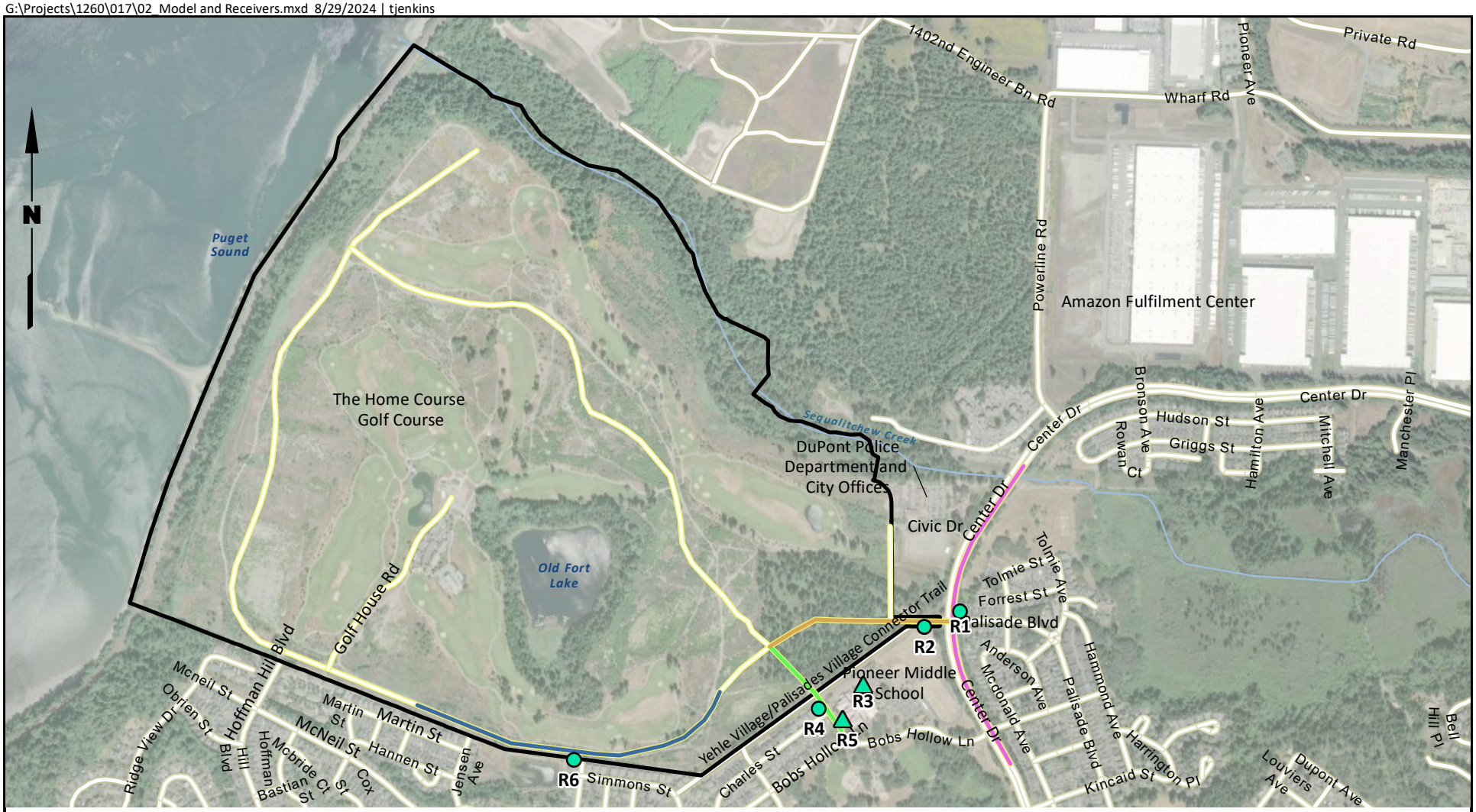
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Scale in Feet

LANDAU ASSOCIATES

Old Fort Lake Noise Existing Conditions Pierce County, Washington	**Project Area and Monitoring Locations**	Figure 1

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Legend

Modeled Roadways

- Center Drive
- OFL East-West Road
- OFL North-South Road (Wren Road)
- OFL East-West Road

- Residential Receiver
- School Receiver
- Project Area
- Project Roadways

0 1,300 2,600

Scale in Feet

Source: Pierce County GIS, Esri World Imagery.

Note

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LANDAU ASSOCIATES

Old Fort Lake
Noise Existing Conditions
Pierce County, Washington

Modeled Roadways and Nearest Sensitive Receivers

Figure 2

WETLANDS, PLANTS AND ANIMALS, AND FISHERIES IMPACT ASSESSMENT

Old Fort Lake Subarea Plan
Dupont, Washington

Draft EIS Report

August 21, 2024

RAEDEKE ASSOCIATES, INC.

Raedeke Associates, Inc.

Wetland & Aquatic Sciences
Wildlife Ecology
Landscape Architecture

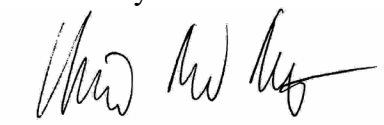
Report To:	David Sherrard DE Sherrard & Associates
Title:	Wetlands, Plants & Animals, and Fisheries Impact Assessment for Old Fort Lake Subarea Plan, Dupont, Washington Draft EIS
Project Number:	2022-088-002
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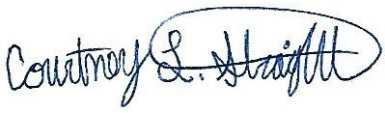
Submitted by:



Signature

Christopher W. Wright
Printed Name

August 21, 2024
Date



Signature

Courtney Straight
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1.0 INTRODUCTION

1.1 STATEMENT OF PURPOSE

This report documents the results of our investigation of the proposed Old Fort Lake Subarea Plan in the City of Dupont, Pierce County, Washington (Figures 1 and 2). The purpose of our investigation was to evaluate the impacts of the proposed Subarea Plan on wetlands, plants, and animals, including fisheries, as part of the Environmental Impact Statement (EIS) for the project.

This report is intended to provide a project-specific analysis of the EIS Alternatives. The analysis will focus on comparing the Old Fort Lake Subarea Plan (EIS Alternative 1) and the No Action Alternative (EIS Alternative 2), which includes the current zoning designations.

1.2 STUDY AREA

The Old Fort Lake subarea study area is a 618-acre property located in Dupont, Washington (Figure 1). The project site is identified as Pierce County Tax Parcel No. 0119224010, 0119262014, 0119271009, 0119272004, 0119272005, 0119272006, which places the project in a portion of Section 26, Township 19 North, Range 1 East, W.M. Parcel maps retrieved online from Pierce County (2023) Public GIS Map depict the property boundaries.

The Subarea boundaries include 618 acres extending from the city-owned parcel along Sequalitchew Creek Canyon on the north to the Hoffman Hills existing residential area to the south and from the Burlington Northern Railroad Right of Way on the bluff above Puget Sound on the west to approximately 500 feet west of Center Drive (the western boundary of two parcels fronting Center Drive) plus a 70-foot wide corridor extending to Center Drive along the alignment of Palisades Blvd.

A 41-acre parcel owned by the Nisqually Tribe and located between the Sequalitchew Creek open space area and the Home Course golf course fairways 5, 6, and 7 is not included in the land use designations in the subarea plan or the city regulations, and the potential impacts of future development is not assessed in this Environmental Impact Statement. Land use and development standards for this parcel are anticipated to be negotiated between the city and the tribe in the future.

Two additional parcels owned by the Nisqually Tribe are as follows:

- Native Cemetery located south of development area E-1. This one-acre cemetery should be presumed to undergo no changes.
- Midden site at the far southwest corner of the subarea. This 5-acre site should be presumed to undergo no changes.

The Old Fort Lake Subarea was historically used as munitions manufacture from 1910 to the mid-1970s, and extensive clean-up efforts have been conducted to remove contaminated soils. Chemical contaminants associated with former explosives manufacturing and fallout from a copper smelter north of the site included lead and arsenic as the primary contaminants, with lesser contaminants including dinitrotoluene (DNT), trinitrotoluene (TNT), mercury, and petroleum. Approximately 600,000 to 1,100,000 cubic yards of hazardous materials were remediated through placement within the golf course area and capped with clean soils. All land within the subarea is subject to deed restrictions on use and exposure of at-risk populations, particularly children, imposed pursuant to a Consent Decree under the Model Toxics Control Act between the state Department of Ecology and the Weyerhaeuser Company. It is possible, however, that the land use and other restrictions can be relaxed by Ecology upon approval of further remediation.

2.0 METHODS

2.1 BACKGROUND REVIEW

Prior to conducting our site investigations, we reviewed existing background maps and information for the project site from the U.S.D.A. Natural Resource Conservation Service (NRCS 2023) Web Soil Survey, the U.S. Fish and Wildlife (USFWS 2024b) National Wetland Inventory (NWI), and the Pierce County (2023) Public GIS Map. We also reviewed the Washington Department of Fish and Wildlife (WDFW 2024b) Priority Habitat and Species (PHS) and the Statewide Washington Integrated Fish Distribution (SWIFD; Northwest Indian Fisheries Commission 2023) databases to determine whether listed or other priority fish and wildlife or their habitats were present within the project site or its vicinity. We examined current and historical aerial photographs (Google Earth 2023) to assist in the definition of existing plant communities, drainage patterns, and land use.

In addition, we reviewed several background documents, including the Wetland and Fish and Wildlife Habitat Assessment Report (Soundview Consultants, 2021a), the Certified Arborist Report (Soundview Consultants, 2021b), the Pioneer Aggregates Plants and Animals Technical Report (Anchor QEA, 2022), the City of Dupont Oak Management Recommendations (Jones & Stokes, 1996), the City of Dupont 2015 Comprehensive Plan (2021), and the draft Old Fort Lake Subarea Master Development Plan (City of Dupont, 2017).

2.2 FIELD INVESTIGATIONS

We conducted site visits on December 8, 2022, and January 4, 19, and 26, 2023, to search for wetlands, streams, or fish and wildlife habitat that may be present on the project site or in the immediate vicinity (Raedeke Associates, Inc. 2023). In addition, we also collected sufficient information to describe the general habitat conditions of the site.

3.0 AFFECTED ENVIRONMENT

3.1 EXISTING HABITAT CONDITIONS

We visited the study area on December 8, 2022, and January 4, 19, and 26, 2023, to document the existing site conditions. Detailed descriptions of our findings can be found in the Existing Conditions Report (Raedeke Associates, Inc. 2023). The study area is characterized by several distinct habitats: areas of mixed coniferous forests in the east end of the project area, around Old Fort Lake, and associated with Sequalitchew Ravine; an active golf course; an early successional forest adjacent to the golf course in areas of recent soil hazard remediation; Old Fort Lake, a topographically confined wetland complex; forested shoreline bluffs on the western portion of the site, and a brackish wetland at the mouth of Sequalitchew Creek (Figure 2; Tables 1 and 2). We also identified several small slope and riverine wetlands associated with Sequalitchew Creek within the ravine located along the northern boundary of the study area.

3.1.1 Wetlands

Wetland 1 (Old Fort Lake) is a topographical depression in the central portion of the project site. Old Fort Lake consists of palustrine scrub-shrub (PSS) and palustrine emergent (PEM) vegetation classes, in addition to open deep-water habitat, according to the USFWS wetland classification system (Cowardin et al. 1992). Old Fort Lake is rated as a Category III wetland using the WDOE wetland rating form (Hruby 2014). Wetland 1 was rated as a Category III wetland with a 75-foot-wide buffer (Dupont 2024).

Wetland 2 (Sequalitchew Creek Riparian Wetlands) consists of palustrine forested (PFO), palustrine scrub-shrub (PSS), and palustrine emergent (PEM) vegetation classes according to the USFWS wetland classification system (Cowardin et al. 1992). Preliminary analysis using the WDOE wetland rating form indicates these wetlands meet the criteria of Category II wetlands; however, complete rating forms for each individual wetland were not prepared at this time. Category II wetlands receive a 100-foot-wide buffer (Dupont 2024).

Wetland 3 (Estuarine Wetland) is located at the mouth of Sequalitchew Ravine. The WDOE wetland rating form (Hruby, 2014) is not calibrated to rate estuarine wetlands based on functions, and instead determines the category based on special characteristics. The estuarine wetland at the mouth of Sequalitchew Creek is a Category II wetland per its special characteristics. Category II wetlands receive a 100-foot-wide buffer (Dupont 2024).

3.1.2 Aquatic and Fish Habitats

Sequalitchew Creek flows generally east to west in a steep ravine along the northern edge of the study area. The creek has documented use by coho salmon (*Oncorhynchus*

kisutch), coastal cutthroat trout (*Oncorhynchus clarkii*), and chum salmon (*O. keta*). All fish and wildlife habitat areas within the City of Dupont receive a 100-foot-wide buffer (Dupont 2024).

The Puget Sound Shoreline is located offsite to the west. The Old Fort Lake subarea is separated from the shoreline by a barbed-wire fence, a steep forested slope, and the BNSF railroad tracks. The shoreline near the project site is designated as Conservancy, where uses are limited within Zones 1, 2, and 3 of the 200-foot-wide shoreline setback.

3.1.3 Wildlife

The project area and the surrounding lands provide habitat for a variety of native animal species common to developed areas of the Puget Sound lowlands. Not all the species regularly found in lowland habitats of the Puget Sound area are expected to inhabit the project site and vicinity because of its size and surroundings of urban commercial development, but a variety of species are expected to occur at the project site. Some species expected to occur on-site possibly do so in low numbers or only during certain times of the year. We observed 45 wildlife species (or sign thereof) throughout our field investigation (Table 4).

WDFW Priority Habitats and Species

The WDFW (2024a) Priority Habitats and Species (PHS) database and the NWIFC (2024) Statewide Integrated Fish Distribution map show no known occurrences of endangered or threatened wildlife species on the project site or in the vicinity. However, the PHS Map identifies the township, including the study area, as habitat for little brown bat, big brown bat, and Yuma myotis (Raedeke Associates, Inc. 2023). Some snags around Old Fort Lake exhibited characteristics that would provide habitat opportunities, such as loose and sloughing bark for bat roosting. In addition, the lake may provide a foraging area due to insect use of the open water habitat.

The PHS identifies the onsite wetlands and a biodiversity area along Sequalitchew Creek as priority habitats. An estuarine and marine wetland is mapped within the nearshore areas of Puget Sound. Other priority habitats that are present but not mapped include the instream and riparian habitats along Sequalitchew Creek, and snags and logs within the forested areas.

The endangered, threatened, or candidate species that occur in Pierce County include Chinook salmon, steelhead trout, bull trout, North American wolverine, marbled murrelet, northern spotted owl, streaked horned lark, yellow-billed cuckoo, monarch butterfly, and Taylor's checkerspot (USFWS 2024a; NOAA Fisheries 2023) (Appendix A).

Chinook Salmon (Oncorhynchus tshawytscha) and Steelhead Trout (Oncorhynchus mykiss). The NOAA Fisheries endangered and threatened species list includes the Puget

Sound evolutionarily significant unit (ESU) of chinook salmon (hereafter "chinook") and the Puget Sound distinct population unit (DSU) of steelhead trout (hereafter "steelhead"). These anadromous salmonid fish species are not documented on the project site or within Sequalitchew Creek (WDFW 2024b; NWIFC 2023). However, both chinook and steelhead occur offsite in Puget Sound.

Bull Trout (Salvelinus confluentus). Bull trout were listed as a threatened species by the USFWS on November 1, 1999. Bull trout are native char, typically found in high, glacially fed watersheds or near cold perennial springs, although individual fish can occur downstream throughout larger river systems (Fraley and Shepard 1989; Rieman and McIntyre 1993; 1995; Buchanan and Gregory 1997). The preferred spawning habitat consists of low-gradient streams with loose, clean gravel (Fraley and Shepard 1989) and water temperatures of 5°C to 9°C in late summer to early fall (Goetz 1989). Bull trout generally live in freshwater their entire lives, although a small component of the Puget Sound population is anadromous.

The USFWS designated bull trout critical habitat on September 26, 2005. Under the ESA listing, the USFWS assumes that bull trout are present in suitable habitat in Pierce County waters unless proven otherwise. Bull trout are not documented in Sequalitchew Creek but occur offsite in estuarine and nearshore waters of Puget Sound. Therefore, it is our assessment that critical habitat for bull trout is not found within the project site.

North American Wolverine (Gulo gulo lateus). On January 2, 2024, the USFWS listed the North American wolverine as threatened (Federal Register 2023a). Although indicated as threatened and potentially occurring within the project area vicinity in Pierce County by the USFWS (2024a), the North American wolverine has not been regularly documented within Pierce County, particularly within the urbanized Puget Sound lowlands. However, established populations in Washington have been documented mainly in the North Cascades and northeastern Washington (Aubry et al. 2007, 2016), and kits have been observed at Mount Rainier National Park as recently as 2020 (WDFW 2024c). Consequently, we do not expect this species to occur regularly in the project vicinity.

Marbled Murrelet (Brachyramphus marmoratus) and Northern Spotted Owl (Strix occidentalis caurina). Marbled murrelets and northern spotted owls are known to occur in Pierce County throughout the year (Smith et al. 1997, WDFW 2024b). However, the lack of old, multi-layered forest on the site or in the vicinity and the urbanized, lowland setting make it highly unlikely that these species would occur in the project area. Data from the PHS database maintained by WDFW (2024b) provide no records of known breeding sites or occurrences of either species within at least several miles of the project site. The remaining stands of trees within the site or vicinity are generally too young and too fragmented by urban development to provide suitable breeding sites for these species or to provide suitable or accessible foraging habitat for spotted owls. We observed

neither species on the site during our field investigations. Based on all these factors, we do not expect either species to be present within or near the project site.

Streaked Horned Lark (Eremophila alpestris strigata). In October 2013, the U.S. Fish and Wildlife Service (Federal Register 2013d) listed the streaked horned lark as a threatened species under the ESA and designated critical habitat for the species. The streaked horned lark is a ground-nesting bird found in open, sparsely-vegetated areas on Puget Sound prairies, on sandy islands in the Columbia River, along the Washington coast, and in the Willamette Valley in Oregon. Streaked horned larks have declined throughout their range and have been extirpated from British Columbia. Streaked horned larks nest and winter in flat, open areas with sparse low-stature vegetation and substantial areas of bare ground and are most often found at airports and on agricultural lands.

The streaked horned lark typically occurs in native prairies and open, sparsely vegetated areas. In Washington, native prairies are the state's fastest-disappearing ecosystem type. Since the mid-1800s over 90 percent of Washington's Puget Prairie habitat has been lost through conversion to human uses such as development or agriculture, or to encroachment of forest or invasive species resulting primarily from fire suppression. Consequently, the USFWS (Federal Register 2013b,c) has designated critical habitat areas that include a mixture of private lands, local municipalities (airports), and non-profit conservation organization lands.

The streaked horned lark is mapped at Gray Army Airfield on Joint Base Lewis-McChord, approximately 3 miles to the east-southeast (WDFW 2024b). No individuals have been documented at or near the project site in any of our background research materials (WDFW 2024b). We did not observe any occurrence of streaked horned larks on or in the vicinity of the project site during our site investigations. Further, much of the habitat contained within the project site is not suitable for the streaked horned lark, due to the management history, presence of humans, lack of prairie habitat, and prevalence of invasive species, such as Scotch broom.

Yellow-billed Cuckoo (Coccyzus americanus). In October 2014, the U.S. Fish and Wildlife Service listed the western distinct population segment (DPS) of the yellow-billed cuckoo as a threatened species (Federal Register 2014c). In western North America, the yellow-billed cuckoo typically occupies forested streamside habitat, particularly where dominated by willows and cottonwoods that form open woodlands with dense, low vegetation; they are generally absent from large, urban areas and dense forests (Seattle Audubon Society 2023). Yellow-billed Cuckoos apparently have been extirpated as a breeding population in Washington, with only occasional sightings over the last 20 years (Seattle Audubon Society 2023; Smith et al. 1997). Because yellow-billed cuckoos are not currently known to occur regularly in Washington, none of the proposed critical habitat is located in Washington (Federal Register 2014a; 2014b;

2014c), and based on the relative lack of suitable riparian habitat on the project site or vicinity, we do not expect this species to occur anywhere within the project vicinity.

Northwestern Pond Turtle (Actinemys marmorata). The Northwestern Pond Turtle is a proposed threatened species and listing is under review (Federal Register 2015). Review of the species' status will continue annually until its status is no longer a candidate species. Disease and predation by bullfrogs and fish such as bass are the main factors in the current decline of western pond turtle populations (USFWS 2024c).

There are six populations of western pond turtles located in protected ponds within Washington State, including one on Joint Base Lewis-McChord (WDFW 1999). As a result, we would not expect northwestern pond turtles to be present within the Action Area.

Monarch Butterfly (Danaus plexippus). A candidate species, the Monarch butterfly, is not federally listed as threatened or endangered. Although the U.S. Fish and Wildlife Service indicated it currently meets the criteria for listing, the Monarch Butterfly was not listed to devote resources to higher-priority listing actions (USFWS 2020b). A review of the species' status will continue annually until its status is no longer a candidate species. Range-wide fragmentation and degradation of habitat are the main factors in the current decline of Monarch butterfly populations (USFWS 2020a).

The Monarch is widespread throughout the contiguous United States and are known to occur in Washington, although they are generally found east of the Cascade Crest. Habitat requirements include sufficient amounts of milkweed, as well as a variety of other nectar-producing plant abundance for nectar foraging, and generally herbaceous and sparsely vegetated plant communities, typically near wetlands and riparian areas (USFWS 2020a). Monarchs are also sensitive to herbicides, and as a result, intensively managed lands are generally not conducive to monarch habitation. Although milkweed is often associated with roadside habitat, such as that found on the project site, there are no reports of native milkweeds west of the Cascade Crest in Washington other than those that were likely planted in the Seattle Area (Xerces Society 2018). As a result, we would not expect monarch butterflies to regularly utilize the project area due to the likely nonexistence of their preferred forage, the lack of open, herbaceous habitat without the use of pesticides and herbicides.

Taylor's Checkerspot (Euphydryas editha taylori). The Taylor's Checkerspot was listed as an endangered species and critical habitat was designated in October 2013 (Federal Register 2013d). The Taylor's Checkerspot butterfly is endemic to the Pacific Northwest and is found in prairie and grassland habitats, coastal bluffs, and small forest openings (balds) (WDFW 2024c). Only eight populations currently exist in Washington, ranging from the San Juan Islands south to the

Cowlitz River. The butterflies lay eggs on harsh paintbrush, marsh speedwell, American brooklime, plantains, and thyme-leaved speedwell. They feed on their host plants as well as sea blush, blue-eyed Marys, and dwarf-owl clover.

The nearest documented occurrence of Taylor's Checkerspot is approximately 6 miles east of the project site, on Joint Base Lewis-McChord (WDFW 2024a), and the nearest designated critical habitat is approximately 14 miles south (USFWS 2022). The project site does not provide native prairie or grassland habitats, and no host plants were observed during our field investigation. Further, much of the habitat within the project site is unsuitable for the Taylor's checkerspot due to the management history, presence of humans, and prevalence of invasive species, such as Scotch broom.

Other Priority Species. As mentioned above, the township, including the project site, is mapped as habitat for little brown bat, big brown bat, and Yuma myotis. However, no bats were observed during our field investigation or previous field investigations (Soundview Consultants 2021a). In addition, WDFW confirmed that bats were not documented within the project site (Soundview Consultants 2021a).

Other WDFW (2024b) priority species mapped at nearby Joint Base Lewis-McChord include western gray squirrel and their nests (state threatened) (approximately 1.5 miles to the south) and two great blue heron rookeries (approximately 1.34 miles to the south).

The western gray squirrel (*Sciurus griseus*) was listed as threatened in Washington State in 1993 (Wiles et al. 2023). Their populations in the state are limited to three geographically isolated areas, including one in Pierce County, on Joint Base Lewis-McChord, where they occupy oak woodlands and conifer forests. Oak trees are known to provide acorns for food and natal den sites for the squirrels. The mixed conifer and oak forests in the vicinity of the project site lack the mature forest stands required to provide the adequate canopy cover required for secure nest sites. No western gray squirrels or their nests were observed during our field investigation. We do not expect western gray squirrels to occur in the vicinity of the project site due to the management history, presence of humans, lack of mature forest, small size of oak forests, and prevalence of invasive species, such as Scotch broom.

Great blue heron (*Ardea herodias*) breeding areas are listed as vulnerable aggregations on the WDFW priority habitats and species list (WDFW 2008). Vulnerable aggregations are defined as "species or groups of animals susceptible to significant population declines, within a specific area or statewide, by virtue of their inclination to aggregate." We did not observe any heron breeding areas during our site investigation. Further, we do not expect heron rookeries to be present within the project vicinity due to the management history and current human use.

Threatened and Endangered Plants

Threatened and endangered plants that occur in Pierce County include the marsh sandwort (USFWS 2024a) (Table 2; Appendix A). However, no threatened and endangered plants were observed or likely to be found on the site, given the management history and prevalence of invasive species such as Scotch broom. The Washington Natural Heritage Program (WNHP 2023) Rare Plant and Ecosystem Locations map identifies giant chain fern (*Woodwardia fimbriata*) offsite to the north of Sequalitchew Creek and white top aster (*Seriocarpus rigidus*), offsite to the east across Center Drive, near Edmond Marsh. Both plants are identified as sensitive species in Washington State.

4.0 IMPACTS

This discussion of probable impacts of the Proposed Action and alternatives is based on our field surveys, review of available literature, as well as information provided by project consultants. Two alternatives are under consideration:

- ***EIS Alternative 1 – Proposed Old Fort Lake Subarea Plan***: EIS Alternative 1 represents the Applicant's proposed Old Fort Lake Subarea Plan and includes the development of a mix of residential, commercial, neighborhood business, entertainment, civic, and recreational/parks/open spaces on the 618-acre project site (Figures 3 and 4). A 41-acre parcel, Native Cemetery, and Midden site owned by the Nisqually Tribe and the Home Course golf course fairways 5, 6, and 7 are not included in the subarea plan land use designations or assessed in the EIS. Negotiations between the tribe and the City are anticipated in the future to determine land use and development standards in those areas. Descriptions of the development areas are as follows:

  PROS - Parks, Recreation, & Open Space designated areas constitute 329 acres, or 53 percent of the subarea.

  - The largest component is the Home Course golf course which accounts for over one-half of the open space. No changes are proposed to the golf course. The ES analysis does not address the golf course which is presumed to undergo no changes.
  - The Old Fort Lake is a water body in a glacial kettle which is surrounded by city-owned open space and totals 47 acres, including water area. Conceptual plans for a trail system within the level area at the top of the bluff above the lake are included in the Subarea Plan. This EIS will address potential impacts qualitatively. A future detailed development plan will be the subject of future detailed environmental analysis.
  - The top of the Puget Sound Bluff includes a narrow open space corridor owned by the city above and east of the Burlington Northern Santa Fe Railroad right-of-way. This corridor ranges from about 35 to 500 feet in width and is about 15 acres in size. This parcel contains an existing informal path along the top of the bluff which is proposed to be expanded into a 12-foot multi-purpose trail. The Wilkes Observatory is located in the northwest corner of this parcel and is proposed to be developed into a historic interpretive site with limited parking and trails. This EIS will address potential impacts qualitatively.
  - The city-owned parcel along Sequalitchew Creek is about 46 acres in size and extends to the top of the canyon with a small level area at the top of

the slope in some areas. It consists of second-growth and native vegetation. Except for an existing trail along the creek which was the route of a narrow-gauge railroad and a switchback trail from the Wilkes Observatory to the mouth of the creek, this area is proposed to be maintained in its existing state. This EIS will address potential impacts qualitatively and note that any future specific development, including formalizing the switchback trail will be addressed in the future by a separate environmental review.

- Two small park areas on either side of the commercial area at the top of the Puget Sound bluff. This EIS will address potential impacts qualitatively presuming development as passive parks with a children's playground. Development should be presumed to remove all vegetation except trees of over 8 inches in diameter which would be replaced with a restroom structure, parking, and landscaping consisting of newly planted ornamental vegetation with turf lawn areas.
- An area of about 10 acres in the far easterly portion of the site, bisected by the main access road is designated open space to meet the tree preservation requirements of city codes. This area is heavily wooded. It may be provided with an interpretive trail system. This EIS will address potential impacts qualitatively.

MH Middle Housing at 94 acres is the largest component of new development on the site. It is envisioned to provide for attached housing types from two to six units in buildings that are compatible in scale, form, and character with single-family houses and contain two or more attached, stacked, or clustered homes including duplexes, triplexes, fourplexes, five-plexes, six-plexes, townhouses, stacked flats, courtyard apartments, and cottage housing. Attached units can be on their own fee-simple lot, or all on one lot.

For the purposes of this EIS analysis, the density of development is 20 dwelling units per acre. Maximum lot coverage by all structures is 40 percent. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

SF Single Family Housing is 70 acres. It is envisioned to provide detached housing.

For the purposes of this EIS analysis, the density of development is 8 dwelling units per acre. Maximum lot coverage by all structures is 40 percent. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation with extensive turf lawn areas. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

MF Multi-Family Housing is 70 acres. It is envisioned to provide for buildings greater than 6 units. The buildings may be no taller than 45 feet, not including underground parking structures.

For the purposes of this EIS analysis, the density of development is 40 dwelling units per acre. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

The ENT Entertainment district is 20 acres. It is intended to provide entertainment and recreation type uses such as hotels, commercial recreation, retail, restaurants, community and cultural centers. These uses may draw visitors from the region and serve to supportive of the adjacent golf course use. There are two areas of ENT one in the easterly portion of the subarea of 9 acres in size and one immediately west of the golf course 11 acres in size.

For the purposes of this EIS analysis, there is no prescribed limit to the density of development. Building coverage is limited only by required landscaping. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

The COM General Commercial district is 8 acres. It is intended to provide for higher intensity commercial uses such as retail spaces, restaurants, and commercial recreation that may draw from a larger region. There are two areas of COM, one in the easterly portion of the subarea of 5 acres in size and one in the far westerly portion of the site 3 acres in size.

For the purposes of this EIS analysis, there is no prescribed limit to the density of development. Building coverage is limited only by required landscaping. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

The NB Neighborhood Business district is 7 acres in size. This zoning designation is intended to provide for smaller scale commercial type uses that serve the subarea and city residents, such as retail and restaurants, personal service uses, light manufacturing buildings no greater than 50,000 SF, professional and medical offices and banks and credit unions. There is one area of NB in the easterly portion of the subarea of 7 acres in size.

For the purposes of this EIS analysis, there is no prescribed limit to the density of development. Building coverage is limited only by required landscaping. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of newly planted ornamental vegetation. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

CIV Civic is a designation intended to provide for public and quasi-public uses such as schools, public parks, convention centers, community and cultural centers, churches, and public utilities. There is one area of CIV in the westerly portion of the subarea of 10 acres in size.

For the purposes of this EIS analysis, development within the CIV designation is presumed to be an elementary school with a floor area of 50,000 square feet and associated parking and driveways. Approximately 7 acres of the site is presumed to be a playfield. Development should be presumed to remove all vegetation within a developed area which would be replaced with structures, parking, streets, and driveways. Landscaping would consist of new planted ornamental vegetation and lawn in the playfield area. The area of development was cleared, and the top one foot of soil was removed in the early 2000s as part of hazardous materials remediation. The growth of vegetation since that time does not meet the city's definition of significant trees and does not require retention. All stormwater management would be by infiltration.

- ***EIS Alternative 2/No Action***: According to SEPA, "No action" does not necessarily mean that nothing (no development) would occur on the site. This alternative is

typically defined as what would most likely happen if the proposal did not occur. Future development of the area may occur, and existing development of the site will continue.

- The project area is currently zoned as Mixed Use Village 1 through 9, a Mixed Use area, a Community Park, and Open Space (Figure 5). This zoning avoids critical areas and their buffers which are protected within Open Space zoning. The Mixed Use Village zoning is defined below per DMC 25.41.010:

  "(1) MUV-1: This subdistrict is intended to support a mix of uses that includes neighborhood-oriented commercial/restaurant uses, hotel, housing, public/community uses, office, light manufacturing, and research and development.

  (2) MUV-2. This subdistrict is intended to support a mix of uses that includes neighborhood-oriented commercial/restaurant uses, hotel, housing, office, light manufacturing, and research and development.

  (3) MUV-3. This subdistrict is intended to support a mix of uses that includes neighborhood-oriented commercial/restaurant uses, multifamily housing, public/community uses, office, light manufacturing, and research and development.

  (4) MUV-4. This subdistrict is intended to support smaller-scale employment and neighborhood-oriented commercial/restaurant uses. The subdistrict is intended to develop with appropriate buffering and building-scale limitations to ensure compatibility with the nearby residential and school properties.

  (5) MUV-5. This subdistrict is intended to be a primary employment area that allows office, light manufacturing, and research and development.

  (6) MUV-6. This subdistrict is intended to be a primary employment area that allows office, light manufacturing, and research and development. This subdistrict also supports specialty commercial/restaurant uses.

  (7) MUV-7. This subdistrict is intended to support a mix of uses that includes neighborhood-oriented commercial/restaurant uses, community/cultural uses, office, light manufacturing, and research and development.

  (8) MUV-8. This subdistrict is intended to be an employment area with supportive residential that allows office, light manufacturing, research and development, community/cultural uses, and multifamily housing.

> (9) MUV-9. This subdistrict is intended to support active recreation and supporting land uses such as commercial/restaurant, administrative office, and hotels."

Mixed Use is defined per DMC 25.35.010 below as:

> "…to implement the comprehensive plan's concept of permitting uses that are allowed in the commercial district, the office district and residential zone district. This area is intended to provide office space, goods and services to the entire community or larger market. "

The area zoned as MUV-9 has already been developed as a golf course (The Home Course) and will not change under either alternative. Both EIS Alternative 1 and EIS Alternative 2 include the development of a mix of residential, commercial, industrial, employment uses, and open space/recreational facilities on the 618-acre site (Figures 3 and 5).

Detailed descriptions of each alternative may be found in the Draft EIS text. Table 5 provides a summary comparison of the land use breakdowns under each alternative. The probable impacts of each of these alternatives on the plant and animal communities of the property are discussed in the following sections.

Both alternatives involve aspects of urbanization. The process of urbanization will affect the existing plant and animal communities in three ways: (1) direct changes in and loss of the habitats available; (2) increase in human use and disturbance associated with the roadway; and (3) potential for changes in the hydrologic characteristics of the site, with potential for impacts to wetland and riparian communities (both plants and animals).

Urbanization is a process of habitat alteration that changes the characteristics of the plant communities and the habitat available for wildlife. The major features of urbanization include loss of vegetation, isolation or fragmentation of remaining vegetation patches, replacement of native vegetation with ornamental species, removal of snags and downed logs, the potential for an increase in the use of pesticides, insecticides, and herbicides, the presence of "super" predators (domestic dogs and cats), and increased noise and other disturbance factors (Thomas et al. 1974; Penland 1984; Adams et al. 1985).

4.1 EIS ALTERNATIVE 1 – PROPOSED OLD FORT LAKE SUBAREA PLAN

As noted above, this alternative (hereafter, "EIS Alternative 1") would involve developing a mixture of residential uses, including single-family, middle housing, multifamily, general commercial, neighborhood business, entertainment, and civic, along with parks, recreational areas, and open space on an approximately 618-acre site.

Approximately 373 acres of open space and golf course area (53% of the site) would be retained, and areas outside the golf course would remain undeveloped forest with trails and other recreational opportunities (Figure 3, Table 5). This open space area includes the Sequalitchew Creek, Old Fort Lake, all the mixed riparian forest along the creek and Old Fort Lake, the approximately 20 acres of conifer forest in the southeast portion of the project site, and the shoreline forest near Puget Sound (Figure 2).

Under EIS Alternative 1, stormwater management will be designed using design standards, including hydrologic modeling, from the Washington Department of Ecology (2019a) Stormwater Management Manual for Western Washington. Stormwater runoff from the developed project areas' impervious and landscaped surfaces will generally be collected and directed to infiltration facilities. The Old Fort Lake Subarea contains a variety of vegetation communities and habitats, including Coniferous Forest, Early Successional Forest, Old Fort Lake and surrounding Mixed Forest, Oak Woodlands, Sequalitchew Creek Ravine, Estuarine Wetland, Puget Sound Shoreline, and the Golf Course. The impacts to each of these areas are discussed below.

4.1.1 Impacts on Habitats

Impacts on Coniferous Forest

Development of the Old Fort Lake Subarea site under EIS Alternative 1 would primarily occur within the Early Successional Forest. However, approximately 20 acres of the Coniferous Forest would be converted to middle housing, commercial, and entertainment land use areas (Figure 3, Table 5). Buildings, roads, impervious surfaces, and non-native plantings would replace existing vegetation. Most of the Coniferous Forest vegetation impacted by the proposed development under this alternative is dominated by widely spaced Douglas fir with occasional Oregon white oak and an understory of Scotch broom, Nootka rose, trailing blackberry, tall Oregon grape, and sword fern.

EIS Alternative 1 would retain approximately 13 acres of the eastern portion of Coniferous Forest as a proposed park/open space, and a proposed road and trails would pass through the area (Figure 4, Table 5). The proposed recreational use of the Coniferous Forest may increase human disturbance, noise, and trash within the forest. The tree roots may become degraded from potential off-trail walking, and wildlife may avoid the area due to increased human presence and noise within the forest. In addition, the removal of the trees will limit nesting, breeding, roosting, foraging, perching, denning, and resting opportunities for birds, mammals, amphibians, and invertebrates within the Coniferous Forest.

The proposed development under this alternative would result in increased forest fragmentation, leaving the retained Coniferous Forest to become more isolated. Note, however, that past activities on the site, such as the extensive clearing and soil removal from remediation efforts and development of The Home Course, have already isolated the Coniferous Forest from other forested areas on the site.

Impacts on Early Successional Forest

Development of the Old Fort Lake Subarea site under EIS Alternative 1 would convert much of the existing Early Successional Forest vegetation communities within the approximately 618 acres to developed land uses, including single-family and multifamily residential, commercial, civic, entertainment, and recreational areas (Figure 3, Table 5). Buildings, roads, impervious surfaces, and non-native plantings would replace existing vegetation. Developed uses on the site under EIS Alternative 1 would result in clearing approximately 225 acres of Early Successional Forest. Most of the forest vegetation impacted by the proposed development within the Early Successional Forest is dominated by saplings of Douglas fir, madrone, black cottonwood, and large patches of Scotch broom, a non-native, invasive species. The trees in the areas are typically no greater than 15 feet tall.

Wildlife movement opportunities provided by the Early Successional Forest will be reduced under Alternative 1 and would center more on retained parks, recreation, and open space areas. Nesting and foraging habitats for smaller songbirds and hunting areas for bird-eating species will be reduced. In addition, the buffer qualities of the Early Successional Forest between other habitat communities and the golf course will be reduced, and proposed developed areas will be adjacent to those habitat communities.

Under EIS Alternative 1, development within the Early Successional Forest would result in disjunct patches of native forest, increasing forest fragmentation on the site and allowing the retained open space areas within or between the various development areas to become more isolated. Note, however, that past activities on the site, such as the extensive clearing and soil removal from remediation efforts and development of the Golf Course, have already left patches of retained forest separated from one another. Also, some connections among areas of open space on the site and with off-site habitat areas would be retained.

Impacts on Old Fort Lake and Surrounding Mixed Forest

Under EIS Alternative 1, the proposed project would result in no direct impacts to Old Fort Lake or its associated buffers, which are located within proposed Parks, Recreation, and Open Space (PROS) designated areas (Figure 3). Clearing and grading outside of the wetland buffers have the potential to result in an increase in sediment if stormwater runoff reaches Old Fort Lake. However, because stormwater management would be by infiltration, this is unlikely. Best management practices would be employed to control erosion and sediment near the wetlands, and it is unlikely that any significant impact on the wetlands would occur under EIS Alternative 1.

Operational impacts on Old Fort Lake would likely be minor under EIS Alternative 1. Wetlands would be subject to the City of Dupont's critical area regulations. Encroachment on wetlands and wetland buffers from buildings, landscaped areas,

and access roadways would not be allowed. Increased human access to Old Fort Lake and the surrounding mixed forest and associated disturbance would be anticipated because of increased human activity in the vicinity. This disturbance is not expected to be significant compared to existing conditions but may result in certain wildlife species avoiding the area due to noise and human disturbance.

Proposed stormwater management facilities would meet or exceed all applicable detention and water quality standards. Under the proposed site plan (Alternative 1), wetland buffers would be retained within designated open space areas in their current state to protect wetland hydrology maintained primarily through precipitation. Old Fort Lake is supported by direct precipitation, groundwater, and infiltration of stormwater runoff would provide recharge to the local groundwater table. Thus, no significant adverse impacts are anticipated to the hydrology sources within Old Fort Lake.

The Old Fort Lake and surrounding mixed forest are adjacent to the Early Successional Forest and Golf Course areas (Figure 3). Development of the Old Fort Lake Subarea under EIS Alternative 1 would convert the early successional forest adjacent to the east of the Old Fort Lake Mixed Forest into multifamily residential areas (Figure 3). Buildings, roads, impervious surfaces, and non-native plantings would replace existing vegetation. Old Fort Lake would be further isolated from the Coniferous Forest, and wildlife species that travel through the Early Successional Forest to move between the Coniferous Forest and Old Fort Lake Mixed Forest would be less likely to use the developed area as a movement corridor.

The proposed development under this alternative would result in disjunct patches of native forest, increasing forest fragmentation on the site and allowing the retained open space areas within or between the various development areas to become more isolated. Note, however, that past activities on the site, such as the extensive clearing and soil removal from remediation efforts and development of the Golf Course, have already left patches of retained forest separated from one another.

The retained open space areas on site would include a network of trails and associated active and passive features such as interpretive signs (Figure 4). These soft-surface trails will be located within the mixed forest surrounding Old Fort Lake, which may require some vegetation clearing. The trails will increase human disturbances in these areas, including oak woodlands within the mixed forest, which may result in damage through human disturbances.

Impacts on Oak Woodlands

Most of the Oak Woodlands across the site are located within the proposed Parks, Recreation, and Open Space areas (Figures 2 and 3). However, a soft surface trail is proposed within or near the Oak Woodlands surrounding Old Fort Lake (Figure 4). The

proposed trail will likely require vegetative clearing, which may include removing some Oregon White Oak trees. The trail would increase disturbances within the Oak Woodlands, causing wildlife to potentially avoid those areas due to increased noise and human presence, and human disturbances could damage oak trees.

EIS Alternative 1 would convert the existing early successional forest adjacent to the Oak Woodlands in the north-central portion of the site into single-family residential and entertainment areas (Figure 3). Existing vegetation in these adjacent areas would be replaced by buildings, roads, and other impervious surfaces, as well as non-native plantings.

The proposed development under this alternative would further isolate patches of Oak Woodlands, with developed areas located between them. Note, however, that past activities on the site, such as the extensive clearing and soil removal from remediation efforts and development of the Golf Course, have already separated patches of Oak Woodlands.

Impacts on Sequalitchew Creek Ravine and Associated Wetlands

The Sequalitchew Creek Ravine and Associated Wetlands are either located offsite or within proposed Parks, Recreation, and Open Space areas under EIS Alternative 1 (Figures 2 and 3). An adjoining area of managed open space would also be retained, allowing only recreational activities, such that no residential, commercial, or civic development would occur within at least 100 feet of the stream or wetlands. Thus, under this alternative, no direct impacts on aquatic and fish habitats are expected. Stormwater from the proposed development will be treated through complete infiltration without direct discharges from Sequalitchew Creek.

Soft surface trails are proposed within the Sequalitchew Creek Ravine and portions of the stream and wetland buffers, with some trails potentially crossing the creek and wetlands (Figure 4). These crossings may require clearing within the buffers and will likely add hard shading to the stream and wetlands. In addition, the trails will likely increase human disturbances, noise, erosion, and trash within the Sequalitchew Creek Ravine, which may cause certain wildlife species to avoid those areas, at least when people are present.

Increased erosion can cause sedimentation within the creek and wetlands, which can suffocate organisms that live and breed within spaces between cobbles (EPA 2024). Sediments in streams can also increase turbidity, which can reduce physiological function or cause mortality or avoidance of aquatic organisms (Henley et al. 2000). Clearing and grading outside of the stream and wetland buffers has the potential to increase sedimentation if stormwater runoff were to reach the wetlands. However, because stormwater management would be by infiltration, this is unlikely. Best management practices would be employed to control erosion and sediment in the vicinity of the stream

and wetlands, and it is unlikely any significant impacts would occur under EIS Alternative 1.

Impacts on the Estuarine Wetland

The Estuarine Wetland is located at the mouth of Sequalitchew Creek before it flows under the railroad and discharges into Puget Sound. The wetland and associated buffer are located either offsite or within proposed Parks, Recreation, and Open Space (Figures 2 and 3). Under EIS Alternative 1, the proposed project would result in no direct impacts to the Estuarine Wetland or its associated buffer. An existing trail to the wetland would likely receive increased usage, increasing noise, erosion, and trash in or near the Estuarine Wetland (Figure 4).

Clearing and grading outside of the wetland buffer has the potential to increase sediment reaching the wetland. However, because stormwater would be managed through complete infiltration, this is unlikely. Best management practices would be employed to control erosion and sediment in the vicinity of the wetland, and it is unlikely that any significant impacts to the Estuarine Wetland from sedimentation or stormwater runoff would occur under EIS Alternative 1.

Impacts on the Puget Sound Shoreline

The Puget Sound Shoreline is located offsite approximately 350 feet to the west of the Old Fort Lake Subarea. Thus, no direct impacts to the Puget Sound are expected to occur. A fence and the BNSF railroad are located between the Old Fort Lake Subarea and the shoreline. Stormwater will be managed through complete infiltrations from the developed portions of the project, thereby having no direct discharges to the Puget Sound.

Under EIS Alternative 1, residential use of fertilizer and pesticide would be expected. Direct infiltration on site will provide treatment through adsorptive removal and degradation. Like the stormwater treatment and flow through the groundwater described above, fertilizers and pesticides are not expected to impact Puget Sound surface waters or associated fish and habitat.

An increased local human population could impact riparian and shoreline habitats, and fish populations through increased recreation and fishing in the local area. Fishing in Puget Sound is quite active, with fishing rules that specify selective gear, harvest timing, quantity, and fish size restrictions.

The fence between the Old Fort Lake Subarea and the shoreline will be removed. The existing trail near Puget Sound will be widened and paved. There will likely be an increase in usage as the local population increases, which may also increase human and pet disturbance, noise, erosion, and trash near the trail and shoreline. In addition, the removal of the fence will likely allow easier access to the shoreline. Disturbance and

noise can cause wildlife to avoid those areas whenever humans are present, and domestic pets may directly harm wildlife. However, human and pet noise would not be louder than passing trains. Removing the fence may also provide improved transit corridors for wildlife species to move between Puget Sound and the onsite habitats.

Increased erosion along Sequalitchew Creek from human disturbances may cause sediments to reach Puget Sound. Excess sediments can suffocate organisms that live and breed within spaces between cobbles (EPA 2024a). Fertilizers can cause rapid growth of algae and aquatic plants, leading to eutrophication, which decreases available oxygen in aquatic habitats, suffocating fish and other aquatic organisms (EPA 2024b). Suspended sediments can also increase turbidity, which can reduce physiological function or cause mortality or avoidance of aquatic organisms (Henley et al. 2000). However, best management practices will be used during trail construction which will minimize erosion and sedimentation impacts.

Impacts on the Golf Course

Due to the increased local population, the golf course would likely receive increased usage. Stormwater on the golf course is infiltrated, so discharges to waterways are unlikely. Due to adjacent developed habitats and the removal of the Early Successional Forest, more wildlife species may be routed through the golf course at night for foraging or as a transit corridor between habitat patches.

4.1.2 Overall Impacts on Wildlife

The impacts of constructing the development under EIS Alternative 1 across the site include both temporary impacts during construction and longer-term impacts of habitat alteration. Construction-related impacts include noise, dust, human activity, temporary vegetation disturbance for staging areas, potential erosion and sediment transport from exposed soils, and other potential water quality impacts. These can alter animal behavior, causing avoidance of adjoining habitats, alteration of movement and dispersal patterns, abandonment of nest sites, reduced breeding success, and increased mortality.

Direct alteration (removal) of the existing mixture of vegetation communities resulting from developing these areas and associated facilities under EIS Alternative 1 would affect the distribution and composition of wildlife populations in the project area and vicinity. As previously mentioned, at buildout, the proposed development and associated facilities would convert approximately 245 acres to more urbanized residential, commercial, entertainment, and civic uses, removing existing habitat available for wildlife across the project area within areas that are currently early successional forest. Also, future development of the areas owned by the Nisqually Tribe are within the early successional forested areas.

The proposed development under EIS Alternative 1 would reduce the habitat available for native wildlife across the site. Eliminating native vegetation cover and replacing it

with impervious surfaces and landscaped areas would reduce the local populations of most native species on the property and cause several changes in the species composition associated with an urban level of development. Some native species would likely be eliminated from the site.

Bird species diversity may decrease on developed portions of the site, which can be accompanied by an increase in bird density (Batten 1972; Vale and Vale 1976; Woolfenden & Rohwer 1969; see also Bollinger and Linder 1994; Dowd 1992; Herkert 1994; Martin-Yanny 1992). This may result in increased densities of omnivores and seed-eaters and a corresponding decrease in insectivores (Beissinger and Osborne 1982). The species typically favored in urban or urbanizing environments are habitat generalists, some of which are invasive exotic species. Planted ornamentals often support far fewer insect species per unit area than native vegetation due to a smaller amount of foliage (less foliage volume) and simpler vegetation structure. Birds in the urban environment primarily forage on the ground, while birds in the nearby forest primarily forage in the tree canopy. Landscaped areas along the roadways throughout the development would likely be managed to limit the growth of tall woody vegetation. Developed landscapes can often facilitate the spread of exotic invasive species (both plants and animals), especially along a linear corridor. No invasive species would be included in the proposed landscaping of the development.

Planted ornamentals often support far fewer insect species per unit area than native vegetation due to a smaller amount of foliage (less foliage volume) in the upper canopy.

Species that dwell primarily in forested habitats, but can persist in partly-urbanized environments, such as chickadees, squirrels, shrews, garter snakes, and some species of amphibians, may persist in the larger open space areas in open space areas of the site near Sequalitchew Creek and associated wetlands as well as near Old Fort Lake but in lower numbers. Other native species adapted to a wide range of habitats or urban environments, such as American robin, American crow, hummingbirds, bushtit, dark-eyed junco, song sparrow, raccoon, and coyote, may increase in abundance on the site, especially in developed areas (Robbins 1979; Penland 1984; Tilghman 1987).

The proposed development would affect animals that are least tolerant of human disturbance, such as ground- and shrub-nesting birds, ground-dwelling mammals, and carnivores. Examples include dark-eyed junco, spotted towhee, black-tailed deer, deer mouse, and Douglas squirrel. However, the areas to be developed currently consist of patches of scotch broom and maturing Douglas fir and black cottonwood saplings. For areas of native habitat that remain (such as in the open space areas near Sequalitchew Creek and Old Fort Lake), studies have shown that some species may not be able to consistently produce young due to competition from urban-adapted species, habitat fragmentation, or increased exposure to edges (e.g., Donovan et al. 1995; Friesen et al. 1995). For example, species such as brown creeper, golden-crowned kinglet, and black-throated gray warblers, which tend to occupy forest interior settings (e.g., Pearson and

Manuwal 2000; 2001), may be adversely affected by predation, nest parasitism, and competition with other species under the proposed development (Marzluff et al. 2007).

Populations of reptiles and amphibians, which rely on forest duff, downed logs, snags, and wetlands, would be substantially reduced within developed areas across the site. Existing wetlands and streams on the site will remain intact, but other special habitat features throughout the site and some local dispersal habitat will be eliminated due to increased fragmentation of retained habitats and the introduction of roadways throughout all the dwelling areas.

The clearing, grading, and construction of EIS Alternative 1 would separate habitat areas and increase fragmentation. This, together with increased disturbance (e.g., vehicular traffic and human presence throughout the trail systems), may affect the movement patterns of some wildlife species, creating a barrier to the movements of small mammals, reptiles, and amphibians. Increased mortality would likely result from animals attempting to cross roads, and some animals may alter movement patterns to avoid areas or time periods of high activity. Increased fragmentation of the remaining native habitat and the expected increased human activity on existing and proposed trails would affect animal movement patterns by causing the animals to avoid areas or time periods of high activity. However, many species would probably continue to use undeveloped areas of the site. Anticipated road crossings in the developing areas would likely represent barriers to the movement of some species, such as small mammals and some amphibians, but little or no barriers to other mammals and most birds.

Larger, more wide-ranging carnivores would likely reduce their site usage as it develops; however, this site also likely represents a small portion of the home range of species such as coyotes.

Impacts Due to Increased Human Activity

The introduction of several dwellings and activity centers under EIS Alternative 1 will result in an increased amount of human activity throughout the project site. This includes human presence on trails, driving through the site on developed roads, increased noise at the dwellings, and occupants' introduction of foreign materials. All these activities could lead to avoidance by local wildlife populations and even mortality due to interactions such as vehicular strikes.

In addition, an increase in the presence of domestic pets would increase the likelihood of disturbance of retained habitats and potentially affect the movements and activities of animals on site. Native species can be adversely impacted by domestic cats and dogs, which can act as “super-predators;” (Leu et al. 2008; Odell and Knight 2001; Penland 1984), particularly with a greater human population at full buildout.

Materials brought on-site by new occupants could potentially have detrimental impacts on local wildlife populations. The use of insecticides by homeowners has been shown to reduce the food resources of insectivorous animal species (Penland 1984). Introducing features such as bird feeders could also increase generalist bird species that could compete with previously present populations.

4.1.3 Impacts to Endangered, Threatened, Sensitive, and Other Priority Species

No endangered, threatened, or sensitive plant species are known or likely to occur in the project area, including the areas owned by the Nisqually Tribe and The Home Course golf course. As discussed in the Existing Conditions Report (Raedeke Associates, Inc. 2023), northern wolverine, marbled murrelet, streaked horned lark, yellow-billed cuckoo, northwestern pond turtle, monarch butterfly, Taylor's checkerspot butterfly, marsh sandwort, and western gray squirrel are not known or expected to occur on or within the vicinity of the project site. Consequently, the development of the site under EIS Alternative 1 is not expected to impact such species adversely. Discussions of potential impacts to species expected to occur within the project vicinity are provided in the following sections.

Chinook Salmon and Steelhead

As noted above, the Puget Sound ESU of Chinook salmon and the Puget Sound DSU of steelhead are known to occur in the Puget Sound but are not documented on the project site or within Sequalitchew Creek (WDFW 2024a; NWIFC 2024). The proposed footbridge trail across Sequalitchew Creek may cause hard shading over the stream, causing fish to avoid those areas. However, Chinook salmon and Steelhead are not known to occur in Sequalitchew Creek. Therefore, impacts to Sequalitchew Creek are not expected to impact Chinook salmon and Steelhead.

As described above, no direct impacts on riparian habitat along Puget Sound will occur, and infiltrated stormwater will not have a measurable direct effect on Sequalitchew Creek or Puget Sound. Increased numbers of humans along the shoreline may increase disturbance near Puget Sound, but disturbances would likely be insignificant compared to existing conditions. Fish populations could be impacted through increased recreation and fishing in the local area. Fishing in Puget Sound is quite active, with fishing rules that specify selective gear, harvest timing, quantity, and fish size restrictions.

Bull Trout

Bull trout are not documented in Sequalitchew Creek but occur offsite in estuarine and nearshore waters of Puget Sound (WDFW 2024a; NWIFC 2024). No direct impacts on riparian habitat along Puget Sound will occur, and infiltrated stormwater will not directly affect Puget Sound. Increased numbers of humans along the shoreline may increase disturbance in the nearshore areas, but disturbances would likely be insignificant compared to existing conditions.

Other Priority Species

Bats

No bats have been documented on the project site. However, the township is identified as habitat for little brown bat, big brown bat, and Yuma myotis. The preservation of trees and snags in open spaces, particularly near Old Fort Lake, will provide roosting opportunities for bats, particularly as trees in those areas continue to age. Bats are unlikely to use the early successional forest areas for roosting, so no current bat habitat is likely to be removed under Alternative 1.

Great Blue Heron

No great blue heron breeding areas were observed on or near the project site. However, herons may use the shoreline for foraging. Increased human disturbance in the area may flush herons from foraging areas. While there is a trail from the project site to the beach, it is steep and not likely to be used regularly. However, the existing trail north of Sequalitchew Creek currently attracts humans to the beach. The increase in humans to the shoreline due to Alternative 1 will likely be insignificant compared with existing conditions.

4.2 EIS ALTERNATIVE 2/NO ACTION – EXISTING ZONING DESIGNATIONS

As noted above, EIS Alternative 2 is the "no action" alternative. However, the existing zoning of the area includes potential development of Mixed Use Villages and a Mixed Use District along with Open Space and a Community Park (Figure 5, Table 5).

Some housing would likely be included in portions of the Mixed Use Villages, but no designated quantity is required. The potential future development may include commercial businesses, restaurants, housing, hotels, light manufacturing, research and development, administrative offices, community/cultural uses, and active recreation. Alternative 2 is likely to result in less permanent residences than Alternative 2. This alternative would likely retain less dedicated open space (137 acres than under Alternative 1 (329 acres). EIS Alternative 2 would likely result in more vegetation clearing (437 acres) than EIS Alternative 1 (245 acres)(Table 5).

As under EIS Alternative 1, stormwater management under Alternative 2 will be designed using design standards, including hydrologic modeling, from the Washington Department of Ecology (2019a) Stormwater Management Manual for Western Washington.

4.2.1 Impacts on Coniferous Forest, Early Successional Forest, Mixed Forest, Oak Woodlands, Sequalitchew Creek Ravine Forest, and the Golf Course

If no future development occurs, impacts to forested areas and the Golf Course are unlikely to occur, and the early successional forest area is expected to mature. If future development occurs under existing zoning, it will likely convert much of the existing early successional forest vegetation communities within the approximately 618 acres to developed land uses, including commercial, residential, manufacturing, research and development, office space, public/community/cultural uses, and recreation (Figure 5, Table 5). If future development occurs, existing vegetation will be replaced by buildings, roads, and other impervious surfaces, as well as non-native plantings. However, most of the forest vegetation impacted is currently Early Successional and is dominated by invasive species.

EIS Alternative 2 would still retain at least 137 acres of Open Space (20% of the site) (Figure 5, Table 5). The Mixed Forest and Oak Woodlands surrounding Old Fort Lake, the Sequalitchew Creek Ravine forest, and the Golf Course will be retained within these areas. If no future development occurs, areas outside of the golf course will remain as undeveloped forest. However, future development under this alternative would likely result in fragmented forest patches, and more vegetation clearing may occur than under EIS Alternative 1.

The Coniferous Forest is within an area currently zoned as MUV-4 and MUV-5 under EIS Alternative 2 (Figure 5). It could potentially see future development of smaller-scale commercial and/or restaurant uses, offices, light manufacturing, and/or research and development facilities.

The Oak Woodlands in the north-central portion of the site are within an area currently zoned as MUV-9, which could be developed as commercial/restaurant space, administrative offices, and hotels intended to support active recreation.

4.2.2 Impacts on Old Fort Lake, Sequalitchew Creek Wetlands, and the Estuarine Wetland

Under EIS Alternative 2, no direct impacts to wetlands or their associated buffers would occur even if future development were to occur under the current zoning, as those areas are zoned as Open Space (Figure 5). No clearing or grading will occur unless future development occurs, as the area is currently zoned, and best management practices will be required to control erosion and sediment near aquatic areas.

Operational impacts on wetlands would likely be minor under EIS Alternative 2 if future development occurs. Wetlands would be subject to the City of Dupont's critical area regulations. Encroachment on wetlands and wetland buffers from buildings, landscaped areas, and access roadways would not be allowed. Human disturbance is expected to be generally comparable to EIS Alternative 1 in that

respect. This disturbance is not expected to be significant compared to existing conditions. No significant adverse impacts are anticipated.

4.2.3 Impacts on Sequalitchew Creek and Puget Sound

Future development under Alternative 2 may result in more cleared areas and impervious surfaces, which may create more stormwater runoff. Fertilizer and pesticide use will likely be similar under either alternative as a golf course is already on the site, and ornamental landscaping will likely be included in most future development, but fertilizer and pesticide use on the golf course would likely remain at current levels if no future development of the area were to occur. However, stormwater infiltration will minimize the risk of runoff entering aquatic habitats.

Both alternatives would retain Sequalitchew Creek, its associated riparian and estuarine wetlands, Old Fort Lake, and other habitats within dedicated open space (Figure 5; Table 5). An adjoining area of managed open space would also be retained, allowing only recreational activities, such that no residential, commercial, or civic development would occur within at least 100 feet of the stream or wetlands. Thus, no direct impacts to aquatic and fish habitats would occur under EIS Alternative 2. No surface waters are known to occur on the site in the areas owned by the Nisqually Tribe or the Home Course, so future development is unlikely to impact aquatic habitats.

Under Alternative 2, an increase in the local population is likely, which could have comparable impacts on fish populations, including threatened fish populations and aquatic habitats, through increased recreation and fishing in the local area.

Future development plans may not include recreational trails near or within critical area buffers, which would limit increases in human access and disturbances in those areas.

The fence between the Old Fort Lake Subarea and the Puget Sound Shoreline may not be removed, which would continue to be a barrier to wildlife passage between the shoreline and other habitat areas. However, the fence would also limit human access to the shoreline and shoreline forest areas preventing additional noise, disturbance, trash, and erosion near the shoreline.

4.2.4 Overall Impacts on Wildlife

If no future development occurs, no impacts on wildlife will occur. However, the early successional forest will mature and provide more habitat for a variety of species. In addition, wildlife corridors will remain and become more established within the site. Impacts of future development under existing zoning across the site would include both temporary impacts during construction and longer-term impacts of habitat alteration. Construction-related impacts include noise, dust, human activity, temporary vegetation disturbance for staging areas, potential erosion and sediment transport from exposed soils, and other potential water quality impacts. These can alter animal behavior, causing

avoidance of adjoining habitats, alteration of movement and dispersal patterns, abandonment of nest sites, reduced breeding success, and increased mortality.

Direct alteration (removal) of the existing mixture of vegetation communities resulting from future development of these areas under EIS Alternative 2 would affect the distribution and composition of wildlife populations in a way that is comparable to Alternative 1. However, more vegetation may be cleared, likely displacing more wildlife populations (Table 5). As with Alternative 1, Alternative 2 will result in increased human activity throughout the project site but may provide less housing for permanent occupants of the area, which may result in fewer human disturbances.

4.2.5 Impacts to Endangered, Threatened, Sensitive, and Other Priority Species

As mentioned above, no endangered, threatened, or sensitive plant species are known or likely to occur in the project area. If future development occurs, increased humans along the shoreline may increase disturbance near Puget Sound, where threatened Chinook salmon, steelhead, and bull trout are known to occur, but disturbances are likely to be comparable to Alternative 1 and existing conditions. In addition, human disturbance on the beach will have similar impacts on great blue heron foraging under either alternative.

5.0 SUMMARY OF MITIGATION

5.1 MITIGATION SEQUENCE

Mitigation has been defined by the State Environmental Policy Act (SEPA) (WAC 197-11-768; cf. Cooper 1987) and subsequently in a Memorandum of Agreement between the Environmental Protection Agency and the COE (Anonymous 1989). In order of desirability, mitigation may include:

- Avoidance - avoiding impacts by not taking action or parts of an action;
- Minimization - minimizing impacts by limiting the degree or magnitude of the action and its implementation;
- Compensatory Mitigation - may involve:
  a) repairing, rehabilitating, or restoring the affected environment;
  b) replacing or creating substitute resources or environments;
  c) mitigation banking.

The Proposed Action under EIS Alternative 1 incorporates a number of measures to avoid or minimize potential impacts on wetlands, streams, plants and animals, and fisheries.

5.2 REQUIRED AND PROPOSED MITIGATION

Wetlands, streams, listed fish and wildlife species, and their habitats are protected under federal, state, and local laws, including the City of Dupont Code. As such, the Old Fort Lake Subarea project will adhere to the City of Dupont critical areas ordinance and Shoreline Master Program regulations regarding avoidance and minimization of impacts, as well as buffer requirements and protection of fish and wildlife habitat conservation areas.

No direct impacts would occur to wetlands or Sequalitchew Creek under the Old Fort Lake Subarea Plan (EIS Alternative 1). Sequalitchew Creek and the riparian and estuarine wetlands along the creek would be retained within dedicated open space that encompasses their required buffers and the entire river corridor and additional forest habitat. However, a proposed footbridge across Sequalitchew Creek would span the Ordinary High Water Mark of the stream and the wetlands. This would result in hard shading over the stream and wetlands with clearing and construction of the bridge within the critical area buffers. A critical area permit with mitigation measures would be required to compensate for buffer impacts.

Old Fort Lake would be retained in an open space tract that encompasses an area greater than its required buffer. No compensatory mitigation for direct impacts would be required.

In addition, the Old Fort Lake Subarea Plan includes several measures to minimize impacts to wetlands, water quality, and associated vegetation and fish and wildlife habitat both during and after construction:

- Construction limits, including staging areas, would be clearly marked in the field prior to beginning construction activities.
- Clearly marking the limits of wetland buffer areas and designated open space areas on construction plans and in the field to prevent unauthorized damage to critical areas during construction.
- A permanent stormwater management system would be designed and installed consistent with the Stormwater Management Manual for Western Washington (WDOE 2019a) and applicable City of Dupont and Pierce County development regulations in place at the time of permitting for the project. Operation of this system would avoid and minimize the potential for impacts on surface waters and fisheries resources.
- Appropriate BMPs and TESC measures would be implemented in accordance with an approved SWPPP, consistent with standards of the current Stormwater Management Manual for Western Washington, including specific measures to prevent and control spills of pollutants, and to handle, control, and store potential contaminants.
- Construction staging areas would be located outside of stream and wetland buffers to minimize impacts to vegetation.
- If any wetland buffer areas temporarily disturbed for construction access and staging will be revegetated, subject to an approved mitigation plan, with a mixture of native plant species following completion of construction activities.
- Avoiding vehicle re-fueling and maintenance activities within wetland and stream buffers or within at least 100 feet of wetlands and streams.

5.3 Other Potential Mitigation Measures

Landscape strips within the road corridors may also include native plants that have some value for wildlife cover and food, where feasible, given considerations of maintaining adequate sight distance for public safety and other applicable road standards.

All hiking trails could be located outside the streams, wetlands, and buffers to avoid vegetative clearing and increasing human disturbance in those areas.

Trails could be routed to avoid clearing within the Oak Woodlands.

The Coniferous Forest proposed to be converted into commercial, entertainment, and middle housing areas could be preserved as Parks, Recreation, and Open Space.

Wildlife habitat corridors could be maintained or added, including areas between the Coniferous Forest in the southeastern portion of the site and Old Fort Lake and/or the Sequalitchew Creek Ravine.

Management of invasive species, including the prominent Scotch Broom across the site, could be included in the proposal.

6.0 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant impacts to wetlands or aquatic or fish habitats are expected under the Old Fort Lake Subarea Plan (Alternative 1). Development of the project site under either EIS Alternative 1 or 2 would result in the following unavoidable adverse impacts:

1. Removal of a substantial area of the existing native and non-native vegetation and soils and replacement by non-native communities or impervious surfaces outside of the critical areas and their buffers; retained native vegetation communities among the various development areas would become more fragmented;

2. A reduction in the local populations of most native wildlife species in the area and continuation of a shift in species composition to favor species more adapted to urban environments; those animals displaced from the site would likely perish; and

3. An increase in disturbance of adjoining areas of native forest and riparian habitat and on adjacent lands as a result of increased human activity including vehicular traffic.

Such impacts are typical and unavoidable in the context of urban development.

No additional significant unavoidable adverse impacts to plants and animals not identified for this project area would likely occur under either EIS Alternative 1 or EIS Alternative 2.

7.0 LIMITATIONS

We have prepared this report for the exclusive use of The City of Dupont and their consultants. No other person or agency may rely upon the information, analysis, or conclusions contained herein without permission from them.

The determination of ecological system classifications, functions, values, and boundaries is an inexact science, and different individuals and agencies may reach different conclusions. With regard to wetlands, the final determination of their boundaries for regulatory purposes is the responsibility of the various agencies that regulate development activities in wetlands. We cannot guarantee the outcome of such determinations. Therefore, the conclusions of this report should be reviewed by the appropriate regulatory agencies.

We warrant that the work performed conforms to standards generally accepted in our field, and prepared substantially in accordance with then-current technical guidelines and criteria. The conclusions of this report represent the results of our analysis of the information provided by the project proponent and their consultants, together with information gathered in the course of the study. No other warranty, expressed or implied, is made.

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FIGURES AND TABLES

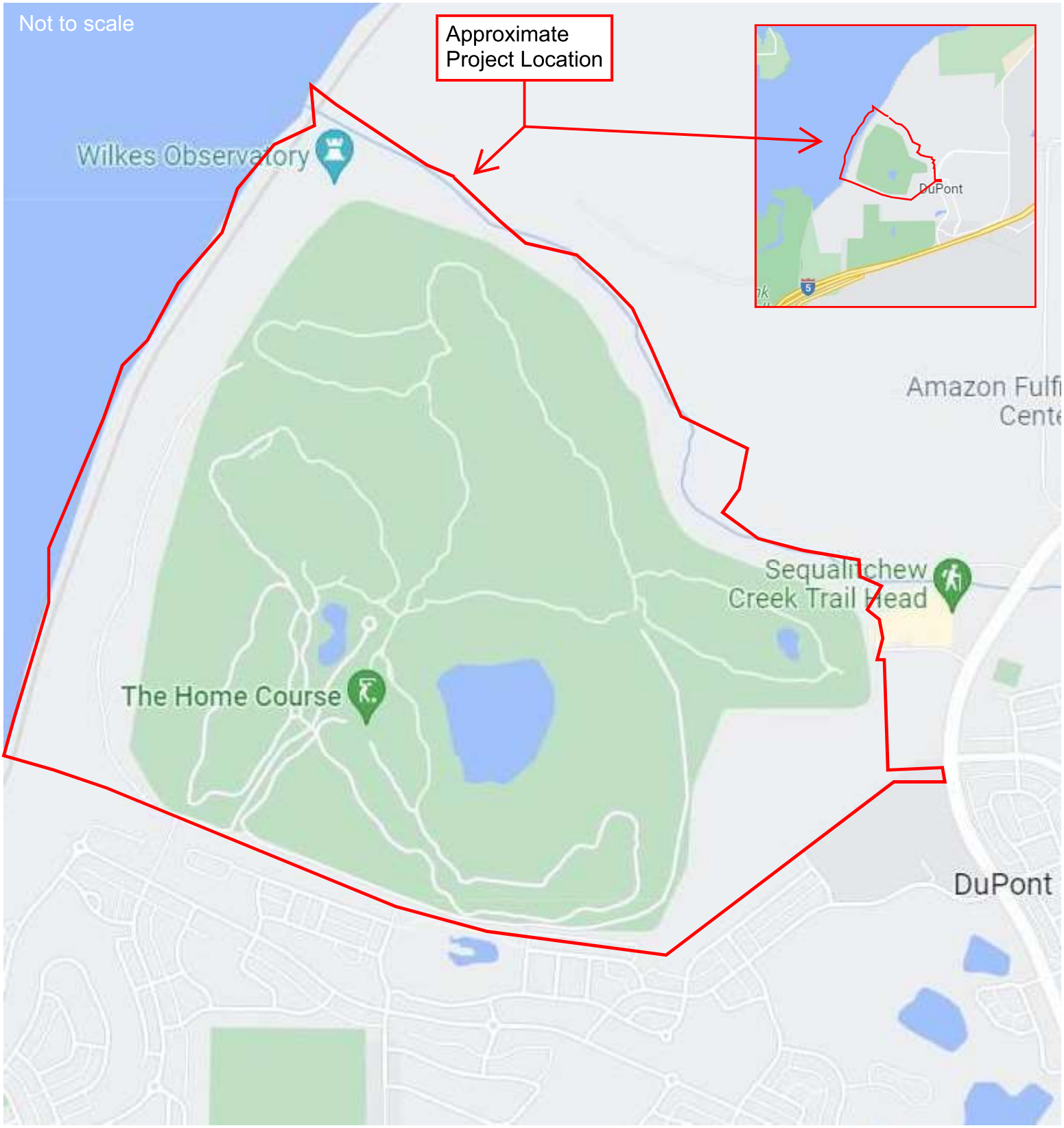


FIGURE 1 - Vicinity & Regional Map

Old Fort Lake Subarea

XX Center Drive, Dupont, WA

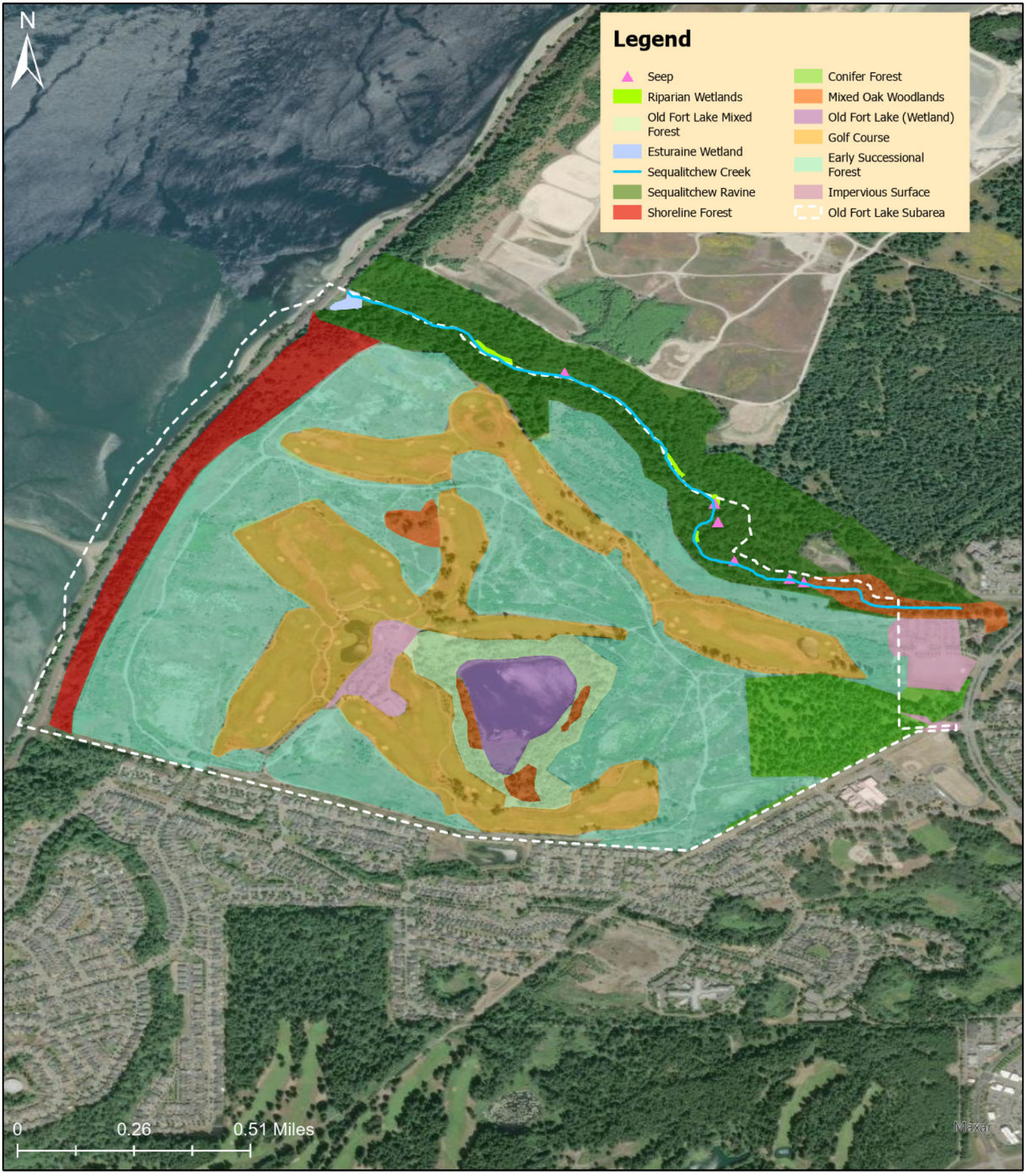
RAI PROJECT: 2022-088-001

PREPARED: 1/17/2023

BY: WR

Image source: https://www.maps.google.com

Raedeke Associates, Inc.
2111 N. Northgate Way,
Suite 219 Seattle, WA 98133



7/12/24

Figure 2 - Habitat Map
Old Fort Lake Subarea

Note: habitat boundaries based on handheld GPS units and have not been surveyed. Boundaries are approximate and for planning purposes only.

Project no: 2022-088-002

Raedeke Associates, Inc.

Old Fort Lake Subarea Plan

Draft Proposed Future Land Use Map - Concept G

April 11, 2024

N

0 250 500 1,000 1,500 2,000 Feet

Land Use Designation		Area	Density	Units
SF	Single Family	70 ac	4-8 du/ac	280-560 du
MH	Middle Housing	94 ac	12-20 du/ac	1,128-1,880 du
MF	Multifamily	34 ac	20-40 du/ac	680-1,360 du
COM	General Commercial	10 ac		
NB	Neighborhood Business	7 ac		
ENT	Entertainment	20 ac		
CIV	Civic	10 ac		
PROS	Parks, Recreation, & Open Space	329 ac		
NT	Nisqually Tribe Land	46 ac		
	Designated Cultural Resource			
	OFL Subarea Boundary	618 ac		2,076-3,780 du
	Dupont City Limits			

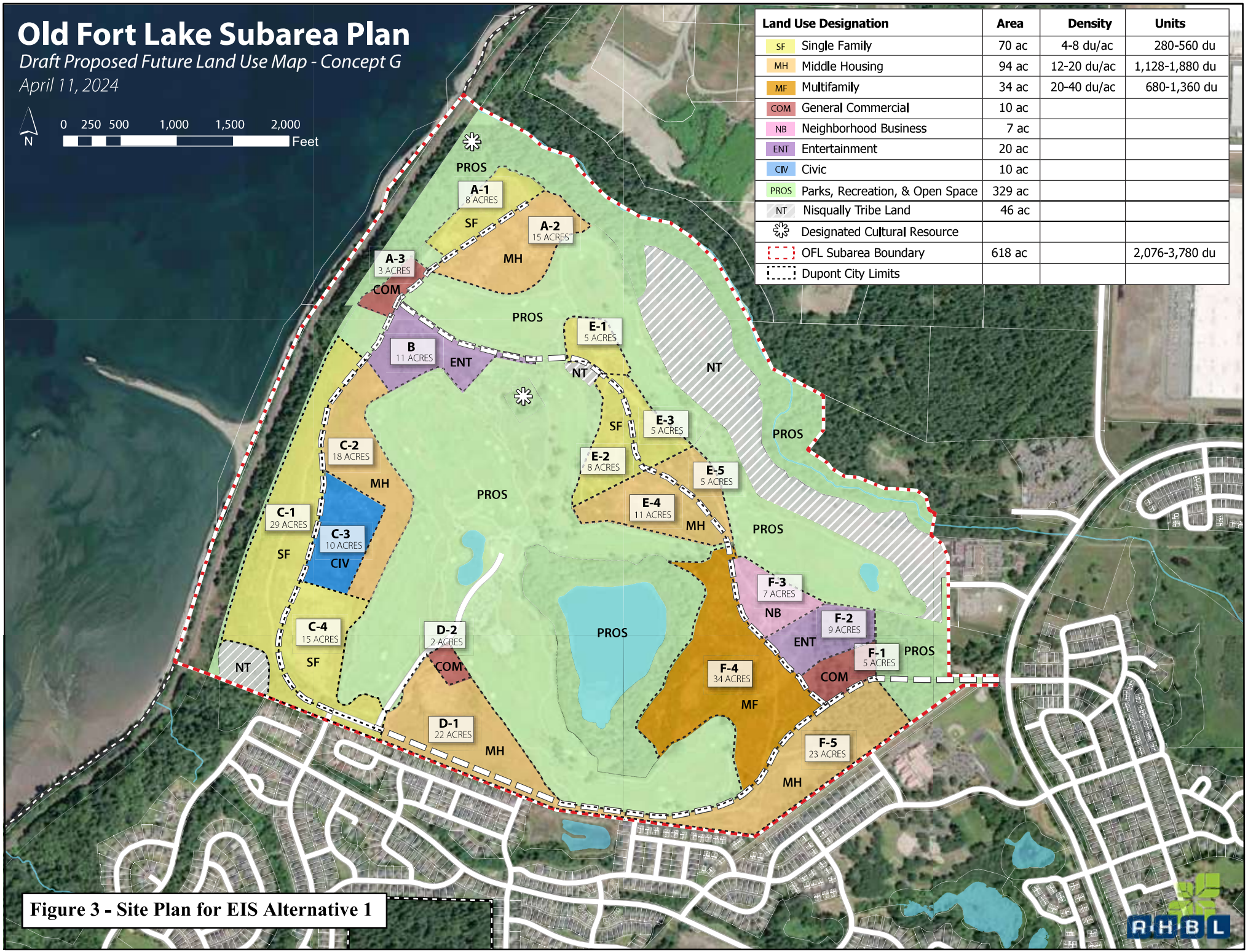


Figure 3 - Site Plan for EIS Alternative 1



Figure 4 - Parks, Recreation, and Open Space (PROS) Map for EIS Alternative 1

THE DUPONT VISION - A model small city known for its planned setting and hometown sense of community - a place that blends its natural beauty and rich Northwest history with a proactive approach to its future

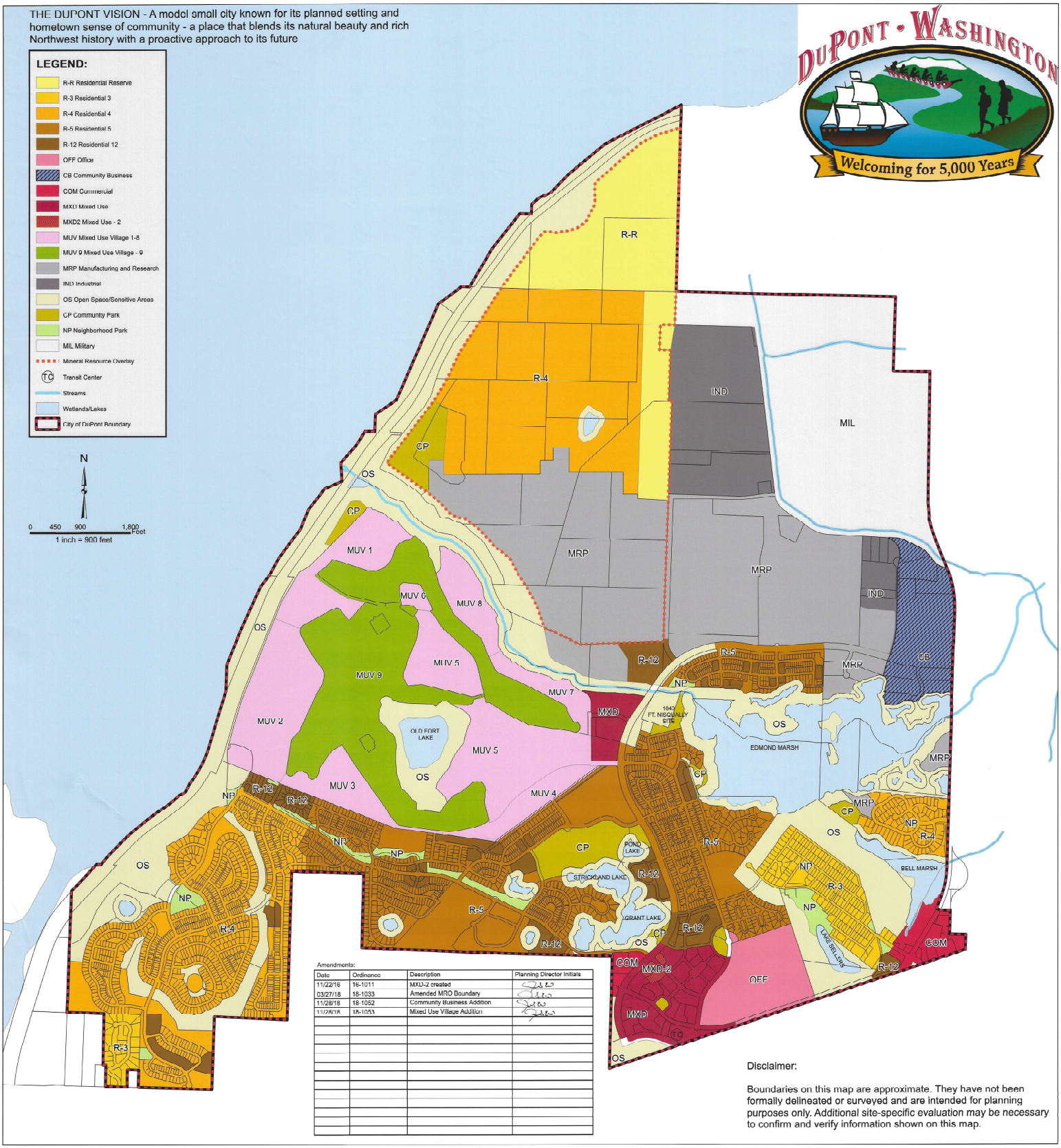
DUPONT • WASHINGTON
Welcoming for 5,000 Years

LEGEND:

- R-R Residential Reserve
- R-3 Residential 3
- R-4 Residential 4
- R-5 Residential 5
- R-12 Residential 12
- OFF Office
- CB Community Business
- COM Commercial
- MXD Mixed Use
- MXD2 Mixed Use - 2
- MUV Mixed Use Village 1-8
- MUV 9 Mixed Use Village - 9
- MRP Manufacturing and Research
- IND Industrial
- OS Open Space/Sensitive Areas
- CP Community Park
- NP Neighborhood Park
- MIL Military
- Mineral Resource Overlay
- TC Transit Center
- Streams
- Wetlands/Lakes
- City of DuPont Boundary

N

0 450 900 1,800 Feet
1 inch = 900 feet



Amendments:

Date	Ordinance	Description	Planning Director Initials
11/22/16	16-1011	MXD-2 created	
03/27/18	18-1033	Amended MRO Boundary	
11/28/18	18-1052	Community Business Addition	
11/28/18	18-1053	Mixed Use Village Addition	

Disclaimer:

Boundaries on this map are approximate. They have not been formally delineated or surveyed and are intended for planning purposes only. Additional site-specific evaluation may be necessary to confirm and verify information shown on this map.

STATE OF WASHINGTON)
) ss.
COUNTY OF PIERCE)

On this 13th day of February, 2019 before me, then undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared MIKE COURTS, to me know to be the person who signed as the MAYOR of CITY OF DuPONT, a municipal corporation, the corporation that executed the within and foregoing instrument and acknowledged said instrument to be her free and voluntary act and deed and the free and voluntary act and deed of CITY OF DuPONT, for the uses and purposes therein mentioned; and on oath stated that she was authorized to execute the said instrument on behalf of said CITY OF DuPONT.

IN WITNESS WHEREOF I have hereunto set my hand and official seal the day and year first above written

Tiffany Graves (Printed Name)
NOTARY PUBLIC in and for the State of Washington.
My Commission Expires 04-29-2021

CITY OF DuPONT

I hearby certify that this figure is an accurate and true representation of the City's Zoning Map

DATED this 13th day of February, 2019

CITY OF DuPONT
by
MIKE COURTS, MAYOR

Figure 5 - Current Zoning Map (EIS Alternative 2)

Table 1. Summary of wetlands on the Old Fort Lake project site:

Wetland	Name	Vegetation Class	Size (acres)	Rating	Buffer (ft)
1	Old Fort Lake	PSS/PEM		III	75
2	Sequalitchew Creek Riparian Wetland Complex	PFO/PSS/PEM		II	100
3	Estuarine Wetland	PEM	0.85	II	100

1 Ratings and buffers for the current EIS are based on the current WDOE rating system (Hruby 2014) and the current City of Dupont (2024) critical areas regulations.

Table 2. Summary of habitat types within the Old Fort Lake Subarea project site, based on 2023 field investigations.

Cover Type	Existing Habitat (Acres)	Percentage of Cover Within OFL Subarea Footprint
Coniferous Forest	33	5%
Early Successional Forest	245	40%
Old Fort Lake Mixed Forest	24	4%
Mixed Oak Woodlands	~14	2%
Sequalitchew Creek Riparian Forest	~35	6%
Shoreline Forest	30	5%
Old Fort Lake	19	3%
Sequalitchew Creek	N/A	N/A
Riparian Wetlands	<1	<0.5%
Estuarine Wetlands	<1	<0.5%
Golf Course	170	27%
Nisqually Tribe Land	46	7%
Total	**618**	**100%**

Table 3. Federally or state–listed species that may occur in Pierce County or in the vicinity of the project area.

Common Name	Scientific Name	Federal Status	State Status
Chinook salmon (Puget Sound ESU)	*Oncorhynchus tshawytscha*	Threatened	N/A
Steelhead trout (Puget Sound DPS)	*Oncorhynchus mykiss*	Threatened	Candidate
Bull trout/dolly varden	*Salvelinus confluentus*	Threatened	Candidate
North American wolverine	*Gulo gulo luscus*	Threatened	Candidate
Marbled murrelet	*Brachyramphus marmoratus*	Threatened	Endangered
Northern spotted owl	*Strix occidentalis caurina*	Threatened	Endangered
Streaked horned lark	*Eremophila alpestris strigata*	Threatened	Endangered
Yellow-billed cuckoo (Western DPS)	*Coccyzus americanus*	Threatened	Endangered
Northwestern pond turtle	*Actinemys marmorata*	Proposed Threatened	Endangered
Monarch Butterfly	*Danaus plexippus*	Candidate	Candidate
Taylor's checkerspot	*Euphydryas editha taylori*	N/A	Endangered
Marsh sandwort	*Arenaria paludicola*	Endangered	Possibly Extirpated

Source: WDFW 2024b; USFWS 2024a, NOAA 2016

Table 4. Common and scientific names of wildlife observed (seen or heard) and wildlife sign recorded along the project site during our December 2022 field investigation.

Common Name	Scientific Name	Location
BIRDS		
American crow	*Corvus brachyrhynchos*	Observed throughout site
American robin	*Turdus migratorius*	Observed throughout site
American wigeon	*Mareca americana*	Golf course pond
Anna's hummingbird	*Calypte anna*	CF, SCR
Bald eagle (juvenile)	*Haliaeetus leucocephalus*	Flying over ESF towards OFL
Bewick's wren	*Thryomanes bewickii*	SCR, OFL forest
Black-capped chickadee	*Poecile atricapillus*	CF
Brown creeper	*Certhia americana*	CF
Bufflehead	*Bucephala albeola*	OFL, PS
Bushtit	*Psaltriparus minimus*	CF, SCR
Canada goose	*Branta canadensis*	OFL, PS
Cedar waxwing	*Bomycilla cedrorum*	ESF
Chestnut-backed chickadee	*Poecile rufescens*	Observed throughout site
Common raven	*Corvus corvax*	SCR
Cooper's hawk	*Accipiter cooperii*	ESF
Dark-eyed Junco	*Junco hyemalis*	CF, SCR
Double-crested cormorant	*Phalacrocorax auritus*	PS
Glaucous-winged gull	*Larus glaucescens*	PS
Golden-crowned kinglet	*Regulus satrapa*	CF, SCR, ESF
Hairy woodpecker (excavations)	*Leuconotopicus villosus*	Edge of CF along boundary with ESF
Hooded grebe	*Podiceps gallardoi*	PS
Hutton's vireo	*Vireo huttoni*	CF, ESF
Lesser scaup	*Aythya affinis*	OFL, PS
Northern flicker	*Colaptes auratus*	CF
Pacific wren	*Troglodytes pacificus*	CF, OFL forest, SCR

Pigeon guillemot	*Cepphus columba*	PS
Pileated woodpecker (excavations)	*Dryocopus pileatus*	Edge of CF along boundary with ESF, SCR
Red-breasted nuthatch	*Sitta canadensis*	CF, OFL forest, ESF
Red-breasted sapsucker	*Sphyrapicus ruber*	CF
Red-winged blackbird	*Agelaius phoeniceus*	OFL, golf course pond
Song sparrow	*Melospiza melodica*	Observed throughout site
Spotted towhee	*Pipilo maculatus*	ESF
Steller's jay	*Cyanocitta stelleri*	CF, ESF
Surf scoter	*Melanitta perspicillata*	PS
California scrub jay	*Aphelocoma californica*	ESF
MAMMALS		
Black-tailed deer (sign)	*Odocoileus hemionus*	CF, ESF
Coyote (sign)	*Canis latrans*	CF, ESF
Deer mouse	*Peromyscus maniculatus*	CF
Douglas squirrel	*Tamiasciurus douglasii*	CF, SCR
Eastern cottontail (sign)	*Sylvilagus floridanus*	Observed throughout site
Harbor seal	*Phoca vitulina*	PS
Raccoon	*Procyon lotor*	CF
Sea lion (California or Steller) (vocalizations)	*Otariidae sp.*	PS
AMPHIBIANS		
Pacific tree frog (call)	*Pseudacris regilla*	Edge of CF and ESF, SCR, OFL forest
AQUATIC SPECIES		
Chinese mystery snail (shells)	*Cipangopaludina chinensis*	OFL

OFL = Old Fort Lake; CF = Conifer Forest; ESF = Early Successional Forest; SCR = Sequalitchew Creek Ravine; PS = Puget Sound

Source: Figure 2

Table 5. Summary of Land Use by Alternative.

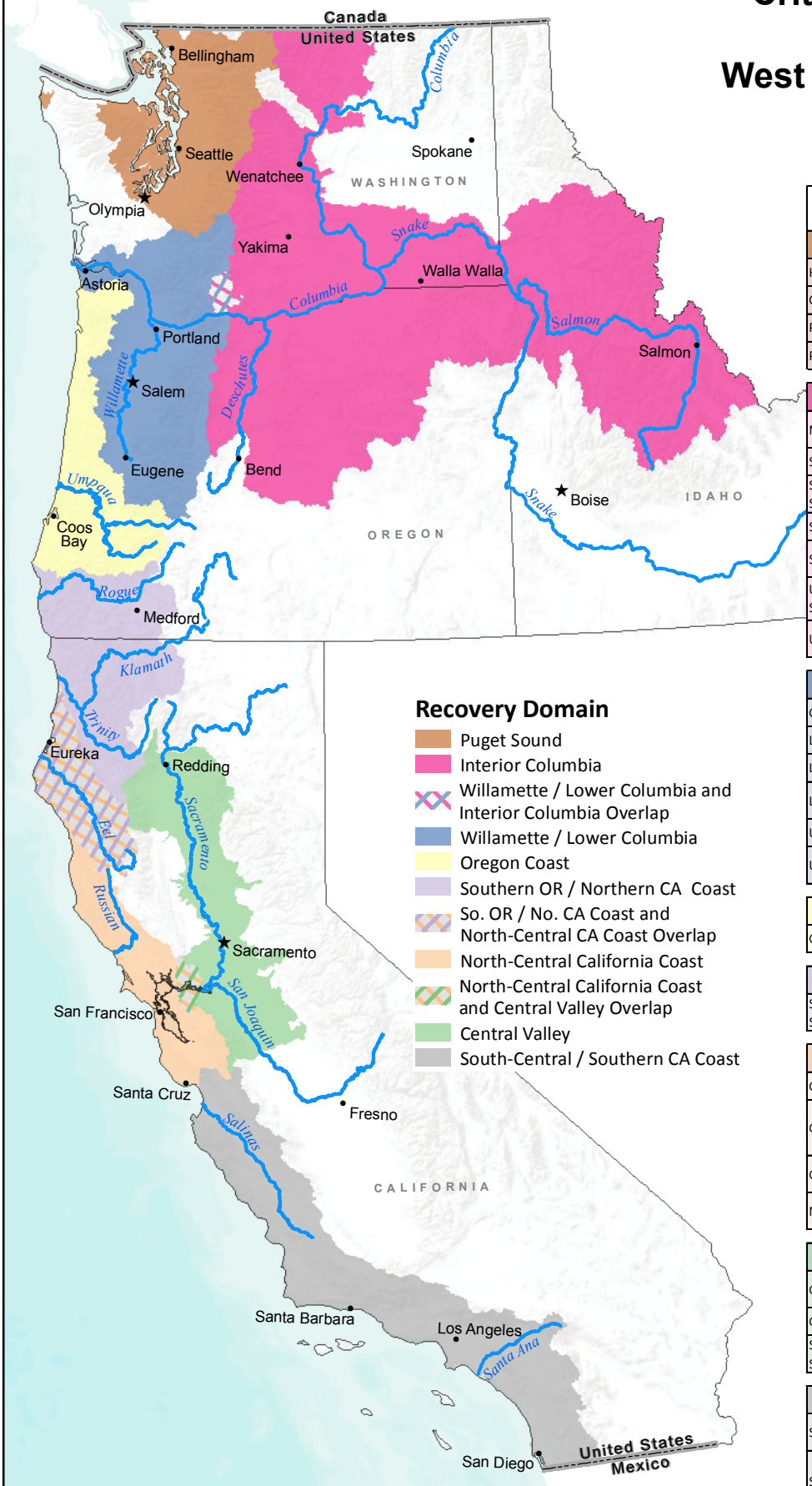
Land Use Designation	**EIS Alt. 1**		**EIS Alt. 2**	
	Ac.	**Units**	**Ac.**	**Units**
Single-Family	70	280-560		
Middle Housing	94	1,128-1,180		
Multi-Family	34	680-1,360		
Subtotal	**198**	**2,088-3,100**		
General Commercial	10			
Neighborhood Business	7			
Entertainment	20			
Civic	10			
Mixed Use Village	--		427	
Mixed Use	--		10	
Subtotal	**47**		**437**	
Parks, Recreation, and Open Space	329		137	
Nisqually Tribe Land	46		46	
Subtotal	**375**		**183**	
TOTAL	**618**	**2,088-3,100**	**618**	
TOTAL CLEARED AREA	**245**		**437**	

Sources: Figures 3, 4, and 5.

APPENDIX A:

Agency Species of Concern Lists:
NOAA Fisheries Status of ESA Listings, West Coast Salmon & Steelhead
USFWS List of Threatened and Endangered Species

Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead



Updated July 2016

Evolutionarily Significant Unit / Distinct Population Segment	ESA Status	Date of ESA Listing	Date of CH Designation
Puget Sound Recovery Domain			
Hood Canal Summer-run Chum Salmon	T	3/25/1999	9/2/2005
Ozette Lake Sockeye Salmon	T	3/25/1999	9/2/2005
Puget Sound Chinook Salmon	T	3/24/1999	9/2/2005
Puget Sound Steelhead	T	5/11/2007	2/24/2016
Interior Columbia Recovery Domain			
Middle Columbia River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Snake River Fall-run Chinook Salmon	T	4/22/1992	12/28/1993
Snake River Spring / Summer-run Chinook Salmon	T	4/22/1992	10/25/1999
Snake River Sockeye Salmon	E	11/20/1991	12/28/1993
Snake River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Upper Columbia River Spring-run Chinook Salmon	E	3/24/1999	9/2/2005
Upper Columbia River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Willamette / Lower Columbia Recovery Domain			
Columbia River Chum Salmon	T	3/25/1999	9/2/2005
Lower Columbia River Chinook Salmon	T	3/24/1999	9/2/2005
Lower Columbia River Coho Salmon	T	6/28/2005	2/24/2016
Lower Columbia River Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Upper Willamette River Chinook Salmon	T	3/24/1999	9/2/2005
Upper Willamette River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Oregon Coast Recovery Domain			
Oregon Coast Coho Salmon	T	2/11/2008	2/11/2008
Southern Oregon / Northern California Coast Recovery Domain			
Southern OR / Northern CA Coasts Coho Salmon	T	5/6/1997	5/5/1999
North-Central California Coast Recovery Domain			
California Coastal Chinook Salmon	T	9/16/1999	9/2/2005
Central California Coast Coho Salmon	E	10/31/1996 (T) 6/28/2005 (E) 4/2/2012 (RE)	5/5/1999
Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Northern California Steelhead	T	6/7/2000 1/5/2006	9/2/2005
Central Valley Recovery Domain			
California Central Valley Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Central Valley Spring-run Chinook Salmon	T	9/16/1999	9/2/2005
Sacramento River Winter-run Chinook Salmon	E	11/5/1990 (T) 1/4/1994 (E)	6/16/1993
South-Central / Southern California Coast Recovery Domain			
South-Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Southern California Steelhead	E	8/18/1997 5/1/2002 (RE) 1/5/2006	9/2/2005

ESA = Endangered Species Act, CH = Critical Habitat, RE = Range Extension
E = Endangered, T = Threatened,

Critical Habitat Rules Cited

- 2/24/2016 (81 FR 9252) Final Critical Habitat Designation for Puget Sound Steelhead and Lower Columbia River Coho Salmon
- 2/11/2008 (73 FR 7816) Final Critical Habitat Designation for Oregon Coast Coho Salmon
- 9/2/2005 (70 FR 52630) Final Critical Habitat Designation for 12 ESU's of Salmon and Steelhead in WA, OR, and ID
- 9/2/2005 (70 FR 52488) Final Critical Habitat Designation for 7 ESU's of Salmon and Steelhead in CA
- 10/25/1999 (64 FR 57399) Revised Critical Habitat Designation for Snake River Spring/Summer-run Chinook Salmon
- 5/5/1999 (64 FR 24049) Final Critical Habitat Designation for Central CA Coast and Southern OR/Northern CA Coast Coho Salmon
- 12/28/1993 (58 FR 68543) Final Critical Habitat Designation for Snake River Chinook and Sockeye Salmon
- 6/16/1993 (58 FR 33212) Final Critical Habitat Designation for Sacramento River Winter-run Chinook Salmon

ESA Listing Rules Cited

- 4/2/2012 (77 FR 19552) Final Range Extension for Endangered Central California Coast Coho Salmon
- 2/11/2008 (73 FR 7816) Final ESA Listing for Oregon Coast Coho Salmon
- 5/11/2007 (72 FR 26722) Final ESA Listing for Puget Sound Steelhead
- 1/5/2006 (71 FR 5248) Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead
- 6/28/2005 (70 FR 37160) Final ESA Listing for 16 ESU's of West Coast Salmon
- 5/1/2002 (67 FR 21586) Range Extension for Endangered Steelhead in Southern California
- 6/7/2000 (65 FR 36074) Final ESA Listing for Northern California Steelhead
- 9/16/1999 (64 FR 50394) Final ESA Listing for Two Chinook Salmon ESUs in California
- 3/25/1999 (64 FR 14508) Final ESA Listing for Hood River Canal Summer-run and Columbia River Chum Salmon
- 3/25/1999 (64 FR 14517) Final ESA Listing for Middle Columbia River and Upper Willamette River Steelhead
- 3/25/1999 (64 FR 14528) Final ESA Listing for Ozette Lake Sockeye Salmon
- 3/24/1999 (64 FR 14308) Final ESA Listing for 4 ESU's of Chinook Salmon
- 3/19/1998 (63 FR 13347) Final ESA Listing for Lower Columbia River and Central Valley Steelhead
- 8/18/1997 (62 FR 43937) Final ESA Listing for 5 ESU's of Steelhead
- 5/6/1997 (62 FR 24588) Final ESA Listing for Southern Oregon / Northern California Coast Coho Salmon
- 10/31/1996 (61 FR 56138) Final ESA Listing for Central California Coast Coho Salmon
- 1/4/1994 (59 FR 222) Final ESA Listing for Sacramento River Winter-run Chinook Salmon
- 4/22/1992 (57 FR 14653) Final ESA Listing for Snake River Spring/summer-run and Snake River Fall Chinook Salmon
- 11/20/1991 (56 FR 58619) Final ESA Listing for Snake River Sockeye Salmon
- 11/5/1990 (55 FR 46515) Final ESA Listing for Sacramento River Winter-run Chinook Salmon

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
Phone: (360) 753-9440 Fax: (360) 753-9405

In Reply Refer To: 06/28/2024 02:02:45 UTC
Project Code: 2023-0057203
Project Name: Old Fort Lake Master Plan

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Washington Fish And Wildlife Office
510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263
(360) 753-9440

PROJECT SUMMARY

Project Code: 2023-0057203
Project Name: Old Fort Lake Master Plan
Project Type: Government / Municipal (Non-Military) Construction
Project Description: The project is an update of the Old Fort Lake Master Plan.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@47.1081351,-122.66116285145591,14z



Counties: Pierce County, Washington

ENDANGERED SPECIES ACT SPECIES

There is a total of 9 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
North American Wolverine *Gulo gulo luscus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5123	Threatened

BIRDS

NAME	STATUS
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Northern Spotted Owl *Strix occidentalis caurina* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/1123	Threatened
Streaked Horned Lark *Eremophila alpestris strigata* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* Population: Western U.S. DPS There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/3911	Threatened

REPTILES

NAME	STATUS
Northwestern Pond Turtle *Actinemys marmorata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1111	Proposed Threatened

FISHES

NAME	STATUS
Bull Trout *Salvelinus confluentus* Population: U.S.A., coterminous, lower 48 states There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8212	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Marsh Sandwort *Arenaria paludicola*	Endangered

No critical habitat has been designated for this species.
Species profile: https://ecos.fws.gov/ecp/species/2229

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Bull Trout *Salvelinus confluentus*	Final

https://ecos.fws.gov/ecp/species/8212#crithab

IPAC USER CONTACT INFORMATION

Agency: DuPont city
Name: Courtney Straight
Address: 2111 N. Northgate Way, Suite 219
City: Seattle
State: WA
Zip: 98133
Email court.straight@gmail.com
Phone: 2063839434

LEAD AGENCY CONTACT INFORMATION

Lead Agency: DuPont city

FEHR PEERS

Memorandum

Date: June 18, 2024

To: Barbara Kincaid, City of DuPont

From: Michael Adamson and Dan Grayuski, Fehr & Peers

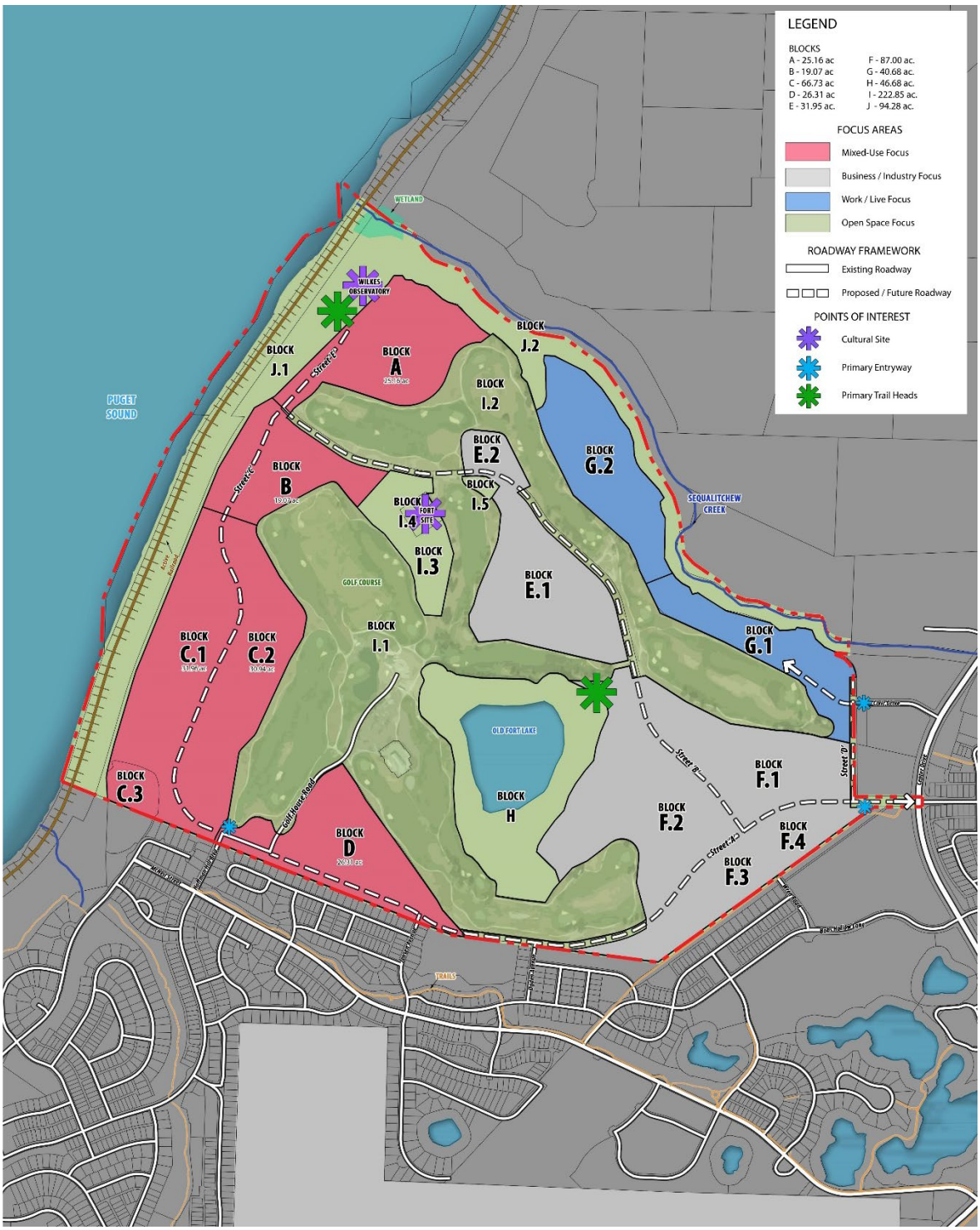
Subject: Final Existing Conditions Memorandum for Old Fort Lake Subarea

TC22-0061

The purpose of this memorandum is to summarize the existing conditions of the City of DuPont transportation network, focused on areas that would serve the Old Fort Lake Subarea. Summarized within this memorandum are the facility conditions for both active transportation and vehicle modes, traffic operations for vehicle modes and a review of existing plans and recent studies performed both within the City of DuPont and regionally.

Figure 1 shows the high-level planned uses for the Old Fort Lake Subarea, per the previous subarea plan completed in 2017. The proposed uses for the Old Fort Lake Subarea are still being defined, and development impacts as well as future transportation conditions under No Action and proposed land use alternatives for the Subarea will be revisited in subsequent memoranda.

Figure 1. High-Level Planned Uses for Old Fort Lake Subarea



Source: City of DuPont *Old Fort Lake Subarea Plan*, 2017.

Existing Conditions

This section covers multiple aspects of the transportation network serving the subarea. Included is a high-level assessment of the roadway, transit, active transportation, and freight networks, in addition to safety for all modes and parking conditions in and around the subarea.

Roadway Network

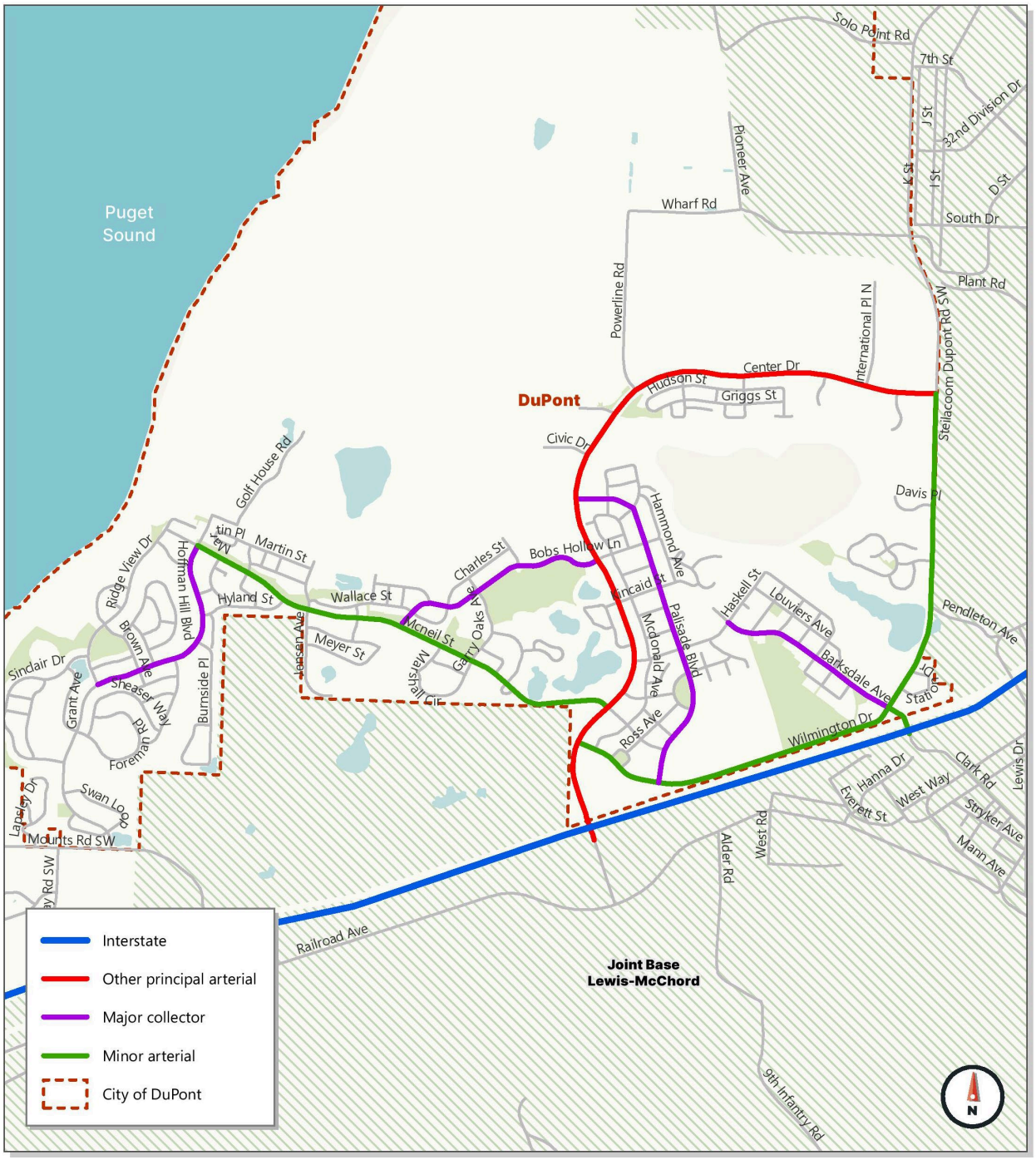
The City of DuPont lies along the I-5 corridor just north of the Joint Base Louis McChord (JBLM), along the southwest border of Pierce County. There are two interchanges on I-5 that provide connection to the City of DuPont, with one of those interchanges also shared with JBLM. However, the City experiences access challenges to and from I-5 as a result of its proximity to JBLM, which is a major employer in both Pierce and Thurston Counties. Peak hour commute traffic to the Base often causes congestion around the Barksdale Interchange and interchanges to the north, leading to high delay for DuPont residents and others attempting to access I-5. DuPont-Steilacoom Road does serve as a potential access point to the north but is not a high-demand corridor for regional travel.

The City has four roadway classifications: Local Roads (comprising the majority of roadways within the City), Major Collectors, Minor Arterials, and Principal Arterials. These functional classifications are aligned with FHWA and WSDOT definitions, and are summarized in **Figure 2**. Center Drive from I-5 exit 118 to DuPont-Steilacoom Road is the only Principal Arterial in the City, with McNeil Street and DuPont-Steilacoom Road classified as Minor Arterials.

DuPont has posted speed limits throughout the City ranging from 25 to 45 miles per hour. **Figure 3** summarizes the posted speed limit on each roadway in the City that is classified as a collector or arterial.

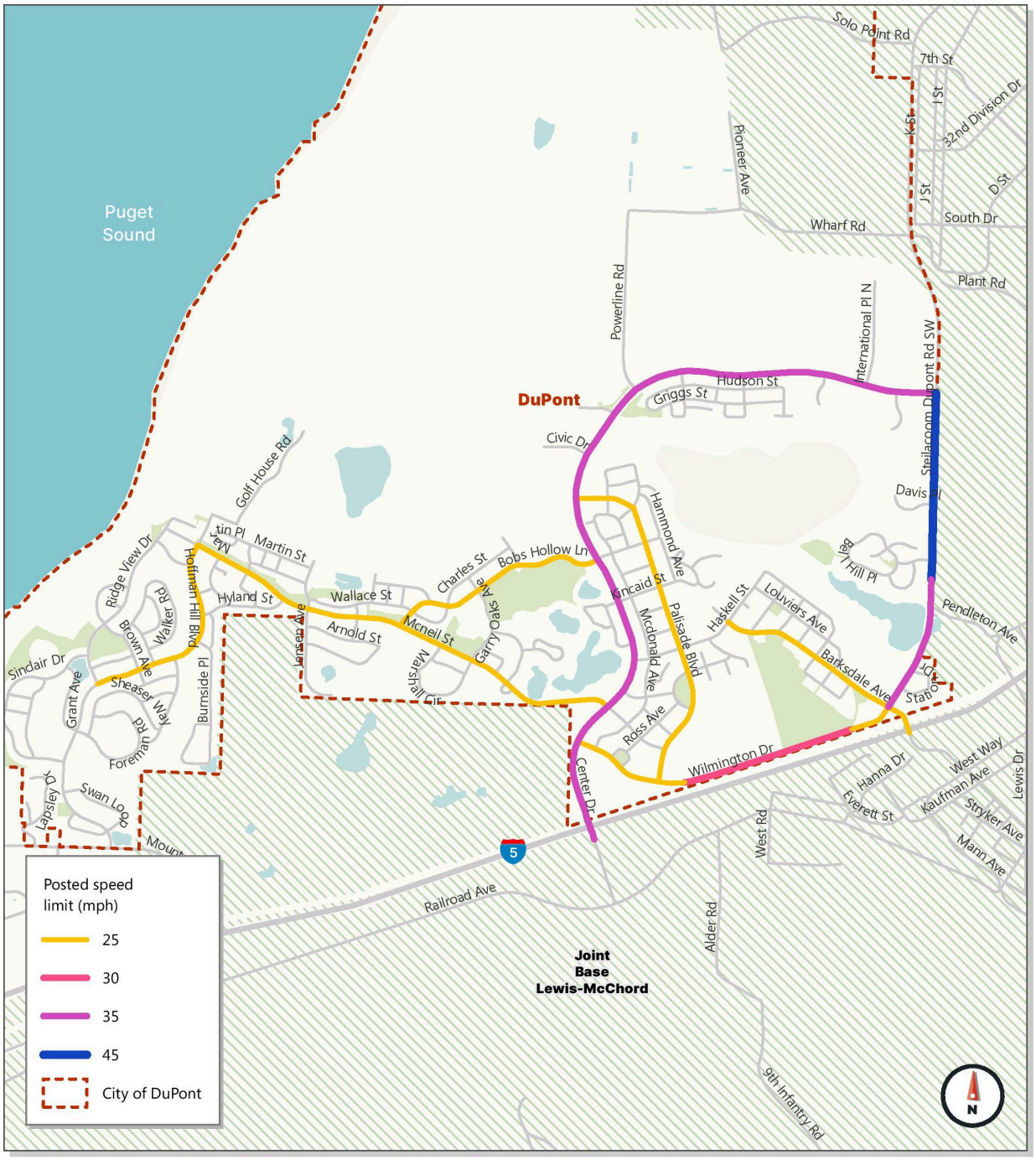
Figure 4 shows the locations of all controlled intersections along a collector or arterial within the City. There are currently 11 signalized intersections with the majority located along Center Drive. Separate from Center Drive and the intersection of DuPont-Steilacoom Road and Barksdale Avenue, the intersections either have a roundabout or are stop controlled. The majority of intersections along McNeil Street, Hoffman Hill Boulevard, Palisade Boulevard, and Barksdale Avenue are two-way stop controlled (side-street stop controlled).

Figure 2. Roadway Functional Classification



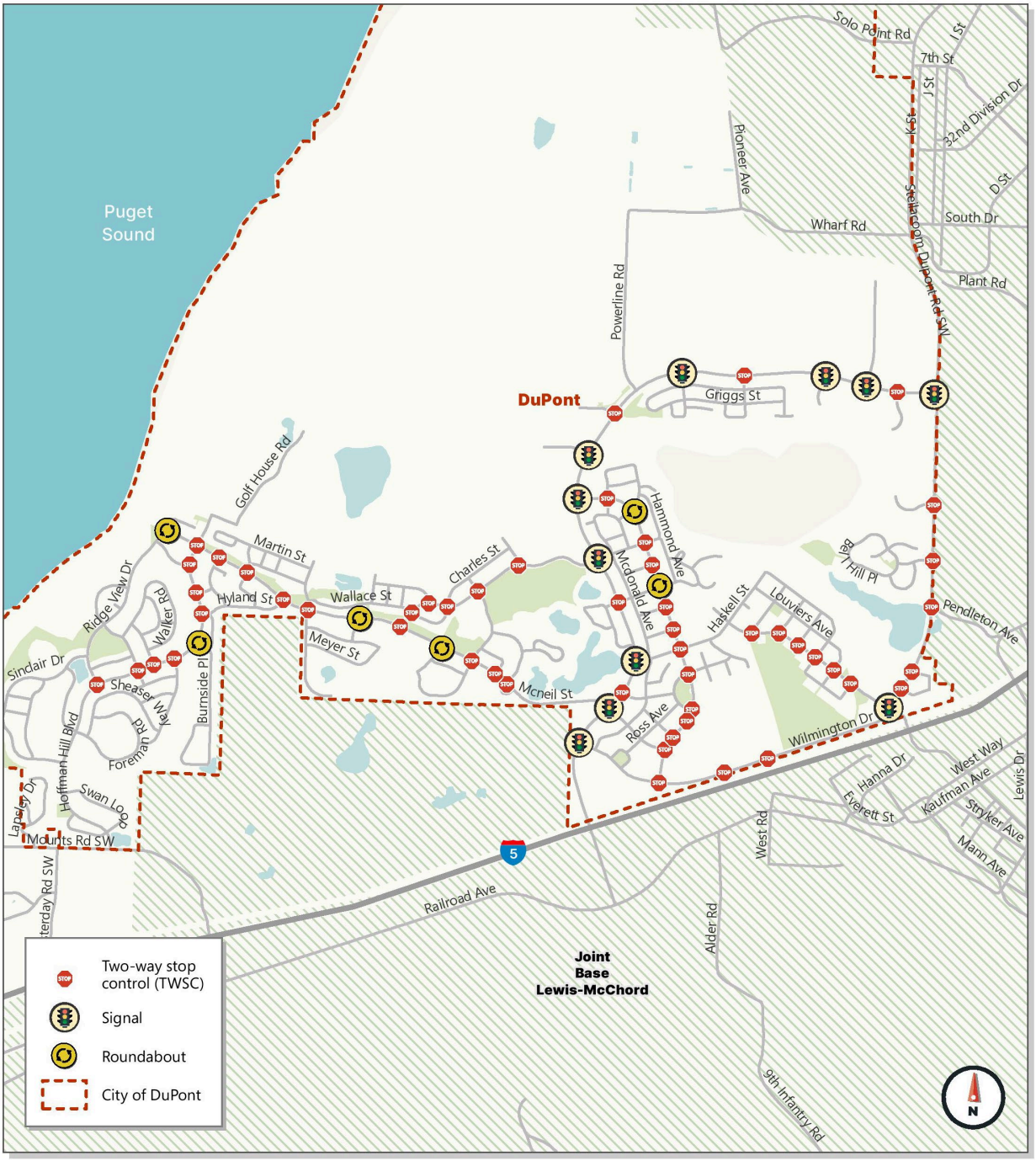
Source: Fehr and Peers, 2023.

Figure 3. Posted Speed Limits on Collectors and Arterials in DuPont



Source: Fehr and Peers, 2023.

Figure 4. Intersection Controls on Collectors and Arterials in DuPont



Source: Fehr and Peers, 2023.

Transit Network

DuPont Station, located on the southeast corner of Wilmington Drive and Palisade Boulevard, serves as the transit hub for the community. This transit center contains 12 bus bays, 126 parking spaces, bike racks, and bike lockers. DuPont Station is served by two regional commute bus routes; ST 592 and ST 594, operated by Sound Transit:

- **ST 592:** Connecting DuPont and Lakewood to Downtown Seattle, with 30-minute headways. Runs during peak hours only.
- **ST 594:** Connecting Lakewood to Downtown Seattle, with one bus in the AM and one bus in the PM that also stops in DuPont.

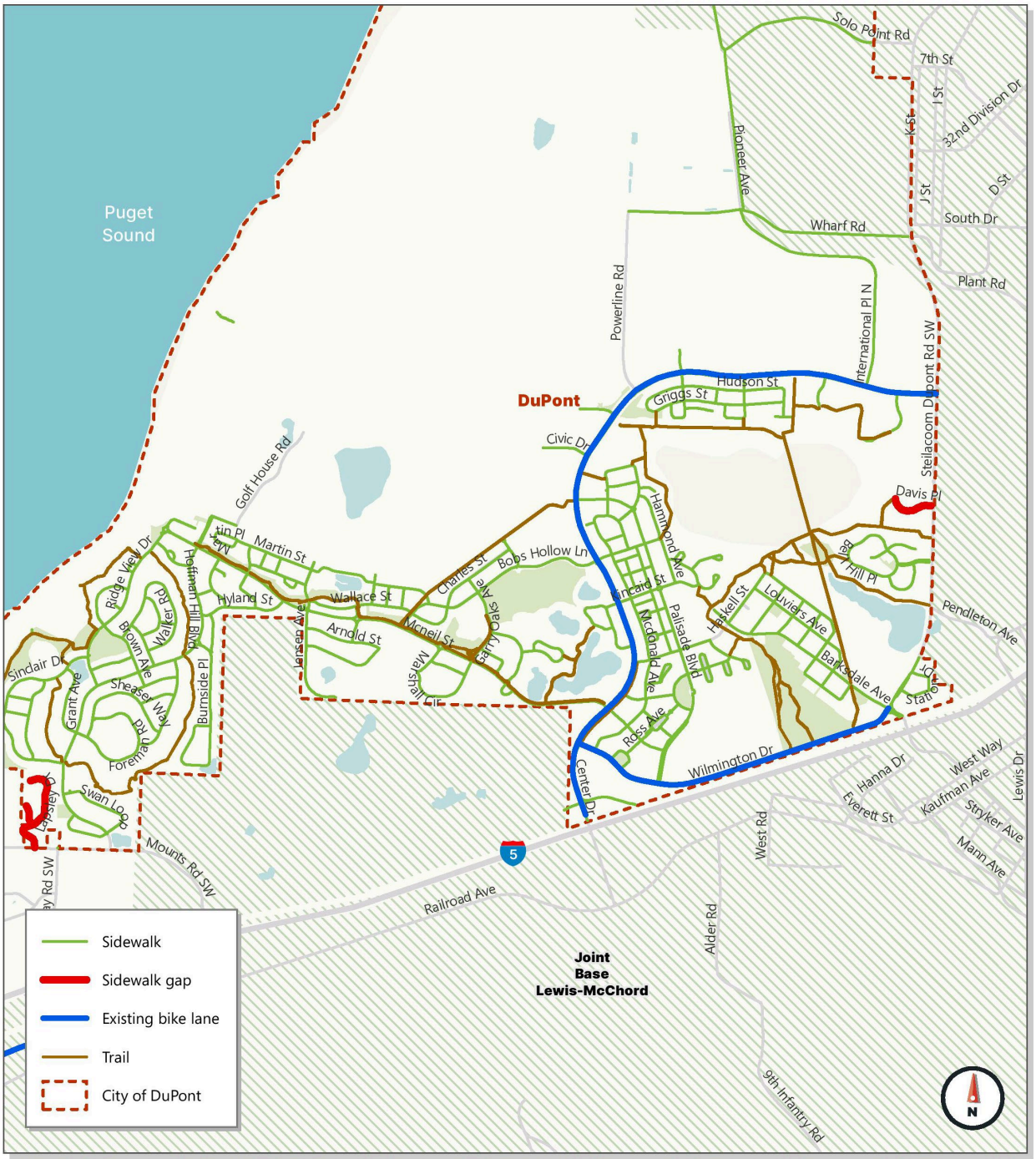
DuPont Station is served exclusively during the peak commute periods of the day, with ST 592 being the only route that has multiple buses stop in DuPont over either peak period. Additionally, Go Transit is an independent transit service that connects Joint Base Lewis-McChord (JBLM) to DuPont Station, in addition to other nearby park and rides. Intercity Transit and Pierce Transit currently do not offer service to the facility.

There is currently no transit service within other areas within the City, including the Old Fort Lake Subarea. As the City expands its employment base with pipeline projects, local transit service may be beneficial. This can be achieved through adding a limited-service fixed route or on-call micro mobility service in coordination with Pierce Transit and/or Intercity Transit.

Active Transportation Network

The Old Fort Lake Subarea is adjacent to Center Drive, which includes a mix of active transportation infrastructure. Some stretches of the corridor contain sidewalks on both sides and striped bicycle lanes, but these facilities do not extend the full length of Center Drive. Outside of the Center Drive corridor, bicycle facilities are limited. Sidewalks exist on both sides of the street throughout most of DuPont, with the exception of DuPont-Steilacoom Road and Lapsley Drive (in the southwest corner of the City). DuPont-Steilacoom Road lacks paved shoulders and would require widening to provide sidewalks and bicycle facilities. In addition to the previously discussed facilities, there is an extensive trail network away from roadways connecting areas throughout the City. All of these active transportation facilities are shown in **Figure 5**.

Figure 5. Active Transportation Facilities



Source: Fehr and Peers, 2023.

Freight Network

DuPont-Steilacoom Road serves as the principal freight corridor within the City, connecting freight to the industrial, manufacturing, and fulfillment warehousing uses to the north. Center Drive at DuPont-Steilacoom Road and Barksdale Avenue at DuPont-Steilacoom Road are the intersections with the highest percentage of heavy vehicles in the City, with 8-10 percent of vehicles passing through these intersections during the AM peak hour considered to be heavy vehicles. Per DuPont Municipal Code 16.05.020, commercial vehicles, with or without trailers, having a gross vehicle weight in excess of 14,000 pounds shall be permitted on DuPont/Steilacoom Road, Center Drive from its intersection with Interstate 5 to McNeil Street, Center Drive from its intersection with DuPont Steilacoom Road to Palisade Boulevard, and the entire length of Wharf Road. The typical freight routing within the City, with this restriction in place, is shown in **Figure 6**.

Figure 6. Freight Network



Source: Fehr and Peers, 2023.

Parking

The Old Fort Lake Subarea is currently undeveloped, so there are no parking facilities within the Subarea itself. On a citywide level, on-street parking exists on all local (residential) roadways, in addition to along McNeil Street. Neither Center Drive nor DuPont-Steilacoom Road has on-street parking facilities.

Safety

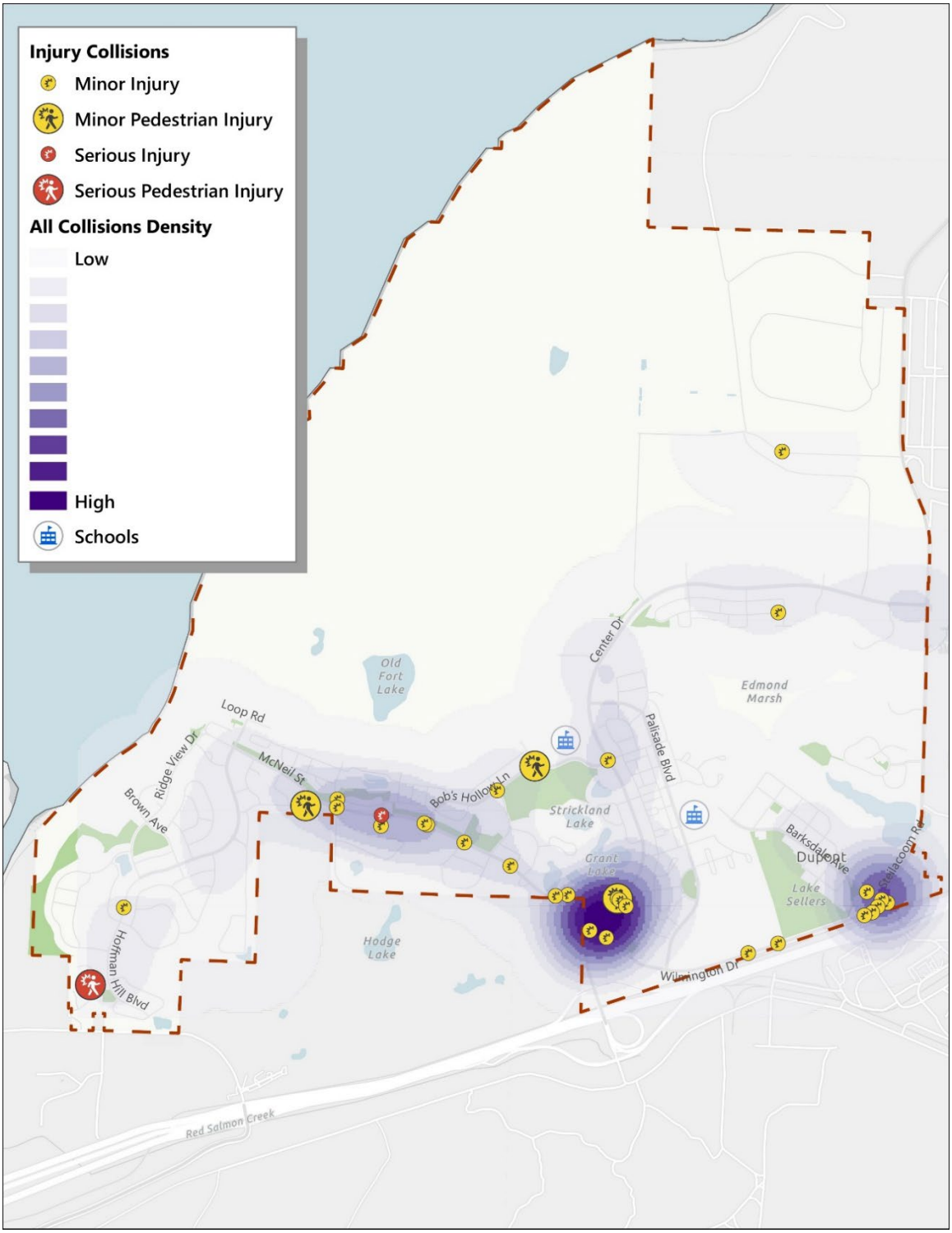
The DuPont Local Road Safety Plan (LRSP), completed in March 2022, analyzed safety trends citywide based on five years of WSDOT collision data (2017-2021). Of the collisions that occurred on DuPont streets between 2016 and 2020, one percent of collisions had a serious injury (2 out of 209 total), which is similar to the proportion of fatal and serious injury collisions in other cities in Washington. In addition, there were 37 injuries, 4 pedestrian collisions, and 4 bicycle collisions in the past five years.

Figure 7 shows a heat map of all collisions in the City of DuPont, overlayed with injury and bicycle/pedestrian collisions. Of the study intersections, three higher-volume intersections have higher collision histories when compared to trends citywide:

- Center Drive and Wilmington Road (17 collisions)
- Center Drive and McNeil Street (11 collisions)
- DuPont-Steilacoom Road and Barksdale Avenue (15 collisions)

These intersections all serve as gateways between I-5 and the City of DuPont and will likewise serve as important pass-through intersections to access the Subarea. The Barksdale Avenue intersection will be rebuilt and relocated to the north of the existing intersection. The existing intersection will be revised to be an all-way stop control intersection, per recent conversations with WSDOT.

Figure 7. Heatmap of All Collisions



Source: City of DuPont *Local Road Safety Plan*, 2022

Traffic Operations

Study Intersections

The existing conditions analysis included eight study intersections throughout the City of DuPont that may be affected by land use changes in the subarea. These study intersections were defined in scoping conversations with City staff. The following intersections were analyzed:

1. Center Drive & Wilmington Drive
2. Center Drive & McNeil Street
3. Center Drive & Bob's Hollow Lane
4. Center Drive & Palisade Boulevard
5. Center Drive & Civic Drive
6. Center Drive & Steilacoom-DuPont Road
7. Steilacoom-DuPont Road/ Wilmington Drive & Barksdale Avenue
8. Bobs Hollow Lane & McNeil Street

Traffic counts were collected on Tuesday, October 4th, 2022 at seven of the above study intersections during the AM and PM peak periods (7-9 AM and 4-6 PM, respectively). These traffic counts are included in **Attachment A**, and traffic volumes at each study intersection are summarized on **Figure 8**. The counts for Bobs Hollow Lane & McNeil Street were pulled from the Patriots Landing Elementary TIA, completed in 2022 and provided in **Attachment B**.

It should be noted that an imbalance in volumes was observed in the counts on Center Drive between Civic Drive and Palisade Boulevard, as well as between Bobs Hollow Lane and Palisade Boulevard. Some imbalance can be expected in traffic counts due to nearby driveways or differences in the peak hour of the counts being compared. However, as there are no driveways or other accesses on these segments, the imbalance was corrected.

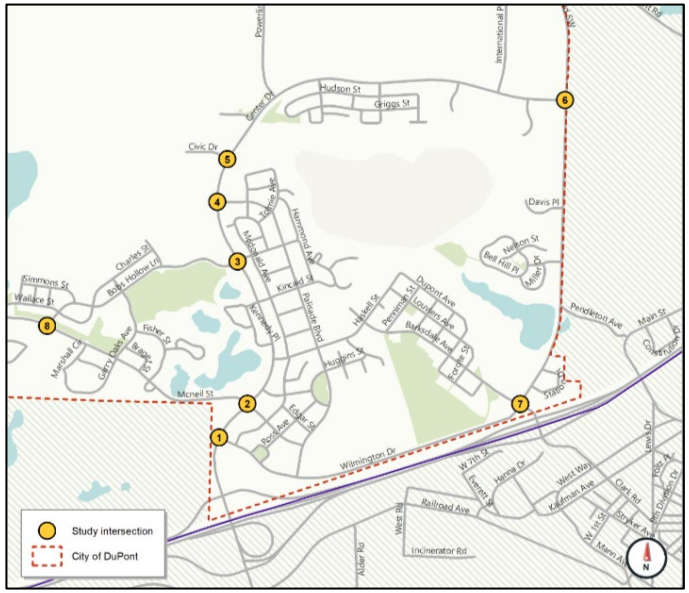
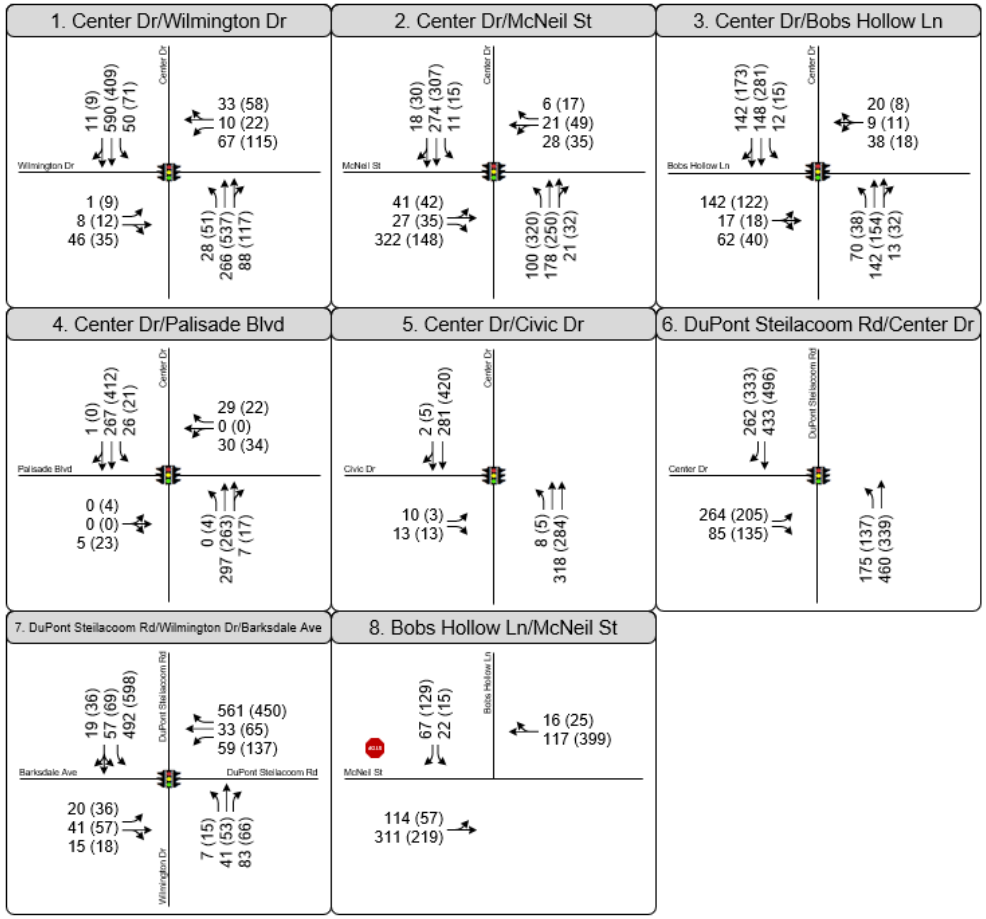


Figure 8. Existing Traffic Volumes for the AM and PM Peak Hours



Source: Fehr and Peers, 2023. **Note, volumes denoted as AM Peak (PM Peak).**

Intersection Level of Service

LOS Methodology

Level of Service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst.

Table 1 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections. The Highway Capacity Manual 6th Edition (HCM 6) methodology was used in this study to remain consistent with "state of the practice" professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For side-street stop-controlled intersections, the LOS is provided for the worst performing movement. Synchro Traffic Analysis Software, 11th Edition, was used to perform the calculations.

The City currently has an LOS D standard. There are exceptions to the standard outlined in the 2015 Comprehensive Plan:

- The intersection of Steilacoom-DuPont Road/Wilmington Drive and Barksdale Avenue, which is allowed to reach an LOS E.
- The City can consider a variance to the Public Works Standards at locations failing the City standard where the potential mitigation is not reasonable or desirable.

Table 1. Level of Service Descriptions

LOS	Description	Signalized Intersections Avg. Delay (sec/veh)[1]	Unsignalized Intersections Avg. Delay (sec/veh)[2]
A	*Free Flow / Insignificant Delay* Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.	< 10.0	< 10.0
B	*Stable Operations / Minimum Delays* Good progression. The presence of other users in the traffic stream becomes noticeable.	> 10.0 to 20.0	> 10.0 to 15.0
C	*Stable Operations / Acceptable Delays* Fair progression. The operation of individual users is affected by interactions with others in the traffic stream	> 20.0 to 35.0	> 15.0 to 25.0
D	*Approaching Unstable Flows / Tolerable Delays* Marginal progression. Operating conditions are noticeably more constrained.	> 35.0 to 55.0	> 25.0 to 35.0
E	*Unstable Operations / Significant Delays Can Occur* Poor progression. Operating conditions are at or near capacity.	> 55.0 to 80.0	> 35.0 to 50.0
F	*Forced, Unpredictable Flows / Excessive Delays* Unacceptable progression with forced or breakdown of operating conditions.	> 80.0	> 50.0

1. Overall intersection LOS and average delay (seconds/vehicle) for all approaches.
2. Worst movement LOS and delay (seconds/vehicle) only.

Source: Fehr & Peers, based on *Highway Capacity Manual 6th Edition*.

Traffic Analysis Results

Table 2 contains the LOS and delay for each of the study intersections for both the AM and PM peak hours. All study intersections are operating at an acceptable level of service. Each intersection currently operates at LOS C or better. The longest delay of 20 seconds occurs during the PM peak hour at the Steilacoom-DuPont Road/Wilmington Drive and Barksdale Avenue intersection, but that level of delay is still well within the City standard. As such, this analysis does not indicate there are any level of service deficiencies under existing conditions. Detailed level of service results for each study intersection are provided in **Attachment C**.

Table 2. Study Intersection Delay and Level of Service for AM and PM Peak Hours

ID	Study Intersection	AM LOS / Control Delay (s)	PM LOS / Control Delay (s)
1	Center Drive & Wilmington Drive	B/10	B/11
2	Center Drive & McNeil Street	B/11	B/14
3	Center Drive & Bob's Hollow Lane	B/11	B/10
4	Center Drive & Palisade Boulevard	A/7	A/8
5	Center Drive & Civic Drive	A/5	A/5
6	Center Drive & Steilacoom-DuPont Road	B/15	B/14
7	Steilacoom-DuPont Road/ Wilmington Drive & Barksdale Avenue	B/17	B/20
8	Bobs Hollow Lane & McNeil Street[1]	C/16 (SBL)	C/17 (SBL)

Notes:
1. Intersection 8 is a side-street stop control intersection. Per HCM 6th methodology, the worst movement LOS is reported.
Source: Fehr and Peers, 2023.

Future Plans and Studies

Development Project Transportation Impact Analyses

There are multiple development projects in various stages of entitlement within the City of DuPont that will add trips to the roadway network surrounding the subarea. These development (pipeline) projects are listed below:

- Pioneer Aggregates South Parcel Project[1]
- Barksdale Station
- Bridge Point 220
- Civic Center Phase 2
- Civic Center Phase 3
- Dupont Industrial
- Patriots Landing
- DuPont Public Works Facility
- Williamson Place East

The land uses for these pipeline projects include warehouse, office, restaurant, utility, residential, and school. In total, the pipeline projects are estimated to generate approximately 1,236 and 798 additional vehicle trips during the AM and PM peak hours, respectively. There are no expected added project trips from the Pioneer Aggregates South Parcel Project.

Transportation Plans

This section describes existing local area plans and planned improvements to the transportation network. Some long-range plans identify strategies for the development of the subarea, and others recommend specific roadway improvements such as new bicycle and pedestrian facilities. Future transportation improvements will be incorporated into No Action and Planned Action alternatives developed as part of this project.

DuPont Old Fort Lake Subarea Plan (2017)

The Old Fort Lake Subarea was originally studied in 2017, with a plan developed at that time. As part of that planned development, robust community outreach was performed, and priorities were created for the overall transportation network within the subarea itself. Based on this community feedback, the following priorities were defined for the subarea:

[1] It should be noted that Pioneer Aggregates South Parcel Project has essentially no trips associated with it, as most of the traffic is already present within the existing roadway network.

1. Provide a robust multimodal transportation network that serves a variety of users.
2. Provide excellent street design that complements desired future land uses and reflects community values.
3. Plan a well-connected and efficient road network.

The ongoing Old Fort Lake Subarea Plan serves as an update to the original subarea plan created in 2017. As part of this update, land use assumptions are anticipated to shift, in addition to the overall layout of the subarea.

DuPont Comprehensive Plan (2015)

Last amended in 2021, the Comprehensive Plan articulates the City's vision for its future for the next 20 years. Transportation-related goals and priorities from the Comprehensive Plan focus on improving access and flow to I-5, in addition to multimodal priorities, as follows:

1. Continue working with regional partners to develop and implement projects that reduce I-5 congestion, including improvements to DuPont-Steilacoom Road and the Mounts Road connection.
2. Support measures to restore local transit services, integrating the regional bus and rail mass transit services available in DuPont, Lakewood, Tacoma, and Olympia.
3. Maintain the existing transportation system and fill gaps in the non-motorized network (including pedestrian sidewalks, trails, and the bicycle facilities).
4. Monitor the progress of high-speed rail services and ensure that impacts on DuPont are mitigated.[2]

Transportation Improvement Program: 2022 – 2027

The Six-Year Transportation Improvement Program for 2022-2027 (TIP) outlines short- and long-term transportation projects – including the addition of new sidewalks, curb, gutter, and road overlays – throughout the City. The following projects were identified in the TIP as affecting roadway or active transportation capacity:

Projects:

- **Powerline Road Improvements** – From Center Drive to Wharf Road, design and construct new arterial roadway along Powerline Road.

[2] There are currently no firm plans for high-speed rail connections within the Puget Sound area. However, it should be noted that many commuters and regions are currently studying the feasibility of its implementation, including Thurston County.

- **Center Drive Traffic Signal Coordination** – From 1-5 Exit 118 to DuPont-Steilacoom Road, wireless connection of eight traffic control lights on Center Drive.
- **I-5 Exit 119 Reconstruction** – Reconstruct interchange at DuPont Steilacoom Road to include two separate interchanges, one connecting directly to DuPont Steilacoom Road and one at the existing interchange location at Barksdale Avenue.
- **DuPont Steilacoom Road Improvements** – Roadway improvements, including improvements at the intersection of DuPont Steilacoom Road and Center Drive.
- **McNeil Street and Ridge View Drive Reconfiguration** – Reconfigure the roundabout at this intersection.

Studies:

- **Sequalichew Creek Pedestrian Crossing onto Center Drive** – Study the type and feasibility of a pedestrian crossing on Center Drive at the Sequalichew Creek.
- **Northeast City Access Feasibility Study** – Study access improvements and future plans for vehicle access in the northeastern portion of the City.
- **Vehicle Access to Puget Sound Feasibility Study** – Study potential vehicle access options to the Puget Sound waterfront.

The TIP also notes that a South Loop Road will be constructed to connect Hoffman Hill Boulevard to Center Drive; this road lies within the subarea, and it is assumed that it will be constructed as part of the buildout of the subarea.

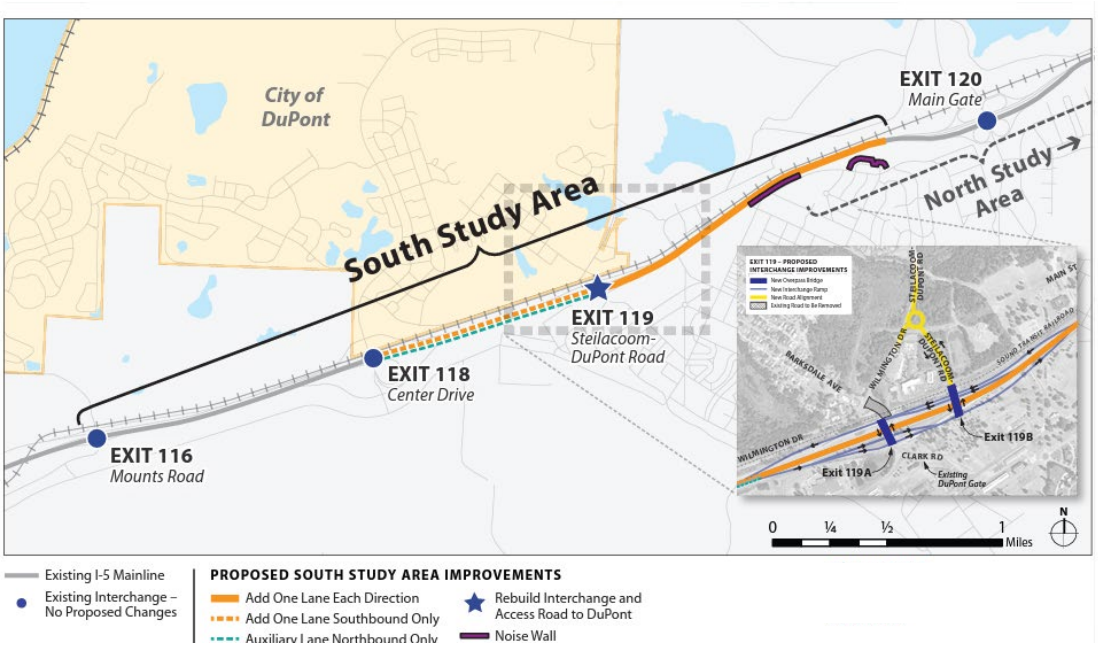
I-5 JBLM Vicinity Congestion Relief Project

Numerous studies have been completed in relation to I-5 within the JBLM vicinity. This area has historically experienced elevated levels of congestion, related to JBLM Base traffic, and these studies have sought to relieve this congestion, improve local and mainline system efficiency, enhance mobility, and support the regional HOV network, improve safety, and increase transit and travel demand management opportunities. In the South Study Area Report (completed in 2020), the following build alternative was defined for I-5 near DuPont (represented graphically in **Figure 9**). It should be noted that some of these improvements are already under construction or completed:

- An added I-5 lane in each direction from Center Drive to north of the Steilacoom-DuPont Road interchange.
- Designation of one northbound I-5 lane for HOV use from Mounts Road to Thorne Lane and one southbound I-5 lane for HOV use from Thorne Lane to Steilacoom-DuPont Road.
- A new northbound auxiliary lane from Center Drive to Steilacoom-DuPont Road.
- A reconfigured interchange at Steilacoom-DuPont Road.
- A new access road to I-5 (to be named Steilacoom-DuPont Road).
- Reconfiguration of Steilacoom-DuPont Road intersection at Wilmington Drive/Barksdale Avenue.

- A new shared use bicycle and pedestrian path connecting the JBLM DuPont Gate to Steilacoom-DuPont Road and Wilmington Drive.
- Supporting features such as stormwater management, illumination, traffic signals, Intelligent Transportation Systems (ITS), and signing would also be included in the Project.

Figure 9. I-5 JBLM Vicinity Congestion Relief Project, Build Alternative



Source: WSDOT *I-5 JBLM Vicinity Congestion Relief Project – South Study Area*, 2021.

Sound Transit ST 3 System Plan

The goal of the Sound Transit ST 3 System Plan is to improve and expand the regional transit system by connecting the major cities in King, Pierce and Snohomish Counties with light rail, Bus Rapid Transit (BRT), express bus and commuter rail. Included in the planned system expansion is the **Sounder Extension to DuPont** project. As part of this project, Sounder South will extend south from Lakewood, adding new stations at Tillicum and DuPont, both with parking. This extension is anticipated to be open for service by 2045, and will provide commuter rail connection for DuPont residents, as well as for regional commuters accessing JBLM. It is anticipated that this could have an impact not only on transit usage within the City itself, but also on overall commuter traffic to JBLM.

Key Findings and Subarea Implications

- The subarea lacks transit connections to the rest of the City.
- There are sidewalks throughout the majority of the City of DuPont, in addition to an extensive trail network. Though bicycle lanes exist on Center Drive and portions of Wilmington Drive, these facilities are not separated and likely are only comfortable for use by experienced bicyclists.
- The City of DuPont experienced a higher density of collisions centered around the high-volume intersections of Center Drive and Wilmington Road, Center Drive and McNeil Street, as well as DuPont-Steilacoom Road and Barksdale Avenue.
- All intersections operate at LOS C or better under existing conditions.
- The No Action alternative will account for the improvements to I-5 as a result of the I-5 JBLM Vicinity Congestion Relief Project. The other TIP projects could be considered in the future as potential mitigation strategies for traffic impacts, but will not be assumed in the No Action alternative.

Attachment A – Traffic Counts

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

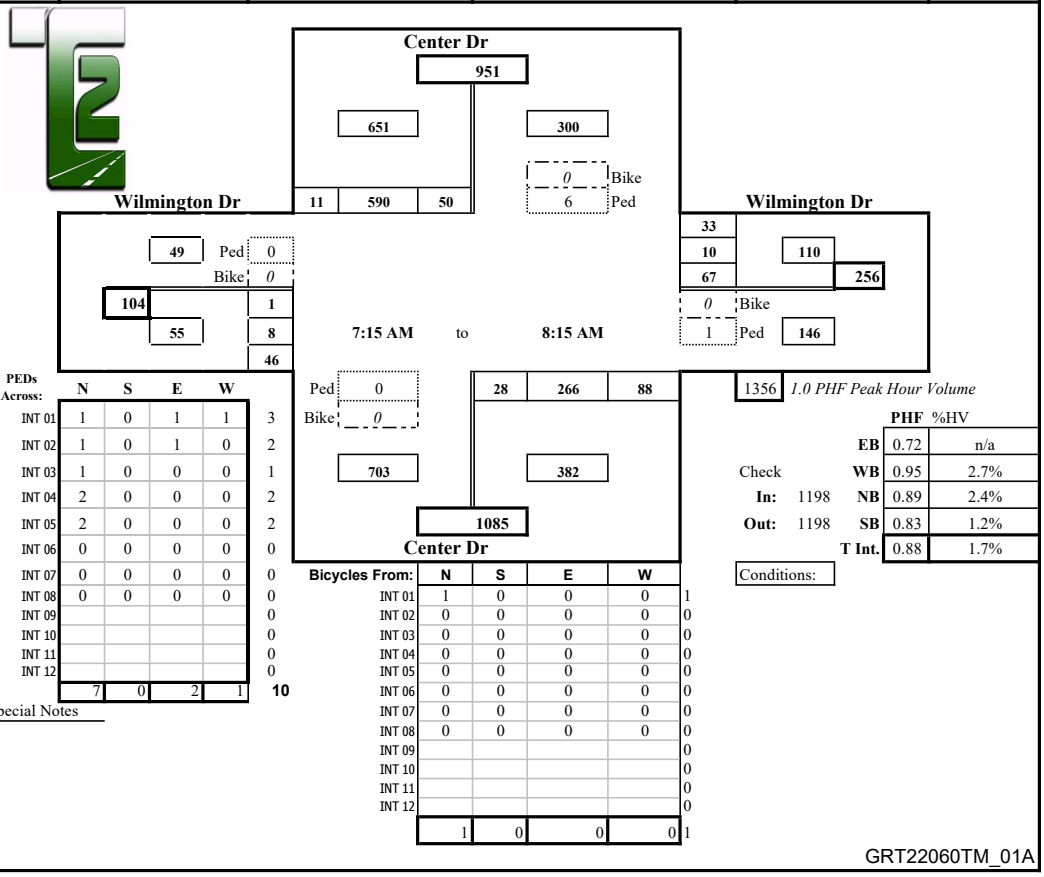
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Wilmington Dr **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Wilmington Dr				From West on (EB) Wilmington Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	3	12	143	1	1	7	61	14	0	22	1	3	0	2	3	8	277
7:30 A	1	10	129	2	3	11	74	22	2	18	0	9	0	0	1	8	284
7:45 A	3	15	179	2	3	6	70	22	0	19	2	5	0	0	3	16	339
8:00 A	2	11	137	2	1	2	68	25	0	14	4	11	0	1	1	14	290
8:15 A	2	14	145	5	2	9	54	19	1	16	4	8	0	0	3	8	285
8:30 A	0	12	128	5	4	6	57	20	2	19	5	5	0	0	2	14	273
8:45 A	0	7	134	5	3	13	60	35	0	24	3	7	0	1	2	8	299
9:00 A	4	7	141	4	2	17	41	44	1	21	3	9	0	2	1	9	299
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	15	88	1136	26	19	71	485	201	6	153	22	57	0	6	16	85	2346
	Peak Hour: 7:15 AM to 8:15 AM																
Total	8	50	590	11	9	28	266	88	3	67	10	33	0	1	8	46	1198
Approach	651				382				110				55				1198
%HV	1.2%				2.4%				2.7%				n/a				1.7%
PHF	0.83				0.89				0.95				0.72				0.88



1356 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	0	1	1	3
INT 02	1	0	1	0	2
INT 03	1	0	0	0	1
INT 04	2	0	0	0	2
INT 05	2	0	0	0	2
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	7	0	2	1	10

Bicycles From:	N	S	E	W	
INT 01	1	0	0	0	1
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	0	1

		PHF	%HV
	EB	0.72	n/a
Check	WB	0.95	2.7%
In: 1198	NB	0.89	2.4%
Out: 1198	SB	0.83	1.2%
	T Int.	0.88	1.7%

Conditions:

Special Notes

GRT22060TM_01A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

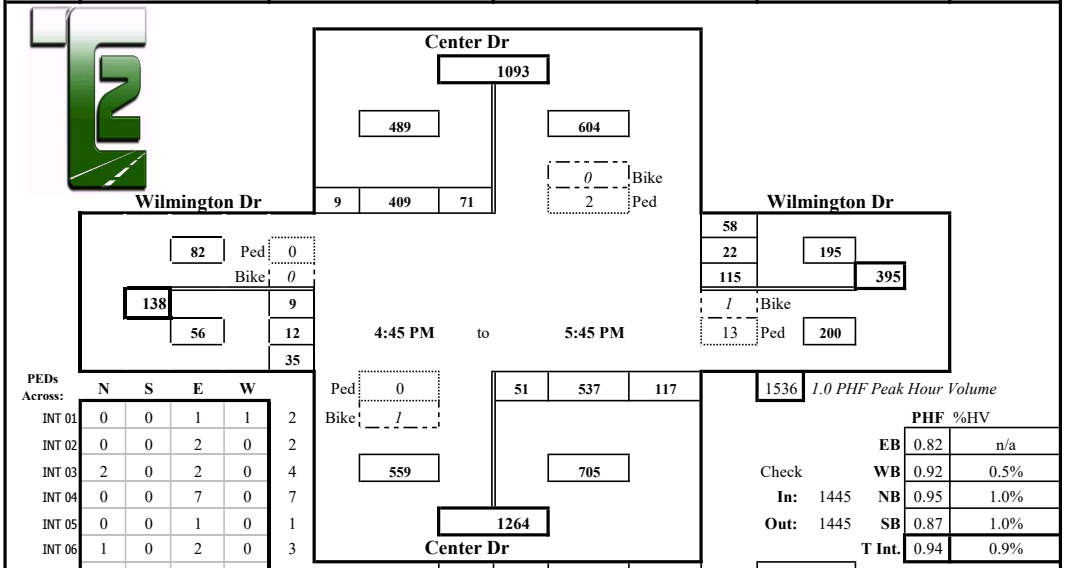
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Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	21	115	2	2	6	109	27	3	43	6	27	0	3	2	6	367
4:30 P	3	9	93	1	1	7	127	31	0	37	2	15	0	1	2	4	329
4:45 P	2	17	104	5	1	9	113	19	1	21	2	19	0	1	2	8	320
5:00 P	2	16	86	1	1	13	126	36	0	24	8	16	0	2	2	8	338
5:15 P	0	12	109	3	3	13	132	29	1	33	8	12	0	4	4	8	367
5:30 P	2	24	96	2	2	13	129	29	0	31	4	11	0	0	4	13	356
5:45 P	1	19	118	3	1	12	150	23	0	27	2	19	0	3	2	6	384
6:00 P	1	12	85	0	1	13	147	28	0	30	2	16	0	0	0	5	338
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	13	130	806	17	12	86	1033	222	5	246	34	135	0	14	18	58	2799
Peak Hour: 4:45 PM to 5:45 PM																	
Total	5	71	409	9	7	51	537	117	1	115	22	58	0	9	12	35	1445
Approach	489				705				195				56				1445
%HV	1.0%				1.0%				0.5%				n/a				0.9%
PHF	0.87				0.95				0.92				0.82				0.94



1536 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	0	0	1	1	2
INT 02	0	0	2	0	2
INT 03	2	0	2	0	4
INT 04	0	0	7	0	7
INT 05	0	0	1	0	1
INT 06	1	0	2	0	3
INT 07	1	0	3	0	4
INT 08	2	0	0	0	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	0	18	1	25

Bicycles From:	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	2	0	2
INT 03	1	1	0	0	2
INT 04	0	1	1	0	2
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	2	3	0	6

		PHF	%HV
	EB	0.82	n/a
Check	WB	0.92	0.5%
In: 1445	NB	0.95	1.0%
Out: 1445	SB	0.87	1.0%
	T Int.	0.94	0.9%

Conditions:

Special Notes

GRT22060TM_01P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

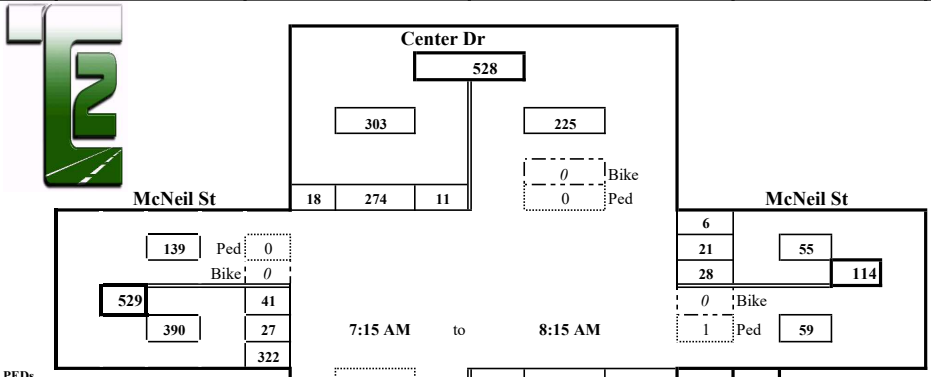
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Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	0	1	72	3	1	14	48	4	3	11	4	2	1	12	9	68	248
7:30 A	1	1	62	2	1	21	62	2	0	4	5	0	0	14	7	75	255
7:45 A	0	1	66	7	2	31	32	8	2	12	6	1	0	9	3	99	275
8:00 A	3	3	64	4	1	26	53	5	1	6	5	4	0	9	7	76	262
8:15 A	1	6	82	5	2	22	31	6	0	6	5	1	2	9	10	72	255
8:30 A	0	1	50	2	1	26	28	8	0	9	3	2	0	12	8	84	233
8:45 A	1	4	55	5	2	29	30	9	0	10	5	2	0	17	14	71	251
9:00 A	3	3	44	5	0	19	32	2	1	6	13	5	4	36	19	85	269
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	9	20	495	33	10	188	316	44	7	64	46	17	7	118	77	630	2048
Peak Hour: 7:15 AM to 8:15 AM																	
Total	5	11	274	18	6	100	178	21	3	28	21	6	2	41	27	322	1047
Approach	303				299				55				390				1047
%HV	1.7%				2.0%				5.5%				0.5%				1.5%
PHF	0.81				0.88				0.72				0.88				0.95



PEDs Across:

	N	S	E	W	
INT 01	0	0	1	0	1
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	1	0	1
INT 05	0	0	0	0	0
INT 06	2	0	4	0	6
INT 07	2	0	0	0	2
INT 08	2	0	0	0	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	0	6	0	12

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	1	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	0	0	1

1100 *1.0 PHF Peak Hour Volume*

		PHF	%HV
		EB	0.88	0.5%
Check		WB	0.72	5.5%
In:	1047	NB	0.88	2.0%
Out:	1047	SB	0.81	1.7%
		T Int.	0.95	1.5%

Conditions:

Special Notes

GRT22060TM_02A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

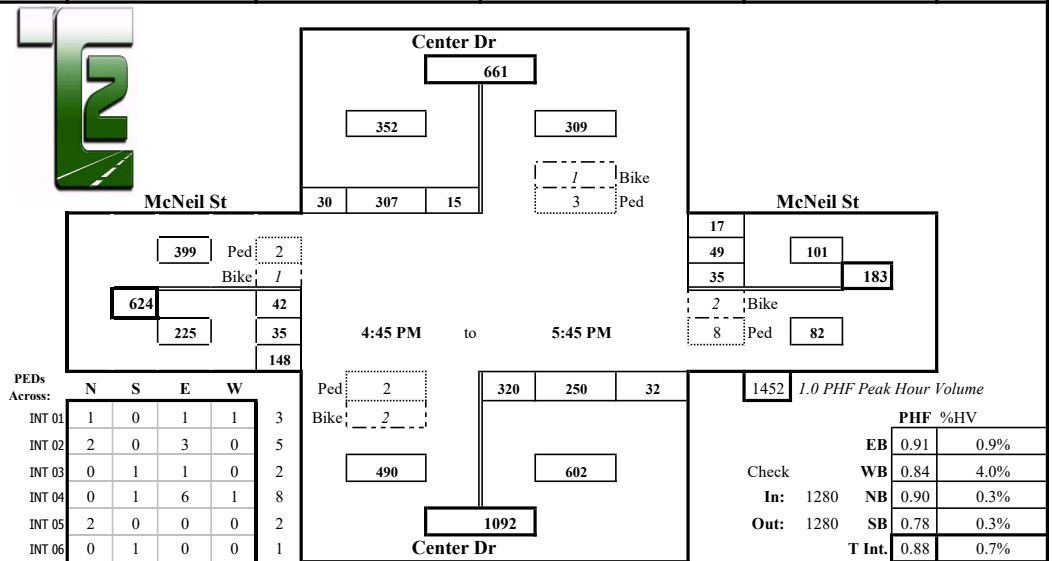
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & McNeil St **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) McNeil St				From West on (EB) McNeil St				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	6	82	11	2	65	61	10	0	12	15	4	1	8	10	47	331
4:30 P	1	2	53	4	0	86	53	9	2	5	23	3	0	5	11	39	293
4:45 P	1	5	78	7	0	73	48	10	0	9	16	3	2	9	4	45	307
5:00 P	0	5	58	6	0	72	69	6	2	10	12	8	0	10	5	29	290
5:15 P	0	3	80	5	1	85	59	9	0	8	12	2	0	13	7	40	323
5:30 P	0	2	67	13	1	69	61	5	1	10	16	2	2	10	9	40	304
5:45 P	1	5	102	6	0	94	61	12	1	7	9	5	0	9	14	39	363
6:00 P	1	3	52	0	1	99	56	9	0	7	17	8	0	5	6	28	290
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	6	31	572	52	5	643	468	70	6	68	120	35	5	69	66	307	2501
	Peak Hour: 4:45 PM to 5:45 PM																
Total	1	15	307	30	2	320	250	32	4	35	49	17	2	42	35	148	1280
Approach	352				602				101				225				1280
%HV	0.3%				0.3%				4.0%				0.9%				0.7%
PHF	0.78				0.90				0.84				0.91				0.88



1452 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.91	0.9%
WB	0.84	4.0%
NB	0.90	0.3%
SB	0.78	0.3%
T Int.	0.88	0.7%

Check In: 1280 Out: 1280

Conditions:

PEDs Across:

	N	S	E	W	
INT 01	1	0	1	1	3
INT 02	2	0	3	0	5
INT 03	0	1	1	0	2
INT 04	0	1	6	1	8
INT 05	2	0	0	0	2
INT 06	0	1	0	0	1
INT 07	1	0	2	1	4
INT 08	4	0	1	2	7
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	10	3	14	5	32

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	2	1	1	0	4
INT 04	0	1	1	1	3
INT 05	0	0	0	0	0
INT 06	0	1	1	0	2
INT 07	1	0	0	0	1
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	3	3	1	10

Special Notes

GRT22060TM_02P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

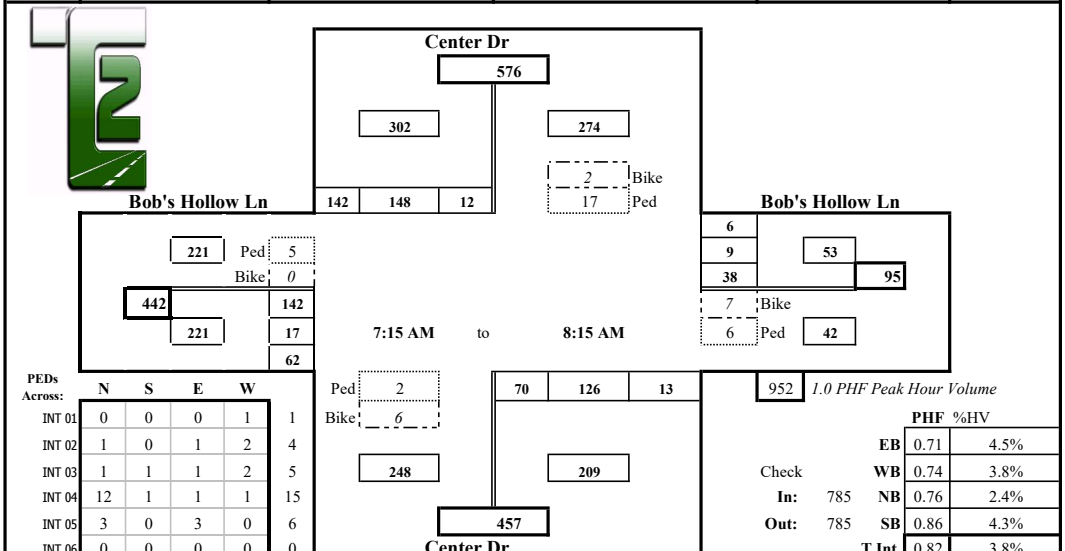
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Bob's Hollow Dr **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Bob's Hollow Ln				From West on (EB) Bob's Hollow Ln				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	1	2	33	8	1	3	58	0	0	9	1	3	0	47	1	20	185
7:30 A	1	1	33	18	0	9	53	7	0	7	0	2	1	28	1	6	165
7:45 A	2	2	44	41	0	17	22	3	1	5	3	1	2	20	3	8	169
8:00 A	9	4	30	54	1	30	25	1	1	14	2	1	0	52	8	17	238
8:15 A	1	5	41	29	4	14	26	2	0	12	4	2	7	42	5	31	213
8:30 A	0	2	27	19	0	4	21	2	0	4	1	2	3	20	5	8	115
8:45 A	3	2	45	10	1	2	32	3	1	9	2	4	1	15	5	7	136
9:00 A	2	3	36	11	0	6	35	3	0	3	3	2	4	40	16	14	172
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	19	21	289	190	7	85	272	21	3	63	16	17	18	264	44	111	1393
	Peak Hour: 7:15 AM to 8:15 AM																
Total	13	12	148	142	5	70	126	13	2	38	9	6	10	142	17	62	785
Approach	302				209				53				221				785
%HV	4.3%				2.4%				3.8%				4.5%				3.8%
PHF	0.86				0.76				0.74				0.71				0.82



PEDs Across:	N	S	E	W	
INT 01	0	0	0	1	1
INT 02	1	0	1	2	4
INT 03	1	1	1	2	5
INT 04	12	1	1	1	15
INT 05	3	0	3	0	6
INT 06	0	0	0	0	0
INT 07	0	1	2	0	3
INT 08	0	0	1	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	17	3	9	6	35

Bicycles From:	N	S	E	W	
INT 01	1	0	1	0	2
INT 02	0	1	0	0	1
INT 03	0	2	3	0	5
INT 04	1	3	4	0	8
INT 05	1	0	0	0	1
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	1	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	7	8	0	18

		PHF	%HV
	EB	0.71	4.5%
Check	WB	0.74	3.8%
In: 785	NB	0.76	2.4%
Out: 785	SB	0.86	4.3%
	T Int.	0.82	3.8%

Conditions:

Special Notes

GRT22060TM_03A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

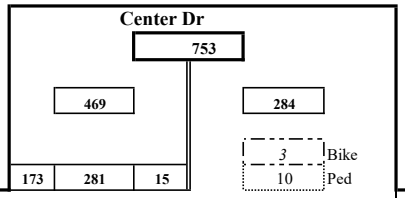
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Bob's Hollow Dr **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Bob's Hollow Ln				From West on (EB) Bob's Hollow Ln				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	61	23	2	12	33	9	0	6	2	1	5	15	1	8	171
4:30 P	3	4	50	42	1	9	36	5	0	2	3	2	1	14	2	4	173
4:45 P	0	5	70	39	0	14	32	7	0	6	3	1	0	22	2	3	204
5:00 P	0	2	58	32	0	9	40	6	0	4	3	1	1	23	6	2	186
5:15 P	0	7	68	51	1	7	36	7	0	5	5	0	1	27	5	23	241
5:30 P	0	2	57	49	1	11	32	11	0	4	1	3	0	37	5	12	224
5:45 P	1	4	98	41	0	11	46	8	0	5	2	4	0	35	2	3	259
6:00 P	0	3	42	37	1	13	41	11	0	1	3	1	1	22	2	7	183
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	27	504	314	6	86	296	64	0	33	22	13	9	195	25	62	1641
Peak Hour: 4:45 PM to 5:45 PM																	
Total	1	15	281	173	2	38	154	32	0	18	11	8	2	122	18	40	910
Approach	469				224				37				180				910
%HV	0.2%				0.9%				n/a				1.1%				0.5%
PHF	0.82				0.86				0.84				0.82				0.88



1036 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	2	2	2	7
INT 02	1	0	1	3	5
INT 03	1	1	1	0	3
INT 04	2	0	2	1	5
INT 05	1	0	0	0	1
INT 06	2	0	0	1	3
INT 07	5	2	3	1	11
INT 08	2	1	2	0	5
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	15	6	11	8	40

Bicycles From:	N	S	E	W	
INT 01	1	1	0	2	4
INT 02	1	2	0	3	6
INT 03	1	0	2	0	3
INT 04	1	1	0	1	3
INT 05	0	0	0	0	0
INT 06	0	0	0	1	1
INT 07	2	0	0	1	3
INT 08	0	1	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	5	2	8	21

	PHF	%HV
EB	0.82	1.1%
WB	0.84	n/a
NB	0.86	0.9%
SB	0.82	0.2%
T Int.	0.88	0.5%

Check In: 910 Out: 910

Conditions:

Special Notes

GRT22060TM_03P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

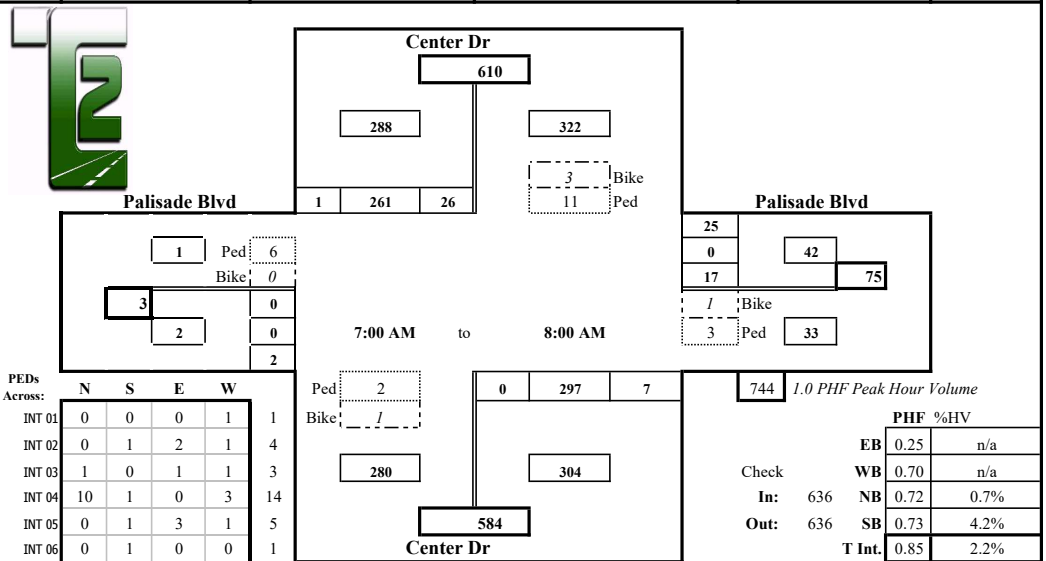
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Palisade Blvd **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Palisade Blvd				From West on (EB) Palisade Blvd				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	1	1	42	0	1	0	102	3	0	5	0	4	0	0	0	0	157
7:30 A	1	7	48	0	0	0	81	2	0	3	0	5	0	0	0	0	146
7:45 A	1	8	83	1	1	0	43	0	0	3	0	7	0	0	0	2	147
8:00 A	9	10	88	0	0	0	71	2	0	6	0	9	0	0	0	0	186
8:15 A	1	5	58	0	8	1	69	2	0	6	0	7	0	0	0	1	149
8:30 A	0	7	39	0	3	0	41	2	0	11	0	4	0	0	0	0	104
8:45 A	3	6	48	0	3	0	47	5	0	6	0	4	0	0	0	0	116
9:00 A	3	4	45	0	1	0	72	4	0	4	0	4	0	0	0	0	133
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	19	48	451	1	17	1	526	20	0	44	0	44	0	0	0	3	1138
Peak Hour: 7:00 AM to 8:00 AM																	
Total	12	26	261	1	2	0	297	7	0	17	0	25	0	0	0	2	636
Approach	288				304				42				2				636
%HV	4.2%				0.7%				n/a				n/a				2.2%
PHF	0.73				0.72				0.70				0.25				0.85



PEDs Across:	N	S	E	W	
INT 01	0	0	0	1	1
INT 02	0	1	2	1	4
INT 03	1	0	1	1	3
INT 04	10	1	0	3	14
INT 05	0	1	3	1	5
INT 06	0	1	0	0	1
INT 07	0	0	2	0	2
INT 08	1	0	1	0	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	12	4	9	7	32

Bicycles From:	N	S	E	W	
INT 01	1	0	0	0	1
INT 02	0	1	0	0	1
INT 03	2	0	1	0	3
INT 04	0	0	0	0	0
INT 05	1	0	0	0	1
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	1	1	0	6

	PHF	%HV
EB	0.25	n/a
WB	0.70	n/a
NB	0.72	0.7%
SB	0.73	4.2%
T Int.	0.85	2.2%

Check In: 636 Out: 636

Conditions:

Special Notes

GRT22060TM_04A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

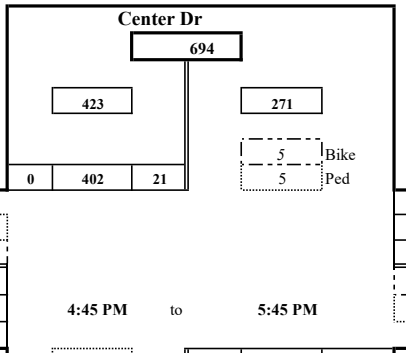
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Palisade Blvd **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Palisade Blvd				From West on (EB) Palisade Blvd				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	7	83	1	2	1	40	5	1	6	0	3	0	0	0	0	146
4:30 P	0	6	90	1	3	2	44	3	1	5	0	1	0	1	0	0	153
4:45 P	0	6	104	1	0	1	51	4	0	4	0	4	0	0	0	1	176
5:00 P	0	3	90	0	1	0	56	9	0	7	0	4	0	0	0	0	169
5:15 P	0	9	91	0	2	1	54	1	0	7	0	4	0	3	0	20	190
5:30 P	0	4	91	0	1	3	62	4	0	6	0	7	0	1	0	3	181
5:45 P	1	5	130	0	0	0	75	3	0	8	0	5	0	0	0	0	226
6:00 P	0	8	76	0	0	0	55	8	0	6	0	4	0	0	0	0	157
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	2	48	755	3	9	8	437	37	2	49	0	32	0	5	0	24	1398
	Peak Hour: 4:45 PM to 5:45 PM																
Total	1	21	402	0	4	4	247	17	0	28	0	20	0	4	0	23	766
Approach	423				268				48				27				766
%HV	0.2%				1.5%				n/a				n/a				0.7%
PHF	0.78				0.86				0.92				0.29				0.85



904 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.29	n/a
WB	0.92	n/a
NB	0.86	1.5%
SB	0.78	0.2%
T Int.	0.85	0.7%

Check In: 766 Out: 766

Conditions:

PEDs Across:

	N	S	E	W	
INT 01	3	1	1	12	17
INT 02	0	0	0	1	1
INT 03	0	0	4	0	4
INT 04	0	0	4	0	4
INT 05	3	0	0	3	6
INT 06	2	3	0	4	9
INT 07	0	1	4	0	5
INT 08	0	1	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	8	6	13	20	47

Bicycles From:

	N	S	E	W	
INT 01	1	0	0	0	1
INT 02	1	2	0	0	3
INT 03	0	0	1	0	1
INT 04	2	2	0	0	4
INT 05	1	0	0	0	1
INT 06	1	2	0	0	3
INT 07	1	0	0	1	2
INT 08	0	0	1	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	7	6	2	1	16

Special Notes

GRT22060TM_04P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

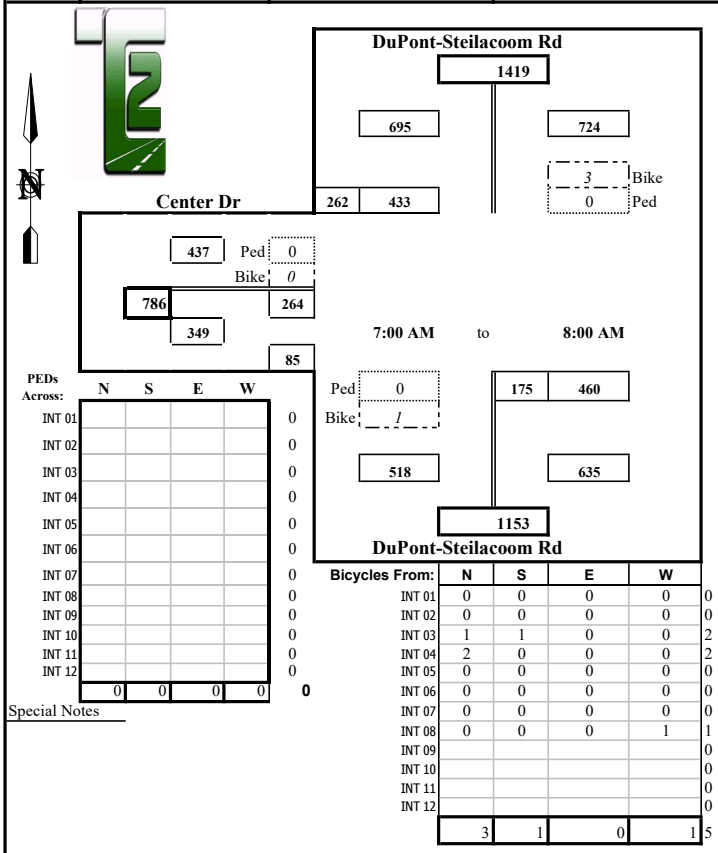
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Du-Pont Steilacoom Rd & Center Dr **Date of Count:** Tue 10/4/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) DuPont-Steilacoom Rd				From South on (NB) DuPont-Steilacoom Rd				From East on (WB) 0				From West on (EB) Center Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	6	0	78	35	16	47	128	0	0	0	0	0	4	95	0	29	412
7:30 A	11	0	106	66	7	67	95	0	0	0	0	0	3	51	0	20	405
7:45 A	23	0	128	77	16	23	117	0	0	0	0	0	3	57	0	21	423
8:00 A	20	0	121	84	24	38	120	0	0	0	0	0	7	61	0	15	439
8:15 A	19	0	118	47	17	23	83	0	0	0	0	0	9	68	0	29	368
8:30 A	18	0	99	34	14	18	95	0	0	0	0	0	8	47	0	26	319
8:45 A	18	0	87	45	15	26	99	0	0	0	0	0	5	43	0	26	326
9:00 A	17	0	90	29	12	24	117	0	0	0	0	0	4	61	0	30	351
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	132	0	827	417	121	266	854	0	0	0	0	0	43	483	0	196	3043
Peak Hour: 7:00 AM to 8:00 AM																	
Total	60	0	433	262	63	175	460	0	0	0	0	0	17	264	0	85	1679
Approach	695				635				0				349				1679
%HV	8.6%				9.9%				n/a				4.9%				8.3%
PHF	0.85				0.91				n/a				0.70				0.96



1756 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.70	4.9%
Check	WB	n/a	n/a
In: 1679	NB	0.91	9.9%
Out: 1679	SB	0.85	8.6%
	T Int.	0.96	8.3%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	1	1	0	0	2
INT 04	2	0	0	0	2
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	1	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	1	0	1	5

Special Notes

GRT22060TM_05A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

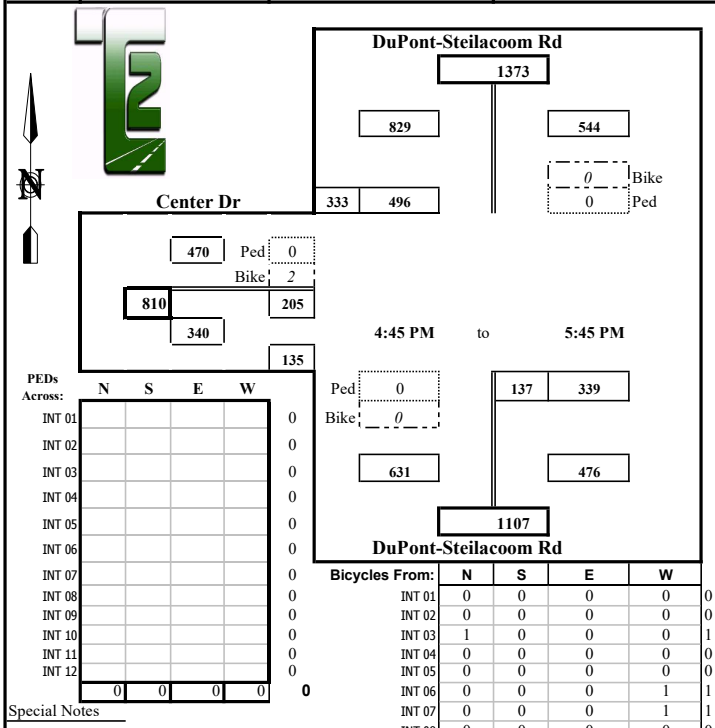
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Du-Pont Steilacoom Rd & Center Dr **Date of Count:** Tue 10/4/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) DuPont-Steilacoom Rd				From South on (NB) DuPont-Steilacoom Rd				From East on (WB) 0				From West on (EB) Center Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	9	0	132	57	8	21	77	0	0	0	0	0	4	23	0	21	331
4:30 P	7	0	144	99	6	19	78	0	0	0	0	0	5	38	0	21	399
4:45 P	3	0	171	90	6	23	95	0	0	0	0	0	2	38	0	27	444
5:00 P	7	0	154	77	9	35	80	0	0	0	0	0	1	32	0	21	399
5:15 P	1	0	128	78	7	22	89	0	0	0	0	0	3	43	0	21	381
5:30 P	8	0	105	99	7	39	94	0	0	0	0	0	3	55	0	20	412
5:45 P	5	0	109	79	5	41	76	0	0	0	0	0	0	75	0	73	453
6:00 P	3	0	95	81	5	68	77	0	0	0	0	0	1	39	0	23	383
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	43	0	1038	660	53	268	666	0	0	0	0	0	19	343	0	227	3202
Peak Hour: 4:45 PM to 5:45 PM																	
Total	21	0	496	333	28	137	339	0	0	0	0	0	7	205	0	135	1645
Approach	829				476				0				340				1645
%HV	2.5%				5.9%				n/a				2.1%				3.4%
PHF	0.90				0.89				n/a				0.57				0.91



1812 *1.0 PHF Peak Hour Volume*

			PHF	%HV
		EB	0.57	2.1%
Check		WB	n/a	n/a
In:	1645	NB	0.89	5.9%
Out:	1645	SB	0.90	2.5%
		T Int.	0.91	3.4%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	1	0	0	0	1
INT 04	0	0	0	0	0
INT 05	0	0	0	0	0
INT 06	0	0	0	1	1
INT 07	0	0	0	1	1
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	2	3

Special Notes

GRT22060TM_05P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

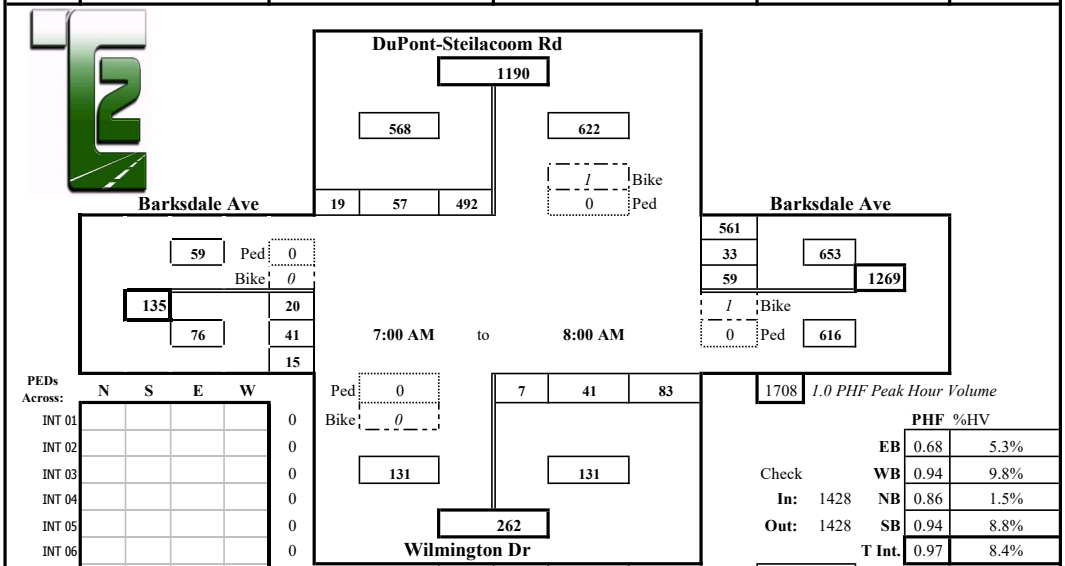
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: DuPont-Steilacoom Rd/Wilmington Dr & Barksdale Ave **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) DuPont-Steilacoom Rd				From South on (NB) Wilmington Dr				From East on (WB) Barksdale Ave				From West on (EB) Barksdale Ave				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	5	113	12	1	0	0	11	21	15	9	6	159	1	4	8	4	348
7:30 A	9	128	15	2	0	2	6	22	10	8	8	151	0	6	6	1	355
7:45 A	20	129	16	6	1	2	13	23	16	17	10	122	0	3	13	3	357
8:00 A	16	122	14	10	1	3	11	17	23	25	9	129	3	7	14	7	368
8:15 A	22	131	16	10	2	1	6	17	17	15	7	83	1	9	15	0	310
8:30 A	19	108	8	8	0	1	13	34	13	14	14	99	0	2	13	3	317
8:45 A	22	130	8	5	1	6	11	31	16	14	8	135	1	8	16	2	374
9:00 A	15	113	13	13	1	1	23	46	10	26	16	138	1	7	23	8	427
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	128	974	102	55	6	16	94	211	120	128	78	1016	7	46	108	28	2856
Peak Hour: 7:00 AM to 8:00 AM																	
Total	50	492	57	19	2	7	41	83	64	59	33	561	4	20	41	15	1428
Approach	568				131				653				76				1428
%HV	8.8%				1.5%				9.8%				5.3%				8.4%
PHF	0.94				0.86				0.94				0.68				0.97



1708 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.68	5.3%
WB	0.94	9.8%
NB	0.86	1.5%
SB	0.94	8.8%
T Int.	0.97	8.4%

Check In: 1428 Out: 1428

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06					0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Bicycles From:

	N	S	E	W	
INT 01	0	0	1	0	1
INT 02	1	0	0	0	1
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	1	0	1
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	2	0	3

Special Notes

GRT22060TM_06A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

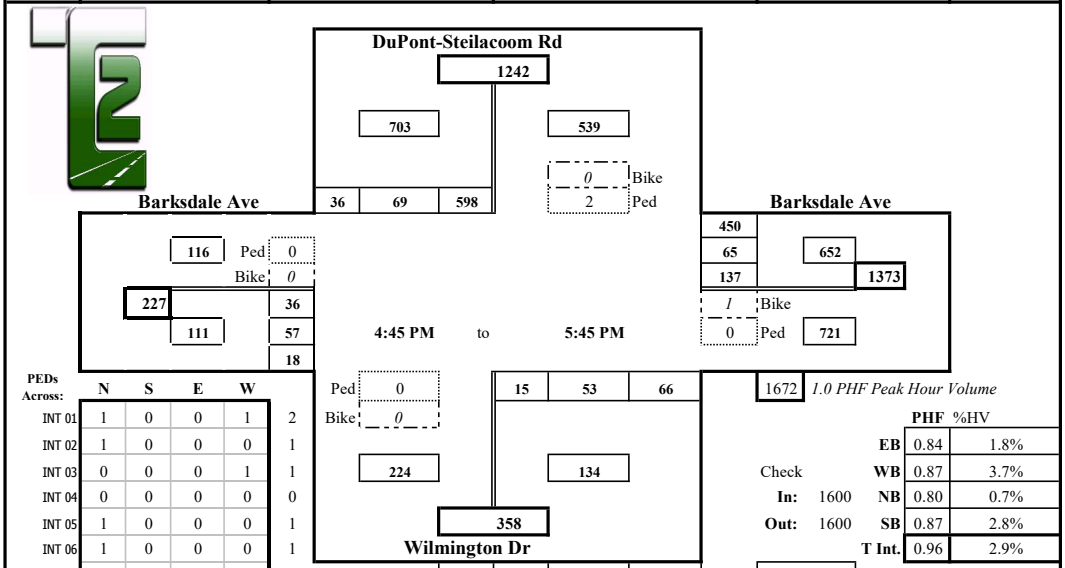
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: DuPont-Steilacoom Rd/Wilmington Dr & Barksdale Ave **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) DuPont-Steilacoom Rd				From South on (NB) Wilmington Dr				From East on (WB) Barksdale Ave				From West on (EB) Barksdale Ave				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	10	135	22	9	3	9	14	16	6	28	14	83	3	3	17	2	352
4:30 P	10	175	19	7	0	3	16	17	7	31	15	99	0	2	10	3	397
4:45 P	3	173	20	13	0	3	4	25	8	29	14	112	0	3	8	6	410
5:00 P	6	169	27	7	0	4	11	10	6	28	14	114	0	7	12	5	408
5:15 P	2	143	13	12	0	3	15	11	9	37	20	92	0	9	19	5	379
5:30 P	7	118	18	6	1	2	14	26	5	44	17	126	1	7	12	5	395
5:45 P	5	168	11	11	0	6	13	19	4	28	14	118	1	13	14	3	418
6:00 P	3	115	16	6	0	5	16	16	5	29	15	122	0	10	16	9	375
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	46	1196	146	71	4	35	103	140	50	254	123	866	5	54	108	38	3134
Peak Hour: 4:45 PM to 5:45 PM																	
Total	20	598	69	36	1	15	53	66	24	137	65	450	2	36	57	18	1600
Approach	703				134				652				111				1600
%HV	2.8%				0.7%				3.7%				1.8%				2.9%
PHF	0.87				0.80				0.87				0.84				0.96



1672 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	1	0	0	1	2
INT 02	1	0	0	0	1
INT 03	0	0	0	1	1
INT 04	0	0	0	0	0
INT 05	1	0	0	0	1
INT 06	1	0	0	0	1
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	0	0	2	6

Bicycles From:	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	1	0	0	0	1
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	1	0	1
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	1	0	2

	PHF	%HV
EB	0.84	1.8%
WB	0.87	3.7%
NB	0.80	0.7%
SB	0.87	2.8%
T Int.	0.96	2.9%

Check In: 1600 Out: 1600

Conditions:

Special Notes

GRT22060TM_06P

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

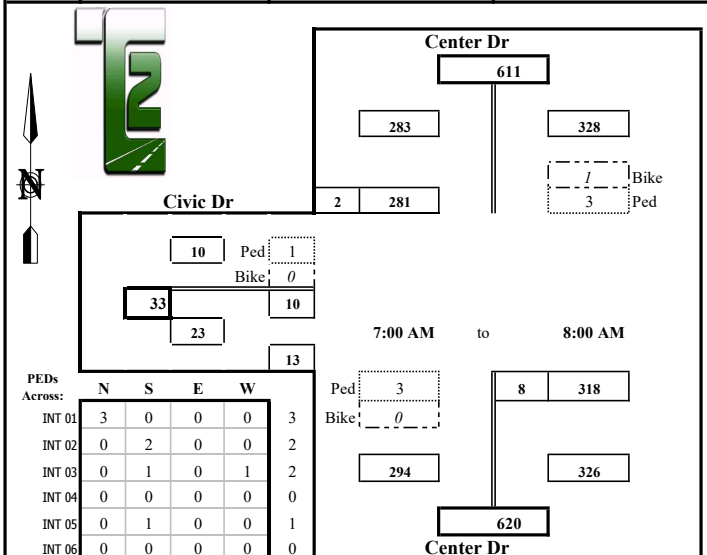
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Civic Dr **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) 0				From West on (EB) Civic Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	1	0	39	0	1	2	109	0	0	0	0	0	0	5	0	1	156
7:30 A	1	0	49	0	2	3	81	0	0	0	0	0	0	5	0	8	146
7:45 A	6	0	88	2	1	1	49	0	0	0	0	0	0	0	0	4	144
8:00 A	11	0	105	0	0	2	79	0	0	0	0	0	0	0	0	0	186
8:15 A	4	0	62	2	1	4	77	0	0	0	0	0	0	0	0	0	145
8:30 A	4	0	45	0	1	2	44	0	0	0	0	0	0	1	0	0	92
8:45 A	4	0	55	0	0	2	49	0	0	0	0	0	0	0	0	0	106
9:00 A	3	0	48	1	0	1	73	0	0	0	0	0	0	3	0	1	127
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	34	0	491	5	6	17	561	0	0	0	0	0	0	14	0	14	1102
Peak Hour: 7:00 AM to 8:00 AM																	
Total	19	0	281	2	4	8	318	0	0	0	0	0	0	10	0	13	632
Approach	283				326				0				23				632
%HV	6.7%				1.2%				n/a				n/a				3.6%
PHF	0.67				0.73				n/a				0.44				0.85



PEDs Across:	N	S	E	W	
INT 01	3	0	0	0	3
INT 02	0	2	0	0	2
INT 03	0	1	0	1	2
INT 04	0	0	0	0	0
INT 05	0	1	0	0	1
INT 06	0	0	0	0	0
INT 07	0	0	0	1	1
INT 08	1	0	1	0	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	4	1	2	11

Special Notes

Bicycles From:	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	1	0	0	0	1
INT 04	0	0	0	0	0
INT 05	2	0	0	0	2
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	1	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	0	0	1	4

744 *1.0 PHF Peak Hour Volume*

			PHF	%HV
		EB	0.44	n/a
Check		WB	n/a	n/a
In:	632	NB	0.73	1.2%
Out:	632	SB	0.67	6.7%
		T Int.	0.85	3.6%

Conditions:

GRT22060TM_08A

Prepared for: **Geri Reinart**

Traffic Count Consultants, Inc.

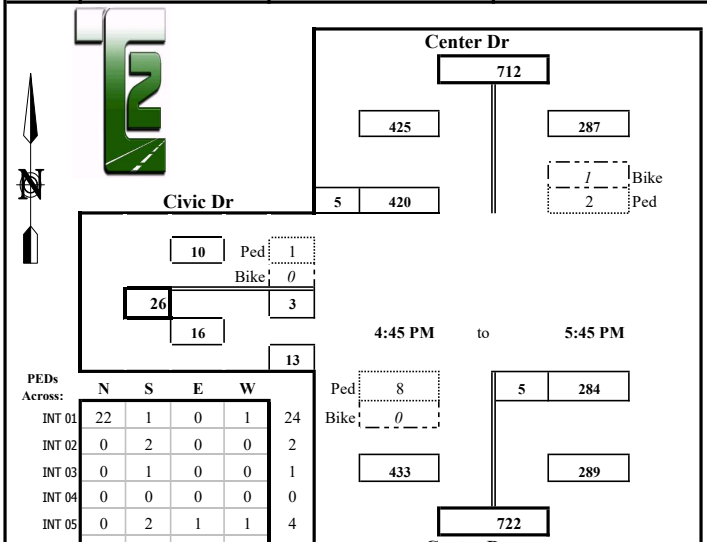
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Civic Dr **Date of Count:** Tue 10/04/2022

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) 0				From West on (EB) Civic Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	0	87	0	1	3	43	0	0	0	0	0	0	1	0	3	137
4:30 P	0	0	99	0	2	2	46	0	0	0	0	0	0	0	0	3	150
4:45 P	0	0	108	1	0	1	58	0	0	0	0	0	0	2	0	4	174
5:00 P	0	0	94	2	2	3	58	0	0	0	0	0	0	1	0	2	160
5:15 P	0	0	93	1	0	0	63	0	0	0	0	0	0	1	0	6	164
5:30 P	1	0	100	0	1	1	80	0	0	0	0	0	0	0	0	3	184
5:45 P	2	0	133	2	0	1	83	0	0	0	0	0	0	1	0	2	222
6:00 P	0	0	91	1	0	1	61	0	0	0	0	0	0	0	0	0	154
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	0	805	7	6	12	492	0	0	0	0	0	0	6	0	23	1345
	Peak Hour: 4:45 PM to 5:45 PM																
Total	3	0	420	5	3	5	284	0	0	0	0	0	0	3	0	13	730
Approach	425				289				0				16				730
%HV	0.7%				1.0%				n/a				n/a				0.8%
PHF	0.79				0.86				n/a				0.57				0.82



PEDs Across:	N	S	E	W	
INT 01	22	1	0	1	24
INT 02	0	2	0	0	2
INT 03	0	1	0	0	1
INT 04	0	0	0	0	0
INT 05	0	2	1	1	4
INT 06	1	6	0	0	7
INT 07	1	0	0	0	1
INT 08	1	0	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	25	12	1	2	40

Bicycles From:	N	S	E	W	
INT 01	2	0	0	1	3
INT 02	1	0	0	0	1
INT 03	0	0	0	0	0
INT 04	1	0	1	0	2
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	0	0	1	0	1
INT 08	0	0	3	0	3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	4	0	5	1	10

Special Notes

888 *1.0 PHF Peak Hour Volume*

			PHF	%HV
		EB	0.57	n/a
Check		WB	n/a	n/a
In:	730	NB	0.86	1.0%
Out:	730	SB	0.79	0.7%
		T Int.	0.82	0.8%

Conditions:

Attachment B – Patriot's Landing Traffic Impact Analysis

Received 7-22-2022

Transportation Impact Analysis

DUPONT MASTER PLAN

Prepared for:
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July 2022

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Introduction

This transportation impact analysis (TIA) identifies potential transportation-related impacts associated with the construction of an elementary school and multi-family residential apartment building located at the southeast corner of the Bobs Hollow Land/McNeil Street intersection in DuPont, WA. As necessary, mitigation measures are identified that would reduce or offset significant transportation related impacts that the project may have on the surrounding transportation system.

Project Description

The proposed development includes two uses adjacent to one another on the south side of McNeil Street west of Marshall Circle. This includes multi-family housing use on the south parcel and an elementary school on the north parcel. More detail on each use is provided below and the location of the two uses as well as the study intersections are illustrated in Figure 1. The proposed site plan is shown on Figure 2.

Multi-family Housing
The multi-family portion of the project would consist of two buildings. One building would include 140 standard apartment units and the other would include 140 senior adult apartment units. The residential development will be accessed by one driveway along Marshall Circle.

Elementary School
The proposed elementary school would be located on the northern parcel and have a capacity for 500 students within Steilacoom School District. The school would primarily capture existing students west of Center Drive that currently attend both Chloe Clark Elementary School and Saltar's Point Elementary School. The new school would alleviate pressure from the two other elementary schools and provide for a more accessible and walkable location for families in the area. There are approximately 470 students in this area and all are either currently driven or bussed to the other two schools. The new school would reduce travel distances for schools and provide for more walking opportunities and less transportation impacts within the region during school arrival and dismissal times.

The elementary school will be accessed via two driveways. One will be located along McNeil Street and utilized as a parent drop-off/pick-up access. The other will be located along Marshall Circle and is anticipated to be the school bus access point.

The traffic impact analysis will focus on the PM peak hour of the adjacent street when traffic volumes are typically their highest. The trip generation, distribution and study intersections are discussed in the subsequent sections.

It is anticipated that the proposed project would be constructed and occupied by 2026.

Study Scope

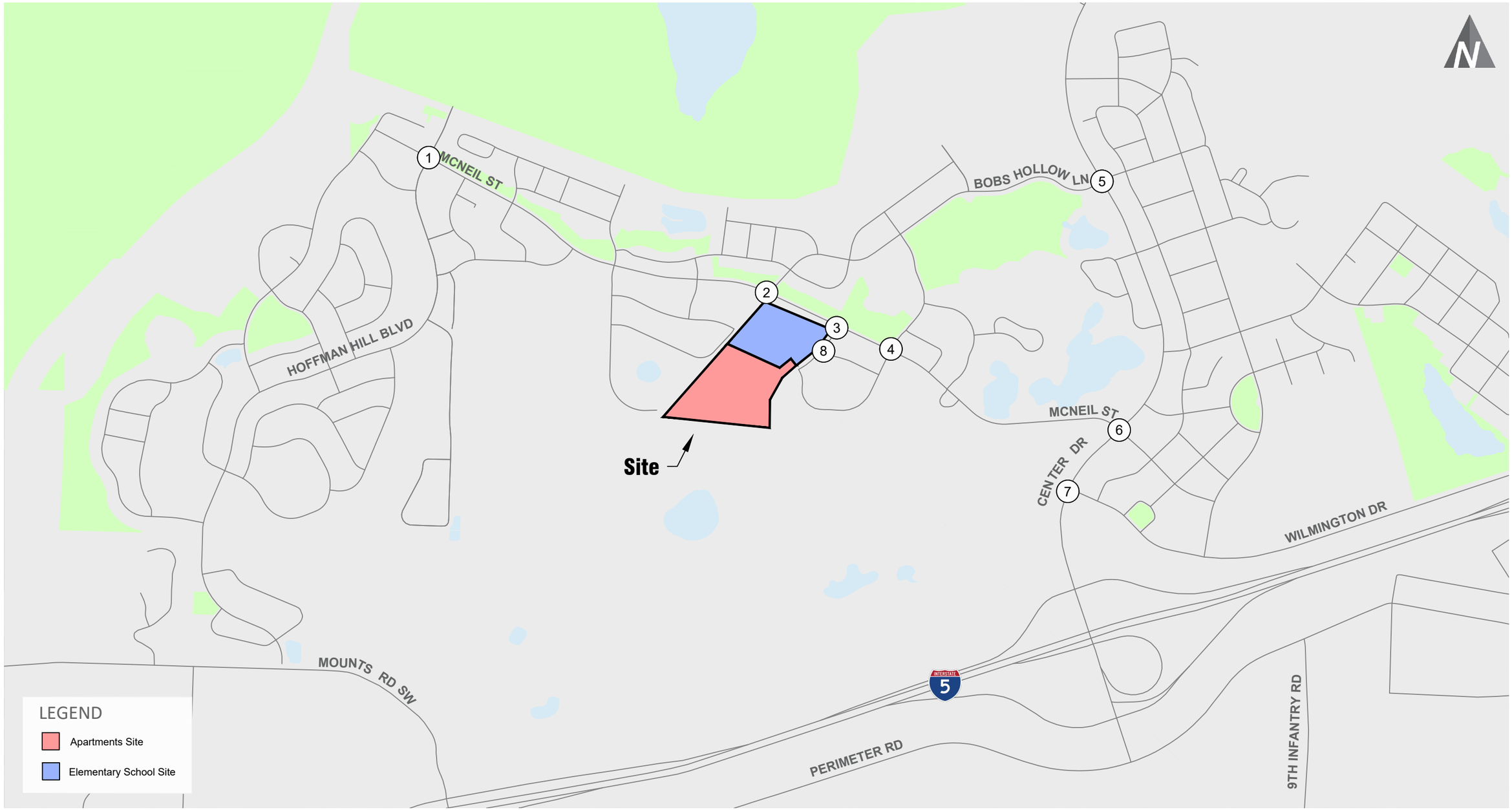
The following study scope was based on coordination with City of DuPont staff. Based on the anticipated vehicular impacts of the proposed project, the following intersections were selected for analysis during the AM and PM peak hour:

1. Hoffman Hill Boulevard/McNeil Street
2. Bobs Hollow Lane/McNeil Street
3. Marshall Circle/McNeil Street

4. Garry Oaks Avenue/McNeil Street
5. Center Drive/Bobs Hollow Lane
6. Center Drive/McNeil Street
7. Center Drive/Wilmington Drive
8. Marshall Circle/Bradley Street

In addition, the site driveways along McNeil Street and Marshall Circle were evaluated under with-project conditions.

The scope of the analysis included a review of existing and future without-project conditions in the vicinity of the project site under weekday AM and PM peak hour conditions. This report includes a review of the surrounding street system, existing and future without-project weekday AM and PM peak hour traffic volumes, traffic operations, and traffic safety. Future with-project conditions were estimated by adding site-generated traffic to future without-project volumes. The project's impacts on the surrounding transportation system were identified by comparing the future with-project conditions to the future without-project conditions.

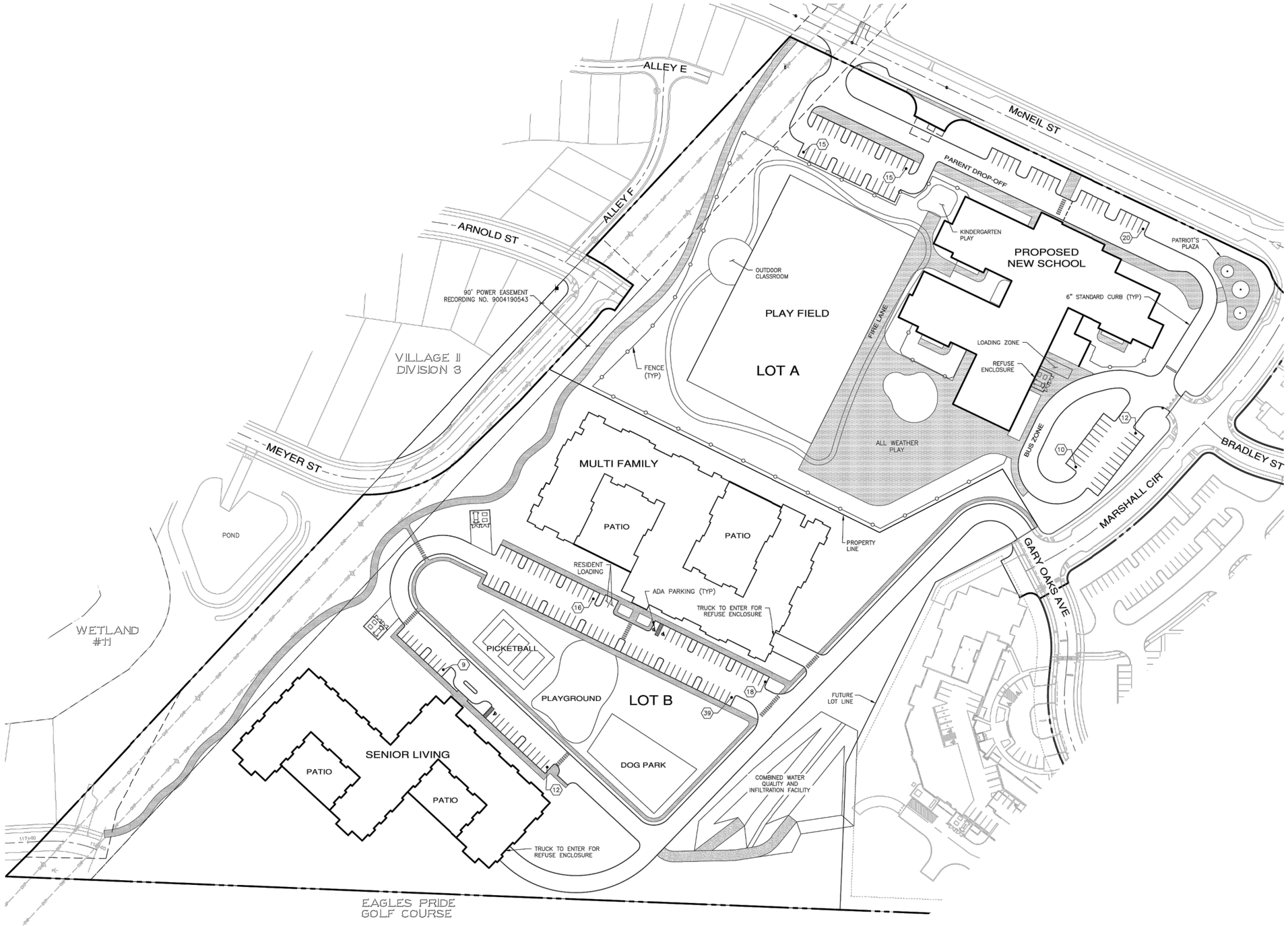


Site Vicinity & Study Intersections

DuPont Master Plan

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FIGURE
1



Proposed Site Plan

DuPont Master Plan

transpogroup

FIGURE
2

Existing & Future Without-Project Conditions

This section describes both existing and future without-project conditions within the vicinity of the proposed project. Study area characteristics are summarized for the surrounding street system, existing and future without-project weekday AM and PM peak hour traffic volumes, traffic operations, and traffic safety.

Street System

The following sections describe the existing street network within the vicinity of the proposed project and anticipated changes resulting from planned improvements.

Existing

The existing street network near the site is summarized in Table 1. The site is surrounded by primarily urban arterials and collectors. Access to the site is via Marshall Circle, a local road.

Table 1. Existing Street Network Summary

Roadway	Classification[1]	Speed Limit	# Lanes	Pedestrian Facilities	Bicycle Facilities
Hoffman Hill Boulevard	Urban Major Collector	25	2	Yes	No
McNeil Street	Urban Minor Arterial	25	2	Yes	No
Bobs Hollow Lane	Urban Major Collector	25	2	Yes	No
Marshall Circle	Local[2]	25	2	Yes	No
Garry Oaks Avenue	Local[2]	25	2	Yes	No
Center Drive	Urban Other Principal Arterial	35	4	Yes	Intermittent
Wilmington Drive	Urban Minor Arterial	30	2	Yes	Intermittent

Source: Transpo Group, May 2022
1. As classified by the WSDOT Functional Classification Map.
2. No classification provided - Local was assumed.

Planned Improvements

Based on a review of the WSDOT Statewide Transportation Improvement Program (STIP) 2022-2025, no planned improvements are anticipated to take place in the project area.

As a part of the DuPont Six-year Transportation Improvement Program (TIP) 2022-2027, there are planned improvements to take place in the project area impacting Center Drive Traffic Signals. Currently, the Center Drive Signal Coordination is not assumed because the project is not currently funded.

Traffic Volumes

The following sections summarize existing and forecast 2026 without-project traffic volumes within the study area.

Existing

Traffic counts were collected at each study intersection in October 2021, May 2022 and June 2022. For counts in 2021, a 2 percent growth rate was applied to reach Existing (2022) volumes. Figure 3 illustrates the existing weekday AM and PM peak hour traffic volumes at the study

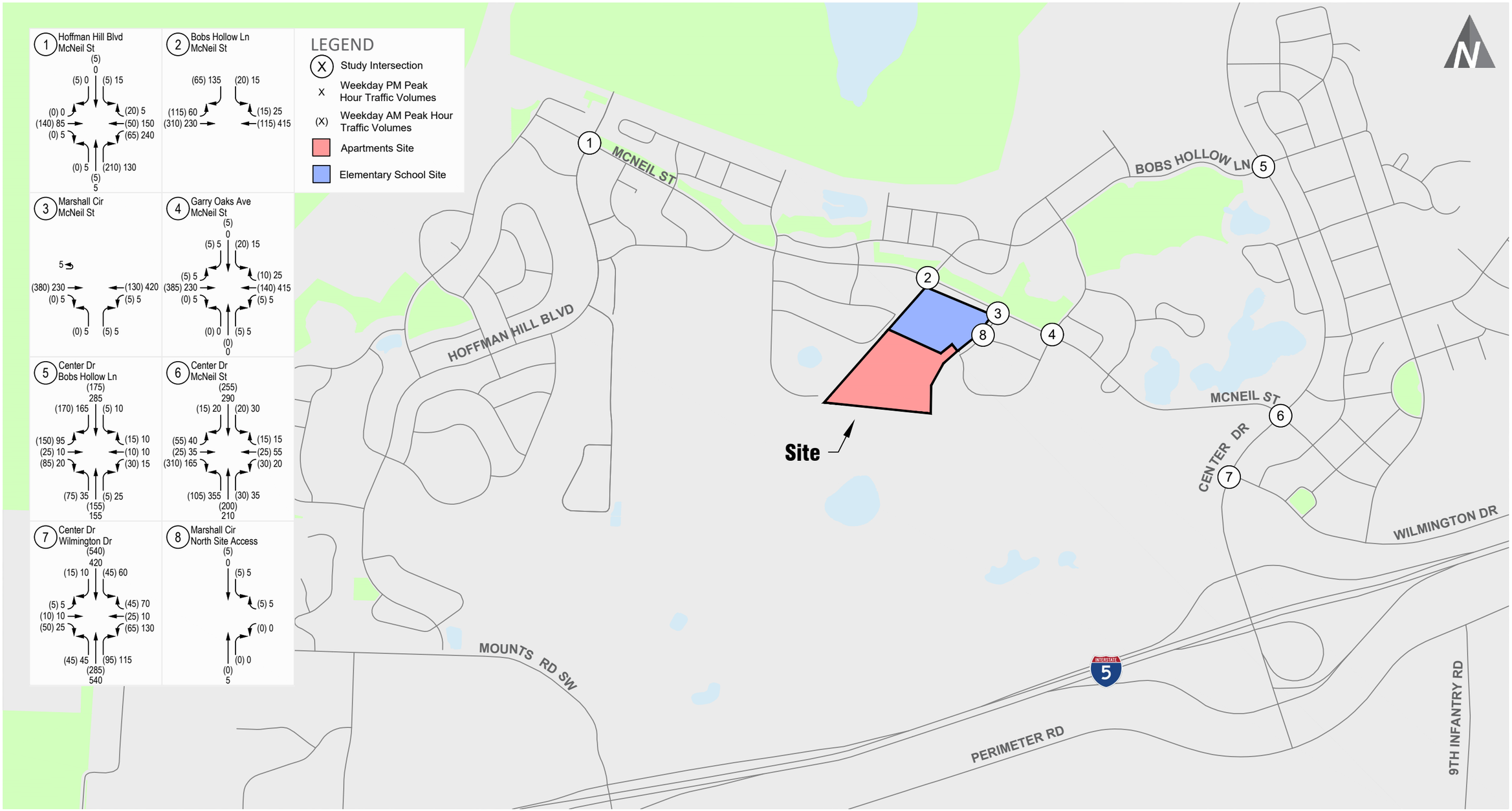
intersections. Volumes are rounded to the nearest 5 vehicles to account for the daily fluctuations in traffic volumes. Detail traffic counts are provided in Appendix A.

Future Without-Project

Future (2026) Without-Project weekday AM and PM peak hour traffic volumes were estimated by growing existing traffic volumes by 2 percent per year. Pipeline projects were provided for this analysis by Pierce County, and included the following projects:

- Williamson Place
- Civic Center Phase 2 & 3
- DuPont Industrial
- Barksdale Station
- PW Facility
- Snow Blossom FC

Figure 4 illustrates the Future (2026) Without-Project weekday AM and PM peak hour traffic volumes.

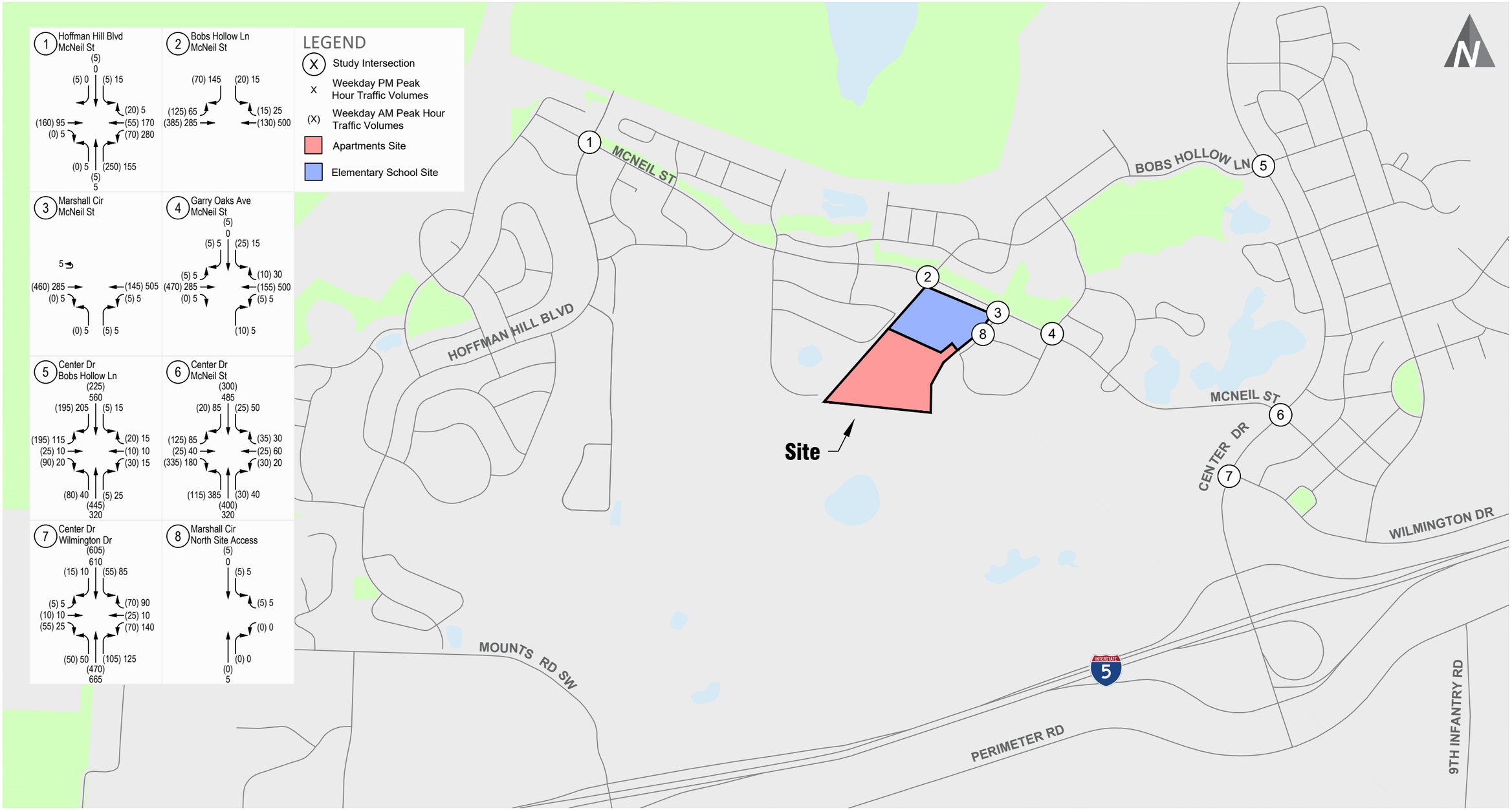


Existing Weekday Peak Hour Traffic Volumes

DuPont Master Plan

transpogroup

FIGURE
3



Future (2026) Without-Project Weekday Peak Hour Traffic Volumes

DuPont Master Plan

transpogroup

FIGURE
4

Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At side-street stop-controlled intersections, like the study intersections, LOS is measured in average delay per vehicle and is reported for the worst operating movement of the intersection. Traffic operations for an intersection can be described alphabetically with a range of levels of service (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. Appendix B contains a detailed explanation of LOS criteria and definitions.

Weekday AM and PM peak hour traffic operations for existing and future without-project conditions were evaluated at the study intersections using the *Synchro 11* software program based on the procedures identified in the *Highway Capacity Manual*, *6th Edition* (HCM 6).

Existing and Future (2026) Without-Project weekday AM and PM peak hour intersection operations are summarized in Table 2. Detailed LOS worksheets for each intersection are included in Appendix C. The City of Dupont's adopted LOS standard is LOS D.

Table 2. Existing and Future (2026) Weekday Peak Hour Intersection LOS Summary

	Existing			2026 Without-Project		
Intersection	**LOS[1]**	**Delay[2]**	**WM[3] or V/C[4]**	**LOS**	**Delay**	**WM or V/C**
AM Peak Hour						
1. Hoffman Hill Boulevard/McNeil Street	B	13	SB	B	14	SB
2. Bobs Hollow Lane/McNeil Street	C	18	SBL	C	21	SBL
3. Marshall Circle/McNeil Street	A	5	0.41	A	5	0.47
4. Gary Oaks Avenue/McNeil Street	C	16	SB	C	20	SB
5. Center Drive/Bobs Hollow Lane	B	12	-	B	14	-
6. Center Drive/McNeil Street	B	11	-	D	39	-
7. Center Drive/Wilmington Drive	A	9	-	A	10	-
8. Marshall Circle/N School Access	A	8	SB	A	8	WB
PM Peak Hour						
1. Hoffman Hill Boulevard/McNeil Street	D	27	SB	E	35	SB
2. Bobs Hollow Lane/McNeil Street	C	17	SBL	C	21	SBL
3. Marshall Circle/McNeil Street	A	5	0.39	A	5	0.44
4. Gary Oaks Avenue/McNeil Street	C	16	SB	C	19	SB
5. Center Drive/Bobs Hollow Lane	A	10	-	B	11	-
6. Center Drive/McNeil Street	B	13	-	D	43	-
7. Center Drive/Wilmington Drive	A	10	-	B	11	-
8. Marshall Circle/N School Access	A	0	N/A[5]	A	0	N/A[5]

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 2016)
2. Average delay per vehicle in seconds.
3. Worst movement (WM) reported for unsignalized intersections.
4. V/C ratio is the volume-to-capacity ratio reported for roundabouts.
5. No conflicting movements in this scenario.

As shown in Table 2, all study intersections are anticipated to operate at LOS D or better with the exception of the intersection of Hoffman Hill Boulevard and McNeil Street (Intersection 1) which operates at LOS E with 35 seconds of delay under Future (2026) Without-Project conditions.

Traffic Safety

Recent collision records were reviewed within the study area to identify if any existing traffic safety issues exist at the study intersections. Collision data for the three most recent calendar

years were provided by WSDOT[1] (January 1, 2019, and December 31, 2021). A summary of the total and average annual number of reported accidents at each study intersection is provided in Table 3.

Table 3. Three-Year Collision Summary – 2019 to 2021

Intersection	Number of Collisions			Total	Annual Average	Collisions per MEV[1]
	2019	2020	2021			
1. Hoffman Hill Boulevard/McNeil Street	0	0	0	0	0.00	0.00
2. Bobs Hollow Lane/McNeil Street	1	0	0	1	0.33	0.14
3. Marshall Circle/McNeil Street	1	0	0	1	0.33	0.18
4. Gary Oaks Avenue/McNeil Street	0	0	0	0	0.00	0.00
5. Center Drive/Bobs Hollow Lane	2	2	1	5	1.67	0.51
6. Center Drive/McNeil Street	2	1	0	3	1.00	0.25
7. Center Drive/Wilmington Drive	4	1	7	12	4.00	0.89

Source: WSDOT, 2021.
1. Million entering vehicles.

As shown in Table 3, there were a total of 22 collisions at the study intersections from January 1, 2019 to December 31, 2021, with averages ranging from 0 to 4 collisions per year. The majority of collisions (14) resulted in property damage only. There were no reported fatalities within the study area. There were also no collisions involved pedestrians or bicyclists within the study area. The most common type of collisions were collisions involving a vehicle turning at an approach to the intersection.

The number of collisions per million entering vehicles (MEV) was also reviewed for the study area. The collision rate is representative of the number of collisions per one million entering vehicles (MEV) at each intersection. Intersections with a rate greater than 1.0 collision per MEV are typically noted for further investigation to determine whether an adverse condition exists. The highest collisions per MEV is at the intersection of Center Drive and Wilmington Drive, a value of 0.89. The collision summary suggests that there are not adverse conditions involving safety at any of the study intersections.

[1] *Under 23 U.S. Code § 409 and 23 U.S. Code § 148, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.*

Project Impacts

The following sections summarize the proposed project's impacts on the surrounding street system. First, traffic volumes generated by the proposed project are estimated and then distributed and assigned to adjacent roadways within the study area. Next, project trips are added to future without-project traffic volumes and the potential impact to traffic operations, safety, transit, and non-motorized facilities are identified. Site-specific items are also discussed such as the traffic operations of the site's access driveway and estimated on-site parking demand.

Trip Generation

Trip generation for the proposed development was calculated based on trip rates using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 11th Edition (2021). ITE's Senior Adult Housing (Multifamily) (LU #252), Multifamily Housing (Low-Rise) (LU #220), and Elementary School (LU #520) land uses were assumed for the proposed development. Trip generation estimates for the Elementary School were completed for the overall capacity of 500 students and actual enrollments upon opening are anticipated to be below that.

Table 4 shows the weekday net new vehicle trips generated by the elementary school portion of the development. It should be noted that the anticipated AM bus/vehicular drop off window is 8:35 a.m. until 9:05 a.m. which falls in the general AM peak hour of 7:00 a.m. to 9:00 a.m. The anticipated PM bus/vehicular pick-up window is 3:15 p.m. until 3:45 p.m. which falls outside of the general PM peak hour of 4:00 p.m. to 6:00 p.m.

Table 4. Estimated Weekday Elementary School Trip Generation

Land Use[1]	Size	Daily Trips	AM Peak Hour			Afternoon Peak[2]			PM Peak Hour		
			In	Out	Total	In	Out	Total	In	Out	Total
Proposed											
Elementary School (LU #520)	500 students	**1,136**	200	170	**370**	104	121	**225**	37	43	**80**

1. Average trip rates from ITE *Trip Generation Manual*, 11th Edition (2021).
2. PM trip rate for the PM dismissal period, which would occur from 3:15 p.m. until 3:45 p.m.

As shown in Table 4, the elementary school portion is estimated to generate 1,136 weekday daily trips with 370 occurring the AM peak hour and 80 occurring in the PM peak hour when considering the standard 4:00 p.m. to 6:00 p.m. window. During the anticipated dismissal window, 225 trips are expected. The trip generation related to the residential portion of the development is shown in Table 5.

Table 5. Estimated Weekday Residential Trip Generation

Land Use[1]	Size	Daily Trips	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Proposed								
Senior Adult Housing (Multifamily) (LU #252)	140 du	454	10	18	28	20	15	35
Multifamily Housing (Low-Rise) (LU #220)	140 du	944	13	43	56	45	26	71
Total		***1,398***	*23*	*61*	***84***	*65*	*41*	***106***

Note: du = dwelling units
1. Average trip rates from ITE *Trip Generation Manual*, 11th Edition (2021).

As shown in Table 5, the residential portion is estimated to generate 1,398 weekday daily trips with 84 occurring the AM peak hour and 106 occurring in the PM peak hour.

The trip generation during the AM and PM commuter peaks for the two developments combined are summarized in Table 6.

Table 6. Estimated Weekday Combined Trip Generation during Adjacent Street Peaks

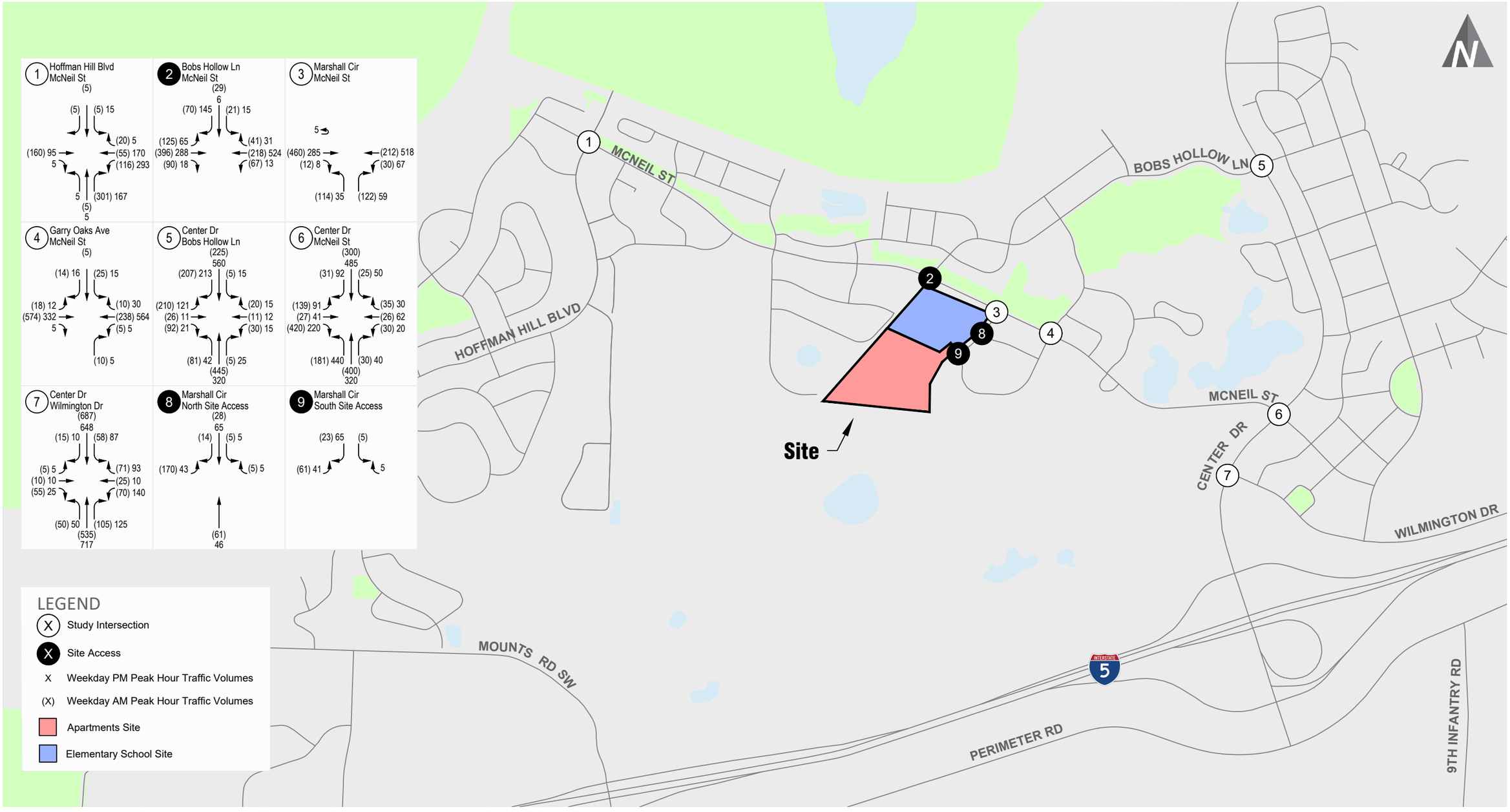
Land Use[1]	Size	Daily Trips	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Proposed								
Elementary School (LU #520)	500 students	1,136	200	170	370	37	43	80
Senior Adult Housing (Multifamily) (LU #252)	140 du	454	10	18	28	20	15	35
Multifamily Housing (Low-Rise) (LU #220)	140 du	944	13	43	56	45	26	71
Total		**2,534**	223	231	**454**	102	84	**186**

Note: du = dwelling units
1. Average trip rates from ITE *Trip Generation Manual*, 11th Edition (2021).

As shown in Table 6, the proposed project is estimated to generate 2,534 weekday daily trips with 454 occurring during the AM peak hour and 186 occurring during the PM peak hour. The detailed trip generation calculations are included in Appendix D.

Trip Distribution & Assignment

Trip distribution patterns for the proposed uses to and from the site were determined by specific land use, one for the school one for the residential land uses. The school trip distribution was determined by distributing trips to and from residential areas west of Center Drive since that is the preliminary eastern boundary for the school, as well as *OnTheMap* to determine the potential distribution for employees living outside of the residential area. The residential trip distribution was determined by assessing turning movement counts along Center Drive as well as using *OnTheMap*. *OnTheMap* is a web-based mapping and reporting application, which shows where workers are employed and where they live based on census data. The *OnTheMap* census data was used to project where people may work who live within the vicinity of the proposed development. The distribution of residential trips is expected to follow the trends shown by the census data. The project distribution for the proposed developments are shown on Figure 5 and Figure 6. The project trips were then assigned to the Future (2026) Without-Project volumes, creating the Future (2026) With-Project volumes. The with-project volumes are shown on Figure 7.

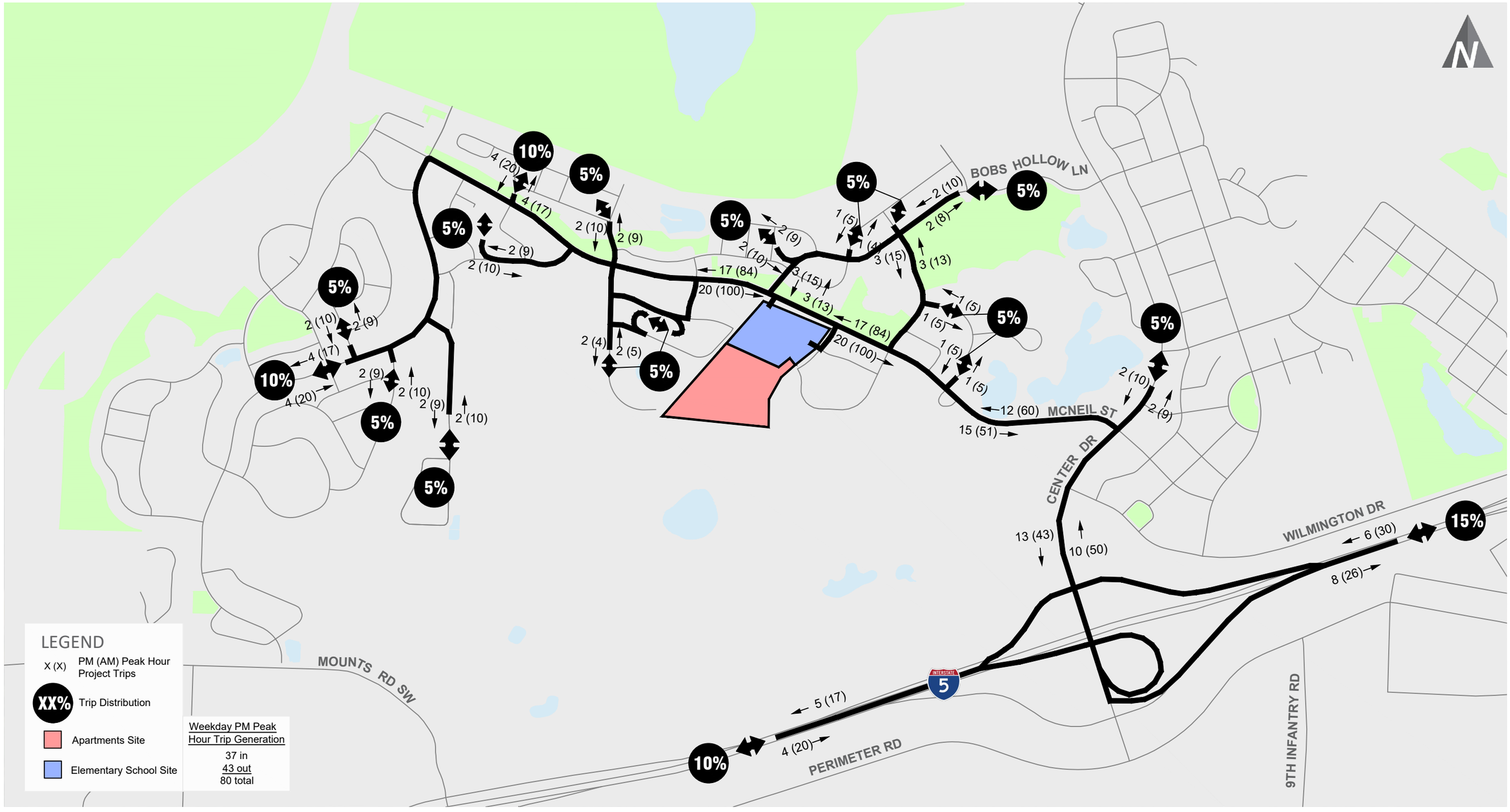


Future 2026 With-Project Weekday Peak Hour Traffic Volumes

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FIGURE
7

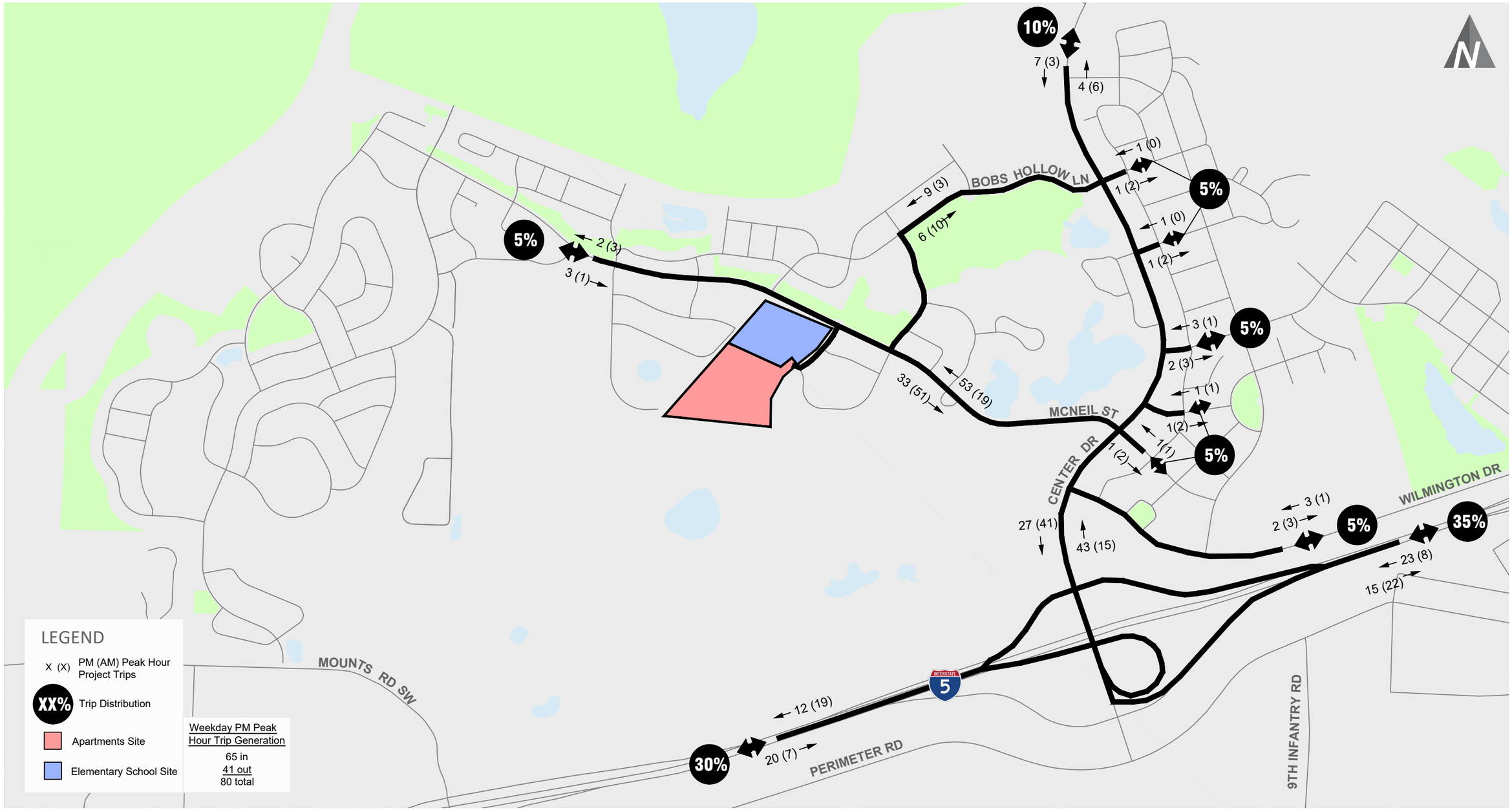


Proposed Elementary School Trip Distribution & Assignment

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FIGURE
6



Proposed Residential Trip Distribution & Assignment

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transpogroup

FIGURE
5

Traffic Volume Impact

Table 7 summarizes the anticipated increase in total entering traffic at the study intersections as well as the percent of future with-project traffic volumes attributable to the proposed project.

Table 7. Traffic Volume Impacts at Study Intersections

Intersection	Total Entering Vehicles			Percent Project Share
	2026 Without-Project	New Project Trips	2026 With-Project	
Weekday AM Peak Hour				
1. Hoffman Hill Blvd/McNeil St	575	97	672	14.4%
2. Bobs Hollow Ln/McNeil St	745	312	1,057	29.5%
3. Marshall Cir/McNeil St	615	335	950	35.3%
4. Garry Oaks Ave/McNeil St	690	209	899	23.2%
5. Center Dr/Bobs Hollow Ln	1,325	32	1,357	2.4%
6. Center Dr/McNeil St	1,465	179	1,644	10.9%
7. Center Dr/Wilmington Dr	1,535	151	1,686	9.0%
Weekday PM Peak Hour				
1. Hoffman Hill Blvd/McNeil St	735	25	760	3.3%
2. Bobs Hollow Ln/McNeil St	1,035	70	1,105	6.3%
3. Marshall Cir/McNeil St	815	162	977	16.6%
4. Garry Oaks Ave/McNeil St	855	129	984	13.1%
5. Center Dr/Bobs Hollow Ln	1,350	20	1,370	1.5%
6. Center Dr/McNeil St	1,780	111	1,891	5.9%
7. Center Dr/Wilmington Dr	1,825	95	1,920	4.9%

As shown in Table 7, the project generated traffic volumes are anticipated to be from approximately 2 percent to 35 percent in the AM peak hour. In the PM peak hour, project generated traffic volumes are anticipated to be approximately 6 percent or less at the study intersections with the exception of Marshall Circle/McNeil Street and Garry Oaks Avenue/McNeil Street which show project shares of 16.6 percent and 13.1 percent respectively.

Traffic Operations Impact

A Future (2026) With-Project level of service analysis was conducted for the weekday AM and PM peak hour to analyze traffic impacts of the proposed project. The same methodologies were applied as described for existing and future without-project conditions. All intersection parameters such as channelization and intersection control were consistent with those used in the evaluation of future without-project conditions.

A comparison of Future (2026) Without-Project and With-Project weekday AM and PM peak hour traffic operations are summarized in Table 8. Detailed LOS worksheets are provided in Appendix C.

Table 8. Future Weekday Peak Hour Intersection LOS Summary

Intersection	2026 Without-Project			2026 With-Project		
	LOS[1]	Delay[2]	WM[3] or V/C[4]	LOS	Delay	WM or V/C
AM Peak Hour						
1. Hoffman Hill Boulevard/McNeil Street	B	14	SB	C	16	SB
2. Bobs Hollow Lane/McNeil Street	C	21	SBL	E	39	SBL
3. Marshall Circle/McNeil Street	A	5	0.47	A	7	0.49
4. Gary Oaks Avenue/McNeil Street	C	20	SB	D	27	SB
5. Center Drive/Bobs Hollow Lane	B	14	-	B	15	-
6. Center Drive/McNeil Street	D	39	-	D	46	-
7. Center Drive/Wilmington Drive	A	10	-	A	10	-
8. Marshall Circle/North School Access	A	8	WB	B	11	EBL
9. Marshall Circle/South Site Access	*With-Project Only*			A	8	EB
PM Peak Hour						
1. Hoffman Hill Boulevard/McNeil Street	E	35	SB	E	39	SB
2. Bobs Hollow Lane/McNeil Street	C	21	SBL	C	23	SBL
3. Marshall Circle/McNeil Street	A	5	0.44	A	5	0.52
4. Gary Oaks Avenue/McNeil Street	C	19	SB	C	20	SB
5. Center Drive/Bobs Hollow Lane	B	11	-	B	11	-
6. Center Drive/McNeil Street	D	43	-	D	49	-
7. Center Drive/Wilmington Drive	B	11	-	B	11	-
8. Marshall Circle/North Site Access	A	0	N/A[5]	A	10	EBL
9. Marshall Circle/South Site Access	*With-Project Only*			A	8	EB

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 2016)
2. Average delay per vehicle in seconds.
3. Worst movement (WM) reported for unsignalized intersections.
4. V/C is the volume-to-capacity ratio reported for roundabouts.
5. No conflicting movement in this scenario.

As shown in Table 8, all study intersections are anticipated to operate to operate at LOS D or better with the exception of two intersections. The intersection of Bobs Hollow Lane and McNeil Street operates at LOS E under Future (2026) With-Project AM peak hour conditions. It functions as a site access in this condition and is discussed further in the site access evaluation.

The intersection of Hoffman Hill Boulevard and McNeil Street operates at LOS E under Future (2026) With-Project PM peak hour conditions. Queuing was reviewed the intersection and show a 95th percentile queue of up to one vehicle at the two-way stop-controlled intersection of Hoffman Hill Boulevard and McNeil Street.

School Site Access Evaluation

Traffic Operations

Vehicle access to the school site is proposed via two driveways. One along McNeil Street aligned with Bobs Hollow Lane which will function as entry-only, and the other located along Marshall Circle which will function as mostly exit-only aside from faculty and bus traffic. Since the majority of traffic will be occurring during the AM peak hour, a 15-minute LOS summary is shown in Table 9. The summary splits traffic into 15-minute windows with traffic weighted most towards the assumed school start time of 9:00 AM.

Table 9. Future (2026) With-Project AM Peak Hour 15-Minute Volumes and LOS

Intersections	Future With-Project Traffic Volumes				Future Without-Project			Future With-Project		
	EB	WB	NB	SB	LOS[1]	Delay[2]	WM[3]	LOS	Delay	WM
2. Bobs Hollow Lane/McNeil Street										
8:00 – 8:15 a.m.	151	70	-	18	C	16	SBL	C	19	SBL
8:15 – 8:30 a.m.	151	60	-	23	B	14	SBL	C	16	SBL
8:30 – 8:45 a.m.	182	82	-	17	C	15	SBL	C	21	SBL
8:45 – 9:00 a.m.	280	138	-	35	C	22	SBL	F	69	SBL
8. Marshall Circle/North School Access										
8:00 – 8:15 a.m.	18	0	12	14	A	0	N/A[4]	A	9	EBL
8:15 – 8:30 a.m.	18	0	13	16	A	0	N/A[4]	A	9	EBL
8:30 – 8:45 a.m.	39	5	13	11	A	0	N/A[4]	A	10	EBL
8:45 – 9:00 a.m.	95	0	13	12	A	0	N/A[4]	B	12	EBL

1. Level of Service (A – F) as defined by the *Highway Capacity Manual* (TRB, 2010)
2. Average delay per vehicle in seconds.
3. Worst movement reported for unsignalized intersections; SBL = Southbound Left, EBL = Eastbound Left.
4. No conflicting movements.

Weekday AM peak hour traffic operations at the site driveways are forecast to operate at LOS C or better for each interval with the exception of the 8:45 – 9:00 AM window at the Bobs Hollow Lane/McNeil Street intersection. For this condition with a regular school schedule, it is anticipated that local residents may find alternate traffic routes to avoid excessive delays. As shown in Table 9, the southbound left movement is most affected by delay, which would impact 5 of the 35 total southbound vehicles. Queuing at the intersection of Bobs Hollow Lane and McNeil Street was also reviewed and showed anticipated queues of less than one vehicle on all approaches during the AM peak hour. Detailed LOS worksheets are provided in Appendix C.

Summary of Findings

This traffic impact study summarizes the project traffic impacts of the proposed school and residential development. General findings include:

- The proposed project, constructing 140 senior adult housing and 140 multifamily housing (low-rise) along with an elementary school with up to 500 students, is estimated to generate approximately 2,534 weekday daily trips with 454 occurring in the AM peak hour and 186 occurring in the PM peak hour.
- Off-site study intersections operate at LOS D or better under future (2026) with-project AM and PM conditions with the exception of Hoffman Hill Boulevard/McNeil Street. The intersection operates at LOS E in without- and with-project conditions and would experience an increase in delay of four seconds and minimal queuing with the addition of project traffic.
- Site accesses are anticipated to operate at LOS B or better with the exception of the access aligned with Bobs Hollow Lane/McNeil Street during a portion of the AM peak period. The 15-minute LOS analysis shows that the access is anticipated to operate at LOS C until the 8:45-9:00 AM school drop-off window where it will operate at LOS F for a short period. It is typical for school access points to have congestion for a short period of time and the LOS F delay is for the southbound left movement where there are 21 vehicles forecasted to use this movement during the entire hour. There are alternative routes in the neighborhood and often times local residents will alter patterns to avoid congestion during these peak times. In addition, traffic volumes and delays are not forecasted to be high enough to meet signal warrants.

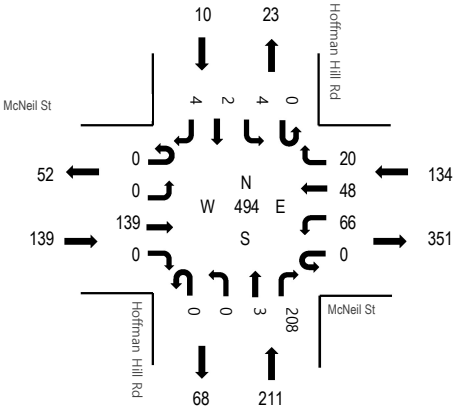
Appendix A: Traffic Counts

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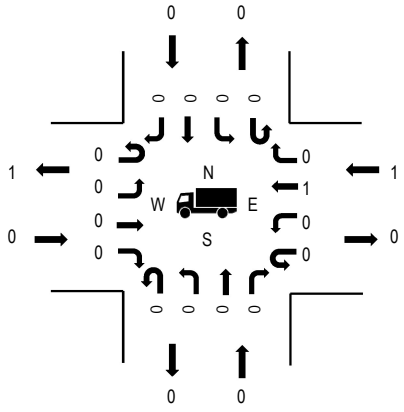
Location: 1 Hoffman Hill Rd & McNeil St AM
Date: Tuesday, May 17, 2022
Peak Hour: 08:00 AM - 09:00 AM

Peak Hour

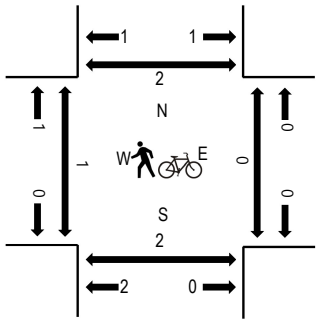
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.83
WB	0.7%	0.73
NB	0.0%	0.82
SB	0.0%	0.63
All	0.2%	0.86

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Hoffman Hill Rd Northbound				Hoffman Hill Rd Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	1	35	0	0	10	7	13	0	0	0	61	0	0	0	0	127	454
7:15 AM	0	0	24	0	0	11	4	8	0	0	0	43	0	0	0	0	90	453
7:30 AM	0	1	19	0	0	18	15	7	0	0	0	58	0	0	0	0	118	465
7:45 AM	0	0	31	0	0	27	13	11	0	0	0	36	0	1	0	0	119	469
8:00 AM	0	0	34	0	0	19	16	11	0	0	2	43	0	0	1	0	126	494
8:15 AM	0	0	25	0	0	18	9	5	0	0	0	44	0	0	1	0	102	
8:30 AM	0	0	38	0	0	10	8	4	0	0	1	57	0	0	0	4	122	
8:45 AM	0	0	42	0	0	19	15	0	0	0	0	64	0	4	0	0	144	
Count Total	0	2	248	0	0	132	87	59	0	0	3	406	0	5	2	4	948	
Peak Hour	0	0	139	0	0	66	48	20	0	0	3	208	0	4	2	4	494	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

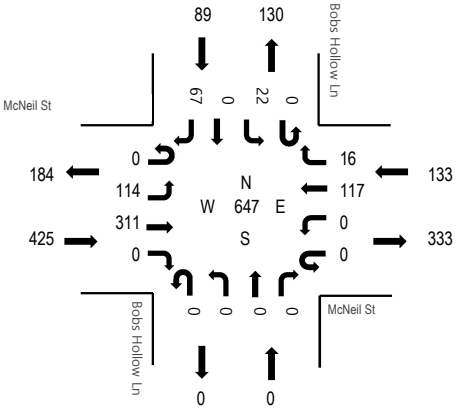
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	2	5	0	0	7
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	1	2	0	3	6
7:30 AM	0	0	1	0	1	7:30 AM	0	0	0	0	0	7:30 AM	1	1	1	2	5
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	2	0	0	1	3
8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	1	1	0	1	3
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	1	0	1	2
8:45 AM	0	0	1	0	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
Count Total	0	0	2	0	2	Count Total	0	0	0	0	0	Count Total	7	10	1	8	26
Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0	Peak Hour	1	2	0	2	5

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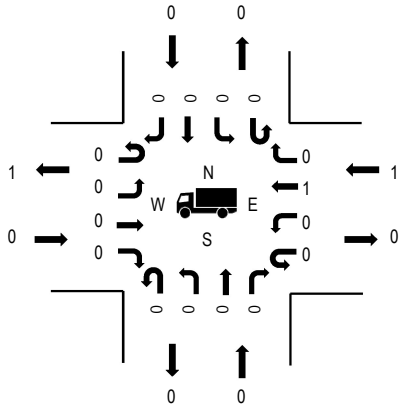
Location: 2 Bobs Hollow Ln & McNeil St AM
Date: Tuesday, May 17, 2022
Peak Hour: 07:00 AM - 08:00 AM

Peak Hour

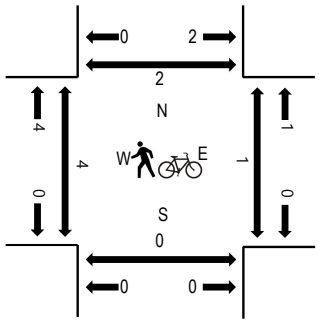
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.90
WB	0.8%	0.74
NB	0.0%	0.00
SB	0.0%	0.54
All	0.2%	0.83

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Bobs Hollow Ln Northbound				Bobs Hollow Ln Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	38	80	0	0	0	26	2	0	0	0	0	0	7	0	8	161	647
7:15 AM	0	19	80	0	0	0	17	5	0	0	0	0	0	4	0	7	132	632
7:30 AM	0	22	76	0	0	0	34	4	0	0	0	0	0	3	0	19	158	636
7:45 AM	0	35	75	0	0	0	40	5	0	0	0	0	0	8	0	33	196	622
8:00 AM	0	26	62	0	0	0	37	3	0	0	0	0	0	6	0	12	146	645
8:15 AM	0	16	68	0	0	0	28	3	0	0	0	0	0	6	0	15	136	
8:30 AM	0	17	90	0	0	0	28	2	0	0	0	0	0	2	0	5	144	
8:45 AM	0	29	142	0	0	0	29	3	0	0	0	0	0	3	0	13	219	
Count Total	0	202	673	0	0	0	239	27	0	0	0	0	0	39	0	112	1,292	
Peak Hour	0	114	311	0	0	0	117	16	0	0	0	0	0	22	0	67	647	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

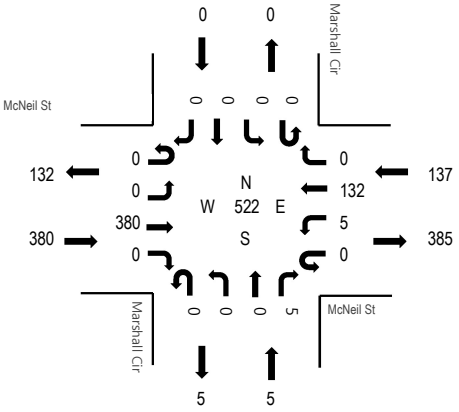
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:15 AM	0	0	1	0	1	7:15 AM	0	0	0	0	0	7:15 AM	1	0	0	2	3
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	1	0	1
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	3	0	0	0	3
8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	1	0	0	3	4
8:45 AM	0	0	1	0	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0
Count Total	0	0	2	0	2	Count Total	0	0	0	0	0	Count Total	5	0	1	5	11
Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0	Peak Hour	4	0	1	2	7

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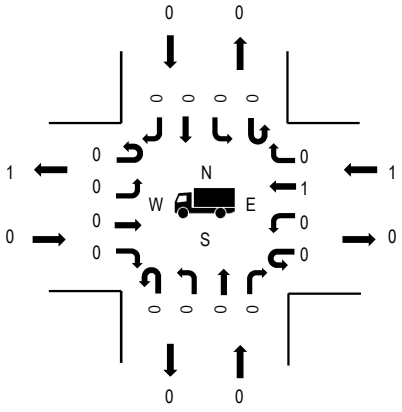
Location: 3 Marshall Cir & McNeil St AM
Date: Tuesday, May 17, 2022
Peak Hour: 08:00 AM - 09:00 AM

Peak Hour

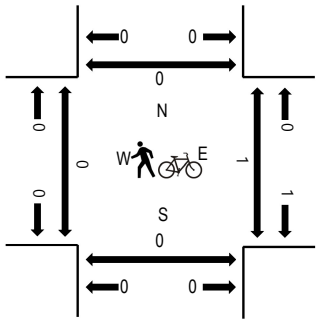
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.66
WB	0.7%	0.88
NB	0.0%	0.31
SB	0.0%	0.00
All	0.2%	0.76

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Marshall Cir Northbound				Marshall Cir Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	0	85	0	0	0	27	0	0	1	0	0	0	0	0	0	113	468
7:15 AM	0	0	83	0	0	0	25	0	0	0	0	0	0	0	0	0	108	462
7:30 AM	0	0	81	0	0	0	35	0	0	0	0	0	0	0	0	0	116	469
7:45 AM	0	0	82	0	0	2	46	0	0	0	0	1	0	0	0	0	131	482
8:00 AM	0	0	68	0	0	0	39	0	0	0	0	0	0	0	0	0	107	522
8:15 AM	0	0	76	0	0	4	31	0	0	0	0	4	0	0	0	0	115	
8:30 AM	0	0	92	0	0	1	35	0	0	0	0	1	0	0	0	0	129	
8:45 AM	0	0	144	0	0	0	27	0	0	0	0	0	0	0	0	0	171	
Count Total	0	0	711	0	0	7	265	0	0	1	0	6	0	0	0	0	990	
Peak Hour	0	0	380	0	0	5	132	0	0	0	0	5	0	0	0	0	522	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

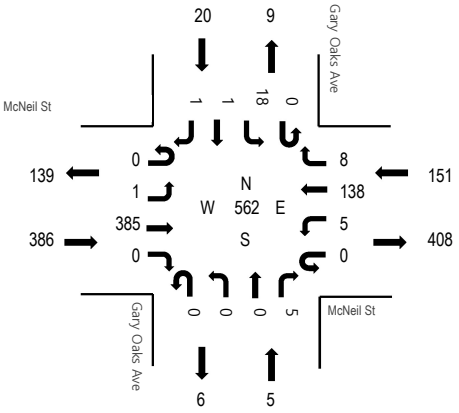
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:15 AM	0	0	1	0	1	7:15 AM	0	0	0	0	0	7:15 AM	0	0	1	0	1
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:45 AM	0	0	1	0	1	8:45 AM	0	0	0	0	0	8:45 AM	0	0	1	0	1
Count Total	0	0	2	0	2	Count Total	0	0	0	0	0	Count Total	0	0	2	0	2
Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0	Peak Hour	0	0	1	0	1

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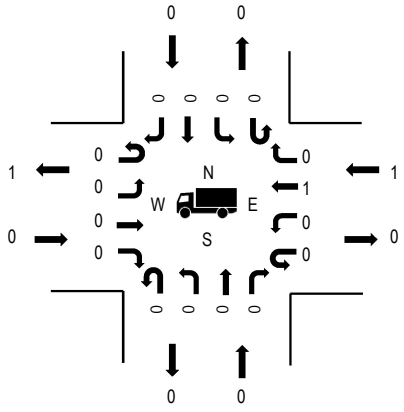
Location: 4 Gary Oaks Ave & McNeil St AM
Date: Tuesday, May 17, 2022
Peak Hour: 08:00 AM - 09:00 AM

Peak Hour

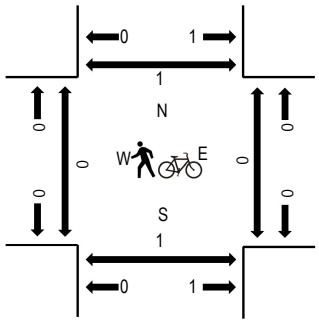
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.67
WB	0.7%	0.90
NB	0.0%	0.42
SB	0.0%	0.71
All	0.2%	0.75

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Gary Oaks Ave Northbound				Gary Oaks Ave Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
7:00 AM	0	0	84	0	0	2	26	2	0	0	0	1	0	1	0	0	116	501
7:15 AM	0	0	82	0	0	1	25	2	0	0	0	1	0	5	0	0	116	503
7:30 AM	0	0	81	0	0	3	34	5	0	0	0	1	0	3	1	1	129	507
7:45 AM	0	0	84	0	0	2	48	1	0	0	0	0	0	4	0	1	140	515
8:00 AM	0	0	71	0	0	1	39	2	0	0	0	0	0	4	1	0	118	562
8:15 AM	0	0	78	0	0	1	33	3	0	0	0	0	0	4	0	1	120	
8:30 AM	0	0	93	0	0	2	35	2	0	0	0	2	0	3	0	0	137	
8:45 AM	0	1	143	0	0	1	31	1	0	0	0	3	0	7	0	0	187	
Count Total	0	1	716	0	0	13	271	18	0	0	0	8	0	31	2	3	1,063	
Peak Hour	0	1	385	0	0	5	138	8	0	0	0	5	0	18	1	1	562	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

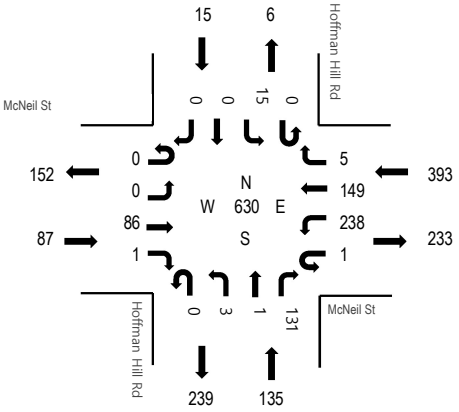
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	1	0	0	1	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0
7:15 AM	0	0	1	0	1	7:15 AM	0	0	0	0	0	7:15 AM	0	1	0	0	1
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	1	1
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0
8:45 AM	0	0	1	0	1	8:45 AM	0	0	0	0	0	8:45 AM	0	1	0	0	1
Count Total	0	1	2	0	3	Count Total	0	0	0	0	0	Count Total	0	2	0	1	3
Peak Hour	0	0	1	0	1	Peak Hour	0	0	0	0	0	Peak Hour	0	1	0	1	2

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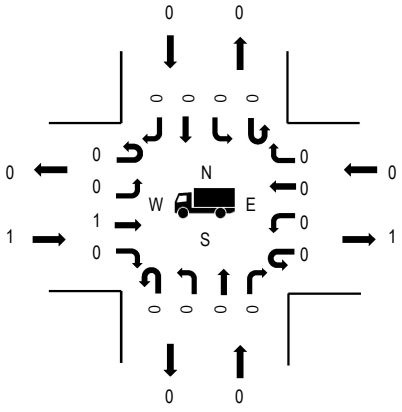
Location: 1 Hoffman Hill Rd & McNeil St PM
Date: Tuesday, May 17, 2022
Peak Hour: 04:45 PM - 05:45 PM

Peak Hour

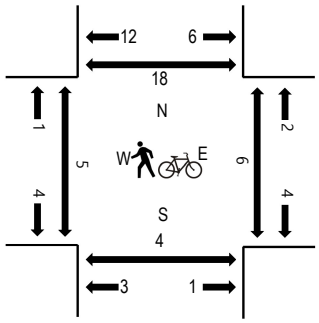
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	1.1%	0.84
WB	0.0%	0.87
NB	0.0%	0.82
SB	0.0%	0.47
All	0.2%	0.93

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Hoffman Hill Rd Northbound				Hoffman Hill Rd Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	10	2	0	38	24	2	0	0	0	20	0	7	0	0	103	506
4:15 PM	0	0	18	0	0	41	26	3	0	0	0	24	0	3	0	0	115	572
4:30 PM	0	0	23	0	0	58	38	3	0	0	0	25	0	0	0	1	148	614
4:45 PM	0	0	17	0	0	51	24	3	0	1	0	40	0	4	0	0	140	630
5:00 PM	0	0	25	0	1	67	45	0	0	1	0	29	0	1	0	0	169	621
5:15 PM	0	0	18	1	0	65	43	1	0	1	0	26	0	2	0	0	157	
5:30 PM	0	0	26	0	0	55	37	1	0	0	1	36	0	8	0	0	164	
5:45 PM	0	0	19	0	0	45	26	1	0	0	0	31	0	8	1	0	131	
Count Total	0	0	156	3	1	420	263	14	0	3	1	231	0	33	1	1	1,127	
Peak Hour	0	0	86	1	1	238	149	5	0	3	1	131	0	15	0	0	630	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

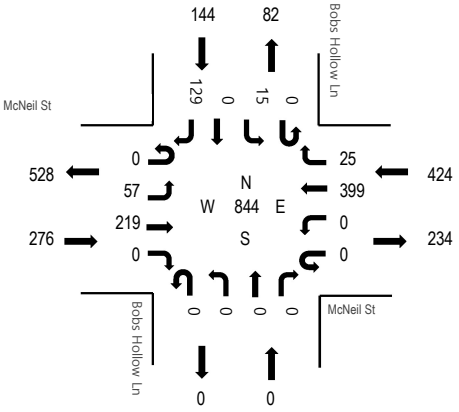
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	2	0	3	0	5
4:15 PM	0	0	0	0	0	4:15 PM	1	1	1	2	5
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	4	4
4:45 PM	0	0	0	0	0	4:45 PM	0	2	0	0	2
5:00 PM	0	0	0	0	0	5:00 PM	0	2	4	6	12
5:15 PM	0	0	0	0	0	5:15 PM	4	0	0	9	13
5:30 PM	1	0	0	0	1	5:30 PM	1	0	2	3	6
5:45 PM	0	0	0	0	0	5:45 PM	0	0	2	2	4
Count Total	1	0	0	0	1	Count Total	8	5	12	26	51
Peak Hour	1	0	0	0	1	Peak Hour	5	4	6	18	33

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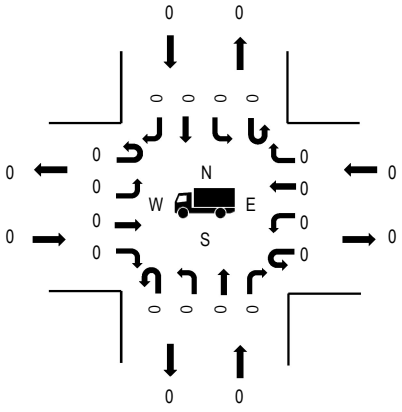
Location: 2 Bobs Hollow Ln & McNeil St PM
Date: Tuesday, May 17, 2022
Peak Hour: 04:30 PM - 05:30 PM

Peak Hour

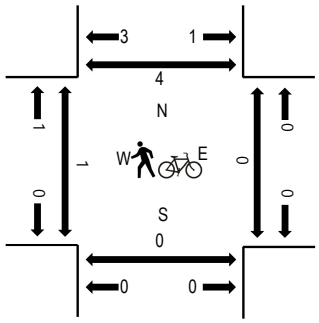
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.93
WB	0.0%	0.84
NB	0.0%	0.00
SB	0.0%	0.82
All	0.0%	0.94

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Bobs Hollow Ln Northbound				Bobs Hollow Ln Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	10	46	0	0	0	72	7	0	0	0	0	0	3	0	27	165	734
4:15 PM	0	11	38	0	0	0	89	5	0	0	0	0	0	2	0	18	163	782
4:30 PM	0	15	57	0	0	0	87	10	0	0	0	0	0	8	0	36	213	844
4:45 PM	0	21	53	0	0	0	77	5	0	0	0	0	0	3	0	34	193	838
5:00 PM	0	13	51	0	0	0	113	6	0	0	0	0	0	1	0	29	213	839
5:15 PM	0	8	58	0	0	0	122	4	0	0	0	0	0	3	0	30	225	
5:30 PM	0	24	56	0	0	0	88	9	0	0	0	0	0	3	0	27	207	
5:45 PM	0	30	58	0	0	0	69	7	0	0	0	0	0	5	0	25	194	
Count Total	0	132	417	0	0	0	717	53	0	0	0	0	0	28	0	226	1,573	
Peak Hour	0	57	219	0	0	0	399	25	0	0	0	0	0	15	0	129	844	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

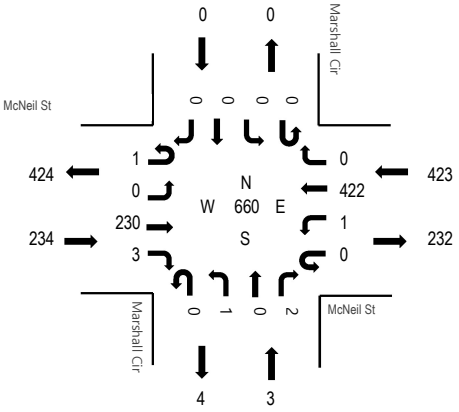
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	3	3
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0
4:30 PM	0	0	0	0	0	4:30 PM	1	0	0	2	3
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	1	1
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	1	1
5:30 PM	1	0	0	0	1	5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	1	1
Count Total	1	0	0	0	1	Count Total	1	0	0	8	9
Peak Hour	0	0	0	0	0	Peak Hour	1	0	0	4	5

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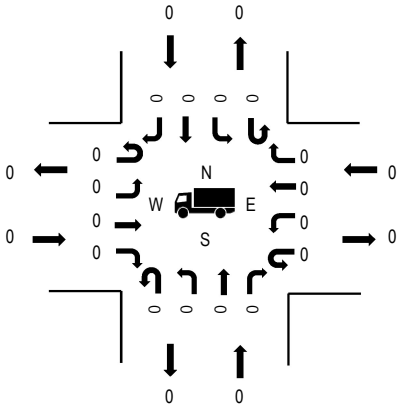
Location: 3 Marshall Cir & McNeil St PM
Date: Tuesday, May 17, 2022
Peak Hour: 04:30 PM - 05:30 PM

Peak Hour

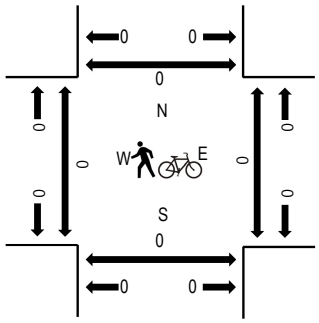
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.0%	0.91
WB	0.0%	0.87
NB	0.0%	0.38
SB	0.0%	0.00
All	0.0%	0.89

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Marshall Cir Northbound				Marshall Cir Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	47	1	0	0	79	0	0	0	0	0	0	0	0	0	127	564
4:15 PM	0	0	41	0	0	1	91	0	0	2	0	1	0	0	0	0	136	611
4:30 PM	1	0	61	2	0	0	97	0	0	0	0	0	0	0	0	0	161	660
4:45 PM	0	0	55	1	0	0	83	0	0	1	0	0	0	0	0	0	140	654
5:00 PM	0	0	53	0	0	0	121	0	0	0	0	0	0	0	0	0	174	654
5:15 PM	0	0	61	0	0	1	121	0	0	0	0	2	0	0	0	0	185	
5:30 PM	0	0	57	0	0	0	98	0	0	0	0	0	0	0	0	0	155	
5:45 PM	0	0	62	0	0	1	77	0	0	0	0	0	0	0	0	0	140	
Count Total	1	0	437	4	0	3	767	0	0	3	0	3	0	0	0	0	1,218	
Peak Hour	1	0	230	3	0	1	422	0	0	1	0	2	0	0	0	0	660	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

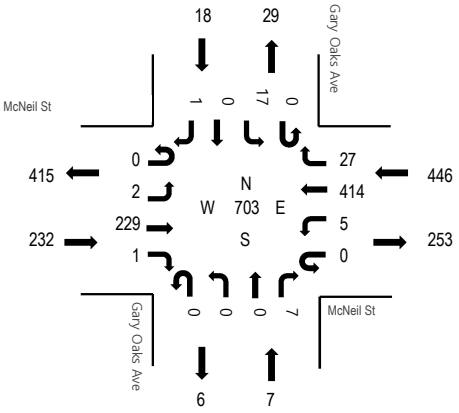
Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	1	0	1
4:15 PM	0	0	0	0	0	4:15 PM	0	0	1	0	1
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:30 PM	1	0	0	0	1	5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	1	0	0	0	1	Count Total	0	0	2	0	2
Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0

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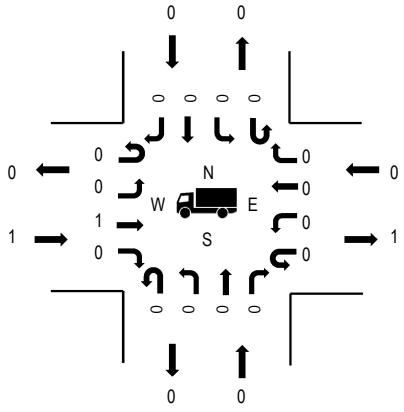
Location: 4 Gary Oaks Ave & McNeil St PM
Date: Tuesday, May 17, 2022
Peak Hour: 05:00 PM - 06:00 PM

Peak Hour

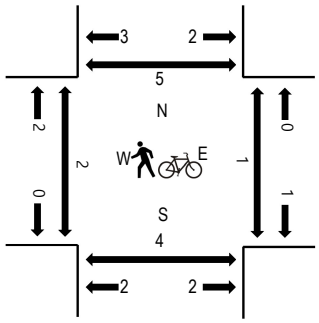
Motorized Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	0.4%	0.92
WB	0.0%	0.83
NB	0.0%	0.58
SB	0.0%	0.64
All	0.1%	0.90

Traffic Counts - Motorized Vehicles

Interval Start Time	McNeil St Eastbound				McNeil St Westbound				Gary Oaks Ave Northbound				Gary Oaks Ave Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	2	48	0	0	2	80	3	0	0	0	3	0	1	1	1	141	603
4:15 PM	0	0	41	0	0	2	91	8	0	0	1	3	0	1	0	1	148	657
4:30 PM	0	0	62	0	0	0	95	4	0	1	0	3	0	2	0	0	167	702
4:45 PM	0	0	56	0	0	0	82	5	0	0	0	1	0	2	0	1	147	697
5:00 PM	0	1	51	0	0	0	123	12	0	0	0	1	0	7	0	0	195	703
5:15 PM	0	0	62	1	0	0	121	3	0	0	0	3	0	3	0	0	193	
5:30 PM	0	0	57	0	0	3	93	5	0	0	0	1	0	3	0	0	162	
5:45 PM	0	1	59	0	0	2	77	7	0	0	0	2	0	4	0	1	153	
Count Total	0	4	436	1	0	9	762	47	0	1	1	17	0	23	1	4	1,306	
Peak Hour	0	2	229	1	0	5	414	27	0	0	0	7	0	17	0	1	703	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	2	2
4:15 PM	0	0	0	0	0	4:15 PM	3	1	0	4	8
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	2	2
4:45 PM	0	0	0	0	0	4:45 PM	0	1	4	6	11
5:00 PM	0	0	0	0	0	5:00 PM	1	0	0	0	1
5:15 PM	0	0	0	0	0	5:15 PM	0	1	1	4	6
5:30 PM	1	0	0	0	1	5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	1	3	0	1	5
Count Total	1	0	0	0	1	Count Total	5	6	5	19	35
Peak Hour	1	0	0	0	1	Peak Hour	2	4	1	5	12

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

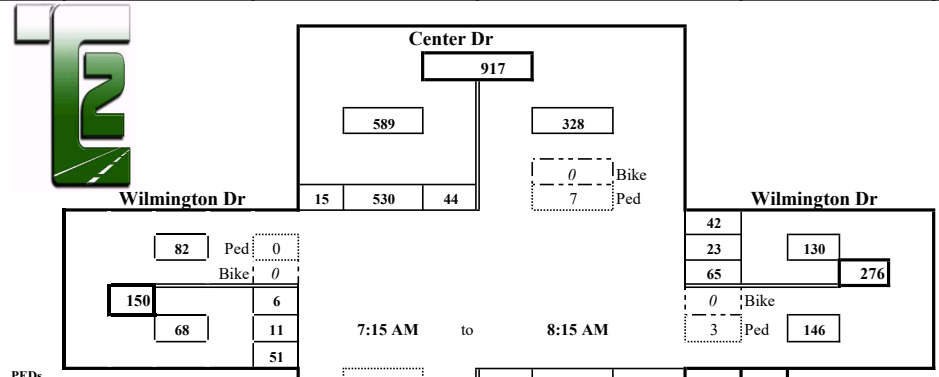
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Wilmington Dr **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Wilmington Dr				From West on (EB) Wilmington Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	2	11	116	4	2	9	53	12	1	17	3	6	0	2	3	5	241
7:30 A	1	8	139	3	2	12	78	31	0	24	9	11	0	2	3	6	326
7:45 A	2	8	117	3	2	8	80	19	0	16	5	15	0	1	3	19	294
8:00 A	1	13	141	2	5	13	71	17	2	13	8	11	0	2	2	12	305
8:15 A	0	15	133	7	2	11	51	24	0	12	1	5	0	1	3	14	277
8:30 A	2	14	113	8	1	11	61	29	0	19	5	9	0	2	3	10	284
8:45 A	0	13	132	2	0	7	58	27	0	17	4	6	0	2	2	7	277
9:00 A	1	14	127	4	3	15	63	26	0	16	4	13	0	3	4	6	295
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	9	96	1018	33	17	86	515	185	3	134	39	76	0	15	23	79	2299
	Peak Hour: 7:15 AM to 8:15 AM																
Total	4	44	530	15	11	44	280	91	2	65	23	42	0	6	11	51	1202
Approach	589				415				130				68				1202
%HV	0.7%				2.7%				1.5%				n/a				1.4%
PHF	0.94				0.86				0.74				0.74				0.92



PEDs Across:	N	S	E	W	
INT 01	4	0	2	1	7
INT 02	1	0	0	0	1
INT 03	1	0	1	0	2
INT 04	1	0	1	0	2
INT 05	4	0	1	0	5
INT 06	0	0	0	0	0
INT 07	1	0	0	0	1
INT 08	4	0	3	0	7
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	16	0	8	1	25

	PHF	%HV
EB	0.74	n/a
WB	0.74	1.5%
NB	0.86	2.7%
SB	0.94	0.7%
T Int.	0.92	1.4%

Check In: 1202 Out: 1202

Bicycles From:	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	0	0	0
INT 06	0	0	0	0	0
INT 07	1	0	0	0	1
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	1	0	0	0	1

N U's	S U's	E U's	W U's
2			
2	0	0	0

Special Notes

GRT21079TM_01A

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

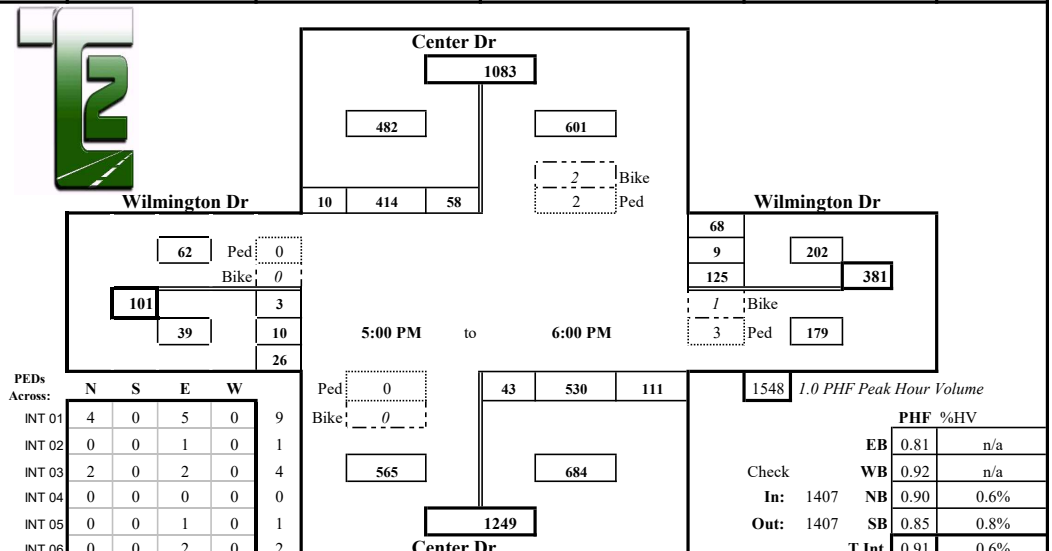
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Wilmington Dr **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Wilmington Dr				From West on (EB) Wilmington Dr				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	3	9	89	0	1	6	97	25	1	23	4	21	0	0	2	5	281
4:30 P	3	9	75	1	1	10	101	28	2	21	3	17	0	1	1	6	273
4:45 P	1	7	89	1	1	11	115	25	0	34	4	12	0	0	3	7	308
5:00 P	0	20	84	2	1	14	115	30	0	21	5	17	0	2	0	6	316
5:15 P	0	16	101	1	2	17	110	22	0	33	0	17	0	0	2	8	327
5:30 P	1	11	97	2	0	11	148	30	0	30	5	20	0	1	1	5	361
5:45 P	1	18	120	4	1	8	145	29	0	39	2	12	0	2	4	4	387
6:00 P	2	13	96	3	1	7	127	30	0	23	2	19	0	0	3	9	332
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	11	103	751	14	8	84	958	219	3	224	25	135	0	6	16	50	2585
Peak Hour: 5:00 PM to 6:00 PM																	
Total	4	58	414	10	4	43	530	111	0	125	9	68	0	3	10	26	1407
Approach	482				684				202				39				1407
%HV	0.8%				0.6%				n/a				n/a				0.6%
PHF	0.85				0.90				0.92				0.81				0.91



1548 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	4	0	5	0	9
INT 02	0	0	1	0	1
INT 03	2	0	2	0	4
INT 04	0	0	0	0	0
INT 05	0	0	1	0	1
INT 06	0	0	2	0	2
INT 07	1	0	0	0	1
INT 08	1	0	0	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	8	0	11	0	19

	PHF	%HV
EB	0.81	n/a
WB	0.92	n/a
NB	0.90	0.6%
SB	0.85	0.8%
T Int.	0.91	0.6%

Check In: 1407 Out: 1407

Bicycles From:	N	S	E	W	
INT 01	0	0	1	0	1
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	0	0	0
INT 05	0	0	0	0	0
INT 06	1	0	0	0	1
INT 07	1	0	1	0	2
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	0	2	0	4

N U's	S U's	E U's	W U's
	1		
	1		
1			
	1		
	1		
	1		
1	5	0	0

Special Notes

GRT21079TM_01P

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

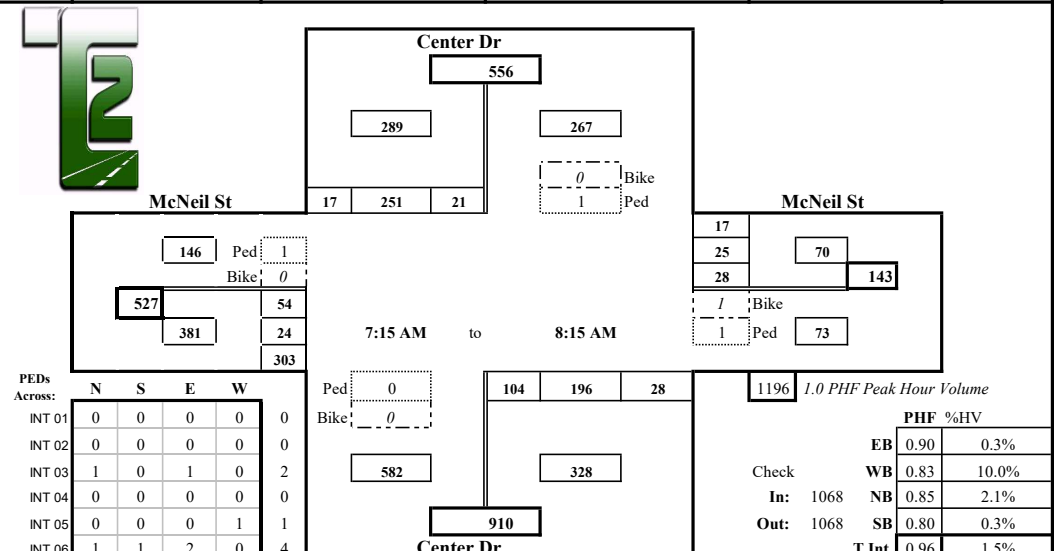
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & McNeil St **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) McNeil St				From West on (EB) McNeil St				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	0	2	47	0	1	9	48	5	1	11	5	2	0	9	3	74	215
7:30 A	0	2	49	3	0	19	64	6	2	4	2	4	0	12	7	87	259
7:45 A	0	5	49	3	1	32	57	7	3	8	9	1	0	15	4	75	265
8:00 A	1	5	76	9	4	33	45	9	2	10	5	6	1	11	3	66	278
8:15 A	0	9	77	2	2	20	30	6	0	6	9	6	0	16	10	75	266
8:30 A	2	7	61	9	1	32	40	0	1	6	3	3	1	21	9	61	252
8:45 A	0	1	48	1	0	24	37	2	0	6	4	2	0	11	10	87	233
9:00 A	2	5	63	5	2	26	52	8	0	5	6	3	2	34	15	77	299
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	5	36	470	32	11	195	373	43	9	56	43	27	4	129	61	602	2067
Peak Hour: 7:15 AM to 8:15 AM																	
Total	1	21	251	17	7	104	196	28	7	28	25	17	1	54	24	303	1068
Approach	289				328				70				381				1068
%HV	0.3%				2.1%				10.0%				0.3%				1.5%
PHF	0.80				0.85				0.83				0.90				0.96



1196 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.90	0.3%
WB	0.83	10.0%
NB	0.85	2.1%
SB	0.80	0.3%
T Int.	0.96	1.5%

Check In: 1068 Out: 1068

Conditions:

PEDs Across:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	1	0	1	0	2
INT 04	0	0	0	0	0
INT 05	0	0	0	1	1
INT 06	1	1	2	0	4
INT 07	0	0	1	0	1
INT 08	0	0	3	0	3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	1	7	1	11

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	1	0	1
INT 05	0	0	0	0	0
INT 06	0	0	0	1	1
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	1	1	2

Special Notes

GRT21079TM_02A

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

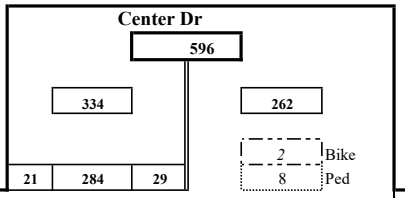
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

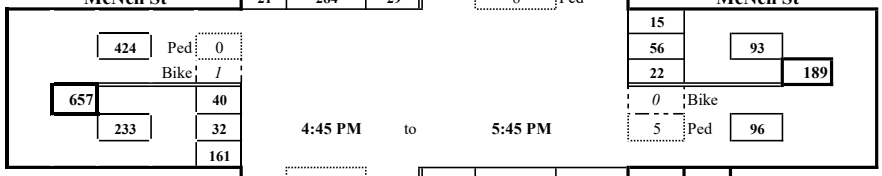
WBE/DBE

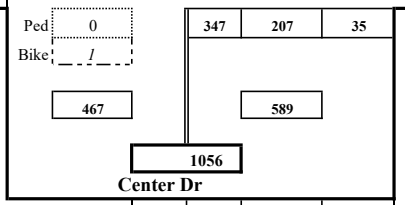
Intersection: Center Dr & McNeil St **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) McNeil St				From West on (EB) McNeil St				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	5	49	3	1	80	28	6	0	9	12	3	3	7	7	40	249
4:30 P	0	4	46	3	1	77	45	2	1	6	19	6	0	12	6	31	257
4:45 P	0	5	42	7	0	63	50	11	1	11	17	4	0	10	8	40	268
5:00 P	0	5	63	4	1	79	47	8	0	4	15	5	1	13	10	41	294
5:15 P	0	9	63	9	0	77	41	8	0	4	11	1	2	9	11	44	287
5:30 P	1	10	65	6	0	96	57	12	0	7	21	4	0	11	6	34	329
5:45 P	1	5	93	2	0	95	62	7	0	7	9	5	0	7	5	42	339
6:00 P	0	3	54	3	0	89	51	9	2	13	19	2	2	4	7	28	282
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	46	475	37	3	656	381	63	4	61	123	30	8	73	60	300	2305
	Peak Hour: 4:45 PM to 5:45 PM																
Total	2	29	284	21	1	347	207	35	0	22	56	15	3	40	32	161	1249
Approach	334				589				93				233				1249
%HV	0.6%				0.2%				n/a				1.3%				0.5%
PHF	0.84				0.89				0.73				0.91				0.92







1356 *1.0 PHF Peak Hour Volume*

PEDs Across:	N	S	E	W	
INT 01	0	1	0	0	1
INT 02	1	6	2	1	10
INT 03	2	2	3	1	8
INT 04	2	0	0	0	2
INT 05	3	0	1	0	4
INT 06	0	0	3	0	3
INT 07	3	0	1	0	4
INT 08	0	0	4	0	4
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	11	9	14	2	36

	PHF	%HV
EB	0.91	1.3%
WB	0.73	n/a
NB	0.89	0.2%
SB	0.84	0.6%
T Int.	0.92	0.5%

Check In: 1249 Out: 1249

Bicycles From:	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	0	1	1
INT 03	0	0	0	3	3
INT 04	0	1	0	0	1
INT 05	0	0	0	0	0
INT 06	1	0	0	0	1
INT 07	1	0	0	1	2
INT 08	0	0	1	0	1
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	2	1	1	5	9

N U's	S U's	E U's	W U's
	1		
0	1	0	0

Special Notes

GRT21079TM_02P

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

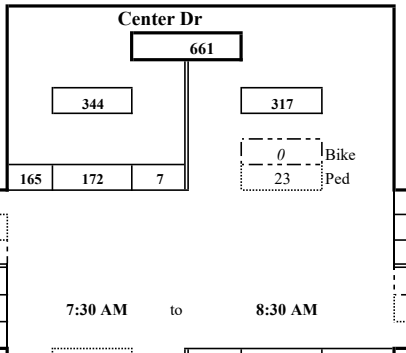
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Bob's Hollow Ln **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Bob's Hollow Ln				From West on (EB) Bob's Hollow Ln				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
7:15 A	0	1	19	4	0	6	58	1	0	4	1	1	0	44	2	10	151
7:30 A	1	1	26	16	0	8	64	1	0	7	0	1	0	25	3	4	156
7:45 A	1	3	33	33	0	19	46	1	0	8	2	1	0	28	7	6	187
8:00 A	5	1	38	64	0	32	36	2	1	12	4	4	1	35	4	35	267
8:15 A	2	1	46	44	1	11	32	1	0	5	2	4	6	58	8	31	243
8:30 A	2	2	55	24	1	10	40	2	2	4	1	6	4	27	4	10	185
8:45 A	1	1	30	9	0	3	35	4	0	7	0	1	1	29	7	11	137
9:00 A	3	1	47	20	2	7	46	3	0	7	4	6	2	24	11	22	198
9:15 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:30 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00 A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	15	11	294	214	4	96	357	15	3	54	14	24	14	270	46	129	1524
	Peak Hour: 7:30 AM to 8:30 AM																
Total	10	7	172	165	2	72	154	6	3	29	9	15	11	148	23	82	882
Approach	344				232				53				253				882
%HV	2.9%				0.9%				5.7%				4.3%				2.9%
PHF	0.83				0.83				0.66				0.65				0.83



1068 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.65	4.3%
WB	0.66	5.7%
NB	0.83	0.9%
SB	0.83	2.9%
T Int.	0.83	2.9%

Check In: 882 Out: 882

Conditions:

PEDs Across:

	N	S	E	W	
INT 01	1	0	0	0	1
INT 02	1	0	0	1	2
INT 03	7	1	0	1	9
INT 04	14	1	1	1	17
INT 05	2	1	0	2	5
INT 06	0	1	0	0	1
INT 07	0	1	0	2	3
INT 08	2	0	0	0	2
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	27	5	1	7	40

Bicycles From:

	N	S	E	W	
INT 01	0	0	0	0	0
INT 02	0	0	1	0	1
INT 03	0	0	0	0	0
INT 04	0	1	4	0	5
INT 05	0	0	3	0	3
INT 06	0	0	0	0	0
INT 07	0	0	0	0	0
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	1	8	0	9

Special Notes

GRT21079TM_03A

Prepared for: **City of DuPont**

Traffic Count Consultants, Inc.

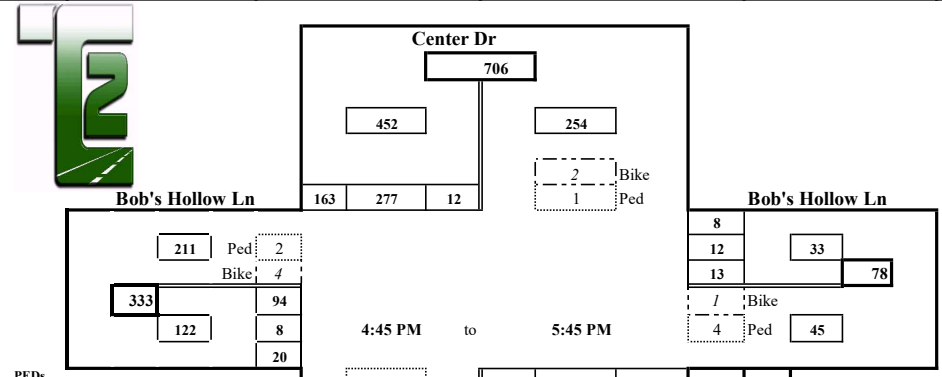
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Center Dr & Bob's Hollow Ln **Date of Count:** Tue 10/05/2021

Location: DuPont, Washington **Checked By:** Jen

Time Interval	From North on (SB) Center Dr				From South on (NB) Center Dr				From East on (WB) Bob's Hollow Ln				From West on (EB) Bob's Hollow Ln				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	3	35	23	1	3	33	4	0	4	2	3	3	15	4	6	135
4:30 P	0	0	41	21	1	4	31	3	1	3	3	3	0	13	5	4	131
4:45 P	0	0	38	26	0	8	29	6	0	1	4	5	0	19	5	5	146
5:00 P	0	1	60	43	0	7	41	6	0	4	3	2	0	25	4	6	202
5:15 P	0	2	68	45	0	5	25	5	0	5	4	1	1	16	2	7	185
5:30 P	1	5	60	43	0	10	37	5	0	4	1	2	0	25	1	5	198
5:45 P	1	4	89	32	1	14	49	9	0	0	4	3	0	28	1	2	235
6:00 P	0	6	52	31	0	3	40	6	0	3	2	5	1	20	3	6	177
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	21	443	264	3	54	285	44	1	24	23	24	5	161	25	41	1409
	Peak Hour: 4:45 PM to 5:45 PM																
Total	2	12	277	163	1	36	152	25	0	13	12	8	1	94	8	20	820
Approach	452				213				33				122				820
%HV	0.4%				0.5%				n/a				0.8%				0.5%
PHF	0.90				0.74				0.83				0.87				0.87



PEDs Across:	N	S	E	W	
INT 01	0	1	1	0	2
INT 02	0	1	1	0	2
INT 03	0	7	1	0	8
INT 04	1	3	1	0	5
INT 05	0	6	1	0	7
INT 06	0	6	1	0	7
INT 07	0	3	1	2	6
INT 08	2	1	0	2	5
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	28	7	4	42

Special Notes

Bicycles From:	N	S	E	W	
INT 01	1	0	0	0	1
INT 02	0	0	0	0	0
INT 03	0	0	0	0	0
INT 04	0	0	0	2	2
INT 05	1	1	0	0	2
INT 06	1	0	0	1	2
INT 07	0	0	1	1	2
INT 08	0	0	0	0	0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	3	1	1	4	9

N U's	S U's	E U's	W U's
	1		
	1		
1			
1	2	0	0

		PHF	%HV
	EB	0.87	0.8%
Check	WB	0.83	n/a
In: 820	NB	0.74	0.5%
Out: 820	SB	0.90	0.4%
	T Int.	0.87	0.5%

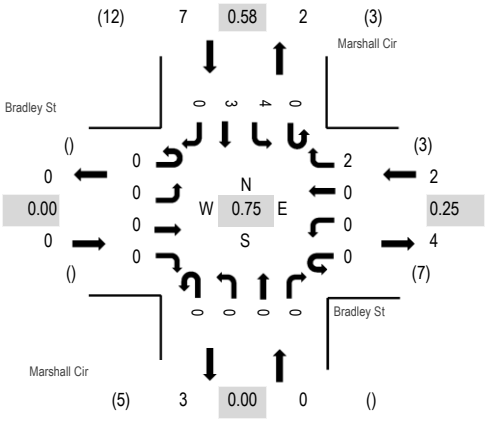
GRT21079TM_03P

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 Marshall Cir & Bradley St AM
Date: Tuesday, June 7, 2022
Peak Hour: 07:45 AM - 08:45 AM
Peak 15-Minutes: 08:15 AM - 08:30 AM

Peak Hour

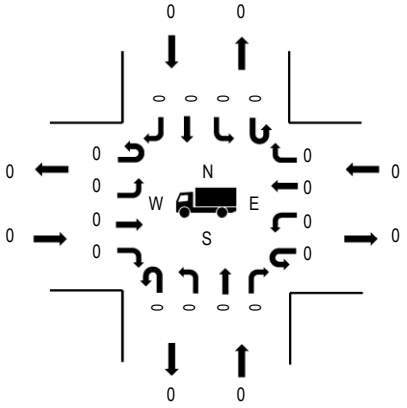
Motorized Vehicles



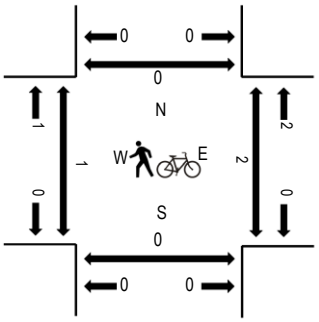
Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	0.0%	0.25
NB	0.0%	0.00
SB	0.0%	0.58
All	0.0%	0.75

Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



Traffic Counts - Motorized Vehicles

Interval Start Time	Bradley St Eastbound				Bradley St Westbound				Marshall Cir Northbound				Marshall Cir Southbound					Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	Total	
7:00 AM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	3	6
7:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5
7:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	7
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	9
8:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	9
8:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3	
8:30 AM	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	3	
8:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
Count Total	0	0	0	0	0	0	0	3	0	0	0	0	0	7	5	0	15	
Peak Hour	0	0	0	0	0	0	0	2	0	0	0	0	0	4	3	0	9	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

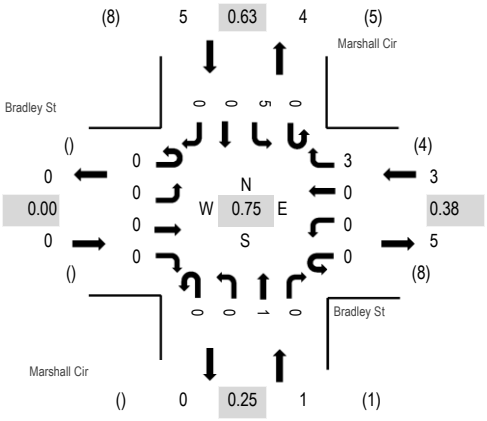
Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	0	0	7:00 AM	0	0	0	2	2
7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0	7:15 AM	0	0	0	0	0
7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0	7:30 AM	0	0	0	0	0
7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0	7:45 AM	0	0	0	0	0
8:00 AM	0	0	0	0	0	8:00 AM	0	0	0	0	0	8:00 AM	0	0	2	0	2
8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0	8:15 AM	0	0	0	0	0
8:30 AM	0	0	0	0	0	8:30 AM	0	0	0	0	0	8:30 AM	1	0	0	0	1
8:45 AM	0	0	0	0	0	8:45 AM	0	0	0	0	0	8:45 AM	1	0	0	0	1
Count Total	0	0	0	0	0	Count Total	0	0	0	0	0	Count Total	2	0	2	2	6
Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0	Peak Hour	1	0	2	0	3

ALL TRAFFIC DATA SERVICES
(303) 216-2439
www.alltrafficdata.net

Location: 1 Marshall Cir & Bradley St PM
Date: Tuesday, June 7, 2022
Peak Hour: 04:00 PM - 05:00 PM
Peak 15-Minutes: 04:45 PM - 05:00 PM

Peak Hour

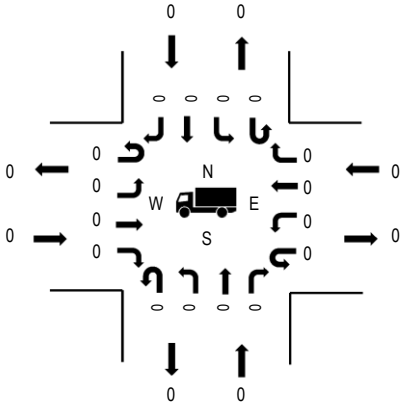
Motorized Vehicles



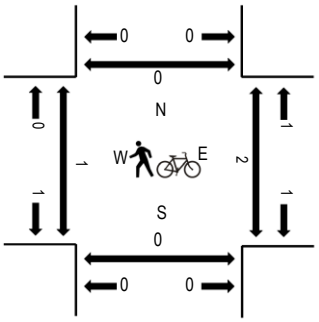
Note: Total study counts contained in parentheses.

	HV%	PHF
EB	0.0%	0.00
WB	0.0%	0.38
NB	0.0%	0.25
SB	0.0%	0.63
All	0.0%	0.75

Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



Traffic Counts - Motorized Vehicles

Interval Start Time	Bradley St Eastbound				Bradley St Westbound				Marshall Cir Northbound				Marshall Cir Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	9
4:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	7
4:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	7
4:45 PM	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	3	7
5:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
5:15 PM	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	
5:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	
5:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Count Total	0	0	0	0	0	0	0	4	0	0	1	0	0	8	0	0	13	
Peak Hour	0	0	0	0	0	0	0	3	0	0	1	0	0	5	0	0	9	

Traffic Counts - Heavy Vehicles, Bicycles on Road, and Pedestrians/Bicycles in Crosswalk

Interval Start Time	Heavy Vehicles					Interval Start Time	Bicycles on Roadway					Interval Start Time	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	0	0	0	0	0	4:00 PM	0	0	0	0	0	4:00 PM	1	0	0	0	1
4:15 PM	0	0	0	0	0	4:15 PM	0	0	0	0	0	4:15 PM	0	0	1	0	1
4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0	4:30 PM	0	0	0	0	0
4:45 PM	0	0	0	0	0	4:45 PM	0	0	0	0	0	4:45 PM	0	0	1	0	1
5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0	5:00 PM	0	0	0	0	0
5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0	5:15 PM	0	0	0	0	0
5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0	5:30 PM	0	0	0	0	0
5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0	5:45 PM	0	0	0	0	0
Count Total	0	0	0	0	0	Count Total	0	0	0	0	0	Count Total	1	0	2	0	3
Peak Hour	0	0	0	0	0	Peak Hour	0	0	0	0	0	Peak Hour	1	0	2	0	3

Appendix B: LOS Definitions

Highway Capacity Manual 2010/6th Edition

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* and 6th Edition (Transportation Research Board, 2010 and 2016, respectively).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010 and 6th Edition*, Transportation Research Board, 2010 and 2016, respectively.

1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

Appendix C: LOS Worksheets

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	140	0	65	50	20	0	5	210	5	5	5
Future Vol, veh/h	0	140	0	65	50	20	0	5	210	5	5	5
Conflicting Peds, #/hr	3	0	2	1	0	2	2	0	1	2	0	3
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	163	0	76	58	23	0	6	244	6	6	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	84	0	0	165	0	0	396	401	167	515	390	76
Stage 1	-	-	-	-	-	-	165	165	-	225	225	-
Stage 2	-	-	-	-	-	-	231	236	-	290	165	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1526	-	-	1419	-	-	568	541	882	474	548	991
Stage 1	-	-	-	-	-	-	842	766	-	782	721	-
Stage 2	-	-	-	-	-	-	776	713	-	722	766	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1522	-	-	1416	-	-	533	508	879	323	515	985
Mov Cap-2 Maneuver	-	-	-	-	-	-	533	508	-	323	515	-
Stage 1	-	-	-	-	-	-	840	764	-	780	678	-
Stage 2	-	-	-	-	-	-	720	671	-	516	764	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.7	10.9	12.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	864	1522	-	-	1416	-	-	496
HCM Lane V/C Ratio	0.289	-	-	-	0.053	-	-	0.035
HCM Control Delay (s)	10.9	0	-	-	7.7	0	-	12.5
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.2	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕					↰	↱	
Traffic Vol, veh/h	115	310	0	0	115	15	0	0	0	20	0	65
Future Vol, veh/h	115	310	0	0	115	15	0	0	0	20	0	65
Conflicting Peds, #/hr	6	0	4	1	0	3	4	0	1	3	0	6
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	139	373	0	0	139	18	0	0	0	24	0	78

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	163	0	0	377	0	0	808	809	160
Stage 1	-	-	-	-	-	-	154	154	-
Stage 2	-	-	-	-	-	-	654	655	-
Critical Hdwy	4.1	-	-	4.11	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1428	-	-	1187	-	-	353	317	890
Stage 1	-	-	-	-	-	-	879	774	-
Stage 2	-	-	-	-	-	-	521	466	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1420	-	-	1187	-	-	306	0	880
Mov Cap-2 Maneuver	-	-	-	-	-	-	306	0	-
Stage 1	-	-	-	-	-	-	766	0	-
Stage 2	-	-	-	-	-	-	518	0	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1420	-	-	1187	-	-	306	880
HCM Lane V/C Ratio	0.098	-	-	-	-	-	0.079	0.089
HCM Control Delay (s)	7.8	0	-	0	-	-	17.8	9.5
HCM Lane LOS	A	A	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-	-	0.3	0.3

MOVEMENT SUMMARY

Site: 3 [Existing AM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	1	0.0	1	0.0	0.009	11.5	LOS B	0.0	1.0	0.49	0.58	0.49	35.2
18	R2	5	0.0	7	0.0	0.009	6.6	LOS A	0.0	1.0	0.49	0.58	0.49	34.5
Approach		6	0.0	8	0.0	0.009	7.4	LOS A	0.0	1.0	0.49	0.58	0.49	34.6
East: McNeil St														
1	L2	5	1.0	7	1.0	0.144	9.2	LOS A	0.7	18.6	0.02	0.45	0.02	36.8
6	T1	130	1.0	171	1.0	0.144	4.5	LOS A	0.7	18.6	0.02	0.45	0.02	36.9
Approach		135	1.0	178	1.0	0.144	4.7	LOS A	0.7	18.6	0.02	0.45	0.02	36.9
West: McNeil St														
2	T1	380	0.0	500	0.0	0.405	4.6	LOS A	2.4	61.2	0.07	0.42	0.07	36.9
12	R2	1	0.0	1	0.0	0.405	4.4	LOS A	2.4	61.2	0.07	0.42	0.07	36.0
Approach		381	0.0	501	0.0	0.405	4.6	LOS A	2.4	61.2	0.07	0.42	0.07	36.9
All Vehicles		522	0.3	687	0.3	0.405	4.6	LOS A	2.4	61.2	0.06	0.43	0.06	36.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

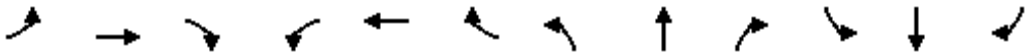
Intersection	
Int Delay, s/veh	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	385	0	5	140	10	0	0	5	20	5	5
Future Vol, veh/h	5	385	0	5	140	10	0	0	5	20	5	5
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
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	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	7	513	0	7	187	13	0	0	7	27	7	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	201	0	0	514	0	0	744	743	515	741	737	196
Stage 1	-	-	-	-	-	-	528	528	-	209	209	-
Stage 2	-	-	-	-	-	-	216	215	-	532	528	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1383	-	-	1057	-	-	333	346	564	335	348	850
Stage 1	-	-	-	-	-	-	538	531	-	798	733	-
Stage 2	-	-	-	-	-	-	791	729	-	535	531	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1382	-	-	1056	-	-	321	340	563	327	342	848
Mov Cap-2 Maneuver	-	-	-	-	-	-	321	340	-	327	342	-
Stage 1	-	-	-	-	-	-	534	527	-	792	727	-
Stage 2	-	-	-	-	-	-	771	723	-	524	527	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	11.5	16
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	563	1382	-	-	1056	-	-	367
HCM Lane V/C Ratio	0.012	0.005	-	-	0.006	-	-	0.109
HCM Control Delay (s)	11.5	7.6	0	-	8.4	0	-	16
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	150	25	85	30	10	15	75	155	5	5	175	170
Future Volume (veh/h)	150	25	85	30	10	15	75	155	5	5	175	170
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.99		0.98	1.00		0.96	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1811	1811	1811	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	181	30	102	36	12	18	90	187	6	6	211	205
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	4	4	4	6	6	6	1	1	1	3	3	3
Cap, veh/h	409	86	173	391	136	147	426	1066	34	460	408	361
Arrive On Green	0.36	0.36	0.36	0.36	0.36	0.36	0.08	0.30	0.30	0.01	0.23	0.23
Sat Flow, veh/h	745	236	474	703	372	403	1795	3538	113	1767	1763	1559
Grp Volume(v), veh/h	313	0	0	66	0	0	90	94	99	6	211	205
Grp Sat Flow(s),veh/h/ln	1454	0	0	1479	0	0	1795	1791	1860	1767	1763	1559
Q Serve(g_s), s	5.6	0.0	0.0	0.0	0.0	0.0	1.5	1.6	1.6	0.1	4.3	4.8
Cycle Q Clear(g_c), s	7.0	0.0	0.0	1.1	0.0	0.0	1.5	1.6	1.6	0.1	4.3	4.8
Prop In Lane	0.58		0.33	0.55		0.27	1.00		0.06	1.00		1.00
Lane Grp Cap(c), veh/h	667	0	0	673	0	0	426	540	560	460	408	361
V/C Ratio(X)	0.47	0.00	0.00	0.10	0.00	0.00	0.21	0.17	0.18	0.01	0.52	0.57
Avail Cap(c_a), veh/h	1614	0	0	1577	0	0	655	1191	1237	723	1087	962
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.5	0.0	0.0	8.7	0.0	0.0	10.5	10.7	10.7	12.0	13.9	14.1
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.1	0.0	1.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	0.0	0.0	0.3	0.0	0.0	0.5	0.5	0.6	0.0	1.5	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.0	0.0	0.0	8.8	0.0	0.0	10.7	10.8	10.8	12.0	14.9	15.5
LnGrp LOS	B	A	A	A	A	A	B	B	B	B	B	B
Approach Vol, veh/h		313			66			283			422	
Approach Delay, s/veh		11.0			8.8			10.8			15.1	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.8	17.0		19.6	7.7	14.1		19.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	27.5		42.5	8.5	25.5		42.5				
Max Q Clear Time (g_c+I1), s	2.1	3.6		9.0	3.5	6.8		3.1				
Green Ext Time (p_c), s	0.0	1.0		2.2	0.1	2.4		0.4				

Intersection Summary			
HCM 6th Ctrl Delay		12.4	
HCM 6th LOS		B	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	25	310	30	25	15	105	200	30	20	255	15
Future Volume (veh/h)	55	25	310	30	25	15	105	200	30	20	255	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1752	1752	1752	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	57	26	323	31	26	16	109	208	31	21	266	16
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
Percent Heavy Veh, %	0	0	0	10	10	10	2	2	2	0	0	0
Cap, veh/h	453	172	601	328	215	448	175	804	118	48	649	39
Arrive On Green	0.28	0.28	0.28	0.28	0.28	0.28	0.10	0.26	0.26	0.03	0.19	0.19
Sat Flow, veh/h	928	627	1608	534	783	1483	1781	3098	454	1810	3460	207
Grp Volume(v), veh/h	83	0	323	57	0	16	109	118	121	21	138	144
Grp Sat Flow(s),veh/h/ln	1555	0	1608	1317	0	1483	1781	1777	1776	1810	1805	1862
Q Serve(g_s), s	0.1	0.0	4.8	0.0	0.0	0.2	1.8	1.6	1.7	0.4	2.1	2.1
Cycle Q Clear(g_c), s	1.0	0.0	4.8	0.8	0.0	0.2	1.8	1.6	1.7	0.4	2.1	2.1
Prop In Lane	0.69		1.00	0.54		1.00	1.00		0.26	1.00		0.11
Lane Grp Cap(c), veh/h	625	0	601	543	0	448	175	461	461	48	339	349
V/C Ratio(X)	0.13	0.00	0.54	0.10	0.00	0.04	0.62	0.26	0.26	0.43	0.41	0.41
Avail Cap(c_a), veh/h	1807	0	1857	1491	0	1606	1071	2108	2106	441	1496	1543
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	8.5	0.0	7.6	8.4	0.0	7.6	13.3	9.0	9.1	14.7	11.0	11.0
Incr Delay (d2), s/veh	0.1	0.0	0.7	0.1	0.0	0.0	3.6	0.3	0.3	6.0	0.8	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	1.1	0.2	0.0	0.1	0.7	0.5	0.5	0.2	0.7	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.5	0.0	8.3	8.4	0.0	7.6	16.9	9.3	9.4	20.8	11.8	11.8
LnGrp LOS	A	A	A	A	A	A	B	A	A	C	B	B
Approach Vol, veh/h		406			73			348			303	
Approach Delay, s/veh		8.3			8.3			11.7			12.4	
Approach LOS		A			A			B			B	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	13.0	5.3	12.5	13.0	7.5	10.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	32.5	7.5	36.5	32.5	18.5	25.5
Max Q Clear Time (g_c+I1), s	2.8	2.4	3.7	6.8	3.8	4.1
Green Ext Time (p_c), s	0.4	0.0	1.4	1.6	0.2	1.5

Intersection Summary	
HCM 6th Ctrl Delay	10.5
HCM 6th LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	50	65	25	45	45	285	95	45	540	15
Future Volume (veh/h)	5	10	50	65	25	45	45	285	95	45	540	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	5	11	54	71	27	49	49	310	103	49	587	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	2	2	3	3	3	1	1	1
Cap, veh/h	410	48	237	416	103	187	496	882	288	572	1204	33
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.06	0.34	0.34	0.06	0.34	0.34
Sat Flow, veh/h	1331	277	1359	1323	590	1072	1767	2610	851	1795	3561	97
Grp Volume(v), veh/h	5	0	65	71	0	76	49	207	206	49	295	308
Grp Sat Flow(s),veh/h/ln	1331	0	1636	1323	0	1662	1767	1763	1698	1795	1791	1867
Q Serve(g_s), s	0.1	0.0	1.1	1.5	0.0	1.2	0.5	2.8	2.8	0.5	4.1	4.1
Cycle Q Clear(g_c), s	1.3	0.0	1.1	2.6	0.0	1.2	0.5	2.8	2.8	0.5	4.1	4.1
Prop In Lane	1.00		0.83	1.00		0.64	1.00		0.50	1.00		0.05
Lane Grp Cap(c), veh/h	410	0	285	416	0	290	496	596	574	572	605	631
V/C Ratio(X)	0.01	0.00	0.23	0.17	0.00	0.26	0.10	0.35	0.36	0.09	0.49	0.49
Avail Cap(c_a), veh/h	1350	0	1440	1350	0	1463	879	2285	2201	961	2322	2421
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.7	0.0	11.1	12.2	0.0	11.2	6.2	7.8	7.8	6.0	8.2	8.2
Incr Delay (d2), s/veh	0.0	0.0	0.4	0.2	0.0	0.5	0.1	0.3	0.4	0.1	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	0.4	0.0	0.4	0.1	0.7	0.7	0.1	1.1	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.7	0.0	11.5	12.4	0.0	11.6	6.3	8.1	8.2	6.1	8.8	8.8
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		70			147			462			652	
Approach Delay, s/veh		11.5			12.0			7.9			8.6	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.2	15.1		9.9	6.2	15.1		9.9				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	8.5	40.5		27.5	8.5	40.5		27.5				
Max Q Clear Time (g_c+I1), s	2.5	4.8		3.3	2.5	6.1		4.6				
Green Ext Time (p_c), s	0.0	2.7		0.3	0.0	4.1		0.6				

Intersection Summary	
HCM 6th Ctrl Delay	8.9
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	5	0	0	0	5	5	0
Future Vol, veh/h	0	0	0	0	0	5	0	0	0	5	5	0
Conflicting Peds, #/hr	1	0	1	2	0	2	1	0	2	2	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	7	0	0	0	7	7	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	28	-	-	25	24	4	8	0	0	2	0	0
Stage 1	22	-	-	2	2	-	-	-	-	-	-	-
Stage 2	6	-	-	23	22	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	-	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	-	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	987	0	0	991	873	1085	1625	-	-	1634	-	-
Stage 1	1002	0	0	1026	898	-	-	-	-	-	-	-
Stage 2	1021	0	0	1000	881	-	-	-	-	-	-	-
Platoon blocked, %			-					-	-		-	-
Mov Cap-1 Maneuver	975	-	-	984	867	1081	1623	-	-	1631	-	-
Mov Cap-2 Maneuver	975	-	-	984	867	-	-	-	-	-	-	-
Stage 1	1001	-	-	1024	896	-	-	-	-	-	-	-
Stage 2	1013	-	-	994	877	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.4	0	3.6
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1623	-	-	-	1081	1631	-	-
HCM Lane V/C Ratio	-	-	-	-	0.006	0.004	-	-
HCM Control Delay (s)	0	-	-	0	8.4	7.2	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	85	5	240	150	5	5	5	130	15	0	0
Future Vol, veh/h	0	85	5	240	150	5	5	5	130	15	0	0
Conflicting Peds, #/hr	23	0	9	10	0	24	9	0	10	24	0	23
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	91	5	258	161	5	5	5	140	16	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	190	0	0	106	0	0	807	810	128	894	810	211
Stage 1	-	-	-	-	-	-	104	104	-	704	704	-
Stage 2	-	-	-	-	-	-	703	706	-	190	106	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1390	-	-	1498	-	-	302	316	927	264	316	834
Stage 1	-	-	-	-	-	-	907	813	-	431	443	-
Stage 2	-	-	-	-	-	-	431	442	-	816	811	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1358	-	-	1484	-	-	249	247	897	178	247	797
Mov Cap-2 Maneuver	-	-	-	-	-	-	249	247	-	178	247	-
Stage 1	-	-	-	-	-	-	898	805	-	421	350	-
Stage 2	-	-	-	-	-	-	341	349	-	669	803	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4.8	10.9	27.2
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	756	1358	-	-	1484	-	-	178
HCM Lane V/C Ratio	0.199	-	-	-	0.174	-	-	0.091
HCM Control Delay (s)	10.9	0	-	-	7.9	0	-	27.2
HCM Lane LOS	B	A	-	-	A	A	-	D
HCM 95th %tile Q(veh)	0.7	0	-	-	0.6	-	-	0.3

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔					↰	↱	
Traffic Vol, veh/h	60	230	0	0	415	25	0	0	0	15	0	135
Future Vol, veh/h	60	230	0	0	415	25	0	0	0	15	0	135
Conflicting Peds, #/hr	5	0	0	0	0	4	0	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	92	92	94	94	92	92	92	94	92	94
Heavy Vehicles, %	0	0	2	2	0	0	2	2	2	0	2	0
Mvmt Flow	64	245	0	0	441	27	0	0	0	16	0	144

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	473	0	0	245	0	0	837	833	465
Stage 1	-	-	-	-	-	-	460	460	-
Stage 2	-	-	-	-	-	-	377	373	-
Critical Hdwy	4.1	-	-	4.12	-	-	6.4	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.52	-
Follow-up Hdwy	2.2	-	-	2.218	-	-	3.5	4.018	3.3
Pot Cap-1 Maneuver	1099	-	-	1321	-	-	339	304	602
Stage 1	-	-	-	-	-	-	640	566	-
Stage 2	-	-	-	-	-	-	698	618	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1094	-	-	1321	-	-	313	0	596
Mov Cap-2 Maneuver	-	-	-	-	-	-	313	0	-
Stage 1	-	-	-	-	-	-	593	0	-
Stage 2	-	-	-	-	-	-	695	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.8	0	13.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1094	-	-	1321	-	-	313	596
HCM Lane V/C Ratio	0.058	-	-	-	-	-	0.051	0.241
HCM Control Delay (s)	8.5	0	-	0	-	-	17.1	12.9
HCM Lane LOS	A	A	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	0	-	-	0.2	0.9

MOVEMENT SUMMARY

Site: 3 [Existing PM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	5	0.0	6	0.0	0.011	10.3	LOS B	0.0	1.1	0.35	0.59	0.35	34.9
18	R2	5	0.0	6	0.0	0.011	5.4	LOS A	0.0	1.1	0.35	0.59	0.35	34.2
Approach		10	0.0	11	0.0	0.011	7.8	LOS A	0.0	1.1	0.35	0.59	0.35	34.6
East: McNeil St														
1	L2	5	0.0	6	0.0	0.385	9.2	LOS A	2.5	63.5	0.07	0.43	0.07	36.7
6	T1	420	0.0	472	0.0	0.385	4.5	LOS A	2.5	63.5	0.07	0.43	0.07	36.8
Approach		425	0.0	478	0.0	0.385	4.6	LOS A	2.5	63.5	0.07	0.43	0.07	36.8
West: McNeil St														
2	T1	235	0.0	264	0.0	0.218	4.5	LOS A	1.0	26.1	0.05	0.43	0.05	36.9
12	R2	5	0.0	6	0.0	0.218	4.3	LOS A	1.0	26.1	0.05	0.43	0.05	36.0
Approach		240	0.0	270	0.0	0.218	4.5	LOS A	1.0	26.1	0.05	0.43	0.05	36.9
All Vehicles		675	0.0	758	0.0	0.385	4.6	LOS A	2.5	63.5	0.06	0.43	0.06	36.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

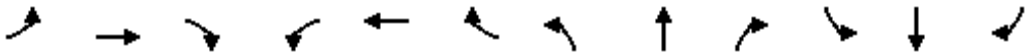
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	5	230	5	5	415	25	0	0	5	15	0	5
Future Vol, veh/h	5	230	5	5	415	25	0	0	5	15	0	5
Conflicting Peds, #/hr	7	0	6	5	0	6	6	0	5	6	0	7
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	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	6	256	6	6	461	28	0	0	6	17	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	496	0	0	268	0	0	774	785	271	774	774	489
Stage 1	-	-	-	-	-	-	277	277	-	494	494	-
Stage 2	-	-	-	-	-	-	497	508	-	280	280	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1078	-	-	1307	-	-	318	327	773	318	332	583
Stage 1	-	-	-	-	-	-	734	685	-	561	550	-
Stage 2	-	-	-	-	-	-	559	542	-	731	683	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1071	-	-	1300	-	-	308	318	764	309	323	575
Mov Cap-2 Maneuver	-	-	-	-	-	-	308	318	-	309	323	-
Stage 1	-	-	-	-	-	-	724	676	-	553	543	-
Stage 2	-	-	-	-	-	-	547	535	-	716	674	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	9.7	16
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	764	1071	-	-	1300	-	-	349
HCM Lane V/C Ratio	0.007	0.005	-	-	0.004	-	-	0.064
HCM Control Delay (s)	9.7	8.4	0	-	7.8	0	-	16
HCM Lane LOS	A	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	95	10	20	15	10	10	35	155	25	10	285	165
Future Volume (veh/h)	95	10	20	15	10	10	35	155	25	10	285	165
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.98		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	109	11	23	17	11	11	40	178	29	11	328	190
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
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	438	54	57	275	167	112	455	1021	163	589	658	371
Arrive On Green	0.24	0.24	0.24	0.24	0.24	0.24	0.05	0.33	0.33	0.01	0.30	0.30
Sat Flow, veh/h	1004	219	234	482	684	458	1795	3080	492	1810	2195	1239
Grp Volume(v), veh/h	143	0	0	39	0	0	40	102	105	11	268	250
Grp Sat Flow(s),veh/h/ln	1457	0	0	1624	0	0	1795	1791	1781	1810	1805	1629
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.4	0.1	4.0	4.2
Cycle Q Clear(g_c), s	2.6	0.0	0.0	0.6	0.0	0.0	0.5	1.3	1.4	0.1	4.0	4.2
Prop In Lane	0.76		0.16	0.44		0.28	1.00		0.28	1.00		0.76
Lane Grp Cap(c), veh/h	548	0	0	553	0	0	455	594	590	589	541	488
V/C Ratio(X)	0.26	0.00	0.00	0.07	0.00	0.00	0.09	0.17	0.18	0.02	0.50	0.51
Avail Cap(c_a), veh/h	1737	0	0	1839	0	0	781	1821	1810	974	1835	1657
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.3	0.0	0.0	9.6	0.0	0.0	7.5	7.8	7.8	7.8	9.5	9.5
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.0	0.2	0.0	0.0	0.1	0.4	0.4	0.0	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.6	0.0	0.0	9.7	0.0	0.0	7.6	7.9	8.0	7.8	10.2	10.4
LnGrp LOS	B	A	A	A	A	A	A	A	A	A	B	B
Approach Vol, veh/h		143			39			247			529	
Approach Delay, s/veh		10.6			9.7			7.9			10.2	
Approach LOS		B			A			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.0	15.4		12.5	6.0	14.4		12.5				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	7.5	33.5		35.5	7.5	33.5		35.5				
Max Q Clear Time (g_c+I1), s	2.1	3.4		4.6	2.5	6.2		2.6				
Green Ext Time (p_c), s	0.0	1.2		0.8	0.0	3.5		0.2				

Intersection Summary	
HCM 6th Ctrl Delay	9.7
HCM 6th LOS	A



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	35	165	20	55	15	355	210	35	30	290	20
Future Volume (veh/h)	40	35	165	20	55	15	355	210	35	30	290	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		0.97	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1900	1900	1900	1885	1885	1885
Adj Flow Rate, veh/h	43	38	179	22	60	16	386	228	38	33	315	22
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	258	184	727	160	284	356	493	1340	220	69	671	47
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.27	0.43	0.43	0.04	0.20	0.20
Sat Flow, veh/h	633	982	1557	237	1516	1567	1810	3101	509	1795	3389	235
Grp Volume(v), veh/h	81	0	179	82	0	16	386	131	135	33	166	171
Grp Sat Flow(s),veh/h/ln	1614	0	1557	1753	0	1567	1810	1805	1805	1795	1791	1833
Q Serve(g_s), s	0.0	0.0	2.8	0.0	0.0	0.3	7.8	1.8	1.8	0.7	3.2	3.3
Cycle Q Clear(g_c), s	1.4	0.0	2.8	1.4	0.0	0.3	7.8	1.8	1.8	0.7	3.2	3.3
Prop In Lane	0.53		1.00	0.27		1.00	1.00		0.28	1.00		0.13
Lane Grp Cap(c), veh/h	442	0	727	444	0	356	493	780	780	69	355	363
V/C Ratio(X)	0.18	0.00	0.25	0.18	0.00	0.04	0.78	0.17	0.17	0.48	0.47	0.47
Avail Cap(c_a), veh/h	1166	0	1460	1211	0	1094	1306	2039	2039	268	998	1021
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	6.5	13.6	0.0	11.9	13.3	6.9	6.9	18.6	14.0	14.0
Incr Delay (d2), s/veh	0.2	0.0	0.2	0.2	0.0	0.1	2.8	0.1	0.1	5.0	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.6	0.5	0.0	0.1	2.9	0.5	0.5	0.4	1.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.8	0.0	6.7	13.8	0.0	12.0	16.0	7.0	7.0	23.6	14.9	15.0
LnGrp LOS	B	A	A	B	A	B	B	A	A	C	B	B
Approach Vol, veh/h		260			98			652			370	
Approach Delay, s/veh		8.9			13.5			12.3			15.7	
Approach LOS		A			B			B			B	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	11.9	6.0	21.6	11.9	15.3	12.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	26.0	5.9	44.6	26.0	28.5	22.0
Max Q Clear Time (g_c+I1), s	3.4	2.7	3.8	4.8	9.8	5.3
Green Ext Time (p_c), s	0.4	0.0	1.7	1.0	1.1	1.7

Intersection Summary	
HCM 6th Ctrl Delay	12.7
HCM 6th LOS	B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	25	130	10	70	45	540	115	60	420	10
Future Volume (veh/h)	5	10	25	130	10	70	45	540	115	60	420	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	5	11	27	143	11	77	49	593	126	66	462	11
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	391	93	227	439	38	269	564	1072	227	472	1358	32
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.05	0.37	0.37	0.07	0.38	0.38
Sat Flow, veh/h	1327	486	1194	1387	202	1414	1795	2926	620	1795	3575	85
Grp Volume(v), veh/h	5	0	38	143	0	88	49	362	357	66	231	242
Grp Sat Flow(s),veh/h/ln	1327	0	1681	1387	0	1616	1795	1791	1755	1795	1791	1869
Q Serve(g_s), s	0.1	0.0	0.7	3.4	0.0	1.7	0.6	5.8	5.8	0.8	3.3	3.3
Cycle Q Clear(g_c), s	1.8	0.0	0.7	4.1	0.0	1.7	0.6	5.8	5.8	0.8	3.3	3.3
Prop In Lane	1.00		0.71	1.00		0.88	1.00		0.35	1.00		0.05
Lane Grp Cap(c), veh/h	391	0	320	439	0	308	564	656	643	472	680	710
V/C Ratio(X)	0.01	0.00	0.12	0.33	0.00	0.29	0.09	0.55	0.55	0.14	0.34	0.34
Avail Cap(c_a), veh/h	1228	0	1380	1314	0	1327	842	1920	1881	777	1970	2056
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.2	0.0	12.0	13.7	0.0	12.4	6.3	9.0	9.0	6.5	7.9	7.9
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.4	0.0	0.5	0.1	0.7	0.8	0.1	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.2	0.9	0.0	0.5	0.2	1.7	1.7	0.2	0.9	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.2	0.0	12.2	14.2	0.0	12.9	6.4	9.8	9.8	6.6	8.2	8.2
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		43			231			768			539	
Approach Delay, s/veh		12.3			13.7			9.6			8.0	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	17.7		11.3	6.4	18.1		11.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	8.5	38.5		29.5	7.5	39.5		29.5				
Max Q Clear Time (g_c+I1), s	2.8	7.8		3.8	2.6	5.3		6.1				
Green Ext Time (p_c), s	0.0	5.1		0.2	0.0	3.0		0.9				

Intersection Summary		
HCM 6th Ctrl Delay		9.7
HCM 6th LOS		A

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	5	0	0
Future Vol, veh/h	0	0	0	5	0	0
Conflicting Peds, #/hr	1	1	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	0	7	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	10	3	2	0	-	0
Stage 1	2	-	-	-	-	-
Stage 2	8	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	1015	1087	1634	-	-	0
Stage 1	1026	-	-	-	-	0
Stage 2	1020	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	1013	1085	1632	-	-	-
Mov Cap-2 Maneuver	1013	-	-	-	-	-
Stage 1	1025	-	-	-	-	-
Stage 2	1019	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	1632	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	0	-
HCM Lane LOS	A	-	A	-
HCM 95th %tile Q(veh)	0	-	-	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	160	0	70	55	20	0	5	250	5	5	5
Future Vol, veh/h	0	160	0	70	55	20	0	5	250	5	5	5
Conflicting Peds, #/hr	3	0	2	1	0	2	2	0	1	2	0	3
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	186	0	81	64	23	0	6	291	6	6	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	90	0	0	188	0	0	435	440	190	578	429	82
Stage 1	-	-	-	-	-	-	188	188	-	241	241	-
Stage 2	-	-	-	-	-	-	247	252	-	337	188	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1518	-	-	1392	-	-	535	514	857	430	521	983
Stage 1	-	-	-	-	-	-	818	748	-	767	710	-
Stage 2	-	-	-	-	-	-	761	702	-	681	748	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1514	-	-	1389	-	-	500	480	854	267	487	977
Mov Cap-2 Maneuver	-	-	-	-	-	-	500	480	-	267	487	-
Stage 1	-	-	-	-	-	-	816	747	-	765	665	-
Stage 2	-	-	-	-	-	-	702	657	-	445	747	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3.7	11.6	13.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	841	1514	-	-	1389	-	-	440
HCM Lane V/C Ratio	0.353	-	-	-	0.059	-	-	0.04
HCM Control Delay (s)	11.6	0	-	-	7.8	0	-	13.5
HCM Lane LOS	B	A	-	-	A	A	-	B
HCM 95th %tile Q(veh)	1.6	0	-	-	0.2	-	-	0.1

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔					↰	↱	
Traffic Vol, veh/h	125	385	0	0	130	15	0	0	0	20	0	70
Future Vol, veh/h	125	385	0	0	130	15	0	0	0	20	0	70
Conflicting Peds, #/hr	6	0	4	1	0	3	4	0	1	3	0	6
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	151	464	0	0	157	18	0	0	0	24	0	84

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	181	0	0	468	0	0			941	942	178
Stage 1	-	-	-	-	-	-			172	172	-
Stage 2	-	-	-	-	-	-			769	770	-
Critical Hdwy	4.1	-	-	4.11	-	-			6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-			5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-			3.5	4	3.3
Pot Cap-1 Maneuver	1407	-	-	1099	-	-			295	265	870
Stage 1	-	-	-	-	-	-			863	760	-
Stage 2	-	-	-	-	-	-			461	413	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1399	-	-	1099	-	-			249	0	860
Mov Cap-2 Maneuver	-	-	-	-	-	-			249	0	-
Stage 1	-	-	-	-	-	-			734	0	-
Stage 2	-	-	-	-	-	-			458	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.9	0	12.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1399	-	-	1099	-	-	249	860
HCM Lane V/C Ratio	0.108	-	-	-	-	-	0.097	0.098
HCM Control Delay (s)	7.9	0	-	0	-	-	21	9.6
HCM Lane LOS	A	A	-	A	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0	-	-	0.3	0.3

MOVEMENT SUMMARY

Site: 3 [Future (2026) Without-Project AM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	1	0.0	1	0.0	0.009	11.9	LOS B	0.0	1.1	0.54	0.60	0.54	35.0
18	R2	5	0.0	7	0.0	0.009	7.1	LOS A	0.0	1.1	0.54	0.60	0.54	34.3
Approach		6	0.0	8	0.0	0.009	7.9	LOS A	0.0	1.1	0.54	0.60	0.54	34.4
East: McNeil St														
1	L2	5	1.0	7	1.0	0.153	9.2	LOS A	0.8	20.3	0.02	0.44	0.02	36.8
6	T1	145	1.0	191	1.0	0.153	4.5	LOS A	0.8	20.3	0.02	0.44	0.02	36.9
Approach		150	1.0	197	1.0	0.153	4.7	LOS A	0.8	20.3	0.02	0.44	0.02	36.9
West: McNeil St														
2	T1	460	0.0	605	0.0	0.467	4.6	LOS A	3.1	77.7	0.07	0.42	0.07	36.9
12	R2	1	0.0	1	0.0	0.467	4.4	LOS A	3.1	77.7	0.07	0.42	0.07	36.0
Approach		461	0.0	607	0.0	0.467	4.6	LOS A	3.1	77.7	0.07	0.42	0.07	36.9
All Vehicles		617	0.2	812	0.2	0.467	4.6	LOS A	3.1	77.7	0.06	0.43	0.06	36.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

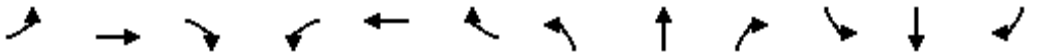
Intersection	
Int Delay, s/veh	1.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	470	0	5	155	10	0	0	10	25	5	5
Future Vol, veh/h	5	470	0	5	155	10	0	0	10	25	5	5
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
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	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	7	627	0	7	207	13	0	0	13	33	7	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	221	0	0	628	0	0	878	877	629	878	871	216
Stage 1	-	-	-	-	-	-	642	642	-	229	229	-
Stage 2	-	-	-	-	-	-	236	235	-	649	642	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1360	-	-	959	-	-	271	289	486	271	291	829
Stage 1	-	-	-	-	-	-	466	472	-	778	718	-
Stage 2	-	-	-	-	-	-	772	714	-	462	472	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1359	-	-	958	-	-	260	284	485	260	286	827
Mov Cap-2 Maneuver	-	-	-	-	-	-	260	284	-	260	286	-
Stage 1	-	-	-	-	-	-	462	468	-	771	712	-
Stage 2	-	-	-	-	-	-	752	708	-	445	468	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.3	12.6	19.7
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	485	1359	-	-	958	-	-	292
HCM Lane V/C Ratio	0.027	0.005	-	-	0.007	-	-	0.16
HCM Control Delay (s)	12.6	7.7	0	-	8.8	0	-	19.7
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.6



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	195	25	90	30	10	20	80	445	5	5	225	195
Future Volume (veh/h)	195	25	90	30	10	20	80	445	5	5	225	195
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.99		0.98	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1811	1811	1811	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	235	30	108	36	12	24	96	536	6	6	271	235
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	4	4	4	6	6	6	1	1	1	3	3	3
Cap, veh/h	447	72	160	361	130	188	390	1149	13	337	451	377
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.08	0.32	0.32	0.01	0.25	0.25
Sat Flow, veh/h	832	186	415	636	337	487	1795	3627	41	1767	1813	1518
Grp Volume(v), veh/h	373	0	0	72	0	0	96	265	277	6	263	243
Grp Sat Flow(s),veh/h/ln	1433	0	0	1460	0	0	1795	1791	1876	1767	1763	1568
Q Serve(g_s), s	8.7	0.0	0.0	0.0	0.0	0.0	1.7	5.5	5.5	0.1	6.2	6.4
Cycle Q Clear(g_c), s	9.9	0.0	0.0	1.3	0.0	0.0	1.7	5.5	5.5	0.1	6.2	6.4
Prop In Lane	0.63		0.29	0.50		0.33	1.00		0.02	1.00		0.97
Lane Grp Cap(c), veh/h	679	0	0	680	0	0	390	567	594	337	438	390
V/C Ratio(X)	0.55	0.00	0.00	0.11	0.00	0.00	0.25	0.47	0.47	0.02	0.60	0.62
Avail Cap(c_a), veh/h	1445	0	0	1424	0	0	541	1053	1103	531	961	855
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.7	0.0	0.0	9.2	0.0	0.0	11.4	12.8	12.8	13.0	15.5	15.6
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.1	0.0	0.0	0.3	0.6	0.6	0.0	1.3	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	0.0	0.4	0.0	0.0	0.6	2.0	2.0	0.0	2.3	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.4	0.0	0.0	9.3	0.0	0.0	11.7	13.4	13.4	13.0	16.8	17.3
LnGrp LOS	B	A	A	A	A	A	B	B	B	B	B	B
Approach Vol, veh/h		373			72			638			512	
Approach Delay, s/veh		12.4			9.3			13.1			17.0	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	19.3		22.6	8.1	16.1		22.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	27.5		43.5	7.5	25.5		43.5				
Max Q Clear Time (g_c+I1), s	2.1	7.5		11.9	3.7	8.4		3.3				
Green Ext Time (p_c), s	0.0	3.2		2.7	0.1	3.0		0.4				

Intersection Summary			
HCM 6th Ctrl Delay		14.0	
HCM 6th LOS		B	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	25	335	30	25	35	115	400	30	25	300	20
Future Volume (veh/h)	125	25	335	30	25	35	115	400	30	25	300	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1752	1752	1752	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	130	26	349	31	26	36	120	417	31	26	312	21
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
Percent Heavy Veh, %	0	0	0	10	10	10	2	2	2	0	0	0
Cap, veh/h	109	13	1016	91	48	849	157	700	52	53	514	34
Arrive On Green	0.54	0.54	0.54	0.54	0.54	0.54	0.09	0.21	0.21	0.03	0.15	0.15
Sat Flow, veh/h	3	23	1609	2	89	1484	1781	3348	248	1810	3433	230
Grp Volume(v), veh/h	156	0	349	57	0	36	120	220	228	26	163	170
Grp Sat Flow(s),veh/h/ln	26	0	1609	91	0	1484	1781	1777	1819	1810	1805	1858
Q Serve(g_s), s	0.1	0.0	6.3	0.1	0.0	0.7	4.1	6.9	7.0	0.9	5.2	5.3
Cycle Q Clear(g_c), s	33.5	0.0	6.3	33.5	0.0	0.7	4.1	6.9	7.0	0.9	5.2	5.3
Prop In Lane	0.83		1.00	0.54		1.00	1.00		0.14	1.00		0.12
Lane Grp Cap(c), veh/h	121	0	1016	139	0	849	157	371	380	53	270	278
V/C Ratio(X)	1.29	0.00	0.34	0.41	0.00	0.04	0.76	0.59	0.60	0.49	0.60	0.61
Avail Cap(c_a), veh/h	122	0	1016	140	0	849	506	1023	1047	220	747	768
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.4	0.0	5.4	14.9	0.0	5.8	27.5	22.0	22.0	29.5	24.5	24.5
Incr Delay (d2), s/veh	177.2	0.0	0.2	1.9	0.0	0.0	7.5	1.5	1.5	7.0	2.2	2.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	0.0	1.6	0.4	0.0	0.2	2.0	2.8	2.9	0.5	2.3	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	204.7	0.0	5.6	16.8	0.0	5.8	34.9	23.5	23.6	36.5	26.7	26.7
LnGrp LOS	F	A	A	B	A	A	C	C	C	D	C	C
Approach Vol, veh/h		505			93			568			359	
Approach Delay, s/veh		67.1			12.5			26.0			27.4	
Approach LOS		E			B			C			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	38.0	6.3	17.4	38.0	10.0	13.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	33.5	7.5	35.5	33.5	17.5	25.5
Max Q Clear Time (g_c+I1), s	35.5	2.9	9.0	35.5	6.1	7.3
Green Ext Time (p_c), s	0.0	0.0	2.8	0.0	0.2	1.8

Intersection Summary	
HCM 6th Ctrl Delay	39.1
HCM 6th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	55	70	25	70	50	470	105	55	605	15
Future Volume (veh/h)	5	10	55	70	25	70	50	470	105	55	605	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	5	11	60	76	27	76	54	511	114	60	658	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	2	2	3	3	3	1	1	1
Cap, veh/h	386	47	259	412	81	227	475	1000	222	494	1264	31
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.35	0.35	0.06	0.35	0.35
Sat Flow, veh/h	1301	253	1380	1317	429	1208	1767	2865	636	1795	3573	87
Grp Volume(v), veh/h	5	0	71	76	0	103	54	313	312	60	330	344
Grp Sat Flow(s),veh/h/ln	1301	0	1633	1317	0	1637	1767	1763	1738	1795	1791	1869
Q Serve(g_s), s	0.1	0.0	1.2	1.8	0.0	1.8	0.6	4.8	4.8	0.7	4.9	4.9
Cycle Q Clear(g_c), s	2.0	0.0	1.2	3.0	0.0	1.8	0.6	4.8	4.8	0.7	4.9	4.9
Prop In Lane	1.00		0.85	1.00		0.74	1.00		0.37	1.00		0.05
Lane Grp Cap(c), veh/h	386	0	306	412	0	307	475	615	606	494	634	661
V/C Ratio(X)	0.01	0.00	0.23	0.18	0.00	0.34	0.11	0.51	0.51	0.12	0.52	0.52
Avail Cap(c_a), veh/h	1201	0	1330	1237	0	1333	868	2061	2032	885	2094	2186
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.7	0.0	11.7	12.9	0.0	11.9	6.5	8.7	8.7	6.4	8.6	8.6
Incr Delay (d2), s/veh	0.0	0.0	0.4	0.2	0.0	0.6	0.1	0.7	0.7	0.1	0.7	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.4	0.4	0.0	0.6	0.2	1.3	1.3	0.2	1.4	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.8	0.0	12.0	13.1	0.0	12.5	6.6	9.4	9.4	6.5	9.3	9.3
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		76			179			679			734	
Approach Delay, s/veh		12.1			12.8			9.2			9.1	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.7	16.3		10.8	6.5	16.5		10.8
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	9.5	39.5		27.5	9.5	39.5		27.5
Max Q Clear Time (g_c+I1), s	2.7	6.8		4.0	2.6	6.9		5.0
Green Ext Time (p_c), s	0.0	4.3		0.3	0.0	4.6		0.8

Intersection Summary		
HCM 6th Ctrl Delay	9.6	
HCM 6th LOS	A	

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	5	0	0	0	5	5	0
Future Vol, veh/h	0	0	0	0	0	5	0	0	0	5	5	0
Conflicting Peds, #/hr	1	0	1	2	0	2	1	0	2	2	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	0	0	0	0	7	0	0	0	7	7	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	28	-	-	25	24	4	8	0	0	2	0	0
Stage 1	22	-	-	2	2	-	-	-	-	-	-	-
Stage 2	6	-	-	23	22	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	-	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	-	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	987	0	0	991	873	1085	1625	-	-	1634	-	-
Stage 1	1002	0	0	1026	898	-	-	-	-	-	-	-
Stage 2	1021	0	0	1000	881	-	-	-	-	-	-	-
Platoon blocked, %			-					-	-		-	-
Mov Cap-1 Maneuver	975	-	-	984	867	1081	1623	-	-	1631	-	-
Mov Cap-2 Maneuver	975	-	-	984	867	-	-	-	-	-	-	-
Stage 1	1001	-	-	1024	896	-	-	-	-	-	-	-
Stage 2	1013	-	-	994	877	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	8.4	0	3.6
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1623	-	-	-	1081	1631	-	-
HCM Lane V/C Ratio	-	-	-	-	0.006	0.004	-	-
HCM Control Delay (s)	0	-	-	0	8.4	7.2	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	0	0	-	-

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	95	5	280	170	5	5	5	155	15	0	0
Future Vol, veh/h	0	95	5	280	170	5	5	5	155	15	0	0
Conflicting Peds, #/hr	23	0	9	10	0	24	9	0	10	24	0	23
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	102	5	301	183	5	5	5	167	16	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	212	0	0	117	0	0	926	929	139	1027	929	233
Stage 1	-	-	-	-	-	-	115	115	-	812	812	-
Stage 2	-	-	-	-	-	-	811	814	-	215	117	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1364	-	-	1484	-	-	251	270	915	215	270	811
Stage 1	-	-	-	-	-	-	895	804	-	376	395	-
Stage 2	-	-	-	-	-	-	376	394	-	792	803	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1333	-	-	1470	-	-	200	201	886	135	201	775
Mov Cap-2 Maneuver	-	-	-	-	-	-	200	201	-	135	201	-
Stage 1	-	-	-	-	-	-	886	796	-	367	297	-
Stage 2	-	-	-	-	-	-	284	297	-	624	795	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5	11.5	35.3
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	734	1333	-	-	1470	-	-	135
HCM Lane V/C Ratio	0.242	-	-	-	0.205	-	-	0.119
HCM Control Delay (s)	11.5	0	-	-	8.1	0	-	35.3
HCM Lane LOS	B	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	0.9	0	-	-	0.8	-	-	0.4

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔					↰	↱	
Traffic Vol, veh/h	65	285	0	0	500	25	0	0	0	15	0	145
Future Vol, veh/h	65	285	0	0	500	25	0	0	0	15	0	145
Conflicting Peds, #/hr	5	0	0	0	0	4	0	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	92	92	94	94	92	92	92	94	92	94
Heavy Vehicles, %	0	0	2	2	0	0	2	2	2	0	2	0
Mvmt Flow	69	303	0	0	532	27	0	0	0	16	0	154

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	564	0	0	303	0	0			996	992	556
Stage 1	-	-	-	-	-	-			551	551	-
Stage 2	-	-	-	-	-	-			445	441	-
Critical Hdwy	4.1	-	-	4.12	-	-			6.4	6.52	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-			5.4	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.4	5.52	-
Follow-up Hdwy	2.2	-	-	2.218	-	-			3.5	4.018	3.3
Pot Cap-1 Maneuver	1018	-	-	1258	-	-			273	246	534
Stage 1	-	-	-	-	-	-			581	515	-
Stage 2	-	-	-	-	-	-			650	577	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	1013	-	-	1258	-	-			248	0	529
Mov Cap-2 Maneuver	-	-	-	-	-	-			248	0	-
Stage 1	-	-	-	-	-	-			530	0	-
Stage 2	-	-	-	-	-	-			647	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	15.2
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1013	-	-	1258	-	-	248	529
HCM Lane V/C Ratio	0.068	-	-	-	-	-	0.064	0.292
HCM Control Delay (s)	8.8	0	-	0	-	-	20.5	14.6
HCM Lane LOS	A	A	-	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	0	-	-	0.2	1.2

MOVEMENT SUMMARY

Site: 3 [Future (2026) Without-Project PM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	5	0.0	6	0.0	0.011	10.4	LOS B	0.0	1.1	0.39	0.59	0.39	34.9
18	R2	5	0.0	6	0.0	0.011	5.6	LOS A	0.0	1.1	0.39	0.59	0.39	34.1
Approach		10	0.0	11	0.0	0.011	8.0	LOS A	0.0	1.1	0.39	0.59	0.39	34.5
East: McNeil St														
1	L2	5	0.0	6	0.0	0.441	9.2	LOS A	3.2	80.2	0.07	0.43	0.07	36.7
6	T1	505	0.0	567	0.0	0.441	4.5	LOS A	3.2	80.2	0.07	0.43	0.07	36.8
Approach		510	0.0	573	0.0	0.441	4.6	LOS A	3.2	80.2	0.07	0.43	0.07	36.8
West: McNeil St														
2	T1	290	0.0	326	0.0	0.255	4.5	LOS A	1.3	32.1	0.05	0.43	0.05	36.9
12	R2	5	0.0	6	0.0	0.255	4.3	LOS A	1.3	32.1	0.05	0.43	0.05	36.0
Approach		295	0.0	331	0.0	0.255	4.5	LOS A	1.3	32.1	0.05	0.43	0.05	36.9
All Vehicles		815	0.0	916	0.0	0.441	4.6	LOS A	3.2	80.2	0.07	0.43	0.07	36.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

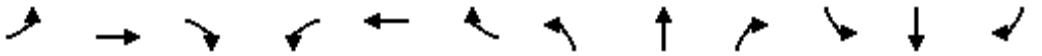
Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	285	5	5	500	30	0	0	5	15	0	5
Future Vol, veh/h	5	285	5	5	500	30	0	0	5	15	0	5
Conflicting Peds, #/hr	7	0	6	5	0	6	6	0	5	6	0	7
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	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	6	317	6	6	556	33	0	0	6	17	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	596	0	0	329	0	0	933	946	332	933	933	587
Stage 1	-	-	-	-	-	-	338	338	-	592	592	-
Stage 2	-	-	-	-	-	-	595	608	-	341	341	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	990	-	-	1242	-	-	248	264	714	248	268	513
Stage 1	-	-	-	-	-	-	681	644	-	496	497	-
Stage 2	-	-	-	-	-	-	494	489	-	678	642	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	983	-	-	1235	-	-	240	257	706	240	261	506
Mov Cap-2 Maneuver	-	-	-	-	-	-	240	257	-	240	261	-
Stage 1	-	-	-	-	-	-	672	636	-	489	490	-
Stage 2	-	-	-	-	-	-	482	482	-	664	634	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.1	10.1	19.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	706	983	-	-	1235	-	-	276
HCM Lane V/C Ratio	0.008	0.006	-	-	0.004	-	-	0.081
HCM Control Delay (s)	10.1	8.7	0	-	7.9	0	-	19.2
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	115	10	20	15	10	15	40	320	25	15	560	205
Future Volume (veh/h)	115	10	20	15	10	15	40	320	25	15	560	205
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.98		0.96	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	132	11	23	17	11	17	46	368	29	17	644	236
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
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	414	41	49	219	144	152	375	1427	112	556	1019	373
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.42	0.42	0.02	0.40	0.40
Sat Flow, veh/h	1080	165	200	432	585	617	1795	3357	263	1810	2564	939
Grp Volume(v), veh/h	166	0	0	45	0	0	46	195	202	17	453	427
Grp Sat Flow(s),veh/h/ln	1445	0	0	1634	0	0	1795	1791	1830	1810	1805	1698
Q Serve(g_s), s	3.3	0.0	0.0	0.0	0.0	0.0	0.6	3.1	3.1	0.2	8.9	8.9
Cycle Q Clear(g_c), s	4.1	0.0	0.0	0.9	0.0	0.0	0.6	3.1	3.1	0.2	8.9	8.9
Prop In Lane	0.80		0.14	0.38		0.38	1.00		0.14	1.00		0.55
Lane Grp Cap(c), veh/h	504	0	0	516	0	0	375	761	777	556	717	675
V/C Ratio(X)	0.33	0.00	0.00	0.09	0.00	0.00	0.12	0.26	0.26	0.03	0.63	0.63
Avail Cap(c_a), veh/h	1168	0	0	1242	0	0	520	1609	1644	744	1614	1518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.0	0.0	0.0	12.8	0.0	0.0	7.9	8.2	8.2	7.5	10.7	10.7
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.0	0.9	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	0.0	0.3	0.0	0.0	0.2	0.9	1.0	0.1	2.9	2.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.3	0.0	0.0	12.9	0.0	0.0	8.0	8.3	8.3	7.6	11.6	11.7
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	B	B
Approach Vol, veh/h		166			45			443			897	
Approach Delay, s/veh		14.3			12.9			8.3			11.5	
Approach LOS		B			B			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	23.2		15.3	6.6	22.0		15.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	39.5		31.5	5.7	39.3		31.5				
Max Q Clear Time (g_c+I1), s	2.2	5.1		6.1	2.6	10.9		2.9				
Green Ext Time (p_c), s	0.0	2.5		0.9	0.0	6.6		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			11.0									
HCM 6th LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	85	40	180	20	60	30	385	320	40	50	485	85
Future Volume (veh/h)	85	40	180	20	60	30	385	320	40	50	485	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1900	1900	1900	1885	1885	1885
Adj Flow Rate, veh/h	92	43	196	22	65	33	418	348	43	54	527	92
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	77	22	954	58	140	614	469	1421	174	79	680	118
Arrive On Green	0.34	0.34	0.34	0.34	0.34	0.34	0.26	0.44	0.44	0.04	0.22	0.22
Sat Flow, veh/h	0	65	1567	0	408	1578	1810	3234	397	1795	3033	527
Grp Volume(v), veh/h	135	0	196	87	0	33	418	193	198	54	310	309
Grp Sat Flow(s),veh/h/ln	65	0	1567	408	0	1578	1810	1805	1826	1795	1791	1769
Q Serve(g_s), s	0.0	0.0	4.4	0.0	0.0	1.0	17.4	5.3	5.3	2.3	12.7	12.9
Cycle Q Clear(g_c), s	27.0	0.0	4.4	27.0	0.0	1.0	17.4	5.3	5.3	2.3	12.7	12.9
Prop In Lane	0.68		1.00	0.25		1.00	1.00		0.22	1.00		0.30
Lane Grp Cap(c), veh/h	100	0	954	198	0	614	469	793	802	79	402	397
V/C Ratio(X)	1.35	0.00	0.21	0.44	0.00	0.05	0.89	0.24	0.25	0.68	0.77	0.78
Avail Cap(c_a), veh/h	100	0	954	198	0	614	635	981	992	158	502	496
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.2	0.0	7.0	20.5	0.0	15.0	28.0	13.8	13.8	36.9	28.5	28.6
Incr Delay (d2), s/veh	211.3	0.0	0.1	1.5	0.0	0.0	11.8	0.2	0.2	9.9	5.7	6.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.7	0.0	1.3	1.1	0.0	0.4	8.7	2.1	2.1	1.2	5.9	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	244.5	0.0	7.1	22.1	0.0	15.0	39.7	14.0	14.0	46.8	34.3	34.7
LnGrp LOS	F	A	A	C	A	B	D	B	B	D	C	C
Approach Vol, veh/h		331			120			809			673	
Approach Delay, s/veh		104.0			20.1			27.3			35.5	
Approach LOS		F			C			C			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	31.5	8.0	39.0	31.5	24.8	22.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	27.0	6.9	42.6	27.0	27.5	22.0
Max Q Clear Time (g_c+I1), s	29.0	4.3	7.3	29.0	19.4	14.9
Green Ext Time (p_c), s	0.0	0.0	2.5	0.0	0.9	2.2

Intersection Summary	
HCM 6th Ctrl Delay	42.8
HCM 6th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	25	140	10	90	50	665	125	85	610	10
Future Volume (veh/h)	5	10	25	140	10	90	50	665	125	85	610	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	5	11	27	154	11	99	55	731	137	93	670	11
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	351	95	234	419	32	284	497	1203	225	448	1528	25
Arrive On Green	0.20	0.20	0.20	0.20	0.20	0.20	0.06	0.40	0.40	0.08	0.42	0.42
Sat Flow, veh/h	1301	487	1194	1388	161	1448	1795	2997	561	1795	3606	59
Grp Volume(v), veh/h	5	0	38	154	0	110	55	437	431	93	333	348
Grp Sat Flow(s),veh/h/ln	1301	0	1681	1388	0	1609	1795	1791	1767	1795	1791	1874
Q Serve(g_s), s	0.1	0.0	0.8	4.3	0.0	2.5	0.7	8.1	8.1	1.2	5.5	5.5
Cycle Q Clear(g_c), s	2.6	0.0	0.8	5.1	0.0	2.5	0.7	8.1	8.1	1.2	5.5	5.5
Prop In Lane	1.00		0.71	1.00		0.90	1.00		0.32	1.00		0.03
Lane Grp Cap(c), veh/h	351	0	330	419	0	316	497	719	709	448	759	794
V/C Ratio(X)	0.01	0.00	0.12	0.37	0.00	0.35	0.11	0.61	0.61	0.21	0.44	0.44
Avail Cap(c_a), veh/h	922	0	1068	1028	0	1022	676	1782	1758	672	1867	1954
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.6	0.0	13.8	15.9	0.0	14.5	6.6	9.9	9.9	6.9	8.5	8.5
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.5	0.0	0.7	0.1	0.8	0.8	0.2	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	1.2	0.0	0.8	0.2	2.5	2.5	0.3	1.6	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.6	0.0	13.9	16.4	0.0	15.1	6.7	10.7	10.7	7.1	8.9	8.9
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	A	A
Approach Vol, veh/h		43			264			923			774	
Approach Delay, s/veh		14.1			15.9			10.5			8.7	
Approach LOS		B			B			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.8	21.2		12.7	6.9	22.2		12.7
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	8.5	41.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	3.3	10.1		4.6	2.7	7.5		7.1
Green Ext Time (p_c), s	0.1	6.5		0.1	0.0	4.7		1.0

Intersection Summary	
HCM 6th Ctrl Delay	10.6
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	5	0	0
Future Vol, veh/h	0	0	0	5	0	0
Conflicting Peds, #/hr	1	1	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	0	0	0	7	0	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	10	3	2	0	-	0
Stage 1	2	-	-	-	-	-
Stage 2	8	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	1015	1087	1634	-	-	0
Stage 1	1026	-	-	-	-	0
Stage 2	1020	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	1013	1085	1632	-	-	-
Mov Cap-2 Maneuver	1013	-	-	-	-	-
Stage 1	1025	-	-	-	-	-
Stage 2	1019	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	1632	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	0	-	0	-
HCM Lane LOS	A	-	A	-
HCM 95th %tile Q(veh)	0	-	-	-

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	160	0	116	55	20	0	5	301	5	5	5
Future Vol, veh/h	0	160	0	116	55	20	0	5	301	5	5	5
Conflicting Peds, #/hr	3	0	2	1	0	2	2	0	1	2	0	3
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	86	86	86	86	86	86	86	86	86	86	86	86
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	0	186	0	135	64	23	0	6	350	6	6	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	90	0	0	188	0	0	543	548	190	715	537	82
Stage 1	-	-	-	-	-	-	188	188	-	349	349	-
Stage 2	-	-	-	-	-	-	355	360	-	366	188	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1518	-	-	1392	-	-	454	447	857	348	453	983
Stage 1	-	-	-	-	-	-	818	748	-	671	637	-
Stage 2	-	-	-	-	-	-	666	630	-	657	748	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1514	-	-	1389	-	-	410	400	854	187	405	977
Mov Cap-2 Maneuver	-	-	-	-	-	-	410	400	-	187	405	-
Stage 1	-	-	-	-	-	-	816	747	-	669	570	-
Stage 2	-	-	-	-	-	-	587	564	-	384	747	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	4.8	12.4	16.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	838	1514	-	-	1389	-	-	339
HCM Lane V/C Ratio	0.425	-	-	-	0.097	-	-	0.051
HCM Control Delay (s)	12.4	0	-	-	7.9	0	-	16.2
HCM Lane LOS	B	A	-	-	A	A	-	C
HCM 95th %tile Q(veh)	2.1	0	-	-	0.3	-	-	0.2

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	125	396	90	67	218	41	0	0	0	21	29	70
Future Vol, veh/h	125	396	90	67	218	41	0	0	0	21	29	70
Conflicting Peds, #/hr	6	0	4	1	0	3	4	0	1	3	0	6
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	151	477	108	81	263	49	0	0	0	25	35	84

Major/Minor	Major1			Major2			Minor2		
Conflicting Flow All	318	0	0	589	0	0	1292	1347	300
Stage 1	-	-	-	-	-	-	456	456	-
Stage 2	-	-	-	-	-	-	836	891	-
Critical Hdwy	4.1	-	-	4.11	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	1253	-	-	991	-	-	182	152	744
Stage 1	-	-	-	-	-	-	643	572	-
Stage 2	-	-	-	-	-	-	429	363	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	1246	-	-	991	-	-	132	0	736
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	0	-
Stage 1	-	-	-	-	-	-	522	0	-
Stage 2	-	-	-	-	-	-	384	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	1.8	15.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1246	-	-	991	-	-	132	736
HCM Lane V/C Ratio	0.121	-	-	0.081	-	-	0.192	0.162
HCM Control Delay (s)	8.3	0	-	9	0	-	38.6	10.8
HCM Lane LOS	A	A	-	A	A	-	E	B
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-	-	0.7	0.6

MOVEMENT SUMMARY

Site: 3 [Future (2026) With-Project AM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	114	0.0	150	0.0	0.376	13.0	LOS B	2.3	56.3	0.69	0.82	0.69	33.7
18	R2	122	0.0	161	0.0	0.376	8.2	LOS A	2.3	56.3	0.69	0.82	0.69	33.0
Approach		236	0.0	311	0.0	0.376	10.5	LOS B	2.3	56.3	0.69	0.82	0.69	33.3
East: McNeil St														
1	L2	30	1.0	39	1.0	0.284	10.0	LOS A	1.7	42.9	0.39	0.53	0.39	35.4
6	T1	212	1.0	279	1.0	0.284	5.3	LOS A	1.7	42.9	0.39	0.53	0.39	35.5
Approach		242	1.0	318	1.0	0.284	5.9	LOS A	1.7	42.9	0.39	0.53	0.39	35.5
West: McNeil St														
2	T1	460	0.0	605	0.0	0.494	4.8	LOS A	3.8	94.7	0.24	0.43	0.24	36.3
12	R2	12	0.0	16	0.0	0.494	4.6	LOS A	3.8	94.7	0.24	0.43	0.24	35.4
Approach		472	0.0	621	0.0	0.494	4.8	LOS A	3.8	94.7	0.24	0.43	0.24	36.3
All Vehicles		950	0.3	1250	0.3	0.494	6.5	LOS A	3.8	94.7	0.39	0.55	0.39	35.3

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

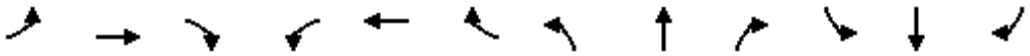
Intersection	
Int Delay, s/veh	1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	18	574	0	5	238	10	0	0	10	25	5	14
Future Vol, veh/h	18	574	0	5	238	10	0	0	10	25	5	14
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
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	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	1	1	1	0	0	0	0	0	0
Mvmt Flow	24	765	0	7	317	13	0	0	13	33	7	19

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	331	0	0	766	0	0	1166	1159	767	1160	1153	326
Stage 1	-	-	-	-	-	-	814	814	-	339	339	-
Stage 2	-	-	-	-	-	-	352	345	-	821	814	-
Critical Hdwy	4.1	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1240	-	-	852	-	-	172	197	405	174	199	720
Stage 1	-	-	-	-	-	-	375	394	-	680	643	-
Stage 2	-	-	-	-	-	-	669	640	-	371	394	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1239	-	-	851	-	-	157	188	404	162	190	719
Mov Cap-2 Maneuver	-	-	-	-	-	-	157	188	-	162	190	-
Stage 1	-	-	-	-	-	-	362	380	-	656	636	-
Stage 2	-	-	-	-	-	-	638	633	-	346	380	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	14.2	27.2
HCM LOS			B	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	404	1239	-	-	851	-	-	220
HCM Lane V/C Ratio	0.033	0.019	-	-	0.008	-	-	0.267
HCM Control Delay (s)	14.2	8	0	-	9.3	0	-	27.2
HCM Lane LOS	B	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	210	26	92	30	11	20	81	445	5	5	225	207
Future Volume (veh/h)	210	26	92	30	11	20	81	445	5	5	225	207
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.99		0.98	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1811	1811	1811	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	253	31	111	36	13	24	98	536	6	6	271	249
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Percent Heavy Veh, %	4	4	4	6	6	6	1	1	1	3	3	3
Cap, veh/h	462	67	159	360	138	190	379	1146	13	332	438	387
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.08	0.32	0.32	0.01	0.25	0.25
Sat Flow, veh/h	858	170	402	629	350	479	1795	3627	41	1767	1763	1560
Grp Volume(v), veh/h	395	0	0	73	0	0	98	265	277	6	271	249
Grp Sat Flow(s),veh/h/ln	1430	0	0	1458	0	0	1795	1791	1876	1767	1763	1560
Q Serve(g_s), s	9.6	0.0	0.0	0.0	0.0	0.0	1.8	5.7	5.7	0.1	6.6	6.9
Cycle Q Clear(g_c), s	10.9	0.0	0.0	1.3	0.0	0.0	1.8	5.7	5.7	0.1	6.6	6.9
Prop In Lane	0.64		0.28	0.49		0.33	1.00		0.02	1.00		1.00
Lane Grp Cap(c), veh/h	688	0	0	688	0	0	379	566	593	332	438	387
V/C Ratio(X)	0.57	0.00	0.00	0.11	0.00	0.00	0.26	0.47	0.47	0.02	0.62	0.64
Avail Cap(c_a), veh/h	1460	0	0	1441	0	0	522	948	993	520	860	761
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	12.0	0.0	0.0	9.2	0.0	0.0	11.8	13.2	13.2	13.4	16.1	16.2
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.1	0.0	0.0	0.4	0.6	0.6	0.0	1.4	1.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.0	0.0	0.4	0.0	0.0	0.7	2.0	2.1	0.0	2.5	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	12.7	0.0	0.0	9.3	0.0	0.0	12.1	13.8	13.8	13.5	17.5	18.0
LnGrp LOS	B	A	A	A	A	A	B	B	B	B	B	B
Approach Vol, veh/h		395			73			640			526	
Approach Delay, s/veh		12.7			9.3			13.6			17.7	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.9	19.7		23.6	8.2	16.5		23.6				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	25.5		45.5	7.5	23.5		45.5				
Max Q Clear Time (g_c+I1), s	2.1	7.7		12.9	3.8	8.9		3.3				
Green Ext Time (p_c), s	0.0	3.1		2.9	0.1	2.9		0.4				

Intersection Summary			
HCM 6th Ctrl Delay		14.5	
HCM 6th LOS		B	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	139	27	420	30	26	35	181	400	30	25	300	31
Future Volume (veh/h)	139	27	420	30	26	35	181	400	30	25	300	31
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1752	1752	1752	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	145	28	438	31	27	36	189	417	31	26	312	32
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
Percent Heavy Veh, %	0	0	0	10	10	10	2	2	2	0	0	0
Cap, veh/h	105	12	1021	87	48	783	242	865	64	52	502	51
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.14	0.26	0.26	0.03	0.15	0.15
Sat Flow, veh/h	0	23	1609	0	97	1484	1781	3348	248	1810	3306	337
Grp Volume(v), veh/h	173	0	438	58	0	36	189	220	228	26	169	175
Grp Sat Flow(s),veh/h/ln	23	0	1609	97	0	1484	1781	1777	1819	1810	1805	1838
Q Serve(g_s), s	0.0	0.0	8.6	0.0	0.0	0.7	6.5	6.6	6.7	0.9	5.5	5.6
Cycle Q Clear(g_c), s	31.5	0.0	8.6	31.5	0.0	0.7	6.5	6.6	6.7	0.9	5.5	5.6
Prop In Lane	0.84		1.00	0.53		1.00	1.00		0.14	1.00		0.18
Lane Grp Cap(c), veh/h	116	0	1021	136	0	783	242	459	470	52	274	279
V/C Ratio(X)	1.49	0.00	0.43	0.43	0.00	0.05	0.78	0.48	0.48	0.50	0.62	0.63
Avail Cap(c_a), veh/h	116	0	1021	136	0	783	606	1083	1109	186	672	684
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	5.8	15.2	0.0	7.2	26.4	19.8	19.8	30.2	25.1	25.1
Incr Delay (d2), s/veh	258.7	0.0	0.3	2.1	0.0	0.0	5.5	0.8	0.8	7.1	2.3	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	2.2	0.4	0.0	0.2	3.0	2.6	2.7	0.5	2.4	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	287.2	0.0	6.1	17.3	0.0	7.2	31.9	20.6	20.6	37.3	27.3	27.4
LnGrp LOS	F	A	A	B	A	A	C	C	C	D	C	C
Approach Vol, veh/h		611			94			637			370	
Approach Delay, s/veh		85.7			13.5			24.0			28.1	
Approach LOS		F			B			C			C	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	36.0	6.3	20.8	36.0	13.1	14.1
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	31.5	6.5	38.5	31.5	21.5	23.5
Max Q Clear Time (g_c+I1), s	33.5	2.9	8.7	33.5	8.5	7.6
Green Ext Time (p_c), s	0.0	0.0	2.8	0.0	0.4	1.7

Intersection Summary	
HCM 6th Ctrl Delay	46.3
HCM 6th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	55	70	25	71	50	535	105	58	687	15
Future Volume (veh/h)	5	10	55	70	25	71	50	535	105	58	687	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	0.99		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1870	1870	1856	1856	1856	1885	1885	1885
Adj Flow Rate, veh/h	5	11	60	76	27	77	54	582	114	63	747	16
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	2	2	3	3	3	1	1	1
Cap, veh/h	369	47	255	396	79	224	455	1098	214	482	1364	29
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.37	0.37	0.06	0.38	0.38
Sat Flow, veh/h	1300	253	1380	1317	425	1211	1767	2938	574	1795	3585	77
Grp Volume(v), veh/h	5	0	71	76	0	104	54	349	347	63	373	390
Grp Sat Flow(s),veh/h/ln	1300	0	1633	1317	0	1636	1767	1763	1749	1795	1791	1871
Q Serve(g_s), s	0.1	0.0	1.3	1.9	0.0	2.0	0.6	5.5	5.6	0.7	5.8	5.8
Cycle Q Clear(g_c), s	2.1	0.0	1.3	3.2	0.0	2.0	0.6	5.5	5.6	0.7	5.8	5.8
Prop In Lane	1.00		0.85	1.00		0.74	1.00		0.33	1.00		0.04
Lane Grp Cap(c), veh/h	369	0	302	396	0	303	455	659	654	482	682	712
V/C Ratio(X)	0.01	0.00	0.23	0.19	0.00	0.34	0.12	0.53	0.53	0.13	0.55	0.55
Avail Cap(c_a), veh/h	1089	0	1207	1125	0	1209	771	2040	2024	791	2072	2165
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	12.5	13.8	0.0	12.7	6.5	8.8	8.8	6.3	8.7	8.7
Incr Delay (d2), s/veh	0.0	0.0	0.4	0.2	0.0	0.7	0.1	0.7	0.7	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.4	0.5	0.0	0.6	0.2	1.6	1.6	0.2	1.7	1.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.6	0.0	12.8	14.0	0.0	13.4	6.6	9.4	9.5	6.5	9.4	9.4
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	A	A
Approach Vol, veh/h		76			180			750			826	
Approach Delay, s/veh		12.9			13.7			9.2			9.1	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	6.8	17.9		11.1	6.6	18.1		11.1
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	8.5	41.5		26.5	8.5	41.5		26.5
Max Q Clear Time (g_c+I1), s	2.3	7.6		4.1	2.6	7.8		5.2
Green Ext Time (p_c), s	0.0	4.9		0.3	0.0	5.4		0.8

Intersection Summary	
HCM 6th Ctrl Delay	9.8
HCM 6th LOS	A

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	170	0	0	0	0	5	0	61	0	5	28	14
Future Vol, veh/h	170	0	0	0	0	5	0	61	0	5	28	14
Conflicting Peds, #/hr	1	0	1	2	0	2	1	0	2	2	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	0	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	75	75	75	75	75	75	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	227	0	0	0	0	7	0	81	0	7	37	19

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	149	-	-	146	154	85	57	0	0	83	0	0
Stage 1	62	-	-	83	83	-	-	-	-	-	-	-
Stage 2	87	-	-	63	71	-	-	-	-	-	-	-
Critical Hdwy	7.1	-	-	7.1	6.5	6.2	4.1	-	-	4.1	-	-
Critical Hdwy Stg 1	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	-	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	-	-	3.5	4	3.3	2.2	-	-	2.2	-	-
Pot Cap-1 Maneuver	824	0	0	827	741	980	1560	-	-	1527	-	-
Stage 1	954	0	0	930	830	-	-	-	-	-	-	-
Stage 2	926	0	0	953	840	-	-	-	-	-	-	-
Platoon blocked, %			-					-	-		-	-
Mov Cap-1 Maneuver	813	-	-	820	735	976	1559	-	-	1524	-	-
Mov Cap-2 Maneuver	813	-	-	820	735	-	-	-	-	-	-	-
Stage 1	953	-	-	928	828	-	-	-	-	-	-	-
Stage 2	918	-	-	946	835	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.1	8.7	0	0.8
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1559	-	-	813	976	1524	-	-
HCM Lane V/C Ratio	-	-	-	0.279	0.007	0.004	-	-
HCM Control Delay (s)	0	-	-	11.1	8.7	7.4	0	-
HCM Lane LOS	A	-	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.1	0	0	-	-

Intersection	
Intersection Delay, s/veh	7.2
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	61	0	0	0	0	23
Future Vol, veh/h	61	0	0	0	0	23
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	66	0	0	0	0	25
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.5	0	6.5
HCM LOS	A	-	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	100%	0%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	0	61	23
LT Vol	0	61	0
Through Vol	0	0	0
RT Vol	0	0	23
Lane Flow Rate	0	66	25
Geometry Grp	1	1	1
Degree of Util (X)	0	0.076	0.024
Departure Headway (Hd)	4.035	4.143	3.415
Convergence, Y/N	Yes	Yes	Yes
Cap	0	869	1044
Service Time	2.071	2.147	1.449
HCM Lane V/C Ratio	0	0.076	0.024
HCM Control Delay	7.1	7.5	6.5
HCM Lane LOS	N	A	A
HCM 95th-tile Q	0	0.2	0.1

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	95	5	293	170	5	5	5	167	15	0	0
Future Vol, veh/h	0	95	5	293	170	5	5	5	167	15	0	0
Conflicting Peds, #/hr	23	0	9	10	0	24	9	0	10	24	0	23
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	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	1	1	1	0	0	0	0	0	0	0	0	0
Mvmt Flow	0	102	5	315	183	5	5	5	180	16	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	212	0	0	117	0	0	954	957	139	1061	957	233
Stage 1	-	-	-	-	-	-	115	115	-	840	840	-
Stage 2	-	-	-	-	-	-	839	842	-	221	117	-
Critical Hdwy	4.11	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1364	-	-	1484	-	-	240	260	915	203	260	811
Stage 1	-	-	-	-	-	-	895	804	-	363	384	-
Stage 2	-	-	-	-	-	-	363	383	-	786	803	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1333	-	-	1470	-	-	190	191	886	123	191	775
Mov Cap-2 Maneuver	-	-	-	-	-	-	190	191	-	123	191	-
Stage 1	-	-	-	-	-	-	886	796	-	355	285	-
Stage 2	-	-	-	-	-	-	270	285	-	608	795	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	5.1	11.6	38.6
HCM LOS			B	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	734	1333	-	-	1470	-	-	123
HCM Lane V/C Ratio	0.259	-	-	-	0.214	-	-	0.131
HCM Control Delay (s)	11.6	0	-	-	8.1	0	-	38.6
HCM Lane LOS	B	A	-	-	A	A	-	E
HCM 95th %tile Q(veh)	1	0	-	-	0.8	-	-	0.4

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕					↰	↕	
Traffic Vol, veh/h	65	288	18	13	524	31	0	0	0	15	6	145
Future Vol, veh/h	65	288	18	13	524	31	0	0	0	15	6	145
Conflicting Peds, #/hr	5	0	1	0	0	4	1	0	0	4	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	0	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	69	306	19	14	557	33	0	0	0	16	6	154

Major/Minor	Major1			Major2					Minor2		
Conflicting Flow All	595	0	0	326	0	0			1065	1071	584
Stage 1	-	-	-	-	-	-			607	607	-
Stage 2	-	-	-	-	-	-			458	464	-
Critical Hdwy	4.1	-	-	4.1	-	-			6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-			5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-			5.4	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-			3.5	4	3.3
Pot Cap-1 Maneuver	991	-	-	1245	-	-			249	223	515
Stage 1	-	-	-	-	-	-			548	489	-
Stage 2	-	-	-	-	-	-			641	567	-
Platoon blocked, %		-	-		-	-					
Mov Cap-1 Maneuver	986	-	-	1245	-	-			221	0	510
Mov Cap-2 Maneuver	-	-	-	-	-	-			221	0	-
Stage 1	-	-	-	-	-	-			498	0	-
Stage 2	-	-	-	-	-	-			627	0	-

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0.2	16
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	986	-	-	1245	-	-	221	510
HCM Lane V/C Ratio	0.07	-	-	0.011	-	-	0.072	0.315
HCM Control Delay (s)	8.9	0	-	7.9	0	-	22.6	15.3
HCM Lane LOS	A	A	-	A	A	-	C	C
HCM 95th %tile Q(veh)	0.2	-	-	0	-	-	0.2	1.3

MOVEMENT SUMMARY

Site: 3 [Future (2026) With-Project PM Peak Hour (Site Folder: General)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: Marshall Circle														
3	L2	35	0.0	39	0.0	0.103	10.6	LOS B	0.5	12.1	0.43	0.64	0.43	35.1
18	R2	59	0.0	66	0.0	0.103	5.8	LOS A	0.5	12.1	0.43	0.64	0.43	34.4
Approach		94	0.0	106	0.0	0.103	7.6	LOS A	0.5	12.1	0.43	0.64	0.43	34.6
East: McNeil St														
1	L2	67	0.0	75	0.0	0.522	9.5	LOS A	4.2	105.9	0.25	0.46	0.25	35.9
6	T1	518	0.0	582	0.0	0.522	4.8	LOS A	4.2	105.9	0.25	0.46	0.25	36.0
Approach		585	0.0	657	0.0	0.522	5.4	LOS A	4.2	105.9	0.25	0.46	0.25	36.0
West: McNeil St														
2	T1	290	0.0	326	0.0	0.273	4.9	LOS A	1.5	36.5	0.24	0.45	0.24	36.3
12	R2	8	0.0	9	0.0	0.273	4.7	LOS A	1.5	36.5	0.24	0.45	0.24	35.4
Approach		298	0.0	335	0.0	0.273	4.9	LOS A	1.5	36.5	0.24	0.45	0.24	36.3
All Vehicles		977	0.0	1098	0.0	0.522	5.4	LOS A	4.2	105.9	0.26	0.47	0.26	35.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

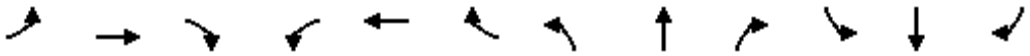
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	12	332	5	5	564	30	0	0	5	15	0	16
Future Vol, veh/h	12	332	5	5	564	30	0	0	5	15	0	16
Conflicting Peds, #/hr	7	0	6	5	0	6	6	0	5	6	0	7
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	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	13	369	6	6	627	33	0	0	6	17	0	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	667	0	0	381	0	0	1076	1083	384	1070	1070	658
Stage 1	-	-	-	-	-	-	404	404	-	663	663	-
Stage 2	-	-	-	-	-	-	672	679	-	407	407	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	932	-	-	1189	-	-	199	219	668	201	223	468
Stage 1	-	-	-	-	-	-	627	603	-	454	462	-
Stage 2	-	-	-	-	-	-	449	454	-	625	601	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	926	-	-	1182	-	-	185	211	660	193	215	462
Mov Cap-2 Maneuver	-	-	-	-	-	-	185	211	-	193	215	-
Stage 1	-	-	-	-	-	-	612	589	-	443	455	-
Stage 2	-	-	-	-	-	-	425	447	-	605	587	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.1	10.5	19.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	660	926	-	-	1182	-	-	276
HCM Lane V/C Ratio	0.008	0.014	-	-	0.005	-	-	0.125
HCM Control Delay (s)	10.5	8.9	0	-	8.1	0	-	19.9
HCM Lane LOS	B	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0	0	-	-	0	-	-	0.4



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	121	11	21	15	12	15	42	320	25	15	560	213
Future Volume (veh/h)	121	11	21	15	12	15	42	320	25	15	560	213
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.97	0.98		0.97	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	139	13	24	17	14	17	48	368	29	17	644	245
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
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	414	44	50	210	168	147	371	1430	112	554	1006	383
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.43	0.43	0.02	0.40	0.40
Sat Flow, veh/h	1075	175	197	401	666	585	1795	3357	263	1810	2534	964
Grp Volume(v), veh/h	176	0	0	48	0	0	48	195	202	17	459	430
Grp Sat Flow(s),veh/h/ln	1447	0	0	1651	0	0	1795	1791	1830	1810	1805	1693
Q Serve(g_s), s	3.5	0.0	0.0	0.0	0.0	0.0	0.7	3.2	3.2	0.2	9.2	9.2
Cycle Q Clear(g_c), s	4.5	0.0	0.0	0.9	0.0	0.0	0.7	3.2	3.2	0.2	9.2	9.2
Prop In Lane	0.79		0.14	0.35		0.35	1.00		0.14	1.00		0.57
Lane Grp Cap(c), veh/h	508	0	0	525	0	0	371	763	779	554	717	672
V/C Ratio(X)	0.35	0.00	0.00	0.09	0.00	0.00	0.13	0.26	0.26	0.03	0.64	0.64
Avail Cap(c_a), veh/h	1144	0	0	1227	0	0	541	1576	1610	737	1548	1452
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	0.0	0.0	12.9	0.0	0.0	8.1	8.3	8.3	7.7	10.9	10.9
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.1	0.0	0.0	0.2	0.2	0.2	0.0	1.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	0.0	0.3	0.0	0.0	0.2	1.0	1.0	0.1	3.0	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.6	0.0	0.0	13.0	0.0	0.0	8.2	8.5	8.5	7.7	11.9	12.0
LnGrp LOS	B	A	A	B	A	A	A	A	A	A	B	B
Approach Vol, veh/h		176			48			445			906	
Approach Delay, s/veh		14.6			13.0			8.5			11.9	
Approach LOS		B			B			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	23.6		15.8	6.8	22.3		15.8				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	5.5	39.5		31.5	6.5	38.5		31.5				
Max Q Clear Time (g_c+I1), s	2.2	5.2		6.5	2.7	11.2		2.9				
Green Ext Time (p_c), s	0.0	2.5		1.0	0.0	6.6		0.2				

Intersection Summary												
HCM 6th Ctrl Delay			11.2									
HCM 6th LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	91	41	220	20	62	30	440	320	40	50	485	92
Future Volume (veh/h)	91	41	220	20	62	30	440	320	40	50	485	92
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.99	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1900	1900	1900	1885	1885	1885
Adj Flow Rate, veh/h	99	45	239	22	67	33	478	348	43	54	527	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	0	0	0	0	0	0	1	1	1
Cap, veh/h	75	21	965	55	139	575	525	1521	186	78	667	126
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.29	0.47	0.47	0.04	0.22	0.22
Sat Flow, veh/h	0	66	1566	0	434	1577	1810	3235	397	1795	2988	564
Grp Volume(v), veh/h	144	0	239	89	0	33	478	193	198	54	315	312
Grp Sat Flow(s),veh/h/ln	66	0	1566	434	0	1577	1810	1805	1826	1795	1791	1761
Q Serve(g_s), s	0.0	0.0	5.7	0.0	0.0	1.1	20.7	5.2	5.2	2.4	13.4	13.6
Cycle Q Clear(g_c), s	26.0	0.0	5.7	26.0	0.0	1.1	20.7	5.2	5.2	2.4	13.4	13.6
Prop In Lane	0.69		1.00	0.25		1.00	1.00		0.22	1.00		0.32
Lane Grp Cap(c), veh/h	96	0	965	194	0	575	525	849	858	78	400	393
V/C Ratio(X)	1.50	0.00	0.25	0.46	0.00	0.06	0.91	0.23	0.23	0.69	0.79	0.79
Avail Cap(c_a), veh/h	96	0	965	194	0	575	635	969	981	153	485	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.0	0.0	7.3	22.2	0.0	16.8	27.8	12.8	12.8	38.3	29.7	29.8
Incr Delay (d2), s/veh	272.0	0.0	0.1	1.7	0.0	0.0	15.4	0.1	0.1	10.5	7.0	7.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.1	0.0	1.7	1.3	0.0	0.4	10.8	2.0	2.0	1.3	6.4	6.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	307.0	0.0	7.4	23.8	0.0	16.8	43.2	12.9	12.9	48.8	36.7	37.2
LnGrp LOS	F	A	A	C	A	B	D	B	B	D	D	D
Approach Vol, veh/h		383			122			869			681	
Approach Delay, s/veh		120.0			21.9			29.6			37.9	
Approach LOS		F			C			C			D	

Timer - Assigned Phs	2	3	4	6	7	8
Phs Duration (G+Y+Rc), s	30.5	8.0	42.7	30.5	28.1	22.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	26.0	6.9	43.6	26.0	28.5	22.0
Max Q Clear Time (g_c+I1), s	28.0	4.4	7.2	28.0	22.7	15.6
Green Ext Time (p_c), s	0.0	0.0	2.5	0.0	0.9	2.1

Intersection Summary	
HCM 6th Ctrl Delay	48.7
HCM 6th LOS	D



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	25	140	10	93	50	717	125	87	648	10
Future Volume (veh/h)	5	10	25	140	10	93	50	717	125	87	648	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	1.00		0.98	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	5	11	27	154	11	102	55	788	137	96	712	11
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	1	1	1
Cap, veh/h	339	95	232	410	30	283	487	1263	219	436	1584	24
Arrive On Green	0.19	0.19	0.19	0.19	0.19	0.19	0.06	0.42	0.42	0.08	0.44	0.44
Sat Flow, veh/h	1297	487	1194	1388	157	1452	1795	3037	528	1795	3610	56
Grp Volume(v), veh/h	5	0	38	154	0	113	55	465	460	96	353	370
Grp Sat Flow(s),veh/h/ln	1297	0	1681	1388	0	1609	1795	1791	1775	1795	1791	1875
Q Serve(g_s), s	0.1	0.0	0.8	4.5	0.0	2.6	0.7	8.9	8.9	1.2	6.0	6.0
Cycle Q Clear(g_c), s	2.8	0.0	0.8	5.3	0.0	2.6	0.7	8.9	8.9	1.2	6.0	6.0
Prop In Lane	1.00		0.71	1.00		0.90	1.00		0.30	1.00		0.03
Lane Grp Cap(c), veh/h	339	0	327	410	0	313	487	744	738	436	786	823
V/C Ratio(X)	0.01	0.00	0.12	0.38	0.00	0.36	0.11	0.62	0.62	0.22	0.45	0.45
Avail Cap(c_a), veh/h	878	0	1025	986	0	981	656	1711	1695	646	1793	1878
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	16.4	0.0	14.4	16.6	0.0	15.2	6.6	10.0	10.0	6.9	8.5	8.5
Incr Delay (d2), s/veh	0.0	0.0	0.2	0.6	0.0	0.7	0.1	0.9	0.9	0.3	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.3	1.3	0.0	0.9	0.2	2.8	2.8	0.4	1.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.4	0.0	14.6	17.2	0.0	15.9	6.7	10.9	10.9	7.2	8.9	8.9
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	A	A
Approach Vol, veh/h		43			267			980			819	
Approach Delay, s/veh		14.8			16.6			10.6			8.7	
Approach LOS		B			B			B			A	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.9	22.6		13.0	6.9	23.6		13.0
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	8.5	41.5		26.5	6.5	43.5		26.5
Max Q Clear Time (g_c+I1), s	3.2	10.9		4.8	2.7	8.0		7.3
Green Ext Time (p_c), s	0.1	7.0		0.1	0.0	5.1		1.0

Intersection Summary	
HCM 6th Ctrl Delay	10.7
HCM 6th LOS	B

Intersection	
Int Delay, s/veh	2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	43	0	0	46	65	0
Future Vol, veh/h	43	0	0	46	65	0
Conflicting Peds, #/hr	1	1	1	0	0	1
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	75	75	75	75	75	75
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	57	0	0	61	87	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	150	89	88	0	-	0
Stage 1	88	-	-	-	-	-
Stage 2	62	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	847	975	1520	-	-	0
Stage 1	940	-	-	-	-	0
Stage 2	966	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	845	973	1519	-	-	-
Mov Cap-2 Maneuver	845	-	-	-	-	-
Stage 1	939	-	-	-	-	-
Stage 2	965	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.6	0	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT
Capacity (veh/h)	1519	-	845	-
HCM Lane V/C Ratio	-	-	0.068	-
HCM Control Delay (s)	0	-	9.6	-
HCM Lane LOS	A	-	A	-
HCM 95th %tile Q(veh)	0	-	0.2	-

Intersection	
Intersection Delay, s/veh	7
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	41	0	0	0	0	65
Future Vol, veh/h	41	0	0	0	0	65
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	0	0	0	0	71
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	7.5	0	6.7
HCM LOS	A	-	A

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	0%	100%	0%
Vol Thru, %	100%	0%	0%
Vol Right, %	0%	0%	100%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	0	41	65
LT Vol	0	41	0
Through Vol	0	0	0
RT Vol	0	0	65
Lane Flow Rate	0	45	71
Geometry Grp	1	1	1
Degree of Util (X)	0	0.053	0.067
Departure Headway (Hd)	4.066	4.258	3.412
Convergence, Y/N	Yes	Yes	Yes
Cap	0	845	1048
Service Time	2.096	2.266	1.438
HCM Lane V/C Ratio	0	0.053	0.068
HCM Control Delay	7.1	7.5	6.7
HCM Lane LOS	N	A	A
HCM 95th-tile Q	0	0.2	0.2

Appendix D: Trip Generation Worksheets

Appendix D: Combined Trip Generation with Standard PM Peak Hour

DuPont Master Plan

Proposed Use														
									Gross Trips			Total Net New		
Land Use	**Setting**	**Size**	**Units**	**Model**	**Equation**	**Rate**	**Units**	**Inbound %**	**Inbound**	**Outbound**	**Subtotal**	**Inbound**	**Outbound**	**Total**
Senior Adult Housing (Multifamily) (LU 252)		**140**	du											
Daily	General Urban/Suburban			Rate	-	3.24	per du	50%	227	227	454	227	227	454
AM Peak Hour	General Urban/Suburban			Rate	-	0.20	per du	34%	10	18	28	10	18	28
PM Peak Hour	General Urban/Suburban			Rate	-	0.25	per du	56%	20	15	35	20	15	35
Multifamily Housing (Low-Rise) (LU 220)		**140**	du											
Daily	General Urban/Suburban			Rate	-	6.74	per du	50%	472	472	944	472	472	944
AM Peak Hour	General Urban/Suburban			Rate	-	0.40	per du	24%	13	43	56	13	43	56
PM Peak Hour	General Urban/Suburban			Rate	-	0.51	per du	63%	45	26	71	45	26	71
Elementary School (LU 520, Standard PM Peak)		**500**	attendees											
Daily	General Urban/Suburban			Rate	-	2.27	ıer attende	50%	568	568	1,136	568	568	1,136
AM Peak Hour	General Urban/Suburban			Rate	-	0.74	ıer attende	54%	200	170	370	200	170	370
PM Peak Hour	General Urban/Suburban			Rate	-	0.16	ıer attende	46%	37	43	80	37	43	80
Subtotal														
Daily									1,267	1,267	2,534	1,267	1,267	2,534
AM Peak Hour									223	231	454	223	231	454
PM Peak Hour									102	84	186	102	84	186

Net New Trips			
Daily	1267	1267	2534
AM Peak Hour	223	231	454
PM Peak Hour	102	84	186

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 10th Edition equation and average trip rate as shown above.
2. AVO = average vehicle occupancy. Retail and Residential AVO based on NCHRP 365 for urban areas with populations over 1 million people. No AVO rate if trips calculated based on person trip rate

Appendix D: Residential Trip Generation

DuPont Master Plan

Proposed Use														
									Gross Trips			Total Net New		
Land Use	**Setting**	**Size**	**Units**	**Model**	**Equation**	**Rate**	**Units**	**Inbound %**	**Inbound**	**Outbound**	**Subtotal**	**Inbound**	**Outbound**	**Total**
Senior Adult Housing (Multifamily) (LU 252)		**140**	du											
Daily	General Urban/Suburban			Rate	-	3.24	per du	50%	227	227	454	227	227	454
AM Peak Hour	General Urban/Suburban			Rate	-	0.20	per du	34%	10	18	28	10	18	28
PM Peak Hour	General Urban/Suburban			Rate	-	0.25	per du	56%	20	15	35	20	15	35
Multifamily Housing (Low-Rise) (LU 220)		**140**	du											
Daily	General Urban/Suburban			Rate	-	6.74	per du	50%	472	472	944	472	472	944
AM Peak Hour	General Urban/Suburban			Rate	-	0.40	per du	24%	13	43	56	13	43	56
PM Peak Hour	General Urban/Suburban			Rate	-	0.51	per du	63%	45	26	71	45	26	71
Subtotal														
Daily									699	699	1,398	699	699	1,398
AM Peak Hour									23	61	84	23	61	84
PM Peak Hour									65	41	106	65	41	106

Net New Trips			
Daily	699	699	1398
AM Peak Hour	23	61	84
PM Peak Hour	65	41	106

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 10th Edition equation and average trip rate as shown above.
2. AVO = average vehicle occupancy. Retail and Residential AVO based on NCHRP 365 for urban areas with populations over 1 million people. No AVO rate if trips calculated based on person trip rate

Appendix D: School Trip Generation Standard PM Peak

DuPont Master Plan

Proposed Use														
									Gross Trips			Total Net New		
Land Use	**Setting**	**Size**	**Units**	**Model**	**Equation**	**Rate**	**Units**	**Inbound %**	**Inbound**	**Outbound**	**Subtotal**	**Inbound**	**Outbound**	**Total**
Elementary School (LU 520 Standard PM Peak)		**500**	attendees											
Daily	General Urban/Suburban			Rate	-	2.27	ıer attende	50%	568	568	1,136	568	568	1,136
AM Peak Hour	General Urban/Suburban			Rate	-	0.74	ıer attende	54%	200	170	370	200	170	370
PM Peak Hour	General Urban/Suburban			Rate	-	0.16	ıer attende	46%	37	43	80	37	43	80
Subtotal														
Daily									568	568	1,136	568	568	1,136
AM Peak Hour									200	170	370	200	170	370
PM Peak Hour									37	43	80	37	43	80

Net New Trips			
Daily	568	568	1136
AM Peak Hour	200	170	370
PM Peak Hour	37	43	80

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 10th Edition equation and average trip rate as shown above.
2. AVO = average vehicle occupancy. Retail and Residential AVO based on NCHRP 365 for urban areas with populations over 1 million people. No AVO rate if trips calculated based on person trip rate

Appendix D: School Trip Generation Peak Dismissal

DuPont Master Plan

Proposed Use														
									Gross Trips			Total Net New		
Land Use	**Setting**	**Size**	**Units**	**Model**	**Equation**	**Rate**	**Units**	**Inbound %**	**Inbound**	**Outbound**	**Subtotal**	**Inbound**	**Outbound**	**Total**
Elementary School (LU 520, Peak Dismissal)		**500**	attendees											
Daily	General Urban/Suburban			Rate	-	2.27	per attende	50%	568	568	1,136	568	568	1,136
AM Peak Hour	General Urban/Suburban			Rate	-	0.74	per attende	54%	200	170	370	200	170	370
PM Peak Hour	General Urban/Suburban			Rate	-	0.45	per attende	46%	104	121	225	104	121	225
Subtotal														
Daily									568	568	1,136	568	568	1,136
AM Peak Hour									200	170	370	200	170	370
PM Peak Hour									104	121	225	104	121	225

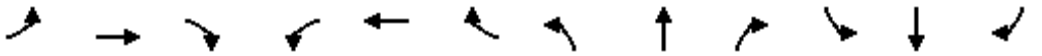
Net New Trips			
Daily	568	568	1136
AM Peak Hour	200	170	370
PM Peak Hour	104	121	225

Notes:

1. Trip rates based on Institute of Transportation Engineers' (ITE) *Trip Generation* 10th Edition equation and average trip rate as shown above.
2. AVO = average vehicle occupancy. Retail and Residential AVO based on NCHRP 365 for urban areas with populations over 1 million people. No AVO rate if trips calculated based on person trip rate

Attachment C – Level of Service Calculations

Existing (2022) Conditions, AM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1	8	46	67	10	33	28	266	88	50	590	11
Future Volume (veh/h)	1	8	46	67	10	33	28	266	88	50	590	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1856	1856	1856	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	1	9	10	76	11	7	32	302	70	57	670	11
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
Percent Heavy Veh, %	0	0	0	3	3	3	2	2	2	1	1	1
Cap, veh/h	385	122	136	382	157	100	553	1143	261	627	1180	19
Arrive On Green	0.15	0.15	0.15	0.15	0.15	0.15	0.13	0.40	0.40	0.06	0.33	0.33
Sat Flow, veh/h	1401	822	913	1382	1055	672	1781	2872	656	1795	3606	59
Grp Volume(v), veh/h	1	0	19	76	0	18	32	185	187	57	333	348
Grp Sat Flow(s),veh/h/ln	1401	0	1736	1382	0	1727	1781	1777	1751	1795	1791	1875
Q Serve(g_s), s	0.0	0.0	0.4	1.9	0.0	0.3	0.4	2.7	2.7	0.8	5.8	5.9
Cycle Q Clear(g_c), s	0.4	0.0	0.4	2.3	0.0	0.3	0.4	2.7	2.7	0.8	5.8	5.9
Prop In Lane	1.00		0.53	1.00		0.39	1.00		0.37	1.00		0.03
Lane Grp Cap(c), veh/h	385	0	258	382	0	257	553	707	697	627	586	613
V/C Ratio(X)	0.00	0.00	0.07	0.20	0.00	0.07	0.06	0.26	0.27	0.09	0.57	0.57
Avail Cap(c_a), veh/h	1610	0	1776	1591	0	1767	742	2565	2528	1039	2679	2804
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	0.0	14.0	14.9	0.0	13.9	6.2	7.7	7.7	7.4	10.6	10.6
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.3	0.0	0.1	0.0	0.2	0.2	0.1	0.9	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.1	0.5	0.0	0.1	0.1	0.7	0.7	0.2	1.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.1	0.0	14.1	15.2	0.0	14.1	6.2	7.9	7.9	7.5	11.5	11.4
LnGrp LOS	B	A	B	B	A	B	A	A	A	A	B	B
Approach Vol, veh/h		20			94			404			738	
Approach Delay, s/veh		14.1			15.0			7.8			11.1	
Approach LOS		B			B			A			B	

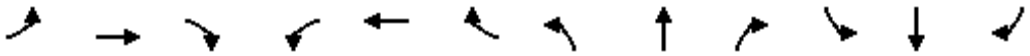
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.3	20.2		10.7	10.0	17.5		10.7				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	11.0	55.0		39.0	9.0	57.0		39.0				
Max Q Clear Time (g_c+I1), s	2.8	4.7		2.4	2.4	7.9		4.3				
Green Ext Time (p_c), s	0.1	2.3		0.1	0.0	4.6		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		10.4	
HCM 6th LOS		B	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	41	27	322	28	21	6	100	178	21	11	274	18
Future Volume (veh/h)	41	27	322	28	21	6	100	178	21	11	274	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1811	1811	1811	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	43	28	218	29	22	2	105	187	15	12	288	14
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	6	6	6	2	2	2	2	2	2
Cap, veh/h	344	179	488	303	176	347	170	1001	80	28	762	37
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.10	0.30	0.30	0.02	0.22	0.22
Sat Flow, veh/h	767	851	1598	591	836	1535	1781	3334	265	1781	3450	167
Grp Volume(v), veh/h	71	0	218	51	0	2	105	99	103	12	148	154
Grp Sat Flow(s),veh/h/ln	1618	0	1598	1427	0	1535	1781	1777	1822	1781	1777	1840
Q Serve(g_s), s	0.0	0.0	0.5	0.0	0.0	0.0	1.8	1.3	1.3	0.2	2.2	2.3
Cycle Q Clear(g_c), s	1.0	0.0	0.5	0.7	0.0	0.0	1.8	1.3	1.3	0.2	2.2	2.3
Prop In Lane	0.61		1.00	0.57		1.00	1.00		0.15	1.00		0.09
Lane Grp Cap(c), veh/h	523	0	488	478	0	347	170	533	547	28	392	406
V/C Ratio(X)	0.14	0.00	0.45	0.11	0.00	0.01	0.62	0.19	0.19	0.43	0.38	0.38
Avail Cap(c_a), veh/h	2359	0	2373	2039	0	2158	1519	2919	2993	506	1908	1977
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.3	0.0	8.8	10.2	0.0	9.5	13.8	8.2	8.2	15.4	10.5	10.5
Incr Delay (d2), s/veh	0.1	0.0	0.6	0.1	0.0	0.0	3.6	0.2	0.2	9.9	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	1.0	0.2	0.0	0.0	0.7	0.3	0.4	0.1	0.7	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.4	0.0	9.5	10.3	0.0	9.5	17.4	8.4	8.4	25.3	11.1	11.1
LnGrp LOS	B	A	A	B	A	A	B	A	A	C	B	B
Approach Vol, veh/h		289			53			307			314	
Approach Delay, s/veh		9.7			10.2			11.5			11.6	
Approach LOS		A			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	14.5		11.7	8.0	12.0		11.7				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	9.0	52.0		44.0	27.0	34.0		44.0				
Max Q Clear Time (g_c+I1), s	2.2	3.3		3.0	3.8	4.3		2.7				
Green Ext Time (p_c), s	0.0	1.2		1.2	0.2	1.7		0.3				

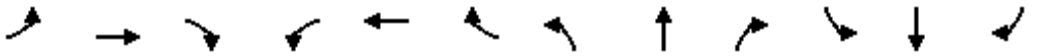
Intersection Summary												
HCM 6th Ctrl Delay			10.9									
HCM 6th LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	142	17	62	38	9	20	70	142	13	12	148	142
Future Volume (veh/h)	142	17	62	38	9	20	70	142	13	12	148	142
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.98	1.00		0.97	0.99		0.96	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1841	1841	1841	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	173	21	60	46	11	8	85	173	11	15	180	44
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	5	5	5	4	4	4	2	2	2	4	4	4
Cap, veh/h	424	66	99	464	106	56	519	913	58	480	585	139
Arrive On Green	0.29	0.29	0.29	0.29	0.29	0.29	0.08	0.27	0.27	0.02	0.21	0.21
Sat Flow, veh/h	874	225	340	1000	363	191	1781	3385	213	1753	2795	665
Grp Volume(v), veh/h	254	0	0	65	0	0	85	90	94	15	111	113
Grp Sat Flow(s),veh/h/ln	1440	0	0	1555	0	0	1781	1777	1821	1753	1749	1711
Q Serve(g_s), s	4.3	0.0	0.0	0.0	0.0	0.0	1.3	1.4	1.4	0.2	1.9	2.0
Cycle Q Clear(g_c), s	5.3	0.0	0.0	1.0	0.0	0.0	1.3	1.4	1.4	0.2	1.9	2.0
Prop In Lane	0.68		0.24	0.71		0.12	1.00		0.12	1.00		0.39
Lane Grp Cap(c), veh/h	589	0	0	626	0	0	519	479	491	480	366	358
V/C Ratio(X)	0.43	0.00	0.00	0.10	0.00	0.00	0.16	0.19	0.19	0.03	0.30	0.32
Avail Cap(c_a), veh/h	2539	0	0	2548	0	0	1024	1886	1933	788	1563	1530
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.8	0.0	0.0	9.3	0.0	0.0	9.6	10.1	10.1	10.7	11.9	12.0
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.2	0.0	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	0.0	0.0	0.3	0.0	0.0	0.4	0.4	0.4	0.1	0.6	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.3	0.0	0.0	9.4	0.0	0.0	9.7	10.2	10.3	10.8	12.4	12.5
LnGrp LOS	B	A	A	A	A	A	A	B	B	B	B	B
Approach Vol, veh/h		254			65			269			239	
Approach Delay, s/veh		11.3			9.4			10.1			12.3	
Approach LOS		B			A			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.7	14.7		15.5	7.9	12.5		15.5				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	7.0	38.0		60.0	13.0	32.0		60.0				
Max Q Clear Time (g_c+I1), s	2.2	3.4		7.3	3.3	4.0		3.0				
Green Ext Time (p_c), s	0.0	1.0		1.9	0.1	1.2		0.4				

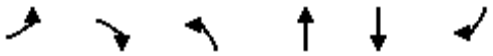
Intersection Summary		
HCM 6th Ctrl Delay		11.0
HCM 6th LOS		B



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	5	30	0	29	0	297	7	26	267	1
Future Volume (veh/h)	0	0	5	30	0	29	0	297	7	26	267	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1841	1841	1841
Adj Flow Rate, veh/h	0	0	1	35	0	6	0	349	7	31	314	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	4	4	4
Cap, veh/h	0	0	203	449	0	200	7	994	20	67	1792	6
Arrive On Green	0.00	0.00	0.13	0.13	0.00	0.13	0.00	0.28	0.28	0.04	0.50	0.50
Sat Flow, veh/h	0	0	1586	1432	0	1567	1795	3589	72	1753	3576	11
Grp Volume(v), veh/h	0	0	1	35	0	6	0	174	182	31	154	161
Grp Sat Flow(s),veh/h/ln	0	0	1586	1432	0	1567	1795	1791	1870	1753	1749	1839
Q Serve(g_s), s	0.0	0.0	0.0	0.6	0.0	0.1	0.0	2.1	2.1	0.5	1.3	1.3
Cycle Q Clear(g_c), s	0.0	0.0	0.0	0.6	0.0	0.1	0.0	2.1	2.1	0.5	1.3	1.3
Prop In Lane	0.00		1.00	1.00		1.00	1.00		0.04	1.00		0.01
Lane Grp Cap(c), veh/h	0	0	203	449	0	200	7	496	518	67	876	921
V/C Ratio(X)	0.00	0.00	0.00	0.08	0.00	0.03	0.00	0.35	0.35	0.46	0.18	0.18
Avail Cap(c_a), veh/h	0	0	2178	2233	0	2152	333	3324	3471	1171	4089	4300
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	10.3	10.5	0.0	10.3	0.0	7.8	7.8	12.7	3.7	3.7
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.4	0.4	4.8	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.5	0.5	0.2	0.1	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	0.0	10.3	10.6	0.0	10.3	0.0	8.2	8.2	17.5	3.8	3.8
LnGrp LOS	A	A	B	B	A	B	A	A	A	B	A	A
Approach Vol, veh/h		1			41			356			346	
Approach Delay, s/veh		10.3			10.6			8.2			5.0	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.0	12.5		8.4	0.0	18.5		8.4				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	18.0	50.0		37.0	5.0	63.0		37.0				
Max Q Clear Time (g_c+I1), s	2.5	4.1		2.0	0.0	3.3		2.6				
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	1.9		0.1				

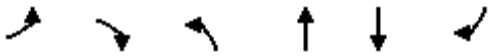
Intersection Summary			
HCM 6th Ctrl Delay		6.9	
HCM 6th LOS		A	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	13	8	318	281	2
Future Volume (veh/h)	10	13	8	318	281	2
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1796	1796
Adj Flow Rate, veh/h	12	0	9	374	331	1
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	1	1	7	7
Cap, veh/h	29	26	588	1936	1070	3
Arrive On Green	0.02	0.00	0.01	0.54	0.31	0.31
Sat Flow, veh/h	1810	1610	1795	3676	3580	11
Grp Volume(v), veh/h	12	0	9	374	162	170
Grp Sat Flow(s),veh/h/ln	1810	1610	1795	1791	1706	1794
Q Serve(g_s), s	0.1	0.0	0.1	1.2	1.6	1.6
Cycle Q Clear(g_c), s	0.1	0.0	0.1	1.2	1.6	1.6
Prop In Lane	1.00	1.00	1.00			0.01
Lane Grp Cap(c), veh/h	29	26	588	1936	523	550
V/C Ratio(X)	0.41	0.00	0.02	0.19	0.31	0.31
Avail Cap(c_a), veh/h	1364	1214	3034	14771	4313	4535
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	4.3	2.7	6.0	6.0
Incr Delay (d2), s/veh	9.1	0.0	0.0	0.0	0.3	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.0	0.3	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	20.1	0.0	4.3	2.7	6.3	6.3
LnGrp LOS	C	A	A	A	A	A
Approach Vol, veh/h	12			383	332	
Approach Delay, s/veh	20.1			2.7	6.3	
Approach LOS	C			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		17.2		5.4	5.3	11.9
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		93.0		17.0	31.0	57.0
Max Q Clear Time (g_c+I1), s		3.2		2.1	2.1	3.6
Green Ext Time (p_c), s		2.6		0.0	0.0	2.0

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	264	85	175	460	433	262
Future Volume (veh/h)	264	85	175	460	433	262
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1826	1752	1752	1767	1767
Adj Flow Rate, veh/h	275	22	182	479	451	114
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	5	10	10	9	9
Cap, veh/h	357	317	236	1022	594	492
Arrive On Green	0.21	0.21	0.14	0.58	0.34	0.34
Sat Flow, veh/h	1739	1547	1668	1752	1767	1462
Grp Volume(v), veh/h	275	22	182	479	451	114
Grp Sat Flow(s),veh/h/ln	1739	1547	1668	1752	1767	1462
Q Serve(g_s), s	7.1	0.5	5.0	7.4	10.8	2.7
Cycle Q Clear(g_c), s	7.1	0.5	5.0	7.4	10.8	2.7
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	357	317	236	1022	594	492
V/C Ratio(X)	0.77	0.07	0.77	0.47	0.76	0.23
Avail Cap(c_a), veh/h	1139	1013	810	2923	1903	1575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	15.2	19.6	5.6	14.0	11.3
Incr Delay (d2), s/veh	3.5	0.1	5.2	0.3	2.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	1.9	1.4	3.5	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	21.3	15.3	24.8	6.0	16.0	11.5
LnGrp LOS	C	B	C	A	B	B
Approach Vol, veh/h	297			661	565	
Approach Delay, s/veh	20.9			11.2	15.1	
Approach LOS	C			B	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		32.6		14.7	11.7	20.9
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		79.0		31.0	23.0	51.0
Max Q Clear Time (g_c+I1), s		9.4		9.1	7.0	12.8
Green Ext Time (p_c), s		3.0		0.8	0.4	3.2

Intersection Summary	
HCM 6th Ctrl Delay	14.5
HCM 6th LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	41	15	59	33	561	7	41	83	492	57	19
Future Volume (veh/h)	20	41	15	59	33	561	7	41	83	492	57	19
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1752	1752	1752	1870	1870	1870	1767	1767	1767
Adj Flow Rate, veh/h	21	42	3	61	34	0	7	42	0	566	0	0
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
Percent Heavy Veh, %	5	5	5	10	10	10	2	2	2	9	9	9
Cap, veh/h	157	227	16	145	230		128	135		828	435	0
Arrive On Green	0.09	0.13	0.13	0.09	0.13	0.00	0.07	0.07	0.00	0.25	0.00	0.00
Sat Flow, veh/h	1739	1684	120	1668	1752	1485	1781	1870	1585	3365	1767	0
Grp Volume(v), veh/h	21	0	45	61	34	0	7	42	0	566	0	0
Grp Sat Flow(s),veh/h/ln	1739	0	1804	1668	1752	1485	1781	1870	1585	1682	1767	0
Q Serve(g_s), s	0.5	0.0	1.0	1.5	0.7	0.0	0.2	0.9	0.0	6.6	0.0	0.0
Cycle Q Clear(g_c), s	0.5	0.0	1.0	1.5	0.7	0.0	0.2	0.9	0.0	6.6	0.0	0.0
Prop In Lane	1.00		0.07	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	157	0	243	145	230		128	135		828	435	0
V/C Ratio(X)	0.13	0.00	0.18	0.42	0.15		0.05	0.31		0.68	0.00	0.00
Avail Cap(c_a), veh/h	240	0	914	461	1129		1025	1076		3176	1667	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.2	0.0	16.7	18.8	16.7	0.0	18.8	19.1	0.0	14.8	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.0	0.4	1.9	0.3	0.0	0.2	1.3	0.0	1.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.4	0.5	0.3	0.0	0.1	0.4	0.0	2.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.6	0.0	17.0	20.8	17.0	0.0	19.0	20.4	0.0	15.9	0.0	0.0
LnGrp LOS	B	A	B	C	B		B	C		B	A	A
Approach Vol, veh/h		66			95	A		49	A		566	
Approach Delay, s/veh		17.5			19.4			20.2			15.9	
Approach LOS		B			B			C			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		8.1	8.8	10.9		15.7	8.9	10.7				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s		25.0	12.0	22.0		41.0	6.0	28.0				
Max Q Clear Time (g_c+I1), s		2.9	3.5	3.0		8.6	2.5	2.7				
Green Ext Time (p_c), s		0.2	0.1	0.1		2.1	0.0	0.1				

Intersection Summary												
HCM 6th Ctrl Delay			16.7									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	2.9

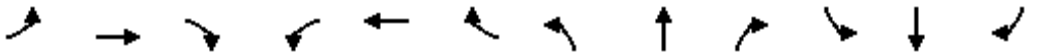
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	114	311	117	16	22	67
Future Vol, veh/h	114	311	117	16	22	67
Conflicting Peds, #/hr	4	0	0	1	6	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	50
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	1	1	2	2
Mvmt Flow	124	338	127	17	24	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	148	0	-	0	732	143
Stage 1	-	-	-	-	140	-
Stage 2	-	-	-	-	592	-
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	1434	-	-	-	388	905
Stage 1	-	-	-	-	887	-
Stage 2	-	-	-	-	553	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1429	-	-	-	345	899
Mov Cap-2 Maneuver	-	-	-	-	345	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	551	-

Approach	EB	WB	SB
HCM Control Delay, s	2.1	0	11.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1429	-	-	-	345	899
HCM Lane V/C Ratio	0.087	-	-	-	0.069	0.081
HCM Control Delay (s)	7.8	0	-	-	16.2	9.4
HCM Lane LOS	A	A	-	-	C	A
HCM 95th %tile Q(veh)	0.3	-	-	-	0.2	0.3

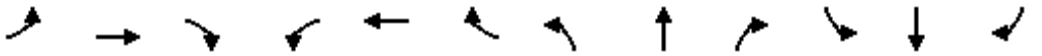
Existing (2022) Conditions, PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	12	35	115	22	58	51	537	117	71	409	9
Future Volume (veh/h)	9	12	35	115	22	58	51	537	117	71	409	9
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		0.96	0.99		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	10	13	8	122	23	13	54	571	107	76	435	8
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	406	185	114	418	191	108	620	1048	196	477	1037	19
Arrive On Green	0.17	0.17	0.17	0.17	0.17	0.17	0.14	0.35	0.35	0.07	0.29	0.29
Sat Flow, veh/h	1389	1095	674	1402	1129	638	1795	2990	558	1795	3598	66
Grp Volume(v), veh/h	10	0	21	122	0	36	54	341	337	76	216	227
Grp Sat Flow(s),veh/h/ln	1389	0	1768	1402	0	1768	1795	1791	1758	1795	1791	1873
Q Serve(g_s), s	0.2	0.0	0.4	3.0	0.0	0.6	0.7	5.6	5.7	1.0	3.6	3.6
Cycle Q Clear(g_c), s	0.9	0.0	0.4	3.3	0.0	0.6	0.7	5.6	5.7	1.0	3.6	3.6
Prop In Lane	1.00		0.38	1.00		0.36	1.00		0.32	1.00		0.04
Lane Grp Cap(c), veh/h	406	0	299	418	0	299	620	628	616	477	516	540
V/C Ratio(X)	0.02	0.00	0.07	0.29	0.00	0.12	0.09	0.54	0.55	0.16	0.42	0.42
Avail Cap(c_a), veh/h	1642	0	1871	1665	0	1871	815	2722	2671	832	2770	2898
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.4	0.0	12.9	14.3	0.0	13.0	6.5	9.6	9.6	8.0	10.6	10.6
Incr Delay (d2), s/veh	0.0	0.0	0.1	0.4	0.0	0.2	0.1	0.7	0.8	0.2	0.5	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.1	0.8	0.0	0.2	0.2	1.6	1.6	0.3	1.1	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	13.4	0.0	13.0	14.7	0.0	13.2	6.6	10.3	10.4	8.2	11.2	11.1
LnGrp LOS	B	A	B	B	A	B	A	B	B	A	B	B
Approach Vol, veh/h		31			158			732			519	
Approach Delay, s/veh		13.1			14.3			10.1			10.7	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.7	17.9		11.2	10.0	15.6		11.2				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	10.0	56.0		39.0	9.0	57.0		39.0				
Max Q Clear Time (g_c+I1), s	3.0	7.7		2.9	2.7	5.6		5.3				
Green Ext Time (p_c), s	0.1	4.7		0.1	0.0	2.7		0.6				

Intersection Summary			
HCM 6th Ctrl Delay		10.8	
HCM 6th LOS		B	



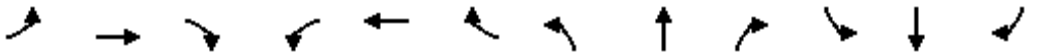
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	35	148	35	49	17	320	250	32	15	307	30
Future Volume (veh/h)	42	35	148	35	49	17	320	250	32	15	307	30
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	48	40	106	40	56	4	364	284	27	17	349	28
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
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	1	1	1
Cap, veh/h	244	163	690	197	211	303	466	1462	138	38	688	55
Arrive On Green	0.18	0.18	0.18	0.18	0.18	0.18	0.26	0.44	0.44	0.02	0.21	0.21
Sat Flow, veh/h	627	927	1569	425	1200	1531	1795	3298	311	1795	3352	267
Grp Volume(v), veh/h	88	0	106	96	0	4	364	153	158	17	185	192
Grp Sat Flow(s),veh/h/ln	1554	0	1569	1624	0	1531	1795	1791	1818	1795	1791	1828
Q Serve(g_s), s	0.2	0.0	0.0	0.0	0.0	0.1	7.9	2.2	2.2	0.4	3.8	3.9
Cycle Q Clear(g_c), s	2.0	0.0	0.0	1.9	0.0	0.1	7.9	2.2	2.2	0.4	3.8	3.9
Prop In Lane	0.55		1.00	0.42		1.00	1.00		0.17	1.00		0.15
Lane Grp Cap(c), veh/h	406	0	690	408	0	303	466	794	806	38	367	375
V/C Ratio(X)	0.22	0.00	0.15	0.24	0.00	0.01	0.78	0.19	0.20	0.44	0.50	0.51
Avail Cap(c_a), veh/h	1248	0	1543	1233	0	1135	2066	2920	2964	301	1159	1184
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.9	0.0	7.1	14.9	0.0	13.5	14.3	7.1	7.1	20.2	14.7	14.7
Incr Delay (d2), s/veh	0.3	0.0	0.1	0.3	0.0	0.0	2.9	0.1	0.1	7.8	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	0.0	0.5	0.7	0.0	0.0	2.9	0.6	0.6	0.2	1.4	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.1	0.0	7.2	15.2	0.0	13.5	17.2	7.2	7.2	27.9	15.8	15.8
LnGrp LOS	B	A	A	B	A	B	B	A	A	C	B	B
Approach Vol, veh/h		194			100			675			394	
Approach Delay, s/veh		10.8			15.2			12.6			16.3	
Approach LOS		B			B			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	23.5		12.3	15.8	13.6		12.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	7.0	68.0		30.0	48.0	27.0		30.0				
Max Q Clear Time (g_c+I1), s	2.4	4.2		4.0	9.9	5.9		3.9				
Green Ext Time (p_c), s	0.0	1.9		0.8	1.1	2.0		0.5				

Intersection Summary			
HCM 6th Ctrl Delay		13.6	
HCM 6th LOS		B	

Notes

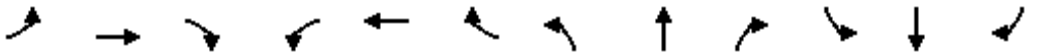
User approved changes to right turn type.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	122	18	40	18	11	8	38	154	32	15	281	173
Future Volume (veh/h)	122	18	40	18	11	8	38	154	32	15	281	173
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.98	1.00		0.97	1.00		0.99	0.99		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	139	20	35	20	12	3	43	175	20	17	319	108
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
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	404	62	60	345	177	33	464	935	105	559	689	228
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.05	0.29	0.29	0.02	0.26	0.26
Sat Flow, veh/h	947	279	270	756	792	145	1795	3241	366	1810	2641	875
Grp Volume(v), veh/h	194	0	0	35	0	0	43	96	99	17	216	211
Grp Sat Flow(s),veh/h/ln	1496	0	0	1693	0	0	1795	1791	1816	1810	1805	1711
Q Serve(g_s), s	2.9	0.0	0.0	0.0	0.0	0.0	0.5	1.3	1.3	0.2	3.2	3.4
Cycle Q Clear(g_c), s	3.6	0.0	0.0	0.5	0.0	0.0	0.5	1.3	1.3	0.2	3.2	3.4
Prop In Lane	0.72		0.18	0.57		0.09	1.00		0.20	1.00		0.51
Lane Grp Cap(c), veh/h	527	0	0	555	0	0	464	517	524	559	471	446
V/C Ratio(X)	0.37	0.00	0.00	0.06	0.00	0.00	0.09	0.19	0.19	0.03	0.46	0.47
Avail Cap(c_a), veh/h	2378	0	0	2494	0	0	988	2669	2706	1025	2578	2443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.0	0.0	0.0	9.9	0.0	0.0	8.0	8.6	8.6	8.4	10.0	10.0
Incr Delay (d2), s/veh	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.0	0.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	0.0	0.0	0.2	0.0	0.0	0.1	0.4	0.4	0.1	1.0	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	11.5	0.0	0.0	9.9	0.0	0.0	8.1	8.8	8.8	8.4	10.7	10.8
LnGrp LOS	B	A	A	A	A	A	A	A	A	A	B	B
Approach Vol, veh/h		194			35			238			444	
Approach Delay, s/veh		11.5			9.9			8.7			10.7	
Approach LOS		B			A			A			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.7	14.3		12.2	6.6	13.4		12.2				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	9.0	48.0		48.0	11.0	46.0		48.0				
Max Q Clear Time (g_c+I1), s	2.2	3.3		5.6	2.5	5.4		2.5				
Green Ext Time (p_c), s	0.0	1.1		1.3	0.0	2.7		0.2				

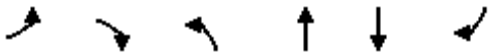
Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	0	23	34	0	22	4	263	17	21	412	0
Future Volume (veh/h)	4	0	23	34	0	22	4	263	17	21	412	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	0.99		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	5	0	0	40	0	4	5	309	16	25	485	0
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	0	0	0
Cap, veh/h	426	0	0	433	0	188	12	1052	54	57	1195	0
Arrive On Green	0.12	0.00	0.00	0.12	0.00	0.12	0.01	0.31	0.31	0.03	0.33	0.00
Sat Flow, veh/h	1390	0	0	1426	0	1575	1781	3435	177	1810	3705	0
Grp Volume(v), veh/h	5	0	0	40	0	4	5	159	166	25	485	0
Grp Sat Flow(s),veh/h/ln	1390	0	0	1426	0	1575	1781	1777	1836	1810	1805	0
Q Serve(g_s), s	0.1	0.0	0.0	0.5	0.0	0.1	0.1	1.9	1.9	0.4	2.9	0.0
Cycle Q Clear(g_c), s	0.1	0.0	0.0	0.7	0.0	0.1	0.1	1.9	1.9	0.4	2.9	0.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.10	1.00		0.00
Lane Grp Cap(c), veh/h	426	0	0	433	0	188	12	544	562	57	1195	0
V/C Ratio(X)	0.01	0.00	0.00	0.09	0.00	0.02	0.41	0.29	0.29	0.44	0.41	0.00
Avail Cap(c_a), veh/h	2155	0	0	2172	0	2109	709	3344	3455	1048	7448	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	10.8	0.0	0.0	11.0	0.0	10.7	13.7	7.3	7.3	13.1	7.1	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.1	0.0	0.0	20.8	0.3	0.3	5.2	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.4	0.4	0.2	0.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.8	0.0	0.0	11.1	0.0	10.8	34.5	7.6	7.6	18.3	7.4	0.0
LnGrp LOS	B	A	A	B	A	B	C	A	A	B	A	A
Approach Vol, veh/h		5			44			330			510	
Approach Delay, s/veh		10.8			11.1			8.0			7.9	
Approach LOS		B			B			A			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.9	13.5		8.3	5.2	14.1		8.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	16.0	52.0		37.0	11.0	57.0		37.0				
Max Q Clear Time (g_c+I1), s	2.4	3.9		2.1	2.1	4.9		2.7				
Green Ext Time (p_c), s	0.0	2.0		0.0	0.0	3.5		0.1				

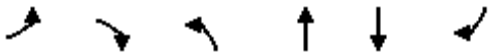
Intersection Summary			
HCM 6th Ctrl Delay		8.1	
HCM 6th LOS		A	



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	13	5	284	420	5
Future Volume (veh/h)	3	13	5	284	420	5
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1885	1885
Adj Flow Rate, veh/h	4	0	6	346	512	5
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	10	9	529	2010	1222	12
Arrive On Green	0.01	0.00	0.01	0.56	0.34	0.34
Sat Flow, veh/h	1810	1610	1795	3676	3728	35
Grp Volume(v), veh/h	4	0	6	346	252	265
Grp Sat Flow(s),veh/h/ln	1810	1610	1795	1791	1791	1879
Q Serve(g_s), s	0.1	0.0	0.0	1.1	2.5	2.5
Cycle Q Clear(g_c), s	0.1	0.0	0.0	1.1	2.5	2.5
Prop In Lane	1.00	1.00	1.00			0.02
Lane Grp Cap(c), veh/h	10	9	529	2010	602	632
V/C Ratio(X)	0.40	0.00	0.01	0.17	0.42	0.42
Avail Cap(c_a), veh/h	1098	977	2926	14900	4656	4885
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	11.4	0.0	4.2	2.5	5.9	5.9
Incr Delay (d2), s/veh	24.3	0.0	0.0	0.0	0.5	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.0	0.4	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.7	0.0	4.2	2.5	6.4	6.4
LnGrp LOS	D	A	A	A	A	A
Approach Vol, veh/h	4			352	517	
Approach Delay, s/veh	35.7			2.5	6.4	
Approach LOS	D			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		18.0		5.1	5.2	12.8
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		96.0		14.0	31.0	60.0
Max Q Clear Time (g_c+I1), s		3.1		2.1	2.0	4.5
Green Ext Time (p_c), s		2.4		0.0	0.0	3.3

Intersection Summary	
HCM 6th Ctrl Delay	5.0
HCM 6th LOS	A



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	205	135	137	339	496	333
Future Volume (veh/h)	205	135	137	339	496	333
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1811	1811	1856	1856
Adj Flow Rate, veh/h	225	32	151	373	545	188
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	6	6	3	3
Cap, veh/h	306	272	199	1109	721	598
Arrive On Green	0.17	0.17	0.12	0.61	0.39	0.39
Sat Flow, veh/h	1781	1585	1725	1811	1856	1538
Grp Volume(v), veh/h	225	32	151	373	545	188
Grp Sat Flow(s),veh/h/ln	1781	1585	1725	1811	1856	1538
Q Serve(g_s), s	5.5	0.8	3.9	4.7	11.8	3.9
Cycle Q Clear(g_c), s	5.5	0.8	3.9	4.7	11.8	3.9
Prop In Lane	1.00	1.00	1.00			1.00
Lane Grp Cap(c), veh/h	306	272	199	1109	721	598
V/C Ratio(X)	0.74	0.12	0.76	0.34	0.76	0.31
Avail Cap(c_a), veh/h	1079	960	746	3213	2288	1897
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.2	16.2	19.8	4.4	12.2	9.8
Incr Delay (d2), s/veh	3.5	0.2	5.9	0.2	1.6	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	1.6	0.7	3.6	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	21.6	16.4	25.7	4.6	13.9	10.1
LnGrp LOS	C	B	C	A	B	B
Approach Vol, veh/h	257			524	733	
Approach Delay, s/veh	21.0			10.6	12.9	
Approach LOS	C			B	B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		33.3		12.9	10.3	23.0
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		82.0		28.0	20.0	57.0
Max Q Clear Time (g_c+I1), s		6.7		7.5	5.9	13.8
Green Ext Time (p_c), s		2.2		0.7	0.3	4.2

Intersection Summary		
HCM 6th Ctrl Delay		13.5
HCM 6th LOS		B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	57	18	137	65	450	15	53	66	598	69	36
Future Volume (veh/h)	36	57	18	137	65	450	15	53	66	598	69	36
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1841	1841	1841	1885	1885	1885	1856	1856	1856
Adj Flow Rate, veh/h	38	59	8	143	68	0	16	55	0	707	0	0
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
Percent Heavy Veh, %	2	2	2	4	4	4	1	1	1	3	3	3
Cap, veh/h	169	209	28	208	282		156	164		964	506	0
Arrive On Green	0.10	0.13	0.13	0.12	0.15	0.00	0.09	0.09	0.00	0.27	0.00	0.00
Sat Flow, veh/h	1781	1612	219	1753	1841	1560	1795	1885	1598	3534	1856	0
Grp Volume(v), veh/h	38	0	67	143	68	0	16	55	0	707	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1831	1753	1841	1560	1795	1885	1598	1767	1856	0
Q Serve(g_s), s	1.0	0.0	1.7	4.0	1.7	0.0	0.4	1.4	0.0	9.3	0.0	0.0
Cycle Q Clear(g_c), s	1.0	0.0	1.7	4.0	1.7	0.0	0.4	1.4	0.0	9.3	0.0	0.0
Prop In Lane	1.00		0.12	1.00		1.00	1.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	169	0	238	208	282		156	164		964	506	0
V/C Ratio(X)	0.22	0.00	0.28	0.69	0.24		0.10	0.34		0.73	0.00	0.00
Avail Cap(c_a), veh/h	244	0	790	550	1119		810	850		2702	1419	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.3	0.0	20.0	21.6	19.0	0.0	21.4	21.9	0.0	16.9	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.6	4.0	0.4	0.0	0.3	1.2	0.0	1.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	0.7	1.6	0.6	0.0	0.2	0.6	0.0	3.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	22.0	0.0	20.7	25.6	19.4	0.0	21.7	23.1	0.0	18.0	0.0	0.0
LnGrp LOS	C	A	C	C	B		C	C		B	A	A
Approach Vol, veh/h		105			211	A		71	A		707	
Approach Delay, s/veh		21.2			23.6			22.8			18.0	
Approach LOS		C			C			C			B	

Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		9.4	11.0	11.6		18.9	9.9	12.8				
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0				
Max Green Setting (Gmax), s		23.0	16.0	22.0		39.0	7.0	31.0				
Max Q Clear Time (g_c+I1), s		3.4	6.0	3.7		11.3	3.0	3.7				
Green Ext Time (p_c), s		0.2	0.2	0.2		2.6	0.0	0.3				

Intersection Summary												
HCM 6th Ctrl Delay			19.7									
HCM 6th LOS			B									

Notes

User approved volume balancing among the lanes for turning movement.

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	57	219	399	25	15	129
Future Vol, veh/h	57	219	399	25	15	129
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	50
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	62	238	434	27	16	140

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	461	0	-	0	810	448
Stage 1	-	-	-	-	448	-
Stage 2	-	-	-	-	362	-
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	1100	-	-	-	349	611
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	704	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1100	-	-	-	326	611
Mov Cap-2 Maneuver	-	-	-	-	326	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	704	-

Approach	EB	WB	SB
HCM Control Delay, s	1.7	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1100	-	-	-	326	611
HCM Lane V/C Ratio	0.056	-	-	-	0.05	0.229
HCM Control Delay (s)	8.5	0	-	-	16.6	12.6
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.2	0.9

FEHR PEERS

Memorandum

Date: August 16, 2024

To: Barbara Kincaid, City of DuPont

From: Michael Adamson and Dan Grayuski, Fehr & Peers

Subject: Transportation Alternative 1 (No Action) Conditions

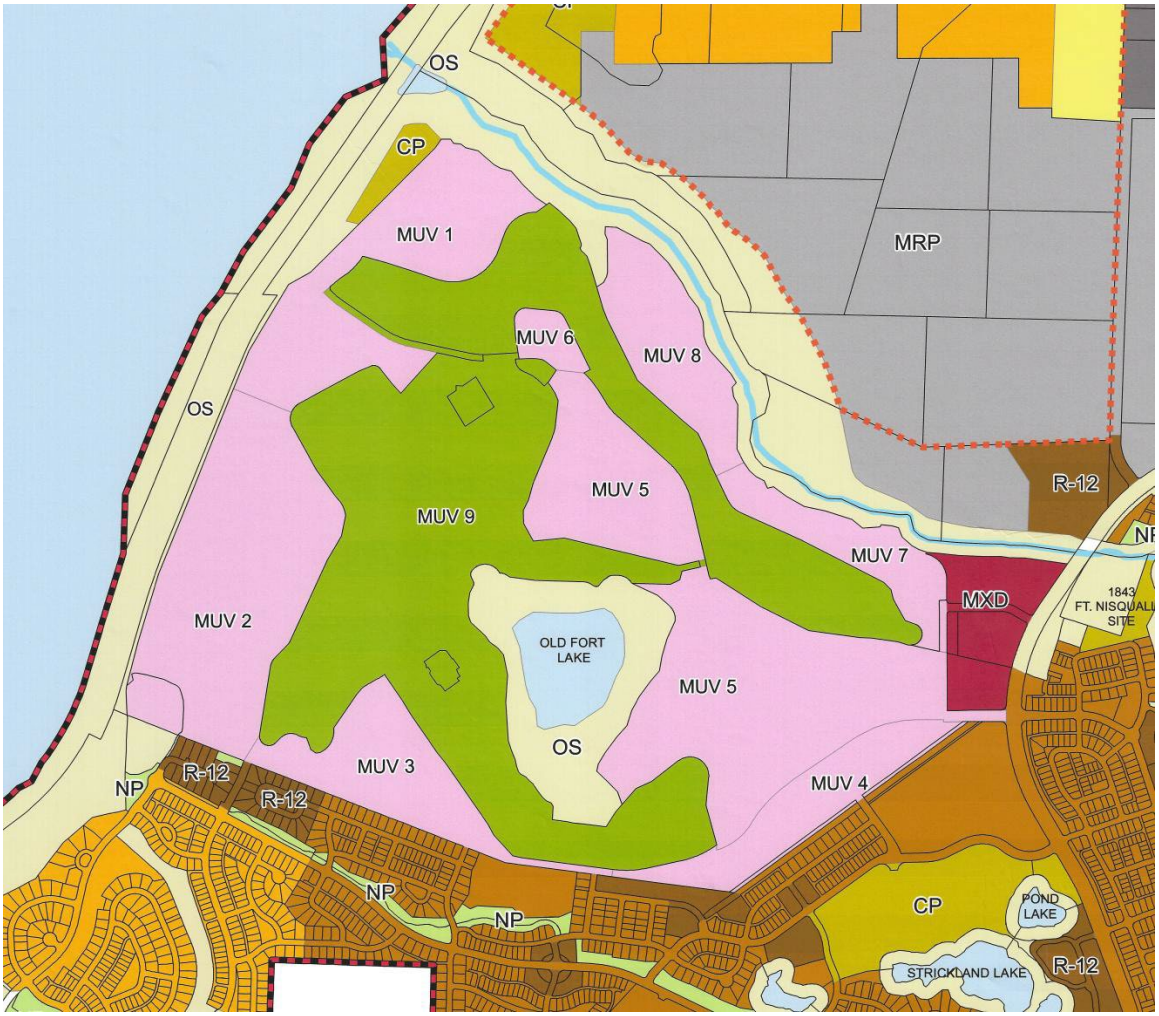
TC22-0061

The purpose of this memorandum is to summarize the Alternative 1 (No Action) alternative condition forecasts and baseline impacts on the transportation network due to growth and other pipeline developments. Per discussions with the City, the No Action Condition represents a proposed buildout of the Old Fort Lake Subarea based on a balance of adopted zoning and land use plans for the Subarea. The previously proposed Founders Ridge site is included in these assumed land use plans; this proposed development is currently being reevaluated, but consistent with discussions between the City and project team, it was decided that the previous uses for the Founders Ridge site are a conservative representation of land use within the Subarea. Summarized in this memorandum are the No Action Condition volumes, traffic operations under these assumptions, and a multimodal assessment of freight truck movements, active transportation, safety, and transit.

The zoning districts (referred to as mixed-use villages, or MUV's) within the Old Fort Lake Subarea are shown on **Figure 1**. Each of these zoning districts represents a combination of uses, as detailed in **Table 1**. A more complete breakdown of these uses is provided in **Attachment A**. It should be noted that the other uses represented in the No Action Condition are planned to be developed in MUV-1 through MUV-4, The previously proposed Founders Ridge site encompasses MUV-5 and MUV-6. MUV-7 and MUV-8 are owned by the Nisqually Tribe, and the future land uses are unknown. Under the No Action Condition, three accesses to the site are being considered:

- Civic Drive at Center Drive
- Palisade Drive at Center Drive
- Hoffman Hill Boulevard at McNeil Street

Figure 1. Old Fort Lake Subarea Zoning



Source: DESA *"Old Fort Lake Subarea Outside Founders Ridge – Cumulative Land Use Projection"*, March 7, 2023. Provided in **Attachment A**.

Table 1. Proposed Old Fort Lake Land Uses by Zoning District, No Action Condition

Use	ITE Code[1]	Unit[2]	Quantity by Zoning District(s)[3]					
			Total	MUV-1	MUV-2	MUV-3	MUV-4	MUV-5/6
No Action Condition, All Other Uses								
Single-Family Residences	210	Dwelling Units	**100**	32	49	19	0	-
Multifamily Residence (24 dwelling units per gross acre)	220	Dwelling Units	**1,000**	322	486	192	0	-
Service[3]	822	KSF	**70.8**	15.2	22.9	9.1	23.6	-
Retail Trade (individual tenant spaces up to 20,000 sf)	822	KSF	**70.7**	15.2	22.9	9.1	23.5	-
Restaurant / Drinking Establishments	932	KSF	**20**	0	10	0	10	-
Office/Research & Development	760	KSF	**1,602.7**	190.5	248.7	113.7	1,049.8	-
Hotel	310	Rooms	**90**	0	90	0	0	-
Founders Ridge, Previously Proposed Use								
Manufacturing	140	KSF	**578**	-	-	-	-	578
General Light Industrial	110	KSF	**145**	-	-	-	-	145

Notes:
1. ITE = Institute of Transportation Engineers
2. KSF = Thousand Square Feet
3. MUV-7 and MUV-8 are owned by the Nisqually Tribe, and future land use is unknown. As such, these zoning districts will not be assumed for this analysis. MUV-9 represents the existing golf course.
4. The "Service" use represents a variety of potential uses. To provide a conservatively high estimate of trip generation for this use, the ITE 822 "Strip Retail" rate was assumed, consistent with the "Retail Trade" use.

Source: David Sherrard and Associates, 2023

No Action Condition

This section summarizes how the roadway network around the Subarea would be utilized, including how pedestrians, bicyclists, and transit riders would access the Subarea under the No Action Condition.

Active Transportation Network

It is anticipated that the buildout of the Subarea under the No Action Condition would lead to increases in pedestrian and bicycle traffic, particularly connecting to retail, service and residential uses. The active transportation network facilities providing access to the Subarea are shown in **Figure 2**, and summarized below:

- **Accessing via Palisade Drive:** There is a shared-use path on Center Drive from the I-5 on- and off-ramps to Haskell Street. The path then converts to a sidewalk in the vicinity of the Subarea. The portion of Center Drive that is north/east of Palisade Drive has a sidewalk on the west side of the street. Pedestrians can access the Subarea from both directions using this facility.

  There are striped bike lanes throughout Center Drive. Bicyclists may use the shared use path on the west/southern portion of Center Drive but have to use the striped bike lanes once the path ends. In addition to these connections, the Yehle Village/Palisade Village Connector Trail provides an active mode connection between the project site and the neighborhoods southwest of the site.

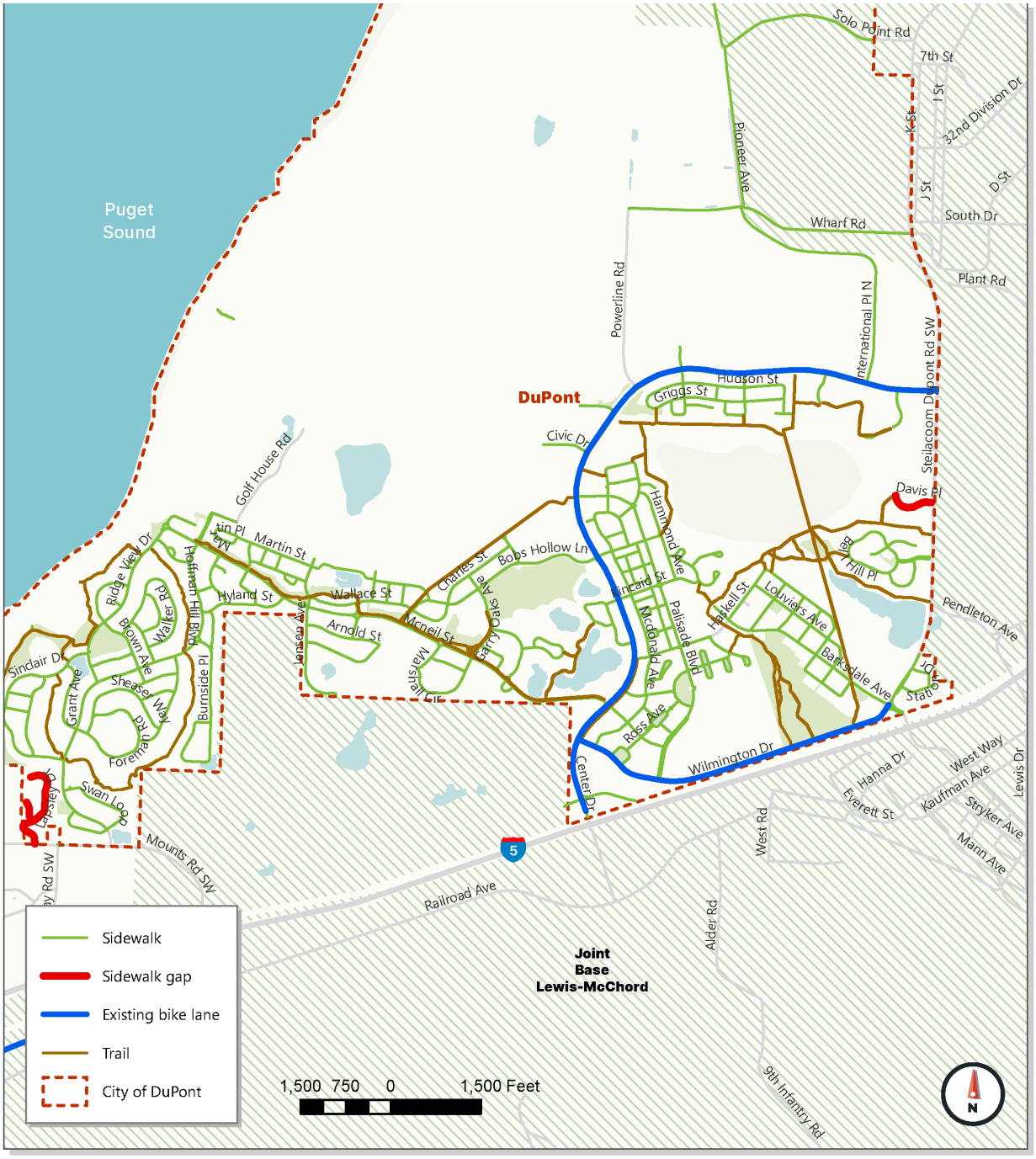
- **Accessing via Hoffman Hill Boulevard:** There is a shared use path on the north side of McNeil Street extending from Hoffman Hill Boulevard to Center Drive. Sidewalks exist on all residential and collector roadways along and around Hoffman Hill Boulevard, facilitating pedestrian access to the Subarea.

  The McNeil Street shared use path also serves as a bicycle connection to Hoffman Hill Boulevard. In addition to this, the low-speed nature of the residential roadways along and around Hoffman Hill Boulevard would facilitate access to the Subarea from surrounding neighborhoods via bicycle.

All study intersections have marked crosswalks and pedestrian countdown timers in the case of signalized intersections. However, the intersections at Palisade Boulevard, Civic Drive, and DuPont-Steilacoom Road are non-ADA compliant as they lack curb cuts or truncated domes, which pose a potential barrier for pedestrians accessing the project site.

Under the No Action Condition, pedestrian facility improvements, such as high visibility crosswalks, curb cuts, truncated domes, and pedestrian crossing signs could make accessing the Subarea more comfortable for travelers walking or biking to the Subarea.

Figure 2. Active Transportation Facilities



Source: Fehr and Peers, 2024.

Safety

The DuPont Local Road Safety Plan (LRSP) completed in March 2022 proposes a list of prioritized projects. While the LRSP does not state a definitive date or commitment for implementing these projects, they are considered as possible safety improvements under No Action Conditions:

1. Citywide reflective striping and signage treatment improvements at roundabouts
2. Citywide crosswalk striping and signage improvements
3. Citywide crosswalk improvements through Rectangular Rapid Flashing Beacons (RRFB's)[1]
4. Citywide lighting data collection

As traffic volumes are expected to increase under the No Action Conditions, so are the amount of conflicts between motorized and non-motorized road users. The stated projects are intended to improve traffic safety throughout the City, particularly for vulnerable groups such as pedestrians and bicyclists.

Transit Network

Currently the Subarea does not have any transit access. The DuPont Station is served by two peak period express routes (Sound Transit 592 and 594), having very limited service in the reverse commute direction. Because of this, they are likely not viable routes for those commuting to the Subarea via bus.

Under No Action Conditions, the City could consider the following options for improving transit connections to the Subarea:

- Coordinate with Pierce Transit to provide a limited-service fixed route bus service along Center Drive that connects DuPont Station to the rest of the City.
- Coordinate with Sound Transit to increase frequency of current routes.
- Coordinate with Pierce Transit, Sound Transit and/or Intercity Transit to provide additional routes connecting to the surrounding communities, such as the Joint Base Lewis-McChord (LBLM), Lakewood, and Lacey.
- Implement active mode improvements on Wilmington Drive, Palisade Drive and Center Drive that facilitate access to the DuPont Station.

Freight Network

Although buildout of the Subarea under the No Action Condition is not planned to result in additions or changes to the existing freight network within the City of DuPont, the previously planned uses for the Founders Ridge development would increase the proportion of freight traffic along the City transportation

[1] RRFBs are pedestrian-actuated enhancements used to improve pedestrian safety and visibility t uncontrolled, marked sidewalks. The device includes two rectangular-shaped yellow indications, each with an LED-array-based light source, that flash with high frequency when activated. (FHWA, June 2018)

network. This would occur mostly along DuPont Steilacoom Road and Center Drive between DuPont-Steilacoom Road and Palisade Boulevard.

Traffic Operations

Study Intersections

The No Action Condition analysis included eight existing study intersections throughout the City of DuPont that may be affected by proposed development land use changes in the Subarea. These study intersections were defined in scoping conversations with City staff. In addition to the eight existing study intersections, updates to the Barksdale Interchange will include the construction of an additional intersection north of the DuPont-Steilacoom Road and Barksdale Avenue intersection. This intersection will directly connect to the new interchange, absorbing any traffic that previously used DuPont-Steilacoom Road and Barksdale Avenue to access I-5. Buildout of the Subarea would also result in several new intersections internal to the Subarea; of these, 4 were included in the No Action Condition analysis.

The following intersections were studied under the No Action Condition (in **bold** are intersections only analyzed under the future alternatives):

1. Center Drive & Wilmington Drive
2. Center Drive & McNeil Street
3. Center Drive & Bob's Hollow Lane
4. Center Drive & Palisade Boulevard
5. Center Drive & Civic Drive
6. Center Drive & DuPont-Steilacoom Road
7. DuPont-Steilacoom Road/Wilmington Drive & Barksdale Avenue
8. Bobs Hollow Lane & McNeil Street
9. Hoffman Hill Boulevard & McNeil Street
10. **I-5 Interchange & DuPont-Steilacoom Road**
101. **OFL Civic Drive Connection & Civic Drive**
102. **OFL East-West Road & OFL Civic Drive Connection**
103. **OFL East-West Road & OFL North-South Road**
104. **Hoffman Hill Blvd & OFL East-West Road**

The traffic controls for intersections 10 through 13 have not been defined, as these are planned intersections that will facilitate internal circulation within the Subarea. For the purposes of this analysis, side-street stop-control (SSSC) was assumed at these locations. The Manual on Uniform Traffic Control Devices (MUTCD) signal warrants were used to determine the need for signalization at intersections with qualifying traffic volumes and delay. Intersections with SSSC were also tested as roundabouts, to reduce side-street delay and provide traffic calming benefits.

Passenger Vehicle Trips

Trip Generation

The trip generation calculations for the No Action Condition are based on the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition (2021). As stated in **Table 1**, the trip calculations for the No Action Condition are a combination of the following two land use sets (with the corresponding zoning districts from **Figure 1** given in parentheses):

- Land use assumptions previously prepared for the Founders Ridge Proposed Use Build Alternative (MUV-5, MUV-6)
- Land use assumptions provided by DESA on March 7th for all remaining non-tribal zoning districts (MUV-1, MUV-2, MUV-3, MUV-4).[2]

Trip generation was assessed separately for these two land use sets. This is because trip distribution for the Founders Ridge development is anticipated to differ from the No Action Condition trip distribution. Trips generated by the previously proposed Founders Ridge development are summarized in **Table 2**.

Because of the mixed-use nature of the remaining uses within the Subarea, it is anticipated that some trip internalization would occur, thus reducing overall vehicle trips generated. To identify this internalization, Fehr & Peers' MXD+ tool was used. This tool accounts for planned uses, size of the planned area, surrounding land uses and transportation infrastructure to determine reductions in trip generation related to internalization, ped/bike infrastructure and transit usage. A breakdown of the methodology and assumptions for MXD+ is provided in **Attachment B**.

Using this tool, it was determined that there would likely be an internalization of at least 5% for Subarea trips generated under both daily and AM/PM peak hour conditions. This rate was assumed for the No Action Condition remaining uses. Trips generated by the remaining uses under the No Action Condition are provided in **Table 3**, including both internalized trips within the Subarea and trips entering or exiting the Subarea. These trips were added to the 2040 Baseline traffic volumes (developed in previous analyses) to determine No Action Condition traffic volumes along the roadway network. The process for developing the 2040 Baseline traffic volumes is provided in **Attachment C**.

[2] MUV-7 and MUV-8 are owned by the Nisqually Tribe, and future land use is unknown. As such, these zoning districts will not be assumed for this analysis. MUV-9 represents the existing golf course.

Table 2. Trip Generation Rates for Founders Ridge Proposed Use

Planned Use	ITE Land Use Code	Units	Daily	AM Peak-Hour Trips			PM Peak-Hour Trips		
				In	Out	Total	In	Out	Total
Manufacturing	140	578 KSF	2746	299	94	393	133	295	428
General Light Industrial	110	145 KSF	706	94	13	107	13	81	94
Total Trips			3,452	393	107	500	146	376	522
Truck Trips			*-296*	*-11*	*-8*	*-20*	*-8*	*-11*	*-19*
Vehicle Trips[1]			**3,156**	**381**	**99**	**480**	**138**	**365**	**503**

Notes:

1. This total reflects passenger vehicles only. Truck trips were subtracted from the total and analyzed in the Truck Project Trips section of this report.

Source: ITE *Trip Generation Manual*, 11th Edition; Fehr & Peers, 2024.

Table 3. Trip Generation Rates for Remaining Uses, No Action Condition

Planned Use	ITE Land Use Code	Units	Daily	AM Peak-Hour Trips			PM Peak-Hour Trips		
				In	Out	Total	In	Out	Total
Single-Family Residences	210	100 Units	943	18	53	71	59	35	94
Multifamily Residence (24 dwelling units per gross acre)	220	1000 Units	6,740	96	30	400	321	189	510
Service[1]	822	70.8 KSF	3,855	100	67	167	233	233	466
Retail Trade (individual tenant spaces up to 20,000 sf)	822	70.7 KSF	3,850	100	67	167	232	233	465
Restaurant / Drinking Establishments	932	20 KSF	2,144	105	86	191	110	71	181
Office/Research & Development	760	1602.7 KSF	17,758	1,354	297	1,651	251	1,319	1,571
Hotel	310	90 Rooms	719	23	18	41	27	26	53
Total Generated Trips			**36,009**	**1,796**	**892**	**2,689**	**1,234**	**2,106**	**3,340**
Internalized Trips			**1,801**	**90**	**46**	**137**	**61**	**106**	**167**
External Trips		Total	34,208	1,706	846	2,552	1,173	2000	3,173
		Truck Trips	*-11*	*-0*	*-1*	*-1*	*-0*	*-0*	*-0*
		Vehicle Trips[2]	**34,197**	**1,706**	**846**	**2,551**	**1,173**	**2,000**	**3,173**

Notes:

1. The "Service" use represents a variety of potential uses. To provide a conservatively high estimate of trip generation for this use, the ITE 822 "Strip Retail" rate was used, consistent with the "Retail Trade" use.
2. This external trips total reflects vehicles only. Truck trips were subtracted from the total and analyzed in the Truck Project Trips section of this report. It was assumed that internalized truck trips would be negligible.

Source: ITE *Trip Generation Manual*, 11th Edition; Fehr & Peers, 2024.

Trip Distribution

To develop a trip distribution for project-generated trips that mirrors local and regional travel trends, Fehr & Peers determined likely travel paths between major activity centers and the proposed land uses. The trip distribution for the Founders Ridge Proposed Use Build Alternative is shown on **Figure 3**. This was used to distribute Founders Ridge trips.

The trip distribution for the remaining uses under the No Action Condition is shown on **Figure 4**, including a sketch of potential roadways that will be constructed as part of buildout of the subarea. To facilitate interpretation of trip routing, three sets of percentages are provided within this figure:

- **Regional Distribution:** The percentage breakdown of trips based on their origin/destination, as follows:
    - 25% to/from internal to the City of DuPont
    - 5% to/from the North via DuPont-Steilacoom Road
    - 40% to/from the southwest via I-5
    - 30% to/from the northeast via I-5
- **Site Access Distribution:** The percentage breakdown of trips accessing at each major access point to the Subarea:
    - 80% accessing via Palisade Boulevard
    - 20% accessing via Hoffman Hill Boulevard
- **Internal Distribution:** The routing of external trips within the Subarea itself:[3]
    - 10% routing to MUV-1 and MUV-2 via Hoffman Hill Boulevard
    - 10% routing to MUV-3 and MUV-4 via Hoffman Hill Boulevard
    - 15% routing to MUV-1 via Palisade Boulevard
    - 65% routing to MUV-2, MUV-3 and MUV-4 via Palisade Boulevard

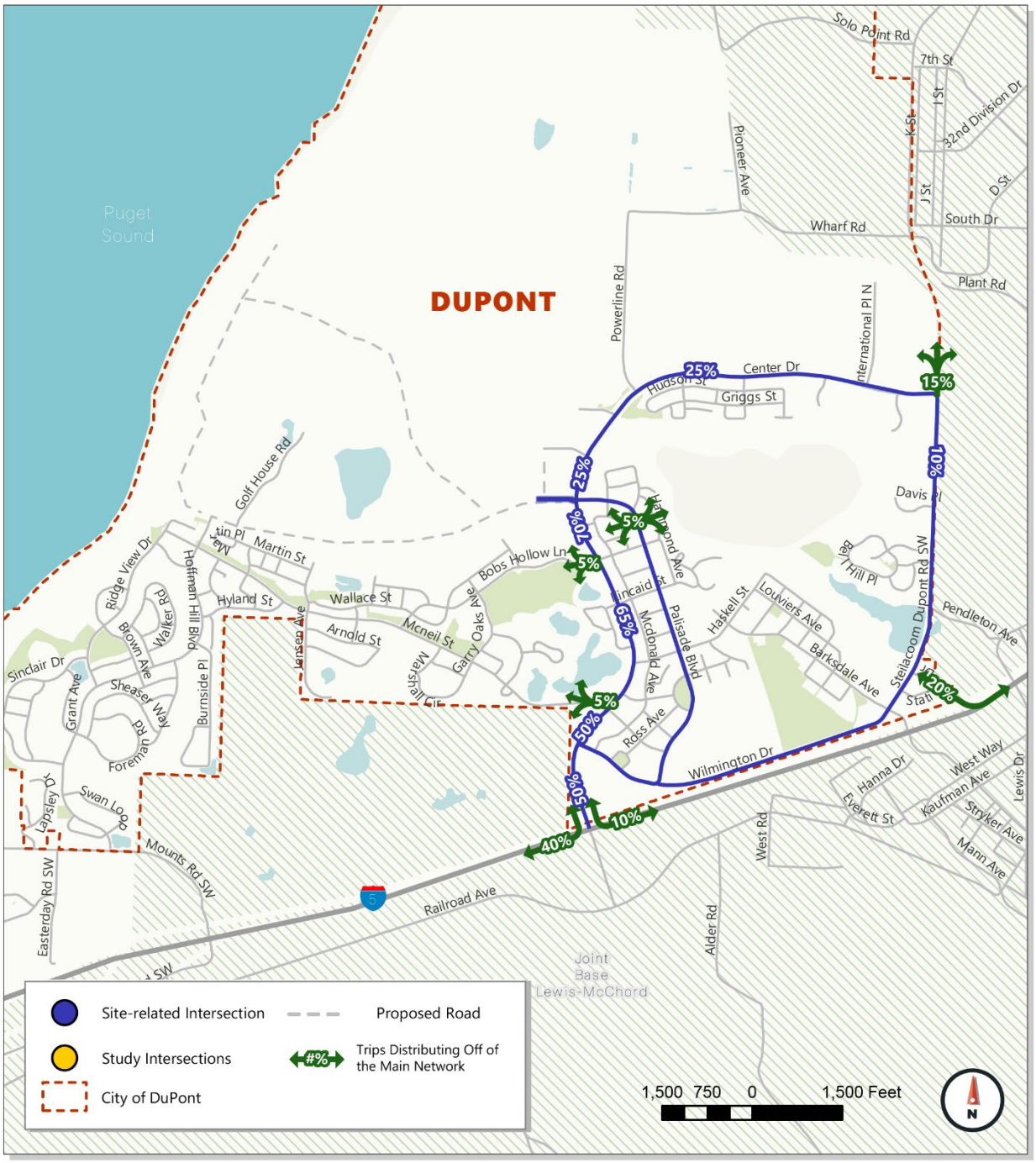
Figure 4 also shows the proportion of trips routed along each segment of the roadway network, including along the roadway network internal to the subarea. Based on these trip distributions, trips were assigned to the roadway network. **Figure 5** shows the trip assignment for the Founders Ridge Proposed Use, while **Figure 6** shows the trip assignment for trips to/from external to the Subarea and **Figure 7** shows the assignment for trips internalized to the Subarea for all remaining uses.[4] These three assignments were combined with the Baseline forecast, with the final No Action Condition forecast shown in **Figure 8**. Note that the traffic controls for study intersections 10-13 represented in these figures are for a base minimum, unimproved case. Subsequent sections provide recommendations on intersection controls and geometry for these Subarea-specific intersections.

[3] Refer to **Attachment A** for the land uses broken out by zoning district.
[4] Intersections 11 and 12 are the only internal study intersections that would facilitate internalized traffic, and as such are the only intersections in **Figure 7** that show volume.

Of vehicle trips generated, the following are expected to use each of the two I-5 interchanges serving DuPont:

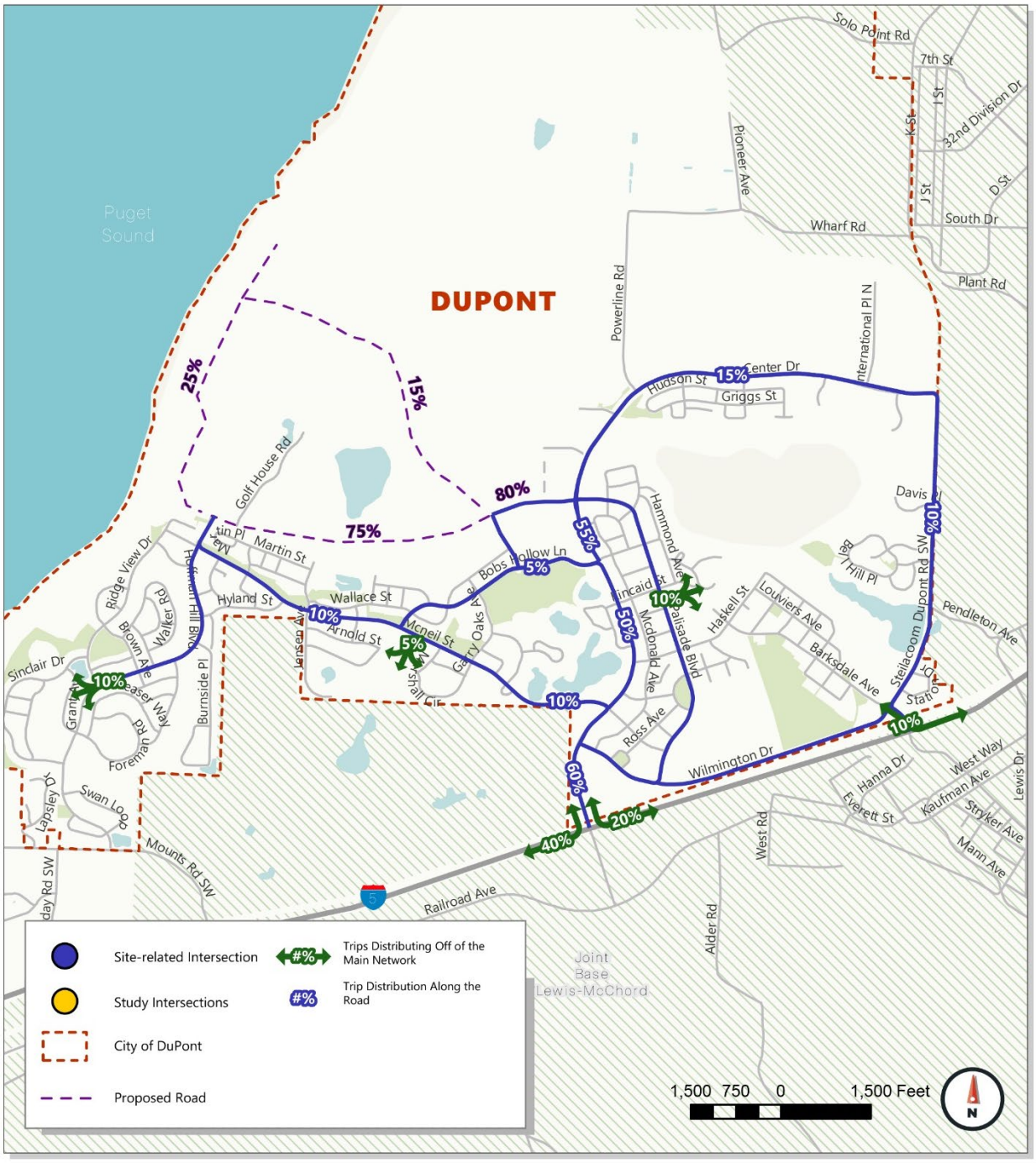
- Center Drive Interchange:
    - AM Peak: 1,812 total vehicle trips, with 563 entering the freeway and 1,249 exiting
    - PM Peak: 2,196 total vehicle trips, with 1,413 entering the freeway and 783 exiting
- Dupont-Steilacoom Road Interchange:
    - AM Peak: 329 total vehicle trips, with 105 entering the freeway and 224 exiting
    - PM Peak: 395 total vehicle trips, with 253 entering the freeway and 142 exiting

Figure 3. Trip Distribution for Founders Ridge Proposed Use



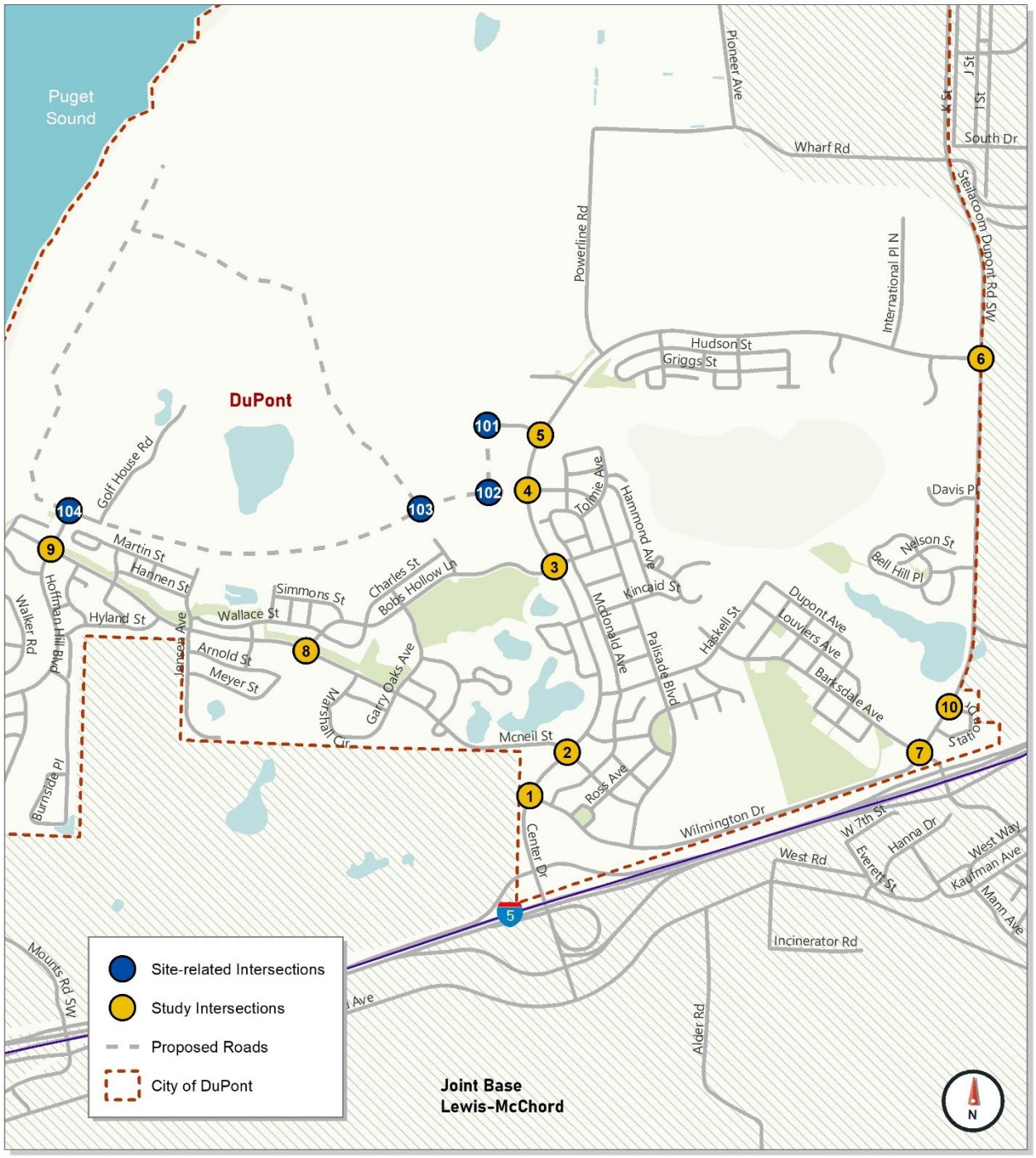
Source: Fehr and Peers, 2024

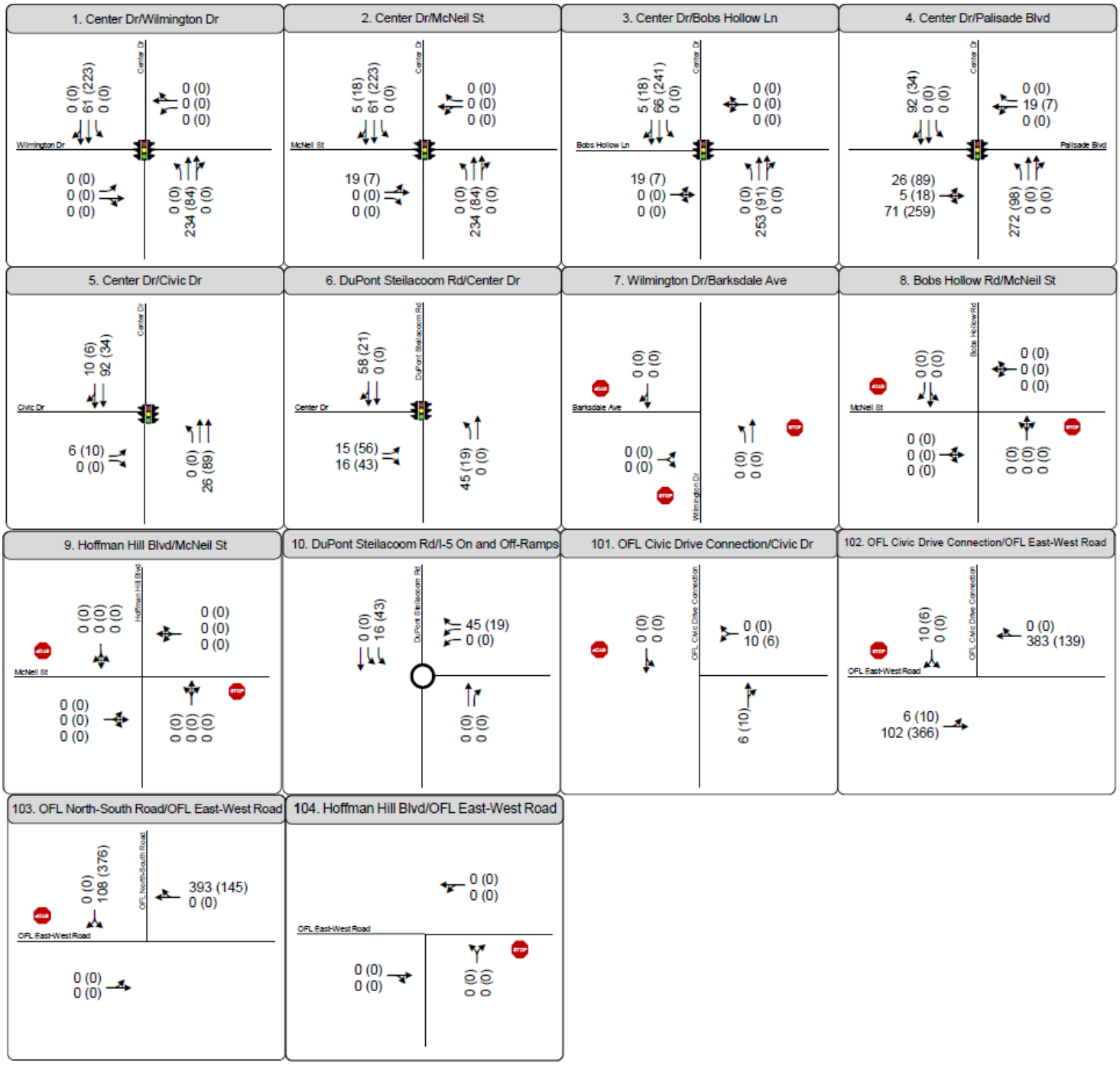
Figure 4. Trip Distribution for Remaining Uses of No Action Condition



Source: Fehr and Peers, 2024

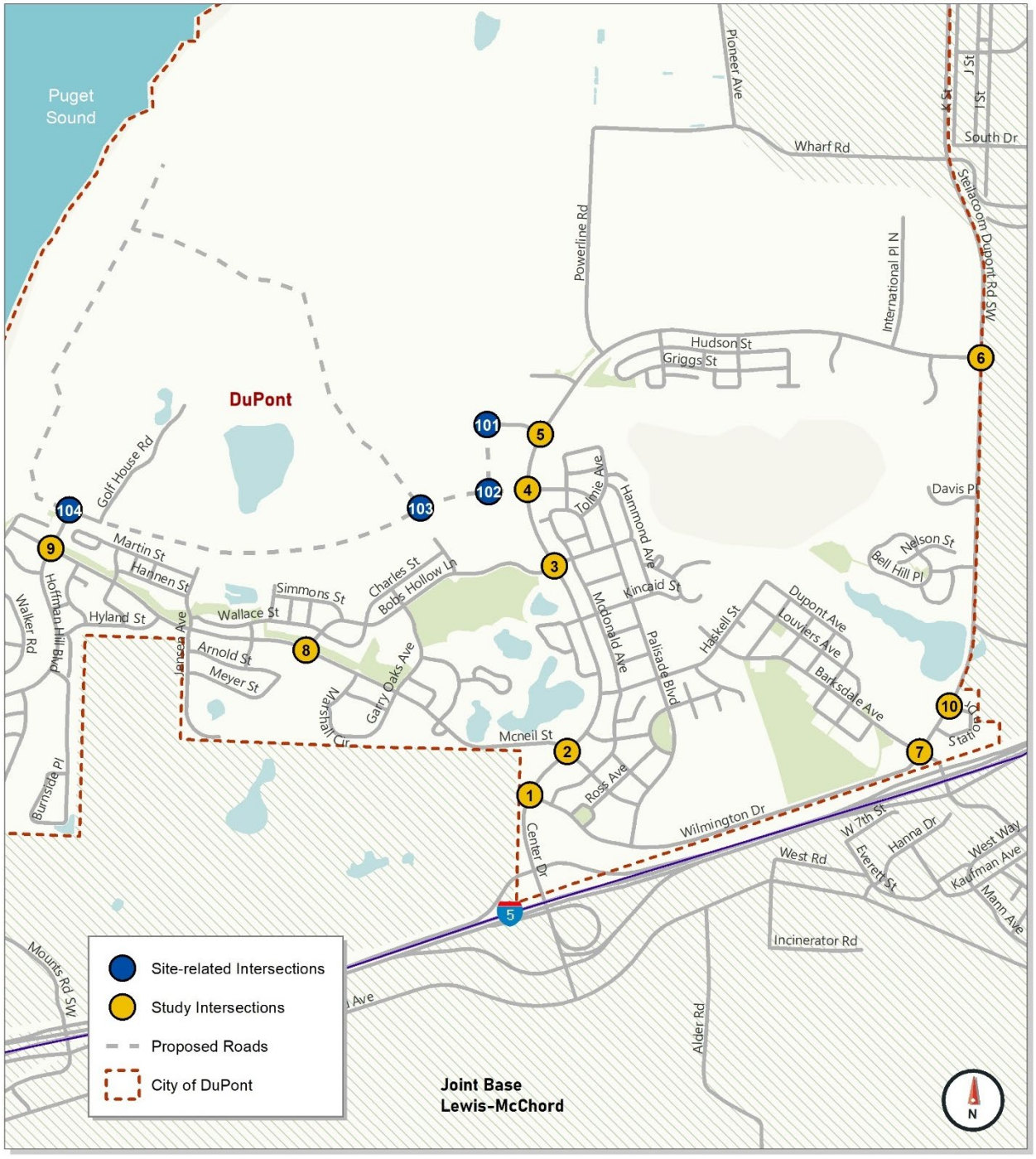
Figure 5. Trip Assignment for Founders Ridge Proposed Use

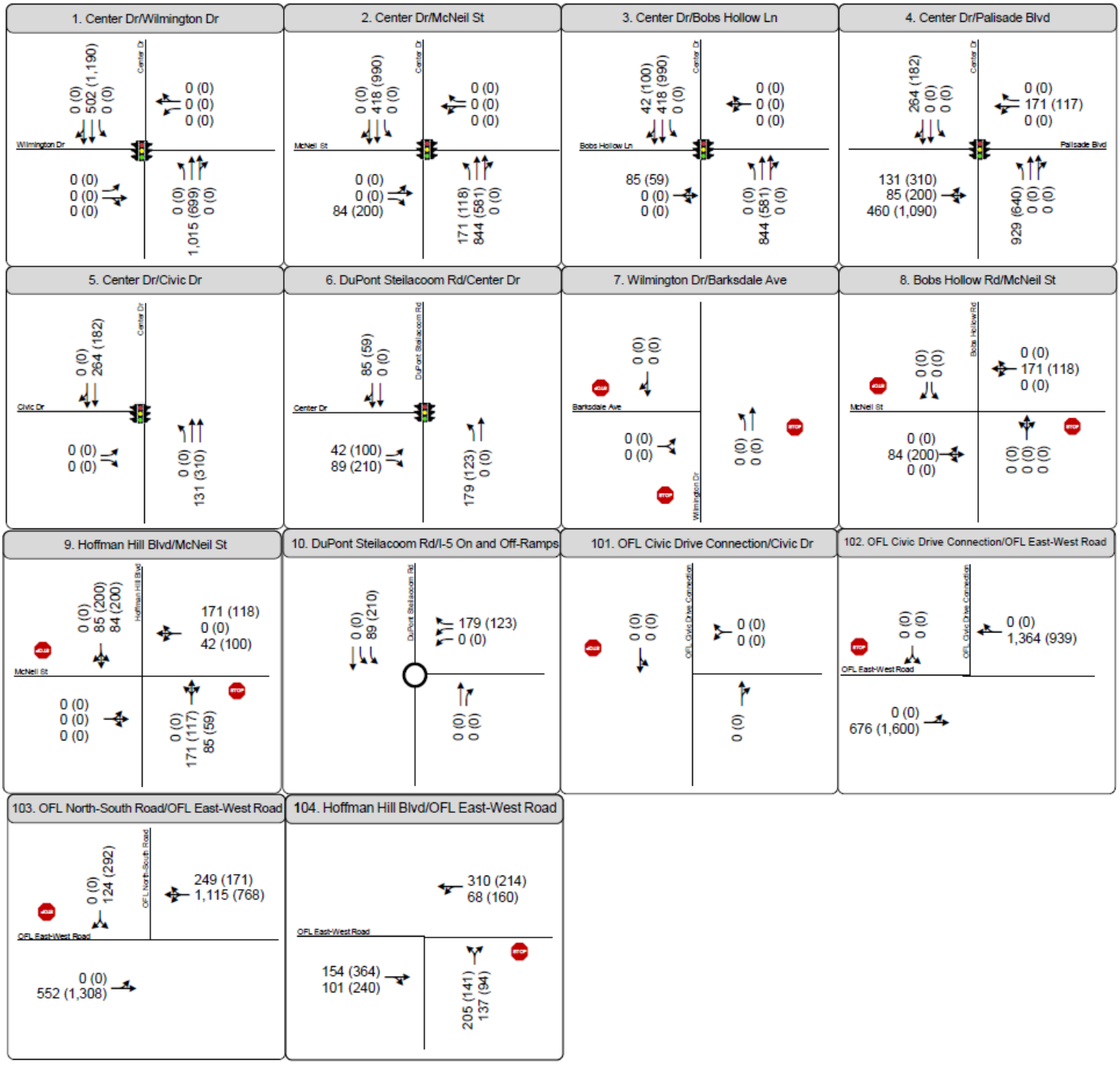




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

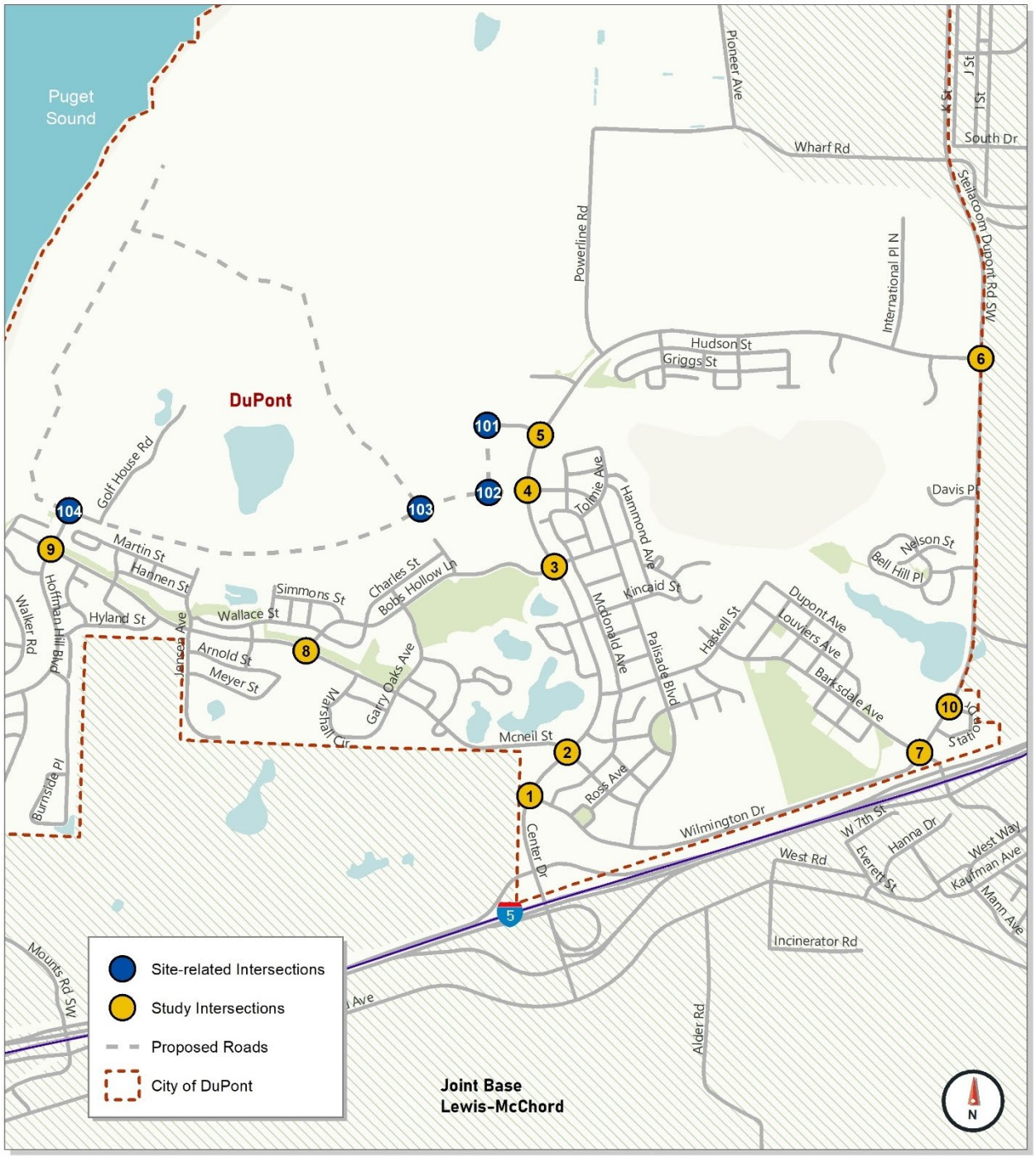
Figure 6. Trip Assignment for Entering/Exiting Trips Accessing Remaining Uses Under No Action Condition

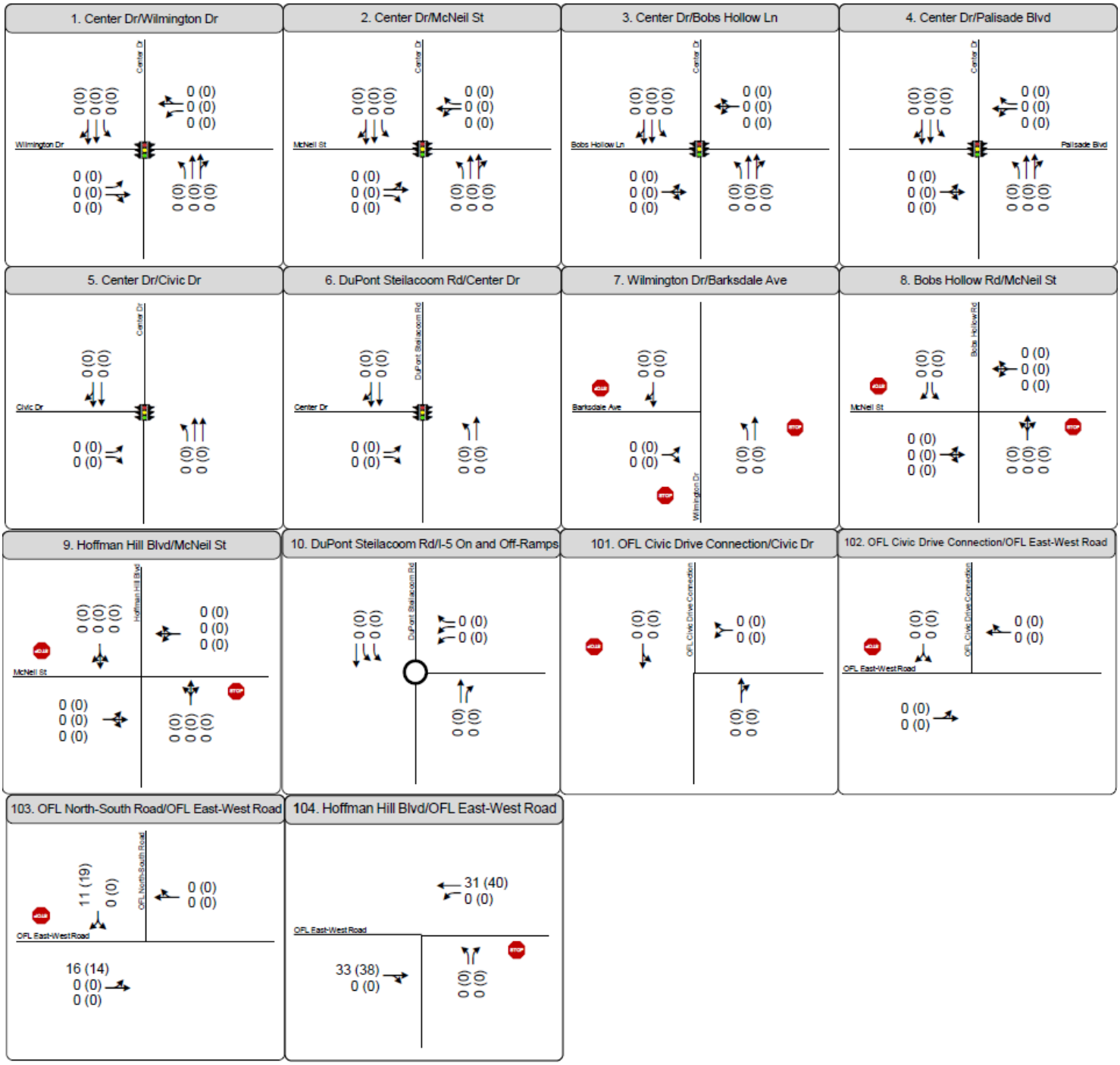




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

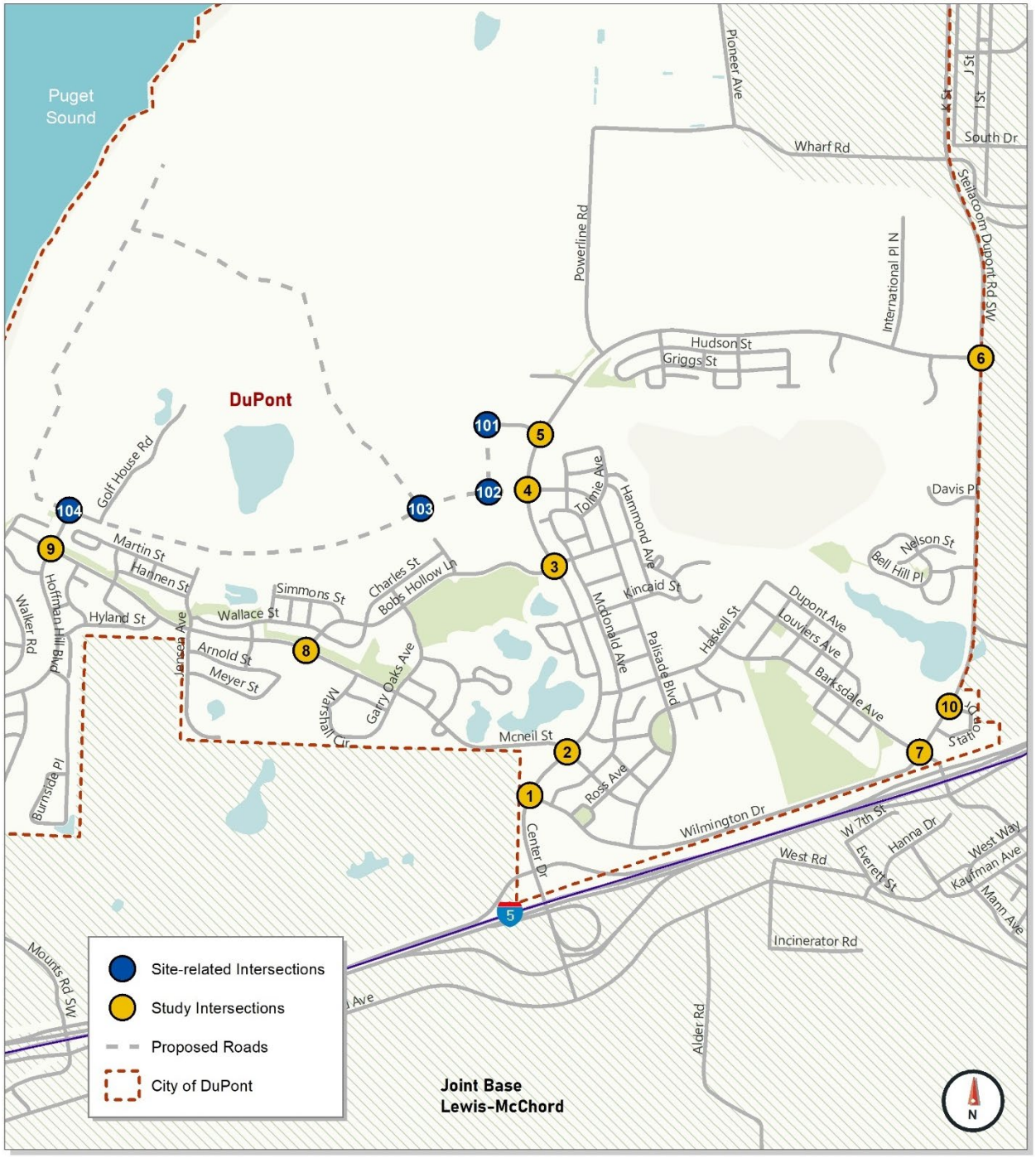
Figure 7. Trip Assignment for Internalized Trips within the Subarea

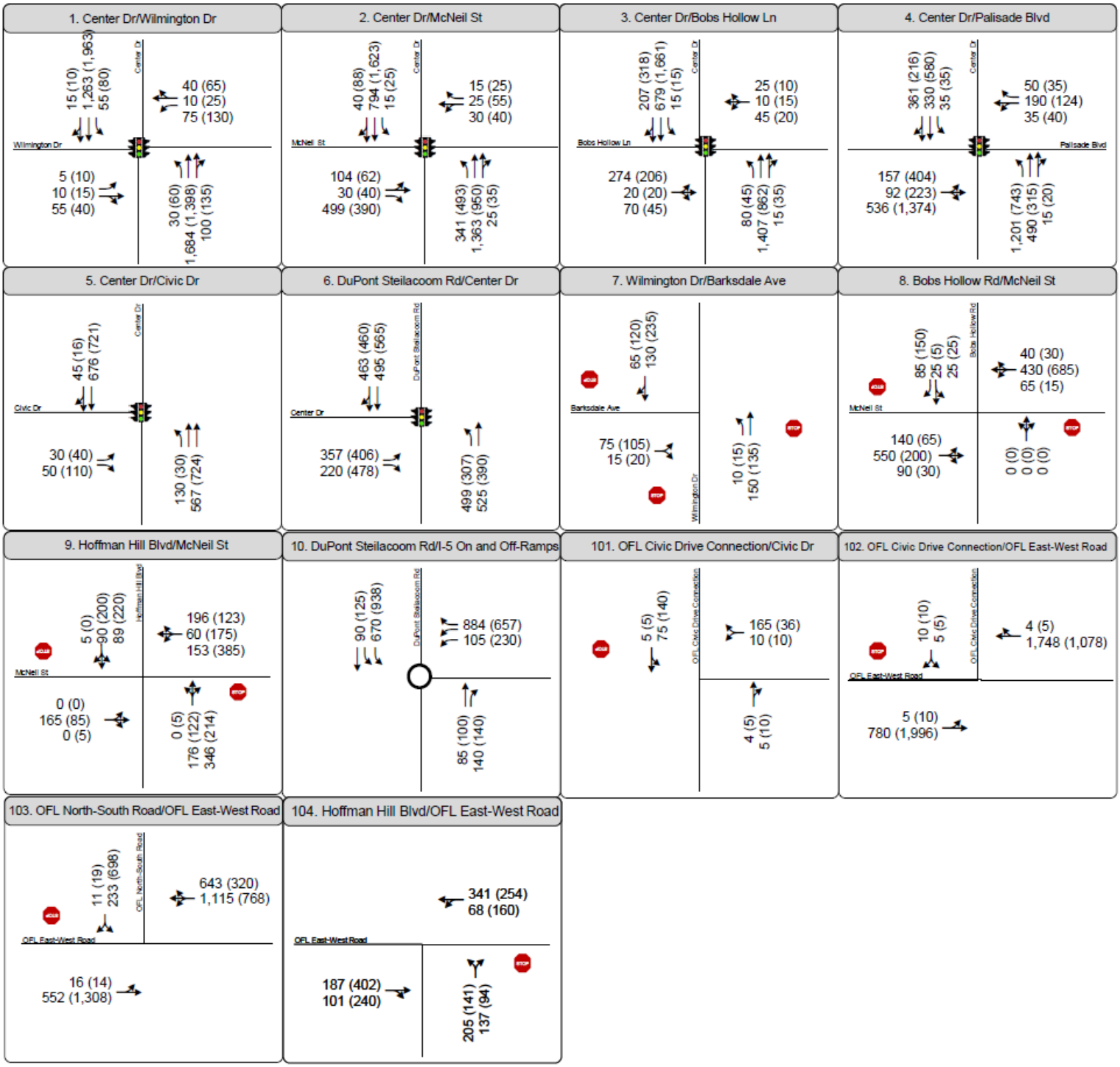




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

Figure 8. Forecasted Traffic Volumes for the AM and PM Peak Hours Under No Action Condition





Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

Truck Project Trips

Truck Trip Generation

During Construction

One particular factor that would need to be addressed both during construction and after completion of the Subarea is the proximity of the proposed roadway network (and the construction/freight trucks using it) to Pioneer Middle School. Contractors would need to consider this proximity during construction to ensure safety concerns are addressed, and appropriate signage and/or barriers should be considered along the new roadway network.

If it isn't possible to quantify phasing and intensity during construction, it is anticipated that focusing on implementing measures for construction activities to mitigate any potential impacts would address truck trip generation during construction. There are several measures to mitigate any potential impacts due to truck trip generation during and post-construction of the No Action Condition. Examples of these mitigations include:

- All construction activity parking (workers vehicles and trucks hauling materials) must be provided on-site (off-street)
- Construction access would be limited during the AM and PM peak hours
- Trucks must only access the constructions areas via defined routes (as established by DuPont Municipal Code)
- Flaggers must be present to facilitate movement of construction traffic on public street access points
- Construction measures and signage should minimize interference/obstruction of pedestrian, bicycle or transit trip-making
- Heightened awareness of the adjacent middle school, ensuring adequate safety measures regarding school-related activities

Post-Construction

On review of the ITE *Trip Generation Manual*, 11th Edition truck trip generation appendices, the post-construction truck trip generation of all land uses under the No Action Condition (other than the previously proposed Founders Ridge development) would be negligible during the AM and PM peak hours, with the exception of the restaurant uses. As such, the Founders Ridge truck trip generation would represent the majority of truck trip generation under the No Action Condition, with a small number of additional truck trips related to restaurant uses. Truck trip generation rates and volumes under the No Action Condition are presented in **Table 4**.

Table 4. Truck Trip Generation for No Action Condition

Planned Use	ITE Land Use Code	Units	Daily	AM Peak-Hour Trips			PM Peak-Hour Trips		
				In	Out	Total	In	Out	Total
Founders Ridge Development									
Manufacturing	140	578 KSF	260	11	8	19	7	10	17
General Light Industrial	110	145 KSF	36	1	0	1	1	1	2
Other Uses within No Action Condition									
Restaurant/Drinking Establishments	932	20 KSF	11	0	1	1	0	0	0
New Truck Trips			**307**	**12**	**9**	**21**	**8**	**11**	**19**

Source: ITE *Trip Generation Manual*, 11th Edition; Fehr & Peers, 2024.

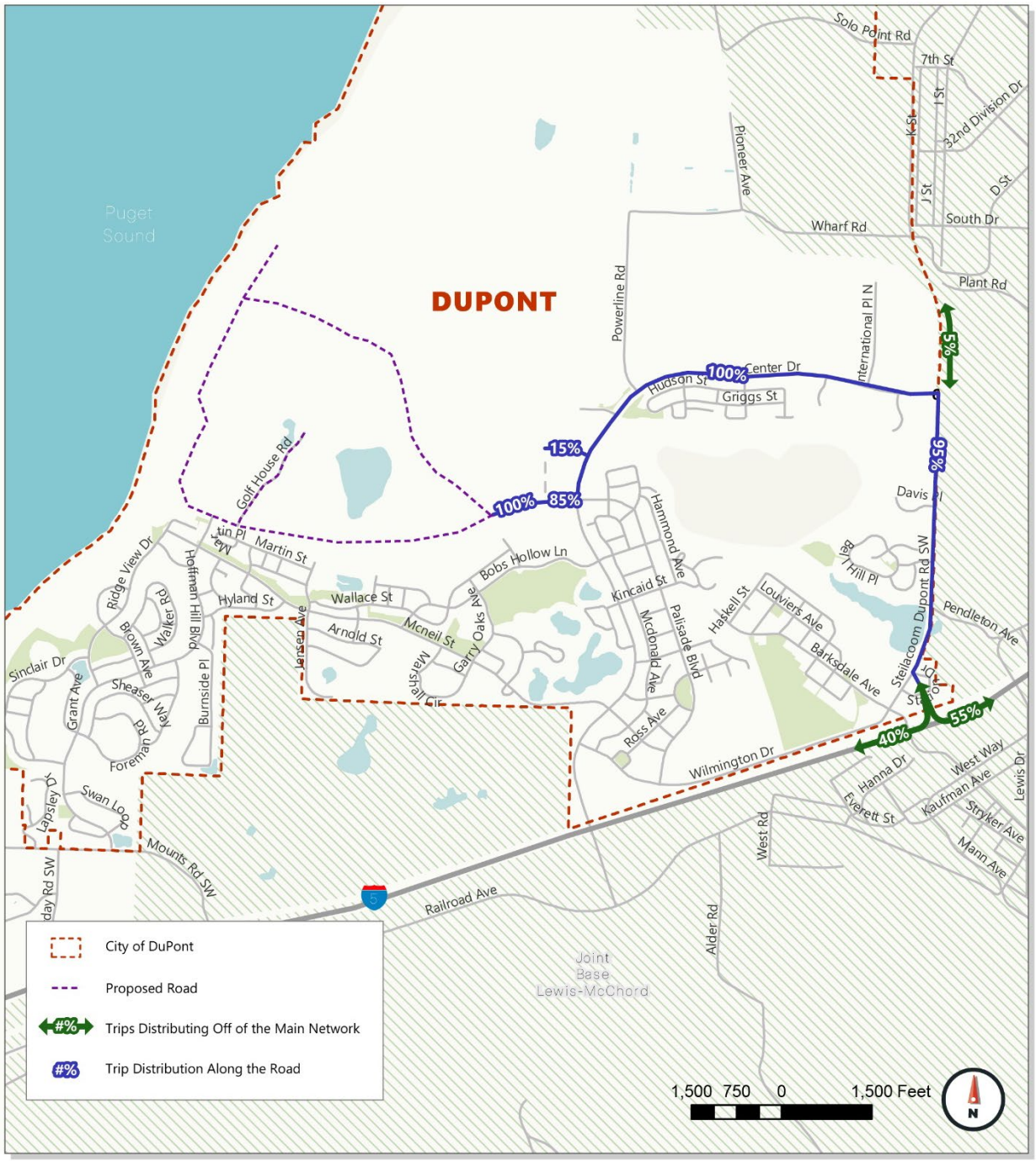
Truck Trip Distribution

The Puget Sound Regional Council (PSRC) model was used to inform the truck trip distribution. This distribution remains relatively consistent with the assumptions in the 2021 TIA, with the exception of trips distributing north along DuPont-Steilacoom Road; under the updated distribution, it is assumed that more of these trips would route north via I-5 instead. The proposed truck trip distribution is shown on **Figure 9**, including a breakdown of anticipated distribution of trucks between Center Drive and Palisade Boulevard, the two main accesses to the Founders Ridge site area. The truck trip assignment is based on this distribution is provided in **Figure 10**.

Of truck trips generated, the following are expected to use the new DuPont-Steilacoom Road Interchange:

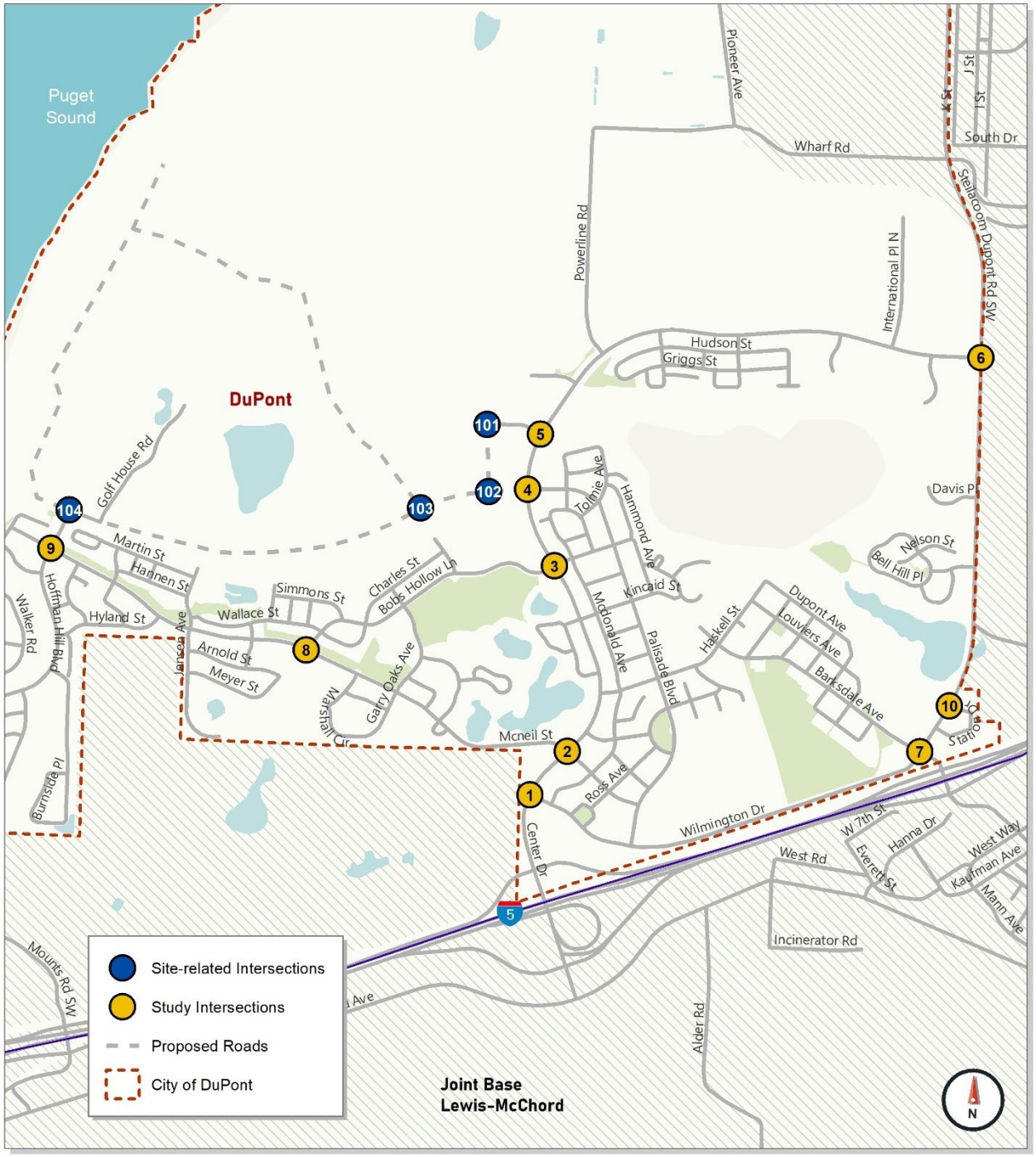
- AM Peak – 20 total truck trips, with 9 entering the freeway and 11 exiting
- PM Peak – 18 total truck trips, with 10 entering the freeway and 8 exiting

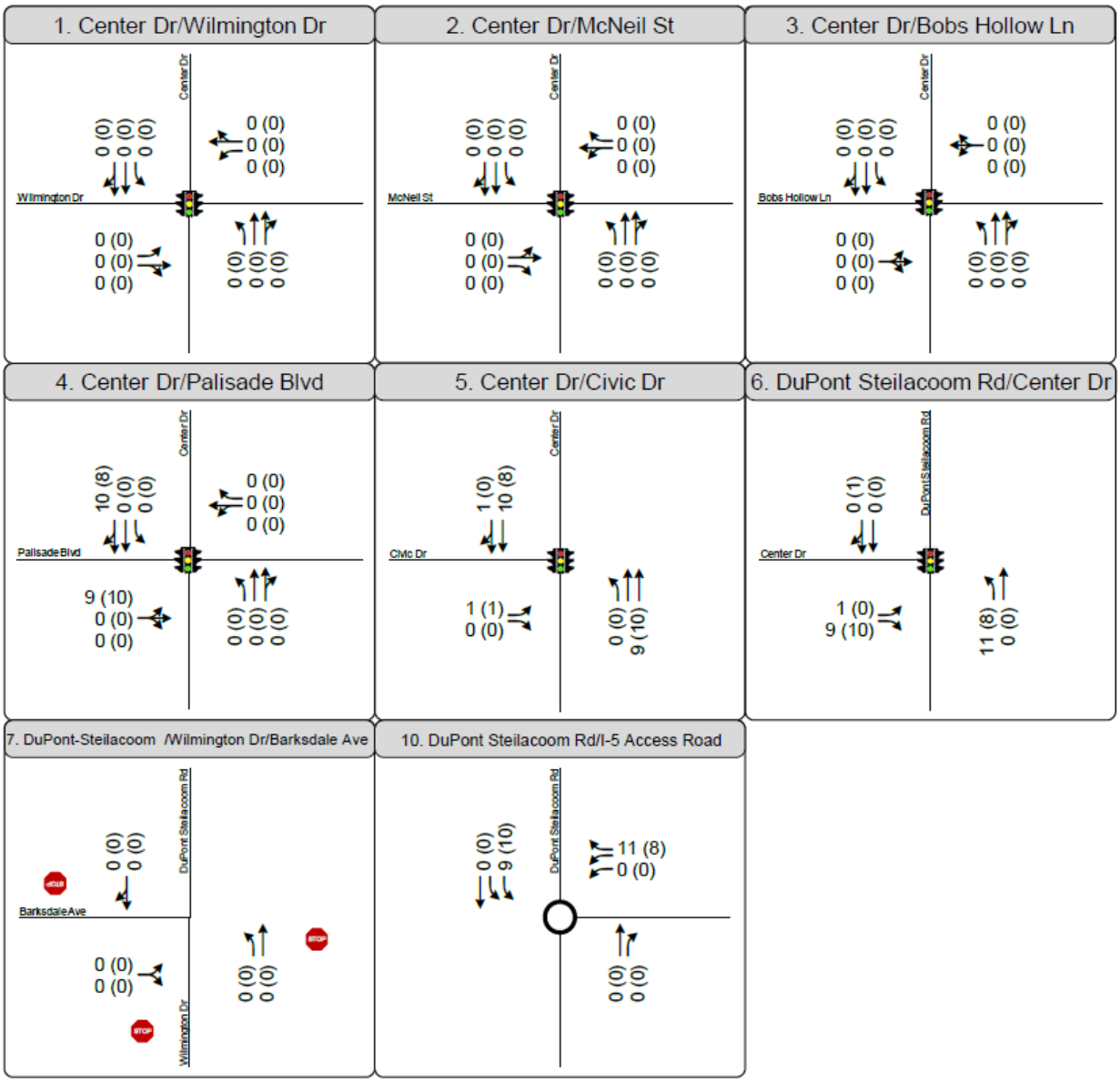
Figure 9. Truck Trip Distribution for No Action Condition



Source: Fehr and Peers, 2024

Figure 10. Truck Trip Assignment for No Action Condition





Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

Intersection Level of Service

LOS Methodology

Level of Service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst.

Table 5 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections. The *Highway Capacity Manual 6th Edition (HCM 6)* methodology was used in this study to remain consistent with "state of the practice" professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For side-street stop-controlled intersections, the LOS is provided for the worst performing movement. Synchro Traffic Analysis Software, 11th Edition, was used to perform the calculations. In any instances where a roundabout control was planned or proposed, SIDRA 9 Traffic Analysis Software was used to estimate roundabout conditions[5].

The City currently has an LOS D standard. There are exceptions to the standard outlined in the 2015 Comprehensive Plan. Exceptions can be approved through a variance to the Public Works Standards.

[5] Fehr & Peers analyzed all roundabouts consistent with the WSDOT SIDRA Policy Settings: https://wsdot.wa.gov/sites/default/files/2021-03/TrafficOps-WSDOTSidraPolicyAndSettings.pdf

Table 5. Level of Service Descriptions

LOS	Description	Signalized Intersections Avg. Delay (sec/veh)[1]	Unsignalized Intersections Avg. Delay (sec/veh)[2]
A	*Free Flow / Insignificant Delay* Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.	< 10.0	< 10.0
B	*Stable Operations / Minimum Delays* Good progression. The presence of other users in the traffic stream becomes noticeable.	> 10.0 to 20.0	> 10.0 to 15.0
C	*Stable Operations / Acceptable Delays* Fair progression. The operation of individual users is affected by interactions with others in the traffic stream	> 20.0 to 35.0	> 15.0 to 25.0
D	*Approaching Unstable Flows / Tolerable Delays* Marginal progression. Operating conditions are noticeably more constrained.	> 35.0 to 55.0	> 25.0 to 35.0
E	*Unstable Operations / Significant Delays Can Occur* Poor progression. Operating conditions are at or near capacity.	> 55.0 to 80.0	> 35.0 to 50.0
F	*Forced, Unpredictable Flows / Excessive Delays* Unacceptable progression with forced or breakdown of operating conditions.	> 80.0	> 50.0

1. Overall intersection LOS and average delay (seconds/vehicle) for all approaches.
2. Worst movement LOS and delay (seconds/vehicle) only.

Source: Fehr & Peers, based on *Highway Capacity Manual 6th Edition*.

Traffic Analysis Results

To provide recommendations on appropriate mitigations under the full buildout of the Subarea, the following Synchro models were developed:

- **No Action Condition Unimproved:** This Synchro model assumes No Action intersection controls and geometry for existing study intersections. For study intersections 9 to 12 (those internal to the Subarea) this Synchro model assumes side-street stop-control to provide a starting point for identifying improvements. Likewise, for roadway segments internal to the Subarea, a basic 2-lane cross-section was assumed. The purpose of this Synchro model was to identify improvements to the Subarea roadway network needed based on projected peak hour volumes and intersection operations. This includes improvements needed at the accesses to the Subarea (the intersections of Center Drive & Civic Drive, Center Drive & Palisade Boulevard, and Hoffman Hill Boulevard & Internal East-West Roadway).
- **No Action Condition with Improvements:** This Synchro model incorporates improvements identified in the No Action Condition Unimproved model to calculate final projected LOS under

the No Action Condition, assuming all improvements are constructed as part of buildout of the Subarea.

Table 6 contains the No Action Condition LOS and delay for each of the study intersections for both AM and PM peak hours. **Attachment D** provides detailed LOS calculation results for all study intersections, including detailed queuing reports. The following subsection identifies recommended improvements to bring these intersections to operate at acceptable levels of delay, in addition to providing adequate segment capacity for projected traffic within the Subarea.

Anticipated Impacts

Under the No Action Condition Unimproved model, all study intersections would operate within the City LOS standards with the exception of the Center Drive & McNeil Street and Center Drive & Palisade Boulevard intersections in the PM peak hour. Queuing impacts include:

- The 95th percentile queuing for the northbound left at Center Drive & McNeil Street and Center Drive & Palisade Boulevard is anticipated to exceed available storage capacity during the PM peak hour.
- The 95th percentile queueing for the northbound left-turn of the intersection of DuPont-Steilacoom Road & Center Drive is anticipated to exceed available storage capacity during the AM peak hour.[6]

Of planned intersections internal to the Subarea, it is anticipated that the Intersections 10-12 would exceed the city's LOS and delay standards for basic side-street stop control configurations.

Keeping Hoffman Hill Boulevard open as a full access to the Subarea would lead to increased traffic along McNeil Street. The City has flagged this roadway as a particularly important connection for residents living in western DuPont, and has set priorities to limit total demand on the roadway. Approximately 10% of No Action Condition trips generated by non-Founders Ridge uses are anticipated to route to/from Hoffman Hill Boulevard via McNeil Street (approximately 3,400 daily trips, 260 AM peak trips and 320 PM peak trips). These trips would largely be comprised of commute trips from residents living in the housing planned in MUV-1, MUV-2 and MUV-3. This would represent a sizable increase in trips on McNeil Street. However, it is anticipated that it would be necessary to keep Hoffman Hill Boulevard open as a full access to the Subarea in order to facilitate access to local residents living to the south of the Subarea, in addition to drawing trips away from the more heavily utilized Palisade Boulevard access.

[6] See **Attachment D** for detailed queueing reports for each signalized intersection.

Recommended Network Improvements For No Action Condition

Based on the No Action Condition Unimproved model, the following improvements are recommended for both study intersections and segments internal to the Subarea. These improvements address LOS and 95th percentile queuing impacts identified under the traffic analyses:

Study Intersections

- **Center Drive & McNeil Street (Int 2):**
  - Construct a dual left-turn for the northbound left-turn movement.
  - Construct a second receiving drop lane (at least 300 feet) on the eastbound approach to the intersection to receive northbound left-turning traffic.
  - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
- **Center Drive & Palisade Drive (Int 4):**
  - Construct dual left-turn (with protected phasing), dual right-turn and a separated through lane for the eastbound approach to the intersection.
  - Construct a dual left-turn for the northbound left-turn movement with protected phasing.
  - Implement an eastbound right-turn overlap phase with the northbound left-turn protected phase.
  - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
- **DuPont-Steilacoom Road & Center Drive (Int 6):**
  - Construct a dual left-turn for the northbound left-turn movement.
- **McNeil Street & Bobs Hollow Lane (Int 8):**
  - Change the intersection control from a side-street stop-control to a single lane roundabout.
- **Hoffman Hill Boulevard & McNeil Street (Int 9):**
  - Change the intersection control from a side-street stop-control to an all-way stop-control
  - Implement the following turn storage lanes, by approach and movement:
    - Northbound right-turn
    - Southbound left-turn
    - Westbound left-turn and right-turn
  - Alternatively, a single-lane roundabout could be considered at this location
- **OFL East-West Road & OFL Civic Drive Connection (Int 102):**
  - Signalize this intersection, offsetting signal timing from the nearby Center Drive & Palisade Boulevard intersection to facilitate east-west throughput. This may require signal coordination between these two intersections.
  - Construct an eastbound left-turn storage lane with permitted phasing
  - Construct separated southbound left-turn and right-turn lanes.

    - Construct three through lanes in each direction for the eastbound and westbound approaches.
    - Offset this intersection as far west as possible from the Center Drive & Palisade Boulevard intersection to build in adequate storage capacity.
- **OFL East-West Road & OFL North-South Road (Int 103):**
    - Signalize this intersection.
    - Construct an eastbound left-turn storage lane with permitted phasing.
    - Construct a dual left-turn for southbound left-turn movement, in addition to a separated southbound right-turn lane.
    - Construct a separated westbound right-turn lane.
    - Construct two through lanes in each direction for the eastbound and westbound approaches.
- **Hoffman Hill Blvd & OFL East-West Road (Int 104):**
    - Construct a single-lane roundabout.

Segments

Recommended roadway cross sections for planned roadways internal to the Subarea are shown in **Figure 11**. These cross sections are based on forecasted vehicle traffic anticipated along these segments during the AM and PM peak hours. As such, they are dependent on final planned uses and the distribution of uses between the zoning districts, and should be reevaluated as uses are developed. These cross sections represent through travel lanes; individual turn storage lanes are also recommended where turn lane warrants are met.

Table 6. Study Intersection Delay and Level of Service Under No Action Conditions

ID	Study Intersection[1]	No Action Unimproved[2]		No Action with Improvements[2,3]	
		AM LOS / Control Delay (s)	PM LOS / Control Delay (s)	AM LOS / Control Delay (s)	PM LOS / Control Delay (s)
1	Center Drive & Wilmington Drive	B/11	B/17	B/11	B/17
2	Center Drive & McNeil Street	C/22	**F/80**	C/24	D/44
3	Center Drive & Bob's Hollow Lane	B/21	C/28	C/21	C/28
4	Center Drive & Palisade Boulevard	**F/317**	**F/581**	D/38	D/50
5	Center Drive & Civic Drive	A/6	A/6	A/6	A/6
6	Center Drive & DuPont-Steilacoom Road	D/46	C/30	C/23	C/22
7	DuPont-Steilacoom Road/Wilmington Drive & Barksdale Avenue	A/9	B/11	A/9	B/11
8	McNeil Street & Bobs Hollow Lane	**F/79 (SBL)**	**E/38 (SBL)**	A/7	A/8
9	Hoffman Hill Boulevard & McNeil Street	**F/637 (SB)**	**F/260 (WB)**	C/18	D/32
10	I-5 Access Road & DuPont-Steilacoom Road	A/7	A/9	A/7	A/9
101	OFL Civic Drive Connection & Civic Drive	A/9 (SB)	A/9 (SB)	A/9 (SB)	A/9 (SB)
102	OFL East-West Road & OFL Civic Drive Connection	**F/142 (SB)**	**F/351 (SB)**	A/5	A/5
103	OFL East-West Road & OFL North-South Road	**F/2,380 (SB)**	**F/11,489 (SB)**	A/6	B/13
104	Hoffman Hill Blvd & OFL East-West Road	D/32 (NBL)	**F/101 (NB)**	A/7	A/9

Notes:

1. Study intersections 1-6 are signalized; Study intersection 7 is all-way stop-controlled; Study intersections 8-9 are side-street stop-controlled; Study intersection 10 is a single-lane roundabout.
2. **Bold** represents delay that exceeds the City's LOS standard.
3. Under the No Action Condition Improved model, study intersection 101 is side-street stop-controlled; Study intersections 102-103 are signalized; and Study intersection 104 is a single-lane roundabout.

Source: Fehr and Peers, 2024.

Figure 11. Recommended Roadway Cross Sections for Roadways Internal to the Subarea



Source: Fehr and Peers, 2024

Key Findings and Subarea Implications

- The No Action Condition would generate approximately 39,462 new daily trips, with 3,452 trips related to the previously proposed Founders Ridge development and 36,010 trips related to the remaining uses within the Subarea. Of these trips, approximately 1,800 are anticipated to remain internal to the site. Vehicle trips generated that are expected to use each I-5 interchange are as follows:
    - Center Drive Interchange:
        - AM Peak: 1,812 total vehicle trips, with 563 entering the freeway and 1,249 exiting
        - PM Peak: 2,196 total vehicle trips, with 1,413 entering the freeway and 783 exiting
    - Dupont-Steilacoom Road Interchange:
        - AM Peak: 329 total vehicle trips, with 105 entering the freeway and 224 exiting
        - PM Peak: 395 total vehicle trips, with 253 entering the freeway and 142 exiting
- The planned project would generate 307 daily truck trips, with 21 in the AM peak hour and 19 in the PM peak hour. Truck trips generated that are expected to use the DuPont-Steilacoom Road Interchange are as follows:
    - AM Peak – 20 total truck trips, with 9 entering the freeway and 11 exiting
    - PM Peak – 18 total truck trips, with 10 entering the freeway and 8 exiting
- The generated trips would result in multiple LOS and queuing impacts on the existing roadway network. Recommended intersection improvements are summarized below, while recommended roadway segment cross-sections within the Subarea are given in **Figure 11**.
    - **Center Drive & McNeil Street (Int 2):**
        - Construct a dual left-turn for the northbound left-turn movement.
        - Construct a second receiving drop lane (at least 300 feet) on the eastbound approach to the intersection to receive northbound left-turning traffic.
        - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
    - **Center Drive & Palisade Drive (Int 4):**
        - Construct dual left-turn (with protected phasing), dual right-turn and a separated through lane for the eastbound approach to the intersection.
        - Construct a dual left-turn for the northbound left-turn movement with protected phasing.
        - Implement an eastbound right-turn overlap phase with the northbound left-turn protected phase.

        - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
    - **DuPont-Steilacoom Road & Center Drive (Int 6):**
        - Construct a dual left-turn for the northbound left-turn movement.
    - **McNeil Street & Bobs Hollow Lane (Int 8):**
        - Change the intersection control from a side-street stop-control to a single lane roundabout.
    - **Hoffman Hill Boulevard & McNeil Street (Int 9):**
        - Change the intersection control from a side-street stop-control to an all-way stop-control
        - Implement the following turn storage lanes, by approach and movement:
            - Northbound right-turn
            - Southbound left-turn
            - Westbound left-turn and right-turn
        - Alternatively, a single-lane roundabout could be considered at this location
    - **OFL East-West Road & OFL Civic Drive Connection (Int 102):**
        - Signalize this intersection, offsetting signal timing from the nearby Center Drive & Palisade Boulevard intersection to facilitate east-west throughput.
        - Construct an eastbound left-turn storage lane with permitted phasing
        - Construct separated southbound left-turn and right-turn lanes.
        - Construct three through lanes in each direction for the eastbound and westbound approaches.
        - Offset this intersection as far west as possible from the Center Drive & Palisade Boulevard intersection to build in adequate storage capacity.
    - **OFL East-West Road & OFL North-South Road (Int 103):**
        - Signalize this intersection.
        - Construct an eastbound left-turn storage lane with permitted phasing.
        - Construct a dual left-turn for southbound left-turn movement, in addition to a separated southbound right-turn lane.
        - Construct a separated westbound right-turn lane.
        - Construct two through lanes in each direction for the eastbound and westbound approaches.
    - **Hoffman Hill Blvd & OFL East-West Road (Int 104):**
        - Construct a single-lane roundabout.
- Improvements, as mentioned in the Active Transportation Network, Safety, Transit Network, and Freight Network sections, to the pedestrian, bicycle, and transit infrastructure would be needed to ensure safe and comfortable access to the Subarea from non-vehicle modes under the No Action Condition.
- It is recommended that the City consider the following options for improving connection to the Subarea via transit:

    - Coordinating with Pierce Transit to provide a limited-service fixed route along Center Drive that connects to DuPont Station to increase transit ridership to the Project site.
    - Coordinating with Sound Transit to increase frequency of current routes.
    - Coordinating with Pierce Transit, Sound Transit and/or Intercity Transit to potentially provide additional routes connecting to the surrounding communities.
    - Emphasizing active mode improvements on Wilmington Drive, Palisade Drive and Center Drive that facilitate access to the DuPont Station.
- Approximately 10% of No Action Condition traffic are expected to route to Hoffman Hill Boulevard via McNeil Street (approximately 3,400 daily trips, 260 AM peak trips and 320 PM peak trips). Although this would represent a sizeable increase in traffic on McNeil Street, it is recommended that Hoffman Hill Boulevard be maintained as a full access to the Subarea in order to facilitate access for residents south of the Subarea and take away traffic from the Palisade Boulevard access, which is anticipated to serve the large majority of Subarea traffic.

Attachment A – Proposed Uses by Zoning District

MEMORANDUM

DATE: March 7, 2023

TO: Michael Adamson, Fehr and Peers

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FROM: David Sherrard, Planner, DE Sherrard & Assoc.

SUBJECT: Founder's Ridge Site - Project Future Land Use
Founder's Ridge Site – Future No Acton Alternative Land Use
Old Fort Lake Subarea Outside Founders Ridge - Cumulative Land Use Projection

Project Future Build Land Use: The Northpoint Founders Ridge "Future Build" alternative is the same as the applicant's proposal as contained in " 09-19-2022 Preliminary Architectural Site Plan 2022-08-16" on https://www.dupontwa.gov/633/Founders-Ridge--Old-Fort-Lake--Applicati and consists of 723,000 square feet of "light manufacturing" use.

The amount of said use on each parcel is as shown on the plans with driveway access as shown. Connection of the internal road system to Center Drive is as shown, except for the mitigation scenario of routing truck traffic to Civic Drive via "Proposed Road 3."

This land use scenario will be analyzed in conjunction with the Future Baseline previously reviewed.

Founder's Ridge Site – Future No Acton Alternative Land Use: As part of the Founder's Ridge Environmental Impact Statement (EIS) the city determined as part of the scope of the EIS the development of a "No Acton" alternative which would "…include discussion of alternative possible future development of the site in accordance with the existing Comprehensive Plan and Old Fort Lake Subarea Plan and existing land use code regulations." The land uses in this Alternative are as shown in Table 1, below.

Trip allocation to the internal street network will presume that each lot has the same mix of uses and the allocation to the internal street system will be in the same proportion as in the proposal site plan.

This land use scenario will be analyzed in conjunction with the Future Baseline previously reviewed.

Table 1 Founder's Ridge Future No Action Alternative Uses

Use	Founders Ridge Projection		Background Peirce County Projections			
			Existing		Projected	
	%	Square Feet	Employees	%	Employees	%
Office	**35%**	**253,050**	32,700	33%	8,100	58%
Research and Development	**35%**	**253,050**	34,900	36%	4,500	32%
Manufacturing	**10%**	**72,300**	17,000	17%	0	0%
Service	**15%**	**108,450**	13,800	14%	1,700	12%
TOTAL	**100%**	**723,000**	98,400	100%	14,100	100%

Note: Percent of employment categories in Pierce County are NOT total employment but are limited to those allowed in the DuPont MUV-5 zone.

This land use scenario will be analyzed in conjunction with the Future Baseline previously reviewed.

Old Fort Lake Subarea Outside Founders Ridge - Cumulative Land Use Projection: As part of the transportation analysis for the Founders Ridge proposal, cumulative impacts of other reasonable development that may occur by the time of the horizon year for impacts are required to be analyzed pursuant to WAC 197-11-060(4)(e) 197-11-792(2)(c)(iii).

Cumulative land use projections are provided for the balance of the Old Fort Lake Subarea to the west of the Founders Ridge site. The projections are provided for the specific areas subject to MUV-1, MUV-2, MUV-3 and MUV-4 zoning districts as shown in the zoning map attached.

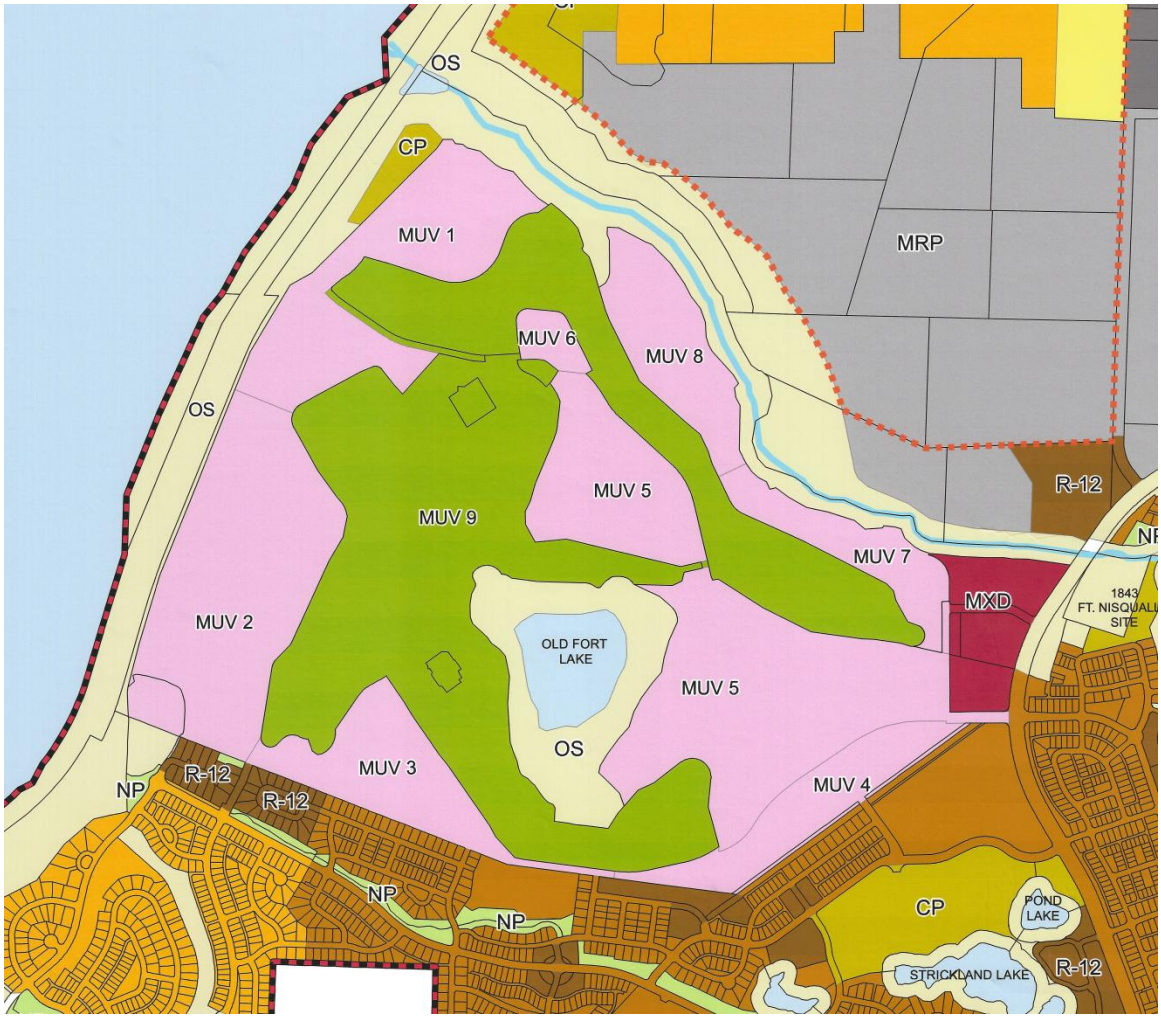
Projections are not provided for the MUV-7 and MUV-8 zoning districts. These parcels are owned by the Nisqually Tribe and future land use is unknown. These parcels would be provided primary access via Civic Drive and would have relatively little effect on the internal roadway system.

Scenario 3 Land Uses for MUV-1, MUV-2, MUV-3 and MUV-4 ZONING

Use	Density	MUV-1	MUV-2	MUV-3	MUV-4	TOTAL
Area		44.17	66.73	26.31	87	137.21
Single-family residences(1)	3 units/ acre	32	49	19		100 units
Acres devoted to use		10.67	16.33	6.33		33
Multifamily residences(1)	24 unit/ acre	322	486	192		1,000 units
Acres devoted to use		13.4	20.3	8		41.7
Service businesses sq ft		15,185	22,941	9,045	23,587	70,758

Use	Density	MUV-1	MUV-2	MUV-3	MUV-4	TOTAL
Acres devoted to use		1.2	1.8	0.7	1.9	3.7
Retail trade (individual tenant spaces under 20,000 sf)		15,185	22,941	9,045	23,537	70,708
Acres devoted to use		1.2	1.8	0.7	3.7	7.4
Restaurant and drinking establishments sq ft		0	10,000	0	10,000	20,000
Acres devoted to use	0.30 FAR	0.00	0.78	0.00	0.8	1.58
Office/R&D		190,541	248,752	113,692	1,054,718	1,602,703
Acres devoted to use	0.30 FAR	14.6	18.7	8.7	80.7	122.6
Hotel Rooms			90.00			90
Acres devoted to use			2.4			2.4

Figure 1. Old Fort Lake Zoning



The orientation of the land use within the specific parcels to the internal transportation network will be determined as part of the analysis.

This land use scenario will be analyzed in conjunction with the Project Build Alternative Future for the Founder's Ridge EIS. For the Old Fort Lake Subarea Plan, we will coordinate further on the land use projections to be used within the Founder's Ridge site for the existing zoning scenario.

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Attachment B – MXD+ Methodology

Trip Generation Methodology

Current accepted methodologies, such as the Institute of Transportation Engineers (ITE) T*rip Generation* methodology, are primarily based on data collected at suburban, single-use, freestanding sites. These defining characteristics limit their applicability to mixed-use or multi-use development projects, such as the proposed project. The land use mix, design features, and setting of the proposed project would include characteristics that influence travel behavior differently from typical single-use suburban developments. Thus, traditional data and methodologies, such as ITE, would not accurately estimate the project vehicle trip generation.

In response to the limitations in the ITE methodology, and to provide a straightforward and empirically validated method of estimating vehicle trip generation at mixed-use developments, the US Environmental Protection Agency (EPA) sponsored a national study of the trip generation characteristics of multi-use sites. Travel survey data was gathered from 239 mixed-use developments (MXDs) in six major metropolitan regions, and correlated with the characteristics of the sites and their surroundings. The findings indicate that the amount of external traffic generated is affected by a wide variety of factors including the mix of employment and residents, the overall size and density of the development, the internal connectivity for walking or driving among land uses, the availability of transit service, and the surrounding trip destinations within the immediate area outside the Project site.

These characteristics were related statistically to trip behavior observed at the study development sites using statistical techniques. These statistical relationships produced equations, known as the EPA MXD model, that allows predicting external vehicle trip reduction as a function of the MXD characteristics. Applying the external vehicle trip reduction percentage to "raw trips", as predicted by ITE, produces an estimate for the number of vehicle trips traveling in or out of the site.

The MXD model has been approved for use by the EPA[1]. It has also been peer-reviewed in the ASCE Journal of Urban Planning and Development[2], peer-reviewed in a 2012 TRB paper evaluating various smart growth trip generation methodologies[3], recommended by SANDAG for use on mixed-use smart growth developments[4], promoted in an American Planning Association (APA) Planning Advisory Service

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[1] Trip Generation Tool for Mixed-Use Developments (2012). www.epa.gov/dced/mxd_tripgeneration.html

[2] "Traffic Generated by Mixed-Use Developments—Six-Region Study Using Consistent Built Environmental Measures." Journal of Urban Planning and Development, 137(3), 248–261.

[3] Shafizadeh, Kevan et al. "Evaluation of the Operation and Accuracy of Available Smart Growth Trip Generation Methodologies for Use in California". Presented at 91st Annual Meeting of the Transportation Research Board, Washington, D.C., 2012.

[4] SANDAG Smart Growth Trip Generation and Parking Study. http://www.sandag.org/index.asp?projectid=378&fuseaction=projects.detail

(PAS)[5] which recommended it for evaluating traffic generation of mixed-use and other forms of smart growth, including in-fill and transit oriented development, It has also been used successfully in multiple certified EIRs in California, in addition to a variety of entitlement, SEPA and EIS efforts in Washington.

In 2020, Fehr & Peers also undertook to update, validate and recalibrate the MXD+ tool to 2019 conditions. This included analyzing trip generation at 12 calibration sites, as well as 4 valdiation sites to determine the accuracy of MXD+ and make adjustments as needed. From this study, minor adjustments were made to the tool to bring travel behaviors to an existing (2019) condition.

[5] Walters, Jerry et al. "Getting Trip Generation Right – Eliminating the Bias Against Mixed Use Development". American Planning Association. May 2013.

Attachment C – No Action Traffic Forecast Calculations

Combined Forecast Development, Interim Steps

Existing AM

Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	28	266	88	50	590	11	1	8	46	67	10	33
Center Dr / McNeil St	2	100	178	21	11	274	18	41	27	322	28	21	6
Center Dr / Bobs Hollow Ln	3	70	142	13	12	148	142	142	17	62	38	9	20
Center Dr / Palisade Blvd	4	0	297	7	26	267	1	0	0	5	30	0	29
Center Dr / Civic Dr	5	8	318	0	0	281	2	10	0	13	0	0	0
Center Dr / DuPont Steilacoom Rd	6	175	460	0	0	433	262	264	0	85	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	7	41	83	492	57	19	20	41	15	59	33	561
McNeil St/ Bob's Hollow	8	0	0	0	22	0	67	114	311	0	0	117	16
McNeil St/ Hoffman Hill Blvd	9	0	5	210	5	5	5	0	140	0	65	50	20

Existing PM

Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	51	537	117	71	409	9	9	12	35	115	22	58
Center Dr / McNeil St	2	320	250	32	15	307	30	42	35	148	35	49	17
Center Dr / Bobs Hollow Ln	3	38	154	32	15	281	173	122	18	40	18	11	8
Center Dr / Palisade Blvd	4	4	263	17	21	412	0	4	0	23	34	0	22
Center Dr / Civic Dr	5	5	284	0	0	420	5	3	0	13	0	0	0
Center Dr / DuPont Steilacoom Rd	6	137	339	0	0	496	333	205	0	135	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	15	53	66	598	69	36	36	57	18	137	65	450
McNeil St/ Bob's Hollow	8	0	0	0	15	0	129	57	219	0	0	399	25
McNeil St/ Hoffman Hill Blvd	9	5	5	130	15	0	0	0	85	5	240	150	5

Baseline AM Forecast

Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	30	305	100	55	675	15	5	10	55	75	10	40
Center Dr / McNeil St	2	115	205	25	15	315	20	45	30	370	30	25	10
Center Dr / Bobs Hollow Ln	3	80	160	15	15	170	160	160	20	70	45	10	25
Center Dr / Palisade Blvd	4	0	340	10	30	305	5	0	0	5	35	0	35
Center Dr / Civic Dr	5	10	365	0	0	320	5	10	0	15	0	0	0
Center Dr / DuPont Steilacoom Rd	6	200	525	0	0	495	300	300	0	95	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	10	45	95	565	65	20	25	45	15	65	40	640
McNeil St/ Bob's Hollow	8	0	0	0	25	0	75	130	355	0	0	135	20
McNeil St/ Hoffman Hill Blvd	9	0	5	250	5	5	5	0	165	0	75	60	25

Baseline AM Delta (Baseline AM - Existing AM)

Name	*Node #*	*NBL*	*NBT*	*NBR*	*SBL*	*SBT*	*SBR*	*EBL*	*EBT*	*EBR*	*WBL*	*WBT*	*WBR*
Center Dr / Wilmington Dr	1	*2*	*39*	*12*	*5*	*85*	*4*	*4*	*2*	*9*	*8*	*0*	*7*
Center Dr / McNeil St	2	*15*	*27*	*4*	*4*	*41*	*2*	*4*	*3*	*48*	*2*	*4*	*4*
Center Dr / Bobs Hollow Ln	3	*10*	*18*	*2*	*3*	*22*	*18*	*18*	*3*	*8*	*7*	*1*	*5*
Center Dr / Palisade Blvd	4	*0*	*43*	*3*	*4*	*38*	*4*	*0*	*0*	*0*	*5*	*0*	*6*
Center Dr / Civic Dr	5	*2*	*47*	*0*	*0*	*39*	*3*	*0*	*0*	*2*	*0*	*0*	*0*
Center Dr / DuPont Steilacoom Rd	6	*25*	*65*	*0*	*0*	*62*	*38*	*36*	*0*	*10*	*0*	*0*	*0*
DuPont Steilacoom Rd / Barksdale Ave	7	*3*	*4*	*12*	*73*	*8*	*1*	*5*	*4*	*0*	*6*	*7*	*79*
McNeil St/ Bob's Hollow	8	*0*	*0*	*0*	*3*	*0*	*8*	*16*	*44*	*0*	*0*	*18*	*4*
McNeil St/ Hoffman Hill Blvd	9	*0*	*0*	*40*	*0*	*0*	*0*	*0*	*25*	*0*	*10*	*10*	*5*

Baseline PM Forecast

Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	*60*	*615*	*135*	*80*	*470*	*10*	*10*	*15*	*40*	*130*	*25*	*65*
Center Dr / McNeil St	2	*365*	*285*	*35*	*15*	*350*	*35*	*50*	*40*	*170*	*40*	*55*	*20*
Center Dr / Bobs Hollow Ln	3	*45*	*175*	*35*	*15*	*320*	*200*	*140*	*20*	*45*	*20*	*15*	*10*
Center Dr / Palisade Blvd	4	*5*	*300*	*20*	*25*	*470*	*0*	*5*	*0*	*25*	*40*	*0*	*25*
Center Dr / Civic Dr	5	*5*	*325*	*0*	*0*	*480*	*5*	*5*	*0*	*15*	*0*	*0*	*0*
Center Dr / DuPont Steilacoom Rd	6	*155*	*390*	*0*	*0*	*565*	*380*	*235*	*0*	*155*	*0*	*0*	*0*
DuPont Steilacoom Rd / Barksdale Ave	7	*15*	*60*	*75*	*685*	*80*	*40*	*40*	*65*	*20*	*155*	*75*	*515*
McNeil St/ Bob's Hollow	8	*0*	*0*	*0*	*15*	*0*	*150*	*65*	*250*	*0*	*0*	*455*	*30*
McNeil St/ Hoffman Hill Blvd	9	*5*	*5*	*155*	*20*	*0*	*0*	*0*	*100*	*5*	*285*	*175*	*5*

Baseline PM Delta (Baseline PM - Existing PM)

Name	*Node #*	*NBL*	*NBT*	*NBR*	*SBL*	*SBT*	*SBR*	*EBL*	*EBT*	*EBR*	*WBL*	*WBT*	*WBR*
Center Dr / Wilmington Dr	1	*9*	*78*	*18*	*9*	*61*	*1*	*1*	*3*	*5*	*15*	*3*	*7*
Center Dr / McNeil St	2	*45*	*35*	*3*	*0*	*43*	*5*	*8*	*5*	*22*	*5*	*6*	*3*
Center Dr / Bobs Hollow Ln	3	*7*	*21*	*3*	*0*	*39*	*27*	*18*	*2*	*5*	*2*	*4*	*2*
Center Dr / Palisade Blvd	4	*1*	*37*	*3*	*4*	*58*	*0*	*1*	*0*	*2*	*6*	*0*	*3*
Center Dr / Civic Dr	5	*0*	*41*	*0*	*0*	*60*	*0*	*2*	*0*	*2*	*0*	*0*	*0*
Center Dr / DuPont Steilacoom Rd	6	*18*	*51*	*0*	*0*	*69*	*47*	*30*	*0*	*20*	*0*	*0*	*0*
DuPont Steilacoom Rd / Barksdale Ave	7	*0*	*7*	*9*	*87*	*11*	*4*	*4*	*8*	*2*	*18*	*10*	*65*
McNeil St/ Bob's Hollow	8	*0*	*0*	*0*	*0*	*0*	*21*	*8*	*31*	*0*	*0*	*56*	*5*
McNeil St/ Hoffman Hill Blvd	9	*0*	*0*	*25*	*5*	*0*	*0*	*0*	*15*	*0*	*45*	*25*	*0*

Pipeline Project Trips AM													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	0	170	0	5	110	0	0	0	0	0	0	10
Center Dr / McNeil St	2	70	110	0	5	25	15	40	0	95	0	0	10
Center Dr / Bobs Hollow Ln	3	0	160	0	0	45	15	30	0	0	0	0	0
Center Dr / Palisade Blvd	4	0	190	0	10	55	0	0	0	0	0	0	20
Center Dr / Civic Dr	5	115	95	0	0	30	35	15	0	35	0	0	0
Center Dr / DuPont Steilacoom Rd	6	100	5	0	0	5	60	25	0	30	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	0	15	0	40	10	5	10	0	0	0	0	100
McNeil St/ Bob's Hollow	8	0	0	0	0	25	0	0	10	90	65	90	25
McNeil St/ Hoffman Hill Blvd	9	0	0	51	0	0	0	0	0	0	46	0	0

Pipeline Project Trips PM													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	0	75	0	5	140	0	0	0	0	0	0	5
Center Dr / McNeil St	2	55	25	0	10	105	40	10	0	40	0	0	5
Center Dr / Bobs Hollow Ln	3	0	40	0	0	145	25	10	0	0	0	0	0
Center Dr / Palisade Blvd	4	0	45	0	15	165	0	0	0	0	0	0	5
Center Dr / Civic Dr	5	25	30	0	0	85	5	25	0	100	0	0	0
Center Dr / DuPont Steilacoom Rd	6	30	0	0	0	5	20	45	0	90	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	0	5	0	85	15	10	5	0	0	0	0	35
McNeil St/ Bob's Hollow	8	0	0	0	0	5	0	0	5	20	15	25	5
McNeil St/ Hoffman Hill Blvd	9	0	0	12	0	0	0	0	0	0	13	0	0

Combined Forecast AM (UNBALANCED)													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	30	435	100	55	700	15	5	10	55	75	10	40
Center Dr / McNeil St	2	170	285	25	15	315	35	85	30	415	30	25	15
Center Dr / Bobs Hollow Ln	3	80	305	15	15	190	160	170	20	70	45	10	25
Center Dr / Palisade Blvd	4	0	485	10	35	325	5	0	0	5	35	0	50
Center Dr / Civic Dr	5	120	410	0	0	320	35	25	0	50	0	0	0
Center Dr / DuPont Steilacoom Rd	6	275	525	0	0	495	320	300	0	115	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	10	55	95	565	65	25	30	45	15	65	40	660
McNeil St/ Bob's Hollow	8	0	0	0	25	25	75	130	355	90	65	205	40
McNeil St/ Hoffman Hill Blvd	9	0	5	261	5	5	5	0	165	0	111	60	25

Combined Forecast AM - Existing AM													
Name	*Node #*	*NBL*	*NBT*	*NBR*	*SBL*	*SBT*	*SBR*	*EBL*	*EBT*	*EBR*	*WBL*	*WBT*	*WBR*
Center Dr / Wilmington Dr	1	2	169	12	5	110	4	4	2	9	8	0	7
Center Dr / McNeil St	2	70	107	4	4	41	17	44	3	93	2	4	9
Center Dr / Bobs Hollow Ln	3	10	168	2	3	47	18	28	3	8	7	1	5
Center Dr / Palisade Blvd	4	0	193	8	9	63	4	0	0	0	5	0	21
Center Dr / Civic Dr	5	122	92	0	0	39	33	15	0	37	0	0	0
Center Dr / DuPont Steilacoom Rd	6	100	65	0	0	62	58	36	0	30	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	3	14	12	73	8	6	10	4	0	6	7	99
McNeil St/ Bob's Hollow	8	0	0	0	3	25	8	16	44	90	65	88	24
McNeil St/ Hoffman Hill Blvd	9	0	0	51	0	0	0	0	25	0	46	10	5

Final Combined Forecast AM (BALANCED)													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	30	435	100	55	700	15	5	10	55	75	10	40
Center Dr / McNeil St	2	170	285	25	15	315	35	85	30	415	30	25	15
Center Dr / Bobs Hollow Ln	3	80	310	15	15	195	160	170	20	70	45	10	25
Center Dr / Palisade Blvd	4	0	490	15	35	330	5	0	0	5	35	0	50
Center Dr / Civic Dr	5	130	410	0	0	320	35	25	0	50	0	0	0
Center Dr / DuPont Steilacoom Rd	6	275	525	0	0	495	320	300	0	115	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	10	55	95	565	65	25	30	45	15	65	40	660
McNeil St/ Bob's Hollow	8	0	0	0	25	25	75	130	355	90	65	205	40
McNeil St/ Hoffman Hill Blvd	9	0	5	261	5	5	5	0	165	0	111	60	25

Combined Forecast PM (UNBALANCED)													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	60	615	135	80	550	10	10	15	40	130	25	65
Center Dr / McNeil St	2	375	285	35	25	410	70	55	40	190	40	55	25
Center Dr / Bobs Hollow Ln	3	45	190	35	15	425	200	140	20	45	20	15	10
Center Dr / Palisade Blvd	4	5	310	20	35	580	0	5	0	25	40	0	25
Center Dr / Civic Dr	5	30	325	0	0	505	10	30	0	110	0	0	0
Center Dr / DuPont Steilacoom Rd	6	165	390	0	0	565	380	250	0	225	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	15	60	75	685	80	45	40	65	20	155	75	515
McNeil St/ Bob's Hollow	8	0	0	0	15	5	150	65	250	20	15	455	30
McNeil St/ Hoffman Hill Blvd	9	5	5	155	20	0	0	0	100	5	285	175	5

Combined Forecast PM - Existing PM													
Name	*Node #*	*NBL*	*NBT*	*NBR*	*SBL*	*SBT*	*SBR*	*EBL*	*EBT*	*EBR*	*WBL*	*WBT*	*WBR*
Center Dr / Wilmington Dr	1	*9*	*78*	*18*	*9*	*141*	*1*	*1*	*3*	*5*	*15*	*3*	*7*
Center Dr / McNeil St	2	*55*	*35*	*3*	*10*	*103*	*40*	*13*	*5*	*42*	*5*	*6*	*8*
Center Dr / Bobs Hollow Ln	3	*7*	*36*	*3*	*0*	*149*	*27*	*18*	*2*	*5*	*2*	*4*	*2*
Center Dr / Palisade Blvd	4	*1*	*52*	*3*	*14*	*168*	*0*	*1*	*0*	*2*	*6*	*0*	*13*
Center Dr / Civic Dr	5	*25*	*41*	*0*	*0*	*85*	*5*	*27*	*0*	*97*	*0*	*0*	*0*
Center Dr / DuPont Steilacoom Rd	6	*28*	*51*	*0*	*0*	*69*	*47*	*45*	*0*	*90*	*0*	*0*	*0*
DuPont Steilacoom Rd / Barksdale Ave	7	*0*	*7*	*9*	*87*	*11*	*9*	*4*	*8*	*2*	*18*	*10*	*65*
McNeil St/ Bob's Hollow	8	*0*	*0*	*0*	*0*	*5*	*21*	*8*	*31*	*20*	*15*	*56*	*5*
McNeil St/ Hoffman Hill Blvd	9	*0*	*0*	*25*	*5*	*0*	*0*	*0*	*15*	*0*	*45*	*25*	*0*

Final Combined Forecast PM (BALANCED)													
Name	Node #	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Center Dr / Wilmington Dr	1	60	615	135	80	550	10	10	15	40	130	25	65
Center Dr / McNeil St	2	375	285	35	25	410	70	55	40	190	40	55	25
Center Dr / Bobs Hollow Ln	3	45	190	35	15	430	200	140	20	45	20	15	10
Center Dr / Palisade Blvd	4	5	315	20	35	580	0	5	0	25	40	0	35
Center Dr / Civic Dr	5	30	325	0	0	505	10	30	0	110	0	0	0
Center Dr / DuPont Steilacoom Rd	6	165	390	0	0	565	380	250	0	225	0	0	0
DuPont Steilacoom Rd / Barksdale Ave	7	15	60	75	685	80	45	40	65	20	155	75	515
McNeil St/ Bob's Hollow	8	0	0	0	15	5	150	65	250	20	15	455	30
McNeil St/ Hoffman Hill Blvd	9	5	5	155	20	0	0	0	100	5	285	175	5

Attachment D – LOS Calculations

No Action (2044) Unimproved Scenario AM Peak Hour

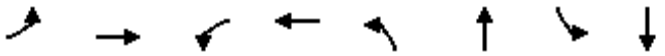
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	10	75	10	30	1684	55	1263
Future Volume (vph)	5	10	75	10	30	1684	55	1263
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	34.0	34.0	34.0	34.0	10.0	26.0	10.0	26.0
Total Split (s)	34.0	34.0	34.0	34.0	10.0	76.0	10.0	76.0
Total Split (%)	28.3%	28.3%	28.3%	28.3%	8.3%	63.3%	8.3%	63.3%
Yellow Time (s)	4.0	4.0	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	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)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 89.5
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Center Dr & Wilmington Dr



1: Center Dr & Wilmington Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	69	79	53	32	1878	58	1345
v/c Ratio	0.02	0.22	0.38	0.19	0.10	0.76	0.30	0.52
Control Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.9
Queue Length 50th (ft)	3	6	49	6	4	393	7	206
Queue Length 95th (ft)	14	45	95	40	18	#837	33	421
Internal Link Dist (ft)		126		229		940		666
Turn Bay Length (ft)			75		65		75	
Base Capacity (vph)	536	684	514	651	314	2559	196	2601
Starvation Cap Reductn	0	0	0	0	0	0	0	303
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.15	0.08	0.10	0.73	0.30	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	55	75	10	40	30	1684	100	55	1263	15
Future Volume (veh/h)	5	10	55	75	10	40	30	1684	100	55	1263	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1856	1856	1856	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	5	11	7	79	11	5	32	1773	102	58	1329	15
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	2	2	2	1	1	1
Cap, veh/h	223	112	72	220	124	57	381	2270	129	243	2348	26
Arrive On Green	0.10	0.10	0.10	0.10	0.10	0.10	0.06	0.66	0.66	0.05	0.65	0.65
Sat Flow, veh/h	1396	1085	691	1384	1200	546	1781	3417	195	1795	3628	41
Grp Volume(v), veh/h	5	0	18	79	0	16	32	915	960	58	656	688
Grp Sat Flow(s),veh/h/ln	1396	0	1776	1384	0	1746	1781	1777	1835	1795	1791	1878
Q Serve(g_s), s	0.3	0.0	0.7	4.4	0.0	0.7	0.4	28.6	29.6	0.8	16.4	16.4
Cycle Q Clear(g_c), s	0.9	0.0	0.7	5.1	0.0	0.7	0.4	28.6	29.6	0.8	16.4	16.4
Prop In Lane	1.00		0.39	1.00		0.31	1.00		0.11	1.00		0.02
Lane Grp Cap(c), veh/h	223	0	184	220	0	181	381	1180	1219	243	1159	1215
V/C Ratio(X)	0.02	0.00	0.10	0.36	0.00	0.09	0.08	0.77	0.79	0.24	0.57	0.57
Avail Cap(c_a), veh/h	583	0	642	577	0	631	381	1572	1623	274	1584	1661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.0	0.0	32.6	34.9	0.0	32.5	5.3	9.3	9.5	10.4	7.9	7.9
Incr Delay (d2), s/veh	0.0	0.0	0.2	1.0	0.0	0.2	0.1	1.8	1.9	0.5	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.3	1.5	0.0	0.3	0.1	8.8	9.5	0.4	5.1	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.0	0.0	32.8	35.9	0.0	32.8	5.4	11.1	11.4	10.9	8.3	8.3
LnGrp LOS	C	A	C	D	A	C	A	B	B	B	A	A
Approach Vol, veh/h		23			95			1907			1402	
Approach Delay, s/veh		32.8			35.4			11.2			8.4	
Approach LOS		C			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.6	58.3		13.3	10.0	56.9		13.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	71.0		29.0	5.0	71.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	31.6		2.9	2.4	18.4		7.1				
Green Ext Time (p_c), s	0.0	21.7		0.1	0.0	12.7		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		10.9	
HCM 6th LOS		B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	104	30	499	30	25	15	341	1363	15	794
Future Volume (vph)	104	30	499	30	25	15	341	1363	15	794
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA	Prot	NA
Protected Phases		4	4 5		8	8 1	5	2	1	6
Permitted Phases	4			8						
Detector Phase	4	4	4 5	8	8	8 1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0	5.0	7.0
Minimum Split (s)	31.0	31.0		31.0	31.0		10.0	26.0	10.0	26.0
Total Split (s)	31.0	31.0		31.0	31.0		42.0	79.0	10.0	47.0
Total Split (%)	25.8%	25.8%		25.8%	25.8%		35.0%	65.8%	8.3%	39.2%
Yellow Time (s)	4.0	4.0		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	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	None		None	None		None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 95.5
Natural Cycle: 80
Control Type: Actuated-Uncoordinated

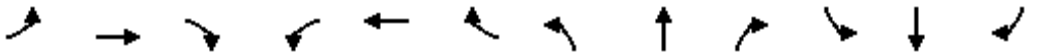
Splits and Phases: 2: Center Dr & McNeil St





Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	525	58	16	359	1461	16	878
v/c Ratio	0.45	0.59	0.18	0.03	0.77	0.71	0.17	0.79
Control Delay	41.2	16.5	36.1	0.1	45.7	16.5	57.0	35.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.2	16.5	36.1	0.1	45.7	16.6	57.0	35.9
Queue Length 50th (ft)	77	187	29	0	216	373	10	268
Queue Length 95th (ft)	164	338	76	0	354	453	37	387
Internal Link Dist (ft)	2890		342			666		1862
Turn Bay Length (ft)		295		140	210		100	
Base Capacity (vph)	389	1099	408	564	708	2656	95	1600
Starvation Cap Reductn	0	0	0	0	0	103	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.48	0.14	0.03	0.51	0.57	0.17	0.55

Intersection Summary



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	30	499	30	25	15	341	1363	25	15	794	40
Future Volume (veh/h)	104	30	499	30	25	15	341	1363	25	15	794	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1811	1811	1811	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	109	32	505	32	26	5	359	1435	25	16	836	39
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	6	6	6	2	2	2	2	2	2
Cap, veh/h	386	104	804	286	213	446	412	1876	33	33	1080	50
Arrive On Green	0.27	0.27	0.27	0.27	0.27	0.27	0.23	0.53	0.53	0.02	0.31	0.31
Sat Flow, veh/h	1132	382	1598	798	782	1535	1781	3574	62	1781	3457	161
Grp Volume(v), veh/h	141	0	505	58	0	5	359	713	747	16	430	445
Grp Sat Flow(s),veh/h/ln	1514	0	1598	1580	0	1535	1781	1777	1859	1781	1777	1841
Q Serve(g_s), s	3.7	0.0	18.7	0.0	0.0	0.2	15.8	25.9	26.0	0.7	17.8	17.8
Cycle Q Clear(g_c), s	5.7	0.0	18.7	2.0	0.0	0.2	15.8	25.9	26.0	0.7	17.8	17.8
Prop In Lane	0.77		1.00	0.55		1.00	1.00		0.03	1.00		0.09
Lane Grp Cap(c), veh/h	490	0	804	498	0	446	412	933	976	33	555	576
V/C Ratio(X)	0.29	0.00	0.63	0.12	0.00	0.01	0.87	0.76	0.77	0.48	0.77	0.77
Avail Cap(c_a), veh/h	561	0	880	570	0	519	810	1616	1691	109	917	951
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.5	0.0	14.7	22.3	0.0	20.5	30.1	15.3	15.3	39.5	25.4	25.4
Incr Delay (d2), s/veh	0.3	0.0	1.2	0.1	0.0	0.0	5.8	1.3	1.3	10.4	2.3	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	6.6	0.8	0.0	0.1	7.1	9.4	9.9	0.4	7.4	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.8	0.0	15.9	22.4	0.0	20.5	36.0	16.7	16.6	49.9	27.7	27.6
LnGrp LOS	C	A	B	C	A	C	D	B	B	D	C	C
Approach Vol, veh/h		646			63			1819			891	
Approach Delay, s/veh		17.7			22.2			20.5			28.1	
Approach LOS		B			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.5	47.7		27.1	23.8	30.4		27.1				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	74.0		26.0	37.0	42.0		26.0				
Max Q Clear Time (g_c+I1), s	2.7	28.0		20.7	17.8	19.8		4.0				
Green Ext Time (p_c), s	0.0	14.5		1.4	1.0	5.6		0.2				

Intersection Summary			
HCM 6th Ctrl Delay		21.9	
HCM 6th LOS		C	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	274	20	45	10	80	1407	15	679
Future Volume (vph)	274	20	45	10	80	1407	15	679
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	32.0	32.0	32.0	32.0	10.0	23.0	10.0	23.0
Total Split (s)	47.0	47.0	47.0	47.0	11.0	63.0	10.0	62.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	9.2%	52.5%	8.3%	51.7%
Yellow Time (s)	4.0	4.0	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	1.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 100.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Center Dr & Bobs Hollow Ln



3: Center Dr & Bobs Hollow Ln



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	383	84	84	1497	16	933
v/c Ratio	0.85	0.18	0.31	0.86	0.11	0.62
Control Delay	50.5	21.3	14.8	29.0	13.0	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	21.3	14.8	29.0	13.0	22.4
Queue Length 50th (ft)	229	29	26	415	5	243
Queue Length 95th (ft)	#444	72	52	#671	15	326
Internal Link Dist (ft)	147	236		701		1014
Turn Bay Length (ft)			85		100	
Base Capacity (vph)	556	562	273	2055	152	1918
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.15	0.31	0.73	0.11	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	274	20	70	45	10	25	80	1407	15	15	679	207
Future Volume (veh/h)	274	20	70	45	10	25	80	1407	15	15	679	207
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.98	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1841	1841	1841	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	288	21	67	47	11	12	84	1481	15	16	715	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	4	4	4	2	2	2	4	4	4
Cap, veh/h	402	24	76	362	85	78	349	1829	19	172	1293	351
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.05	0.51	0.51	0.02	0.48	0.48
Sat Flow, veh/h	1089	79	253	971	282	259	1781	3603	36	1753	2716	737
Grp Volume(v), veh/h	376	0	0	70	0	0	84	730	766	16	460	449
Grp Sat Flow(s),veh/h/ln	1422	0	0	1512	0	0	1781	1777	1862	1753	1749	1704
Q Serve(g_s), s	18.9	0.0	0.0	0.0	0.0	0.0	2.0	29.9	30.0	0.4	16.3	16.3
Cycle Q Clear(g_c), s	21.7	0.0	0.0	2.8	0.0	0.0	2.0	29.9	30.0	0.4	16.3	16.3
Prop In Lane	0.77		0.18	0.67		0.17	1.00		0.02	1.00		0.43
Lane Grp Cap(c), veh/h	502	0	0	525	0	0	349	902	945	172	833	811
V/C Ratio(X)	0.75	0.00	0.00	0.13	0.00	0.00	0.24	0.81	0.81	0.09	0.55	0.55
Avail Cap(c_a), veh/h	752	0	0	776	0	0	383	1184	1241	240	1145	1115
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	0.0	22.2	0.0	0.0	12.0	17.9	17.9	15.7	16.2	16.2
Incr Delay (d2), s/veh	2.3	0.0	0.0	0.1	0.0	0.0	0.4	3.3	3.1	0.2	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	0.0	0.0	1.1	0.0	0.0	0.8	11.7	12.3	0.2	6.1	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.8	0.0	0.0	22.3	0.0	0.0	12.4	21.2	21.1	15.9	16.8	16.8
LnGrp LOS	C	A	A	C	A	A	B	C	C	B	B	B
Approach Vol, veh/h		376			70			1580			925	
Approach Delay, s/veh		30.8			22.3			20.7			16.8	
Approach LOS		C			C			C			B	

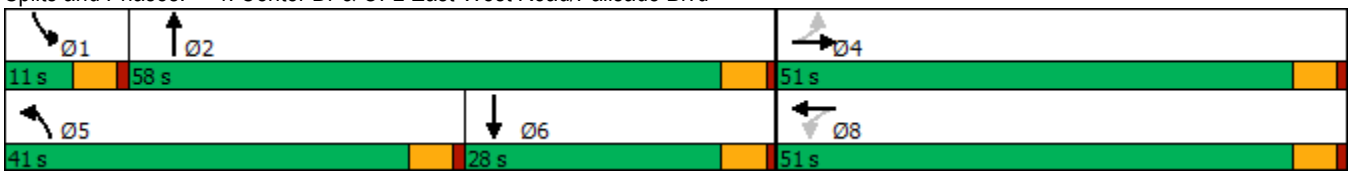
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	49.2		31.3	9.3	46.5		31.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	58.0		42.0	6.0	57.0		42.0				
Max Q Clear Time (g_c+I1), s	2.4	32.0		23.7	4.0	18.3		4.8				
Green Ext Time (p_c), s	0.0	12.2		2.4	0.0	6.8		0.4				

Intersection Summary												
HCM 6th Ctrl Delay			20.8									
HCM 6th LOS			C									

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	157	92	35	190	1201	490	35	330
Future Volume (vph)	157	92	35	190	1201	490	35	330
Turn Type	Perm	NA	Perm	NA	Prot	NA	Prot	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8					
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	39.0	39.0	39.0	39.0	10.0	27.0	10.0	27.0
Total Split (s)	51.0	51.0	51.0	51.0	41.0	58.0	11.0	28.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%	34.2%	48.3%	9.2%	23.3%
Yellow Time (s)	4.0	4.0	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	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	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Center Dr & OFL East-West Road/Palisade Blvd



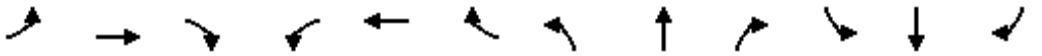


Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	826	37	253	1264	532	37	727
v/c Ratio	1.59	0.21	0.37	2.44	0.32	0.45	0.99
Control Delay	302.2	29.0	27.1	675.5	20.7	73.2	65.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	302.2	29.0	27.1	675.5	20.7	73.2	65.0
Queue Length 50th (ft)	~868	19	132	~1620	139	28	224
Queue Length 95th (ft)	#1115	48	202	#1881	183	66	#357
Internal Link Dist (ft)	391		463		1014		681
Turn Bay Length (ft)				115		115	
Base Capacity (vph)	518	174	686	518	1644	83	737
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	1.59	0.21	0.37	2.44	0.32	0.45	0.99

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	157	92	536	35	190	50	1201	490	15	35	330	361
Future Volume (veh/h)	157	92	536	35	190	50	1201	490	15	35	330	361
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.98	1.00		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1885	1885	1885	1841	1841	1841
Adj Flow Rate, veh/h	165	97	499	37	200	20	1264	516	14	37	347	218
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	1	1	1	4	4	4
Cap, veh/h	135	67	315	226	653	65	541	1636	44	52	388	239
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.30	0.46	0.46	0.03	0.19	0.19
Sat Flow, veh/h	256	173	818	835	1695	170	1795	3559	96	1753	2065	1271
Grp Volume(v), veh/h	761	0	0	37	0	220	1264	259	271	37	293	272
Grp Sat Flow(s),veh/h/ln	1247	0	0	835	0	1865	1795	1791	1865	1753	1749	1588
Q Serve(g_s), s	36.2	0.0	0.0	0.0	0.0	9.8	36.0	10.9	11.0	2.5	19.5	20.1
Cycle Q Clear(g_c), s	46.0	0.0	0.0	6.9	0.0	9.8	36.0	10.9	11.0	2.5	19.5	20.1
Prop In Lane	0.22		0.66	1.00		0.09	1.00		0.05	1.00		0.80
Lane Grp Cap(c), veh/h	517	0	0	226	0	718	541	823	857	52	328	298
V/C Ratio(X)	1.47	0.00	0.00	0.16	0.00	0.31	2.34	0.32	0.32	0.71	0.89	0.91
Avail Cap(c_a), veh/h	517	0	0	226	0	718	541	823	857	88	337	306
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.6	0.0	0.0	24.7	0.0	25.6	41.7	20.4	20.4	57.4	47.3	47.6
Incr Delay (d2), s/veh	222.6	0.0	0.0	0.3	0.0	0.2	606.7	0.2	0.2	16.5	24.0	29.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	47.7	0.0	0.0	0.7	0.0	4.5	106.8	4.5	4.7	1.3	10.6	10.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	264.2	0.0	0.0	25.0	0.0	25.8	648.4	20.6	20.6	74.0	71.3	77.5
LnGrp LOS	F	A	A	C	A	C	F	C	C	E	E	E
Approach Vol, veh/h		761			257			1794			602	
Approach Delay, s/veh		264.2			25.7			462.9			74.3	
Approach LOS		F			C			F			E	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.5	59.9		51.0	41.0	27.4		51.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	53.0		46.0	36.0	23.0		46.0				
Max Q Clear Time (g_c+I1), s	4.5	13.0		48.0	38.0	22.1		11.8				
Green Ext Time (p_c), s	0.0	3.3		0.0	0.0	0.3		1.7				

Intersection Summary			
HCM 6th Ctrl Delay		317.2	
HCM 6th LOS		F	

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	30	50	130	567	676
Future Volume (vph)	30	50	130	567	676
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	7		5	2	6
Permitted Phases		7	2		
Detector Phase	7	7	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	10.0	36.0	24.0	12.0
Total Split (s)	18.0	18.0	40.0	102.0	62.0
Total Split (%)	15.0%	15.0%	33.3%	85.0%	51.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 47.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

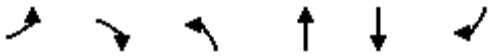
Splits and Phases: 5: Center Dr & Civic Dr





Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	32	53	137	597	759
v/c Ratio	0.11	0.17	0.20	0.21	0.47
Control Delay	28.3	11.7	3.1	2.5	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	11.7	3.1	2.5	14.7
Queue Length 50th (ft)	8	0	11	27	90
Queue Length 95th (ft)	44	34	25	48	239
Internal Link Dist (ft)	652			681	2072
Turn Bay Length (ft)	150		115		
Base Capacity (vph)	635	611	1342	3455	2935
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.05	0.09	0.10	0.17	0.26

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	50	130	567	676	45
Future Volume (veh/h)	30	50	130	567	676	45
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1900	1885	1885	1767	1767
Adj Flow Rate, veh/h	32	4	137	597	712	42
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	0	1	1	9	9
Cap, veh/h	75	69	572	2343	1269	75
Arrive On Green	0.04	0.04	0.11	0.65	0.39	0.39
Sat Flow, veh/h	1753	1610	1795	3676	3309	190
Grp Volume(v), veh/h	32	4	137	597	371	383
Grp Sat Flow(s),veh/h/ln	1753	1610	1795	1791	1678	1732
Q Serve(g_s), s	0.6	0.1	1.2	2.3	5.7	5.7
Cycle Q Clear(g_c), s	0.6	0.1	1.2	2.3	5.7	5.7
Prop In Lane	1.00	1.00	1.00			0.11
Lane Grp Cap(c), veh/h	75	69	572	2343	661	683
V/C Ratio(X)	0.43	0.06	0.24	0.25	0.56	0.56
Avail Cap(c_a), veh/h	691	635	2283	10538	2902	2995
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.4	15.1	4.5	2.4	7.8	7.8
Incr Delay (d2), s/veh	3.8	0.4	0.2	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.1	0.2	0.0	1.3	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.2	15.5	4.7	2.4	8.5	8.5
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	36			734	754	
Approach Delay, s/veh	18.8			2.9	8.5	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		26.6		6.4	8.6	18.0
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		97.0		13.0	35.0	57.0
Max Q Clear Time (g_c+I1), s		4.3		2.6	3.2	7.7
Green Ext Time (p_c), s		4.5		0.0	0.4	5.3

Intersection Summary	
HCM 6th Ctrl Delay	6.0
HCM 6th LOS	A

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	357	220	499	525	495
Future Volume (vph)	357	220	499	525	495
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4			
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	28.0	28.0	10.0	39.0	39.0
Total Split (s)	33.0	33.0	44.0	87.0	43.0
Total Split (%)	27.5%	27.5%	36.7%	72.5%	35.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 118.6
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: DuPont Steilacoom Rd & Center Dr



6: DuPont Steilacoom Rd & Center Dr

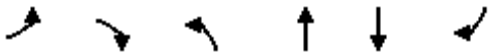


Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	372	229	520	547	998
v/c Ratio	0.96	0.45	1.02	0.48	0.94
Control Delay	82.3	7.9	83.9	10.7	48.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	82.3	7.9	83.9	10.7	48.9
Queue Length 50th (ft)	286	0	~430	181	326
Queue Length 95th (ft)	#479	65	#644	256	#463
Internal Link Dist (ft)	1791			3455	484
Turn Bay Length (ft)			150		
Base Capacity (vph)	392	511	512	1155	1085
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.95	0.45	1.02	0.47	0.92

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	357	220	499	525	495	463
Future Volume (veh/h)	357	220	499	525	495	463
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1781	1722	1752	1767	1767
Adj Flow Rate, veh/h	372	56	520	547	516	341
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	8	12	10	9	9
Cap, veh/h	401	349	545	1190	580	382
Arrive On Green	0.23	0.23	0.33	0.68	0.30	0.30
Sat Flow, veh/h	1739	1510	1640	1752	2005	1264
Grp Volume(v), veh/h	372	56	520	547	452	405
Grp Sat Flow(s),veh/h/ln	1739	1510	1640	1752	1678	1503
Q Serve(g_s), s	23.3	3.3	34.6	16.2	28.6	28.7
Cycle Q Clear(g_c), s	23.3	3.3	34.6	16.2	28.6	28.7
Prop In Lane	1.00	1.00	1.00			0.84
Lane Grp Cap(c), veh/h	401	349	545	1190	507	454
V/C Ratio(X)	0.93	0.16	0.95	0.46	0.89	0.89
Avail Cap(c_a), veh/h	437	379	574	1288	572	512
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	34.2	36.4	8.3	37.1	37.2
Incr Delay (d2), s/veh	24.8	0.2	26.0	0.3	14.8	16.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	12.6	3.1	17.0	5.2	13.2	12.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	66.8	34.5	62.4	8.6	52.0	53.6
LnGrp LOS	E	C	E	A	D	D
Approach Vol, veh/h	428			1067	857	
Approach Delay, s/veh	62.5			34.8	52.7	
Approach LOS	E			C	D	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		80.8		30.7	42.0	38.7
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		82.0		28.0	39.0	38.0
Max Q Clear Time (g_c+I1), s		18.2		25.3	36.6	30.7
Green Ext Time (p_c), s		3.6		0.4	0.5	3.0

Intersection Summary	
HCM 6th Ctrl Delay	46.4
HCM 6th LOS	D

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	15	10	150	130	65
Future Vol, veh/h	75	15	10	150	130	65
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	5	5	2	2	9	9
Mvmt Flow	77	15	10	155	134	67
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	8.6	9	8.8
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	83%	0%
Vol Thru, %	0%	100%	0%	67%
Vol Right, %	0%	0%	17%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	150	90	195
LT Vol	10	0	75	0
Through Vol	0	150	0	130
RT Vol	0	0	15	65
Lane Flow Rate	10	155	93	201
Geometry Grp	7	7	2	5
Degree of Util (X)	0.016	0.211	0.126	0.245
Departure Headway (Hd)	5.423	4.92	4.897	4.382
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	662	731	733	822
Service Time	3.141	2.638	2.922	2.399
HCM Lane V/C Ratio	0.015	0.212	0.127	0.245
HCM Control Delay	8.2	9	8.6	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.8	0.4	1

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	140	475	90	65	305	40	0	0	0	25	25	85
Future Vol, veh/h	140	475	90	65	305	40	0	0	0	25	25	85
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	-	-	-	-	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	152	516	98	71	332	43	0	0	0	27	27	92

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	375	0	0	614	0	0	1424	1386	565	1365	1414	354
Stage 1	-	-	-	-	-	-	869	869	-	496	496	-
Stage 2	-	-	-	-	-	-	555	517	-	869	918	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1183	-	-	965	-	-	113	143	524	125	138	690
Stage 1	-	-	-	-	-	-	347	369	-	556	545	-
Stage 2	-	-	-	-	-	-	516	534	-	347	350	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1183	-	-	965	-	-	62	104	524	99	100	690
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	104	-	99	100	-
Stage 1	-	-	-	-	-	-	278	296	-	446	494	-
Stage 2	-	-	-	-	-	-	383	484	-	278	281	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.7	1.4	0	36.1
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	1183	-	-	965	-	-	99	690
HCM Lane V/C Ratio	-	0.129	-	-	0.073	-	-	0.549	0.134
HCM Control Delay (s)	0	8.5	0	-	9	0	-	78.7	11
HCM Lane LOS	A	A	A	-	A	A	-	F	B
HCM 95th %tile Q(veh)	-	0.4	-	-	0.2	-	-	2.5	0.5

Intersection	
Int Delay, s/veh	136.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	0	165	0	153	60	196	0	176	346	89	90	5
Future Vol, veh/h	0	165	0	153	60	196	0	176	346	89	90	5
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	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	179	0	166	65	213	0	191	376	97	98	5

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	278	0	0	179	0	0	734	789	179	967	683	172
Stage 1	-	-	-	-	-	-	179	179	-	504	504	-
Stage 2	-	-	-	-	-	-	555	610	-	463	179	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1285	-	-	1397	-	-	336	323	864	234	372	872
Stage 1	-	-	-	-	-	-	823	751	-	550	541	-
Stage 2	-	-	-	-	-	-	516	485	-	579	751	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1285	-	-	1397	-	-	227	276	864	~ 52	318	872
Mov Cap-2 Maneuver	-	-	-	-	-	-	227	276	-	~ 52	318	-
Stage 1	-	-	-	-	-	-	823	751	-	550	463	-
Stage 2	-	-	-	-	-	-	346	415	-	244	751	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	3	107.8	$ 637
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	503	1285	-	-	1397	-	-	92
HCM Lane V/C Ratio	1.128	-	-	-	0.119	-	-	2.174
HCM Control Delay (s)	107.8	0	-	-	7.9	0	-	$ 637
HCM Lane LOS	F	A	-	-	A	A	-	F
HCM 95th %tile Q(veh)	19.2	0	-	-	0.4	-	-	17.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

MOVEMENT SUMMARY

Site: 101 [INT 10 No Action_AM (Site Folder: DuPont)]

DuPont-Steilacoom Rd & I-5 On and Off-Ramps
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: DuPont-Steilacoom Rd														
8	T1	85	0.0	92	0.0	0.125	7.4	LOS A	0.7	18.0	0.67	0.68	0.67	35.9
18	R2	140	0.0	152	0.0	0.125	7.2	LOS A	0.8	19.8	0.67	0.67	0.67	34.9
Approach		225	0.0	245	0.0	0.125	7.3	LOS A	0.8	19.8	0.67	0.68	0.67	35.3
East: I-5 On- and Off-Ramps														
1	L2	105	0.0	114	0.0	0.332	10.0	LOS B	2.3	58.4	0.30	0.50	0.30	36.8
16	R2	884	1.0	961	1.0	0.332	3.8	LOS A	2.3	58.4	0.13	0.47	0.13	36.4
Approach		989	0.9	1075	0.9	0.332	4.4	LOS A	2.3	58.4	0.14	0.48	0.14	36.5
North: DuPont Steilacoom Rd														
7	L2	670	1.0	728	1.0	0.277	10.1	LOS B	1.6	40.7	0.28	0.61	0.28	34.6
4	T1	90	0.0	98	0.0	0.277	4.0	LOS A	1.6	40.7	0.27	0.60	0.27	34.9
Approach		760	0.9	826	0.9	0.277	9.4	LOS A	1.6	40.7	0.28	0.61	0.28	34.6
All Vehicles		1974	0.8	2146	0.8	0.332	6.7	LOS A	2.3	58.4	0.26	0.55	0.26	35.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	165	4	5	75	5
Future Vol, veh/h	10	165	4	5	75	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	0	0	20	0	0
Mvmt Flow	11	179	4	5	82	5

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	7	9
Stage 1	-	-	0	0
Stage 2	-	-	7	9
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	1019	890
Stage 1	-	-	-	-
Stage 2	-	-	1021	892
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	1019	0
Mov Cap-2 Maneuver	-	-	1019	0
Stage 1	-	-	-	0
Stage 2	-	-	1021	0

Approach	NB	SB
HCM Control Delay, s	0	8.9
HCM LOS		A

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	1019
HCM Lane V/C Ratio	-	-	0.085
HCM Control Delay (s)	-	-	8.9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.3

Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	5	780	1748	4	5	10
Future Vol, veh/h	5	780	1748	4	5	10
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, %	20	1	1	0	0	20
Mvmt Flow	5	848	1900	4	5	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1904	0	-	0	2760	1902
Stage 1	-	-	-	-	1902	-
Stage 2	-	-	-	-	858	-
Critical Hdwy	4.3	-	-	-	6.4	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.38	-	-	-	3.5	3.48
Pot Cap-1 Maneuver	274	-	-	-	22	77
Stage 1	-	-	-	-	130	-
Stage 2	-	-	-	-	419	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	274	-	-	-	21	77
Mov Cap-2 Maneuver	-	-	-	-	21	-
Stage 1	-	-	-	-	126	-
Stage 2	-	-	-	-	419	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	141.9
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	274	-	-	-	41
HCM Lane V/C Ratio	0.02	-	-	-	0.398
HCM Control Delay (s)	18.4	0	-	-	141.9
HCM Lane LOS	C	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	1.4

Intersection	
Int Delay, s/veh	226

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	16	552	1115	643	233	11
Future Vol, veh/h	16	552	1115	643	233	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	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	8	0
Mvmt Flow	17	600	1212	699	253	12

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1911	0	-	0	2196	1562
Stage 1	-	-	-	-	1562	-
Stage 2	-	-	-	-	634	-
Critical Hdwy	4.1	-	-	-	6.48	6.2
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	2.2	-	-	-	3.572	3.3
Pot Cap-1 Maneuver	315	-	-	-	~ 48	139
Stage 1	-	-	-	-	~ 184	-
Stage 2	-	-	-	-	517	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	315	-	-	-	~ 44	139
Mov Cap-2 Maneuver	-	-	-	-	~ 44	-
Stage 1	-	-	-	-	~ 169	-
Stage 2	-	-	-	-	517	-

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	$ 2379.6
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	315	-	-	-	45
HCM Lane V/C Ratio	0.055	-	-	-	5.894
HCM Control Delay (s)	17.1	0	-		$ 2379.6
HCM Lane LOS	C	A	-	-	F
HCM 95th %tile Q(veh)	0.2	-	-	-	30.8

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	8.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	187	101	68	341	205	137
Future Vol, veh/h	187	101	68	341	205	137
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	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	203	110	74	371	223	149

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	313	0	777	258
Stage 1	-	-	-	-	258	-
Stage 2	-	-	-	-	519	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1259	-	368	786
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	601	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1259	-	346	786
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	566	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	23.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	346	786	-	-	1259	-
HCM Lane V/C Ratio	0.644	0.189	-	-	0.059	-
HCM Control Delay (s)	32.4	10.6	-	-	8	-
HCM Lane LOS	D	B	-	-	A	-
HCM 95th %tile Q(veh)	4.3	0.7	-	-	0.2	-

No Action (2044) Unimproved Scenario PM Peak Hour

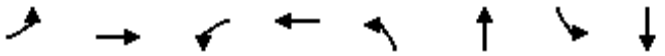
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	15	130	25	60	1398	80	1963
Future Volume (vph)	10	15	130	25	60	1398	80	1963
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	34.0	34.0	34.0	34.0	10.0	26.0	10.0	26.0
Total Split (s)	34.0	34.0	34.0	34.0	10.0	73.0	13.0	76.0
Total Split (%)	28.3%	28.3%	28.3%	28.3%	8.3%	60.8%	10.8%	63.3%
Yellow Time (s)	4.0	4.0	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	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)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 106.5
Natural Cycle: 120
Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Center Dr & Wilmington Dr



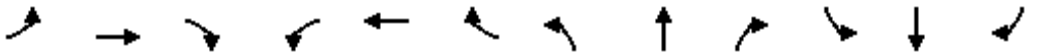
1: Center Dr & Wilmington Dr



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	11	58	137	94	63	1614	84	2077
v/c Ratio	0.05	0.20	0.66	0.30	0.42	0.72	0.38	0.89
Control Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
Total Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	27.5
Queue Length 50th (ft)	7	10	90	16	9	358	13	579
Queue Length 95th (ft)	23	45	155	60	47	621	38	#1035
Internal Link Dist (ft)		126		229		940		666
Turn Bay Length (ft)			75		65		75	
Base Capacity (vph)	351	480	359	488	149	2238	237	2322
Starvation Cap Reductn	0	0	0	0	0	0	0	192
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.12	0.38	0.19	0.42	0.72	0.35	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	40	130	25	65	60	1398	135	80	1963	10
Future Volume (veh/h)	10	15	40	130	25	65	60	1398	135	80	1963	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	11	16	7	137	26	11	63	1472	137	84	2066	11
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	244	179	78	257	179	76	204	2191	203	277	2397	13
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.05	0.66	0.66	0.05	0.66	0.66
Sat Flow, veh/h	1377	1253	548	1399	1252	530	1795	3314	306	1795	3653	19
Grp Volume(v), veh/h	11	0	23	137	0	37	63	791	818	84	1012	1065
Grp Sat Flow(s),veh/h/ln	1377	0	1801	1399	0	1782	1795	1791	1830	1795	1791	1882
Q Serve(g_s), s	0.7	0.0	1.1	9.4	0.0	1.8	1.1	26.7	27.3	1.5	44.4	44.6
Cycle Q Clear(g_c), s	2.5	0.0	1.1	10.5	0.0	1.8	1.1	26.7	27.3	1.5	44.4	44.6
Prop In Lane	1.00		0.30	1.00		0.30	1.00		0.17	1.00		0.01
Lane Grp Cap(c), veh/h	244	0	257	257	0	255	204	1184	1210	277	1175	1235
V/C Ratio(X)	0.05	0.00	0.09	0.53	0.00	0.15	0.31	0.67	0.68	0.30	0.86	0.86
Avail Cap(c_a), veh/h	449	0	525	465	0	519	204	1224	1250	340	1277	1342
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	37.0	41.6	0.0	37.3	19.0	10.2	10.3	9.6	13.5	13.6
Incr Delay (d2), s/veh	0.1	0.0	0.1	1.7	0.0	0.3	0.8	1.3	1.4	0.6	5.8	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.5	3.3	0.0	0.8	0.9	9.6	10.1	0.6	17.3	18.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	0.0	37.2	43.3	0.0	37.6	19.9	11.6	11.7	10.2	19.4	19.2
LnGrp LOS	D	A	D	D	A	D	B	B	B	B	B	B
Approach Vol, veh/h		34			174			1672			2161	
Approach Delay, s/veh		37.6			42.1			12.0			18.9	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.5	70.8		19.2	10.0	70.3		19.2				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	68.0		29.0	5.0	71.0		29.0				
Max Q Clear Time (g_c+I1), s	3.5	29.3		4.5	3.1	46.6		12.5				
Green Ext Time (p_c), s	0.1	17.4		0.1	0.0	18.7		0.5				

Intersection Summary												
HCM 6th Ctrl Delay			17.2									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	62	40	390	40	55	25	493	950	25	1623
Future Volume (vph)	62	40	390	40	55	25	493	950	25	1623
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA	Prot	NA
Protected Phases		4	4 5		8	8 1	5	2	1	6
Permitted Phases	4			8						
Detector Phase	4	4	4 5	8	8	8 1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0	5.0	7.0
Minimum Split (s)	31.0	31.0		31.0	31.0		10.0	26.0	10.0	26.0
Total Split (s)	31.0	31.0		31.0	31.0		32.0	78.0	11.0	57.0
Total Split (%)	25.8%	25.8%		25.8%	25.8%		26.7%	65.0%	9.2%	47.5%
Yellow Time (s)	4.0	4.0		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	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	None		None	None		None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 117.7
Natural Cycle: 150
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: Center Dr & McNeil St



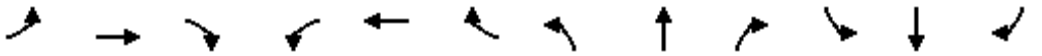


Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	107	411	100	26	519	1037	26	1801
v/c Ratio	0.38	0.56	0.34	0.05	1.31	0.46	0.30	1.19
Control Delay	44.9	24.4	43.5	0.2	193.9	11.6	64.2	122.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.9	24.4	43.5	0.2	193.9	11.6	64.2	122.0
Queue Length 50th (ft)	71	207	66	0	~523	221	20	~899
Queue Length 95th (ft)	126	307	118	1	#738	272	51	#1041
Internal Link Dist (ft)	2890		342			666		1862
Turn Bay Length (ft)		295		140	210		100	
Base Capacity (vph)	307	735	327	482	396	2266	88	1518
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.56	0.31	0.05	1.31	0.46	0.30	1.19

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	40	390	40	55	25	493	950	35	25	1623	88
Future Volume (veh/h)	62	40	390	40	55	25	493	950	35	25	1623	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	65	42	400	42	58	7	519	1000	35	26	1708	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	1	1	1
Cap, veh/h	237	142	696	169	217	363	408	2263	79	44	1516	79
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.23	0.64	0.64	0.02	0.44	0.44
Sat Flow, veh/h	902	681	1598	606	1042	1560	1795	3530	124	1795	3462	181
Grp Volume(v), veh/h	107	0	400	100	0	7	519	507	528	26	878	920
Grp Sat Flow(s),veh/h/ln	1583	0	1598	1648	0	1560	1795	1791	1863	1795	1791	1853
Q Serve(g_s), s	0.6	0.0	22.4	0.0	0.0	0.4	27.0	16.9	16.9	1.7	52.0	52.0
Cycle Q Clear(g_c), s	6.1	0.0	22.4	5.5	0.0	0.4	27.0	16.9	16.9	1.7	52.0	52.0
Prop In Lane	0.61		1.00	0.42		1.00	1.00		0.07	1.00		0.10
Lane Grp Cap(c), veh/h	379	0	696	387	0	363	408	1148	1194	44	784	811
V/C Ratio(X)	0.28	0.00	0.57	0.26	0.00	0.02	1.27	0.44	0.44	0.60	1.12	1.13
Avail Cap(c_a), veh/h	395	0	713	403	0	379	408	1148	1194	91	784	811
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.5	0.0	25.2	39.3	0.0	35.1	45.9	10.7	10.7	57.4	33.4	33.4
Incr Delay (d2), s/veh	0.4	0.0	1.1	0.4	0.0	0.0	140.2	0.3	0.3	12.4	70.4	75.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	8.6	2.5	0.0	0.2	27.8	6.4	6.7	0.9	37.2	39.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.9	0.0	26.3	39.7	0.0	35.1	186.1	11.0	10.9	69.8	103.8	108.8
LnGrp LOS	D	A	C	D	A	D	F	B	B	E	F	F
Approach Vol, veh/h		507			107			1554			1824	
Approach Delay, s/veh		29.2			39.4			69.4			105.8	
Approach LOS		C			D			E			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.9	81.1		29.8	32.0	57.0		29.8				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	73.0		26.0	27.0	52.0		26.0				
Max Q Clear Time (g_c+I1), s	3.7	18.9		24.4	29.0	54.0		7.5				
Green Ext Time (p_c), s	0.0	8.8		0.4	0.0	0.0		0.4				

Intersection Summary			
HCM 6th Ctrl Delay		80.1	
HCM 6th LOS		F	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	206	20	20	15	45	862	15	1661
Future Volume (vph)	206	20	20	15	45	862	15	1661
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	32.0	32.0	32.0	32.0	10.0	23.0	10.0	23.0
Total Split (s)	32.0	32.0	32.0	32.0	10.0	78.0	10.0	78.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	8.3%	65.0%	8.3%	65.0%
Yellow Time (s)	4.0	4.0	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	1.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 116.8
Natural Cycle: 110
Control Type: Actuated-Uncoordinated

Splits and Phases: 3: Center Dr & Bobs Hollow Ln





Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	285	48	47	944	16	2083
v/c Ratio	0.93	0.14	0.35	0.42	0.04	0.98
Control Delay	79.9	31.6	15.1	10.7	6.1	36.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.9	31.6	15.1	10.7	6.1	36.6
Queue Length 50th (ft)	211	23	10	146	4	~808
Queue Length 95th (ft)	#377	56	28	241	10	#1021
Internal Link Dist (ft)	147	236		701		1014
Turn Bay Length (ft)			85		100	
Base Capacity (vph)	323	360	134	2265	377	2135
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.13	0.35	0.42	0.04	0.98

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	20	45	20	15	10	45	862	35	15	1661	318
Future Volume (veh/h)	206	20	45	20	15	10	45	862	35	15	1661	318
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.98	1.00		0.96	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	217	21	41	21	16	2	47	907	37	16	1748	322
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	298	23	46	223	160	18	139	2238	91	403	1904	340
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.03	0.64	0.64	0.02	0.62	0.62
Sat Flow, veh/h	1133	110	214	818	746	85	1795	3503	143	1810	3058	546
Grp Volume(v), veh/h	279	0	0	39	0	0	47	464	480	16	1008	1062
Grp Sat Flow(s),veh/h/ln	1457	0	0	1649	0	0	1795	1791	1854	1810	1805	1799
Q Serve(g_s), s	19.5	0.0	0.0	0.0	0.0	0.0	1.1	14.6	14.6	0.4	55.3	62.9
Cycle Q Clear(g_c), s	21.5	0.0	0.0	2.0	0.0	0.0	1.1	14.6	14.6	0.4	55.3	62.9
Prop In Lane	0.78		0.15	0.54		0.05	1.00		0.08	1.00		0.30
Lane Grp Cap(c), veh/h	367	0	0	401	0	0	139	1144	1185	403	1124	1120
V/C Ratio(X)	0.76	0.00	0.00	0.10	0.00	0.00	0.34	0.41	0.41	0.04	0.90	0.95
Avail Cap(c_a), veh/h	395	0	0	430	0	0	156	1144	1185	450	1138	1134
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	0.0	0.0	36.5	0.0	0.0	27.9	10.2	10.2	8.3	18.7	20.1
Incr Delay (d2), s/veh	7.8	0.0	0.0	0.1	0.0	0.0	1.4	0.2	0.2	0.0	9.5	15.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	0.0	0.0	0.9	0.0	0.0	0.9	5.5	5.7	0.1	24.1	28.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.8	0.0	0.0	36.6	0.0	0.0	29.3	10.4	10.4	8.3	28.2	35.8
LnGrp LOS	D	A	A	D	A	A	C	B	B	A	C	D
Approach Vol, veh/h		279			39			991			2086	
Approach Delay, s/veh		51.8			36.6			11.3			31.9	
Approach LOS		D			D			B			C	

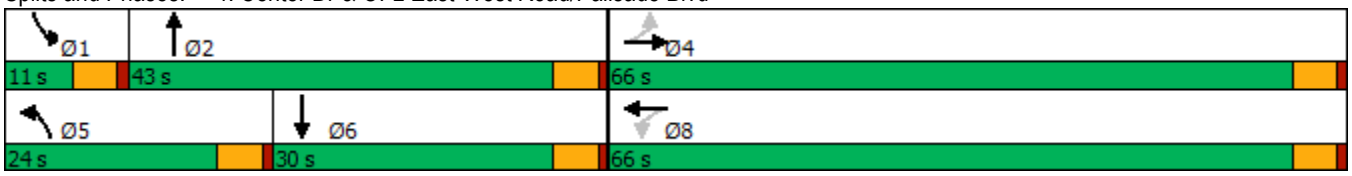
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.0	79.0		29.8	8.9	77.1		29.8				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	73.0		27.0	5.0	73.0		27.0				
Max Q Clear Time (g_c+I1), s	2.4	16.6		23.5	3.1	64.9		4.0				
Green Ext Time (p_c), s	0.0	7.6		0.5	0.0	7.2		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		27.6	
HCM 6th LOS		C	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	404	223	40	124	743	315	35	580
Future Volume (vph)	404	223	40	124	743	315	35	580
Turn Type	Perm	NA	Perm	NA	Prot	NA	Prot	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8					
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	39.0	39.0	39.0	39.0	10.0	27.0	10.0	27.0
Total Split (s)	66.0	66.0	66.0	66.0	24.0	43.0	11.0	30.0
Total Split (%)	55.0%	55.0%	55.0%	55.0%	20.0%	35.8%	9.2%	25.0%
Yellow Time (s)	4.0	4.0	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	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	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated

Splits and Phases: 4: Center Dr & OFL East-West Road/Palisade Blvd





Lane Group	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	2106	42	168	782	353	37	838
v/c Ratio	2.67	0.23	0.19	2.90	0.29	0.44	1.17
Control Delay	773.8	20.8	15.0	883.0	29.4	71.2	131.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	773.8	20.8	15.0	883.0	29.4	71.2	131.4
Queue Length 50th (ft)	~2741	18	61	~1042	107	28	~394
Queue Length 95th (ft)	#3004	44	103	#1282	149	65	#525
Internal Link Dist (ft)	391		463		1014		681
Turn Bay Length (ft)				115		115	
Base Capacity (vph)	788	180	906	270	1200	87	716
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	2.67	0.23	0.19	2.90	0.29	0.43	1.17

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	404	223	1374	40	124	35	743	315	20	35	580	216
Future Volume (veh/h)	404	223	1374	40	124	35	743	315	20	35	580	216
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.98	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1900	1900	1870	1870	1870	1900	1900	1900
Adj Flow Rate, veh/h	425	235	1379	42	131	18	782	332	17	37	611	196
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	0	0	0	2	2	2	0	0	0
Cap, veh/h	185	82	482	265	829	114	282	1158	59	53	558	179
Arrive On Green	0.51	0.51	0.51	0.51	0.51	0.51	0.16	0.34	0.34	0.03	0.21	0.21
Sat Flow, veh/h	292	162	948	318	1630	224	1781	3435	175	1810	2678	858
Grp Volume(v), veh/h	2039	0	0	42	0	149	782	171	178	37	411	396
Grp Sat Flow(s),veh/h/ln	1402	0	0	318	0	1854	1781	1777	1833	1810	1805	1731
Q Serve(g_s), s	55.8	0.0	0.0	0.0	0.0	5.2	19.0	8.5	8.6	2.4	25.0	25.0
Cycle Q Clear(g_c), s	61.0	0.0	0.0	6.9	0.0	5.2	19.0	8.5	8.6	2.4	25.0	25.0
Prop In Lane	0.21		0.68	1.00		0.12	1.00		0.10	1.00		0.50
Lane Grp Cap(c), veh/h	749	0	0	265	0	943	282	599	618	53	376	361
V/C Ratio(X)	2.72	0.00	0.00	0.16	0.00	0.16	2.77	0.29	0.29	0.69	1.09	1.10
Avail Cap(c_a), veh/h	749	0	0	265	0	943	282	599	618	90	376	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.4	0.0	0.0	16.2	0.0	15.8	50.5	29.2	29.2	57.7	47.5	47.5
Incr Delay (d2), s/veh	778.7	0.0	0.0	0.3	0.0	0.1	807.6	0.3	0.3	14.8	74.1	76.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	183.9	0.0	0.0	0.7	0.0	2.2	71.7	3.7	3.8	1.3	18.9	18.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	812.2	0.0	0.0	16.5	0.0	15.8	858.1	29.4	29.5	72.5	121.6	123.5
LnGrp LOS	F	A	A	B	A	B	F	C	C	E	F	F
Approach Vol, veh/h		2039			191			1131			844	
Approach Delay, s/veh		812.2			16.0			602.4			120.4	
Approach LOS		F			B			F			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.5	45.5		66.0	24.0	30.0		66.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	38.0		61.0	19.0	25.0		61.0				
Max Q Clear Time (g_c+I1), s	4.4	10.6		63.0	21.0	27.0		8.9				
Green Ext Time (p_c), s	0.0	2.1		0.0	0.0	0.0		2.1				

Intersection Summary		
HCM 6th Ctrl Delay		580.7
HCM 6th LOS		F

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	40	110	30	724	721
Future Volume (vph)	40	110	30	724	721
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	7		5	2	6
Permitted Phases		7	2		
Detector Phase	7	7	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	10.0	36.0	24.0	12.0
Total Split (s)	25.0	25.0	36.0	95.0	59.0
Total Split (%)	20.8%	20.8%	30.0%	79.2%	49.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 43.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated

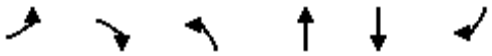
Splits and Phases: 5: Center Dr & Civic Dr





Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	42	116	32	762	776
v/c Ratio	0.12	0.28	0.05	0.33	0.42
Control Delay	25.6	9.3	3.2	4.3	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	9.3	3.2	4.3	12.3
Queue Length 50th (ft)	7	0	2	38	40
Queue Length 95th (ft)	54	48	9	68	245
Internal Link Dist (ft)	652			681	2072
Turn Bay Length (ft)	150		115		
Base Capacity (vph)	950	942	1379	3388	3133
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.04	0.12	0.02	0.22	0.25

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	110	30	724	721	16
Future Volume (veh/h)	40	110	30	724	721	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1796	1900	1885	1856	1870	1870
Adj Flow Rate, veh/h	42	15	32	762	759	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	7	0	1	3	2	2
Cap, veh/h	107	101	480	2159	1462	31
Arrive On Green	0.06	0.06	0.04	0.61	0.41	0.41
Sat Flow, veh/h	1711	1610	1795	3618	3652	75
Grp Volume(v), veh/h	42	15	32	762	379	396
Grp Sat Flow(s),veh/h/ln	1711	1610	1795	1763	1777	1857
Q Serve(g_s), s	0.7	0.3	0.3	3.3	4.9	4.9
Cycle Q Clear(g_c), s	0.7	0.3	0.3	3.3	4.9	4.9
Prop In Lane	1.00	1.00	1.00			0.04
Lane Grp Cap(c), veh/h	107	101	480	2159	730	763
V/C Ratio(X)	0.39	0.15	0.07	0.35	0.52	0.52
Avail Cap(c_a), veh/h	1112	1047	2219	10312	3118	3259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	13.6	4.5	2.9	6.8	6.8
Incr Delay (d2), s/veh	2.3	0.7	0.1	0.1	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.3	0.0	0.2	1.2	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.2	14.3	4.6	3.0	7.4	7.3
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	57			794	775	
Approach Delay, s/veh	15.7			3.1	7.3	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		23.8		6.9	6.2	17.6
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		90.0		20.0	31.0	54.0
Max Q Clear Time (g_c+I1), s		5.3		2.7	2.3	6.9
Green Ext Time (p_c), s		6.5		0.1	0.1	5.7

Intersection Summary	
HCM 6th Ctrl Delay	5.6
HCM 6th LOS	A

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	406	478	307	390	565
Future Volume (vph)	406	478	307	390	565
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4			
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	28.0	28.0	10.0	39.0	39.0
Total Split (s)	41.0	41.0	33.0	79.0	46.0
Total Split (%)	34.2%	34.2%	27.5%	65.8%	38.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None

Intersection Summary
Cycle Length: 120
Actuated Cycle Length: 109.6
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: DuPont Steilacoom Rd & Center Dr



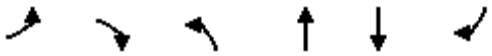
6: DuPont Steilacoom Rd & Center Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	423	498	320	406	1068
v/c Ratio	0.86	0.64	0.86	0.38	0.89
Control Delay	56.4	7.0	65.2	12.1	39.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	56.4	7.0	65.2	12.1	39.2
Queue Length 50th (ft)	304	0	238	147	350
Queue Length 95th (ft)	#468	88	#394	212	#478
Internal Link Dist (ft)	1791			3455	484
Turn Bay Length (ft)			150		
Base Capacity (vph)	576	829	423	1199	1320
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.60	0.76	0.34	0.81

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	406	478	307	390	565	460
Future Volume (veh/h)	406	478	307	390	565	460
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1841	1781	1811	1856	1856
Adj Flow Rate, veh/h	423	147	320	406	589	358
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	4	8	6	3	3
Cap, veh/h	479	420	362	1118	725	440
Arrive On Green	0.27	0.27	0.21	0.62	0.35	0.35
Sat Flow, veh/h	1781	1560	1697	1811	2179	1268
Grp Volume(v), veh/h	423	147	320	406	498	449
Grp Sat Flow(s),veh/h/ln	1781	1560	1697	1811	1763	1592
Q Serve(g_s), s	20.1	6.7	16.1	9.7	22.6	22.6
Cycle Q Clear(g_c), s	20.1	6.7	16.1	9.7	22.6	22.6
Prop In Lane	1.00	1.00	1.00			0.80
Lane Grp Cap(c), veh/h	479	420	362	1118	612	553
V/C Ratio(X)	0.88	0.35	0.88	0.36	0.81	0.81
Avail Cap(c_a), veh/h	728	637	539	1521	820	741
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.9	26.0	33.6	8.3	26.2	26.2
Incr Delay (d2), s/veh	8.4	0.5	11.2	0.2	4.6	5.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	0.1	7.6	3.5	9.9	9.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.3	26.5	44.8	8.5	30.8	31.3
LnGrp LOS	D	C	D	A	C	C
Approach Vol, veh/h	570			726	947	
Approach Delay, s/veh	36.0			24.5	31.0	
Approach LOS	D			C	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		59.4		28.7	23.8	35.6
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		74.0		36.0	28.0	41.0
Max Q Clear Time (g_c+I1), s		11.7		22.1	18.1	24.6
Green Ext Time (p_c), s		2.9		1.6	0.7	6.0

Intersection Summary		
HCM 6th Ctrl Delay		30.2
HCM 6th LOS		C

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	20	15	135	235	120
Future Vol, veh/h	105	20	15	135	235	120
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	108	21	15	139	242	124
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.4	9.1	10.7
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	84%	0%
Vol Thru, %	0%	100%	0%	66%
Vol Right, %	0%	0%	16%	34%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	15	135	125	355
LT Vol	15	0	105	0
Through Vol	0	135	0	235
RT Vol	0	0	20	120
Lane Flow Rate	15	139	129	366
Geometry Grp	7	7	2	5
Degree of Util (X)	0.024	0.199	0.185	0.44
Departure Headway (Hd)	5.646	5.142	5.167	4.33
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	634	697	692	831
Service Time	3.384	2.88	3.215	2.361
HCM Lane V/C Ratio	0.024	0.199	0.186	0.44
HCM Control Delay	8.5	9.2	9.4	10.7
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.1	0.7	0.7	2.3

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	360	30	15	585	30	0	0	0	25	5	150
Future Vol, veh/h	65	360	30	15	585	30	0	0	0	25	5	150
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	-	-	-	-	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	71	391	33	16	636	33	0	0	0	27	5	163

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	669	0	0	424	0	0	1319	1251	408	1235	1251	653
Stage 1	-	-	-	-	-	-	550	550	-	685	685	-
Stage 2	-	-	-	-	-	-	769	701	-	550	566	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	921	-	-	1135	-	-	134	172	643	153	172	467
Stage 1	-	-	-	-	-	-	519	516	-	438	448	-
Stage 2	-	-	-	-	-	-	394	441	-	519	507	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	921	-	-	1135	-	-	77	151	643	139	151	467
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	151	-	139	151	-
Stage 1	-	-	-	-	-	-	467	464	-	394	438	-
Stage 2	-	-	-	-	-	-	247	431	-	467	456	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.2	0	20.4
HCM LOS			A	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	921	-	-	1135	-	-	141	467
HCM Lane V/C Ratio	-	0.077	-	-	0.014	-	-	0.231	0.349
HCM Control Delay (s)	0	9.2	0	-	8.2	0	-	38.1	16.8
HCM Lane LOS	A	A	A	-	A	A	-	E	C
HCM 95th %tile Q(veh)	-	0.2	-	-	0	-	-	0.8	1.5

Intersection	
Intersection Delay, s/veh	139.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	100	5	385	175	123	5	122	214	220	200	0
Future Vol, veh/h	0	100	5	385	175	123	5	122	214	220	200	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	109	5	418	190	134	5	133	233	239	217	0
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	16.9	260.4	33.2	60.8
HCM LOS	C	F	D	F

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	1%	0%	56%	52%
Vol Thru, %	36%	95%	26%	48%
Vol Right, %	63%	5%	18%	0%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	341	105	683	420
LT Vol	5	0	385	220
Through Vol	122	100	175	200
RT Vol	214	5	123	0
Lane Flow Rate	371	114	742	457
Geometry Grp	1	1	1	1
Degree of Util (X)	0.747	0.277	1.511	0.941
Departure Headway (Hd)	8.655	10.116	7.326	8.765
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	423	357	497	415
Service Time	6.655	8.116	5.384	6.765
HCM Lane V/C Ratio	0.877	0.319	1.493	1.101
HCM Control Delay	33.2	16.9	260.4	60.8
HCM Lane LOS	D	C	F	F
HCM 95th-tile Q	6.1	1.1	38.3	10.6

MOVEMENT SUMMARY

Site: 101 [INT 10 No Action_PM (Site Folder: DuPont)]

DuPont-Steilacoom Rd & I-5 On and Off-Ramps
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: DuPont-Steilcoom Rd														
8	T1	100	0.0	109	0.0	0.216	11.8	LOS B	1.4	35.1	0.86	0.87	0.86	33.6
18	R2	140	0.0	152	0.0	0.216	11.1	LOS B	1.6	39.2	0.88	0.84	0.88	32.9
Approach		240	0.0	261	0.0	0.216	11.4	LOS B	1.6	39.2	0.87	0.85	0.87	33.2
East: I-5 On- and Off-Ramps														
1	L2	230	0.0	250	0.0	0.315	10.1	LOS B	2.2	55.5	0.34	0.57	0.34	35.6
16	R2	657	1.0	714	1.0	0.315	3.8	LOS A	2.2	55.5	0.09	0.48	0.09	36.3
Approach		887	0.7	964	0.7	0.315	5.4	LOS A	2.2	55.5	0.16	0.51	0.16	36.1
North: RoadName														
7	L2	938	1.0	1020	1.0	0.472	11.1	LOS B	3.3	83.8	0.53	0.68	0.53	34.0
4	T1	125	0.0	136	0.0	0.472	4.9	LOS A	3.3	83.8	0.52	0.66	0.52	34.4
Approach		1063	0.9	1155	0.9	0.472	10.4	LOS B	3.3	83.8	0.53	0.68	0.53	34.0
All Vehicles		2190	0.7	2380	0.7	0.472	8.5	LOS A	3.3	83.8	0.42	0.63	0.42	34.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	8.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	36	5	10	140	5
Future Vol, veh/h	10	36	5	10	140	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	0	0	20	0	0
Mvmt Flow	11	39	5	11	152	5

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	11	16
Stage 1	-	-	0	0
Stage 2	-	-	11	16
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	1014	882
Stage 1	-	-	-	-
Stage 2	-	-	1017	886
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	1014	0
Mov Cap-2 Maneuver	-	-	1014	0
Stage 1	-	-	-	0
Stage 2	-	-	1017	0

Approach	NB	SB
HCM Control Delay, s	0	9.2
HCM LOS		A

Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	1014
HCM Lane V/C Ratio	-	-	0.155
HCM Control Delay (s)	-	-	9.2
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.5

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	1996	1078	5	5	10
Future Vol, veh/h	10	1996	1078	5	5	10
Conflicting Peds, #/hr	0	0	0	0	46	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, %	20	0	0	0	0	10
Mvmt Flow	11	2170	1172	5	5	11

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1177	0	-	0	3413	1175
Stage 1	-	-	-	-	1175	-
Stage 2	-	-	-	-	2238	-
Critical Hdwy	4.3	-	-	-	6.4	6.3
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.38	-	-	-	3.5	3.39
Pot Cap-1 Maneuver	534	-	-	-	8	225
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	88	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	534	-	-	-	8	225
Mov Cap-2 Maneuver	-	-	-	-	8	-
Stage 1	-	-	-	-	296	-
Stage 2	-	-	-	-	88	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	$ 351.1
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	534	-	-	-	22
HCM Lane V/C Ratio	0.02	-	-	-	0.741
HCM Control Delay (s)	11.9	0	-	-	$ 351.1
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	2.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2634.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	14	1308	768	320	698	19
Future Vol, veh/h	14	1308	768	320	698	19
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, %	0	0	0	0	3	0
Mvmt Flow	15	1422	835	348	759	21

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1183	0	-	0	2461	1009
Stage 1	-	-	-	-	1009	-
Stage 2	-	-	-	-	1452	-
Critical Hdwy	4.1	-	-	-	6.43	6.2
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.2	-	-	-	3.527	3.3
Pot Cap-1 Maneuver	597	-	-	-	~ 33	294
Stage 1	-	-	-	-	~ 351	-
Stage 2	-	-	-	-	~ 214	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	597	-	-	-	~ 29	294
Mov Cap-2 Maneuver	-	-	-	-	~ 29	-
Stage 1	-	-	-	-	~ 309	-
Stage 2	-	-	-	-	~ 214	-

Approach	EB	WB	SB
HCM Control Delay, s	0.1	0	$ 11488.7
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	597	-	-	-	30
HCM Lane V/C Ratio	0.025	-	-	-	25.978
HCM Control Delay (s)	11.2	0	-	$	11488.7
HCM Lane LOS	B	A	-	-	F
HCM 95th %tile Q(veh)	0.1	-	-	-	96.7

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	13.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	402	240	160	254	141	94
Future Vol, veh/h	402	240	160	254	141	94
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	-	100	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	437	261	174	276	153	102

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	698	0	1192	568
Stage 1	-	-	-	-	568	-
Stage 2	-	-	-	-	624	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	908	-	209	526
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	538	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	908	-	169	526
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	571	-
Stage 2	-	-	-	-	435	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.8	65.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	169	526	-	-	908	-
HCM Lane V/C Ratio	0.907	0.194	-	-	0.192	-
HCM Control Delay (s)	100.9	13.5	-	-	9.9	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	6.7	0.7	-	-	0.7	-

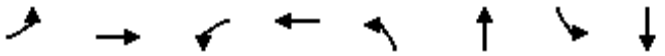
No Action (2044) Improved Scenario AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	5	10	75	10	30	1684	55	1263
Future Volume (vph)	5	10	75	10	30	1684	55	1263
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	34.0	34.0	34.0	34.0	10.0	26.0	10.0	26.0
Total Split (s)	34.0	34.0	34.0	34.0	10.0	76.0	10.0	76.0
Total Split (%)	28.3%	28.3%	28.3%	28.3%	8.3%	63.3%	8.3%	63.3%
Yellow Time (s)	4.0	4.0	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	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)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	14.5	14.5	14.5	14.5	65.6	64.8	66.6	66.9
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.73	0.72	0.74	0.75
v/c Ratio	0.02	0.22	0.38	0.19	0.10	0.76	0.30	0.52
Control Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.9
LOS	D	B	D	B	A	B	A	A
Approach Delay		16.5		34.1		15.7		9.8
Approach LOS		B		C		B		A

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 89.5	
Natural Cycle: 100	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.76	
Intersection Signal Delay: 14.1	Intersection LOS: B
Intersection Capacity Utilization 71.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 1: Center Dr & Wilmington Dr





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	5	69	79	53	32	1878	58	1345
v/c Ratio	0.02	0.22	0.38	0.19	0.10	0.76	0.30	0.52
Control Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Delay	37.4	15.0	45.8	16.8	5.1	15.9	9.8	9.9
Queue Length 50th (ft)	3	6	49	6	4	393	7	206
Queue Length 95th (ft)	14	45	95	40	18	#837	33	421
Internal Link Dist (ft)		126		229		940		666
Turn Bay Length (ft)			75		65		75	
Base Capacity (vph)	536	684	514	651	314	2559	196	2601
Starvation Cap Reductn	0	0	0	0	0	0	0	303
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.10	0.15	0.08	0.10	0.73	0.30	0.59

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	10	55	75	10	40	30	1684	100	55	1263	15
Future Volume (veh/h)	5	10	55	75	10	40	30	1684	100	55	1263	15
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		1.00	1.00		0.98	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1856	1856	1856	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	5	11	7	79	11	5	32	1773	102	58	1329	15
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	3	3	3	2	2	2	1	1	1
Cap, veh/h	223	112	72	220	124	57	381	2270	129	243	2348	26
Arrive On Green	0.10	0.10	0.10	0.10	0.10	0.10	0.06	0.66	0.66	0.05	0.65	0.65
Sat Flow, veh/h	1396	1085	691	1384	1200	546	1781	3417	195	1795	3628	41
Grp Volume(v), veh/h	5	0	18	79	0	16	32	915	960	58	656	688
Grp Sat Flow(s),veh/h/ln	1396	0	1776	1384	0	1746	1781	1777	1835	1795	1791	1878
Q Serve(g_s), s	0.3	0.0	0.7	4.4	0.0	0.7	0.4	28.6	29.6	0.8	16.4	16.4
Cycle Q Clear(g_c), s	0.9	0.0	0.7	5.1	0.0	0.7	0.4	28.6	29.6	0.8	16.4	16.4
Prop In Lane	1.00		0.39	1.00		0.31	1.00		0.11	1.00		0.02
Lane Grp Cap(c), veh/h	223	0	184	220	0	181	381	1180	1219	243	1159	1215
V/C Ratio(X)	0.02	0.00	0.10	0.36	0.00	0.09	0.08	0.77	0.79	0.24	0.57	0.57
Avail Cap(c_a), veh/h	583	0	642	577	0	631	381	1572	1623	274	1584	1661
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.0	0.0	32.6	34.9	0.0	32.5	5.3	9.3	9.5	10.4	7.9	7.9
Incr Delay (d2), s/veh	0.0	0.0	0.2	1.0	0.0	0.2	0.1	1.8	1.9	0.5	0.4	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.3	1.5	0.0	0.3	0.1	8.8	9.5	0.4	5.1	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.0	0.0	32.8	35.9	0.0	32.8	5.4	11.1	11.4	10.9	8.3	8.3
LnGrp LOS	C	A	C	D	A	C	A	B	B	B	A	A
Approach Vol, veh/h		23			95			1907			1402	
Approach Delay, s/veh		32.8			35.4			11.2			8.4	
Approach LOS		C			D			B			A	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.6	58.3		13.3	10.0	56.9		13.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	71.0		29.0	5.0	71.0		29.0				
Max Q Clear Time (g_c+I1), s	2.8	31.6		2.9	2.4	18.4		7.1				
Green Ext Time (p_c), s	0.0	21.7		0.1	0.0	12.7		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		10.9	
HCM 6th LOS		B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	104	30	499	30	25	15	341	1363	15	794
Future Volume (vph)	104	30	499	30	25	15	341	1363	15	794
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA	Prot	NA
Protected Phases		4	4 5		8	8 1	5	2	1	6
Permitted Phases	4			8						
Detector Phase	4	4	4 5	8	8	8 1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0	5.0	7.0
Minimum Split (s)	31.0	31.0		31.0	31.0		10.0	26.0	10.0	26.0
Total Split (s)	41.0	41.0		41.0	41.0		24.0	69.0	10.0	55.0
Total Split (%)	34.2%	34.2%		34.2%	34.2%		20.0%	57.5%	8.3%	45.8%
Yellow Time (s)	4.0	4.0		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	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	None		None	None		None	None	None	None
Act Effct Green (s)		25.8	47.3		25.8	36.9	16.0	52.0	5.5	35.4
Actuated g/C Ratio		0.28	0.50		0.28	0.39	0.17	0.55	0.06	0.38
v/c Ratio		0.38	0.64		0.15	0.03	0.64	0.77	0.16	0.68
Control Delay		34.1	20.3		30.3	0.1	46.0	21.9	57.9	27.7
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		34.1	20.3		30.3	0.1	46.0	21.9	57.9	27.7
LOS		C	C		C	A	D	C	E	C
Approach Delay		23.2			23.8			26.7		28.2
Approach LOS		C			C			C		C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 93.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 26.3	Intersection LOS: C
Intersection Capacity Utilization 72.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 2: Center Dr & McNeil St





Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	141	525	58	16	359	1461	16	878
v/c Ratio	0.38	0.64	0.15	0.03	0.64	0.77	0.16	0.68
Control Delay	34.1	20.3	30.3	0.1	46.0	21.9	57.9	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.1	20.3	30.3	0.1	46.0	21.9	57.9	27.7
Queue Length 50th (ft)	75	213	29	0	117	414	11	245
Queue Length 95th (ft)	145	375	67	0	189	566	37	344
Internal Link Dist (ft)	2890		342			666		1862
Turn Bay Length (ft)		295		140	210		100	
Base Capacity (vph)	569	896	603	722	745	2445	101	2010
Starvation Cap Reductn	0	0	0	0	0	42	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.25	0.59	0.10	0.02	0.48	0.61	0.16	0.44

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	104	30	499	30	25	15	341	1363	25	15	794	40
Future Volume (veh/h)	104	30	499	30	25	15	341	1363	25	15	794	40
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1811	1811	1811	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	109	32	505	32	26	5	359	1435	25	16	836	39
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	6	6	6	2	2	2	2	2	2
Cap, veh/h	421	115	703	311	234	500	458	1801	31	33	1348	63
Arrive On Green	0.31	0.31	0.31	0.31	0.31	0.31	0.13	0.50	0.50	0.02	0.39	0.39
Sat Flow, veh/h	1135	374	1598	804	762	1535	3456	3574	62	1781	3457	161
Grp Volume(v), veh/h	141	0	505	58	0	5	359	713	747	16	430	445
Grp Sat Flow(s),veh/h/ln	1509	0	1598	1567	0	1535	1728	1777	1859	1781	1777	1841
Q Serve(g_s), s	3.8	0.0	22.8	0.0	0.0	0.2	8.9	29.3	29.3	0.8	17.1	17.1
Cycle Q Clear(g_c), s	5.9	0.0	22.8	2.0	0.0	0.2	8.9	29.3	29.3	0.8	17.1	17.1
Prop In Lane	0.77		1.00	0.55		1.00	1.00		0.03	1.00		0.09
Lane Grp Cap(c), veh/h	536	0	703	545	0	500	458	895	937	33	693	718
V/C Ratio(X)	0.26	0.00	0.72	0.11	0.00	0.01	0.78	0.80	0.80	0.49	0.62	0.62
Avail Cap(c_a), veh/h	687	0	865	699	0	656	746	1292	1352	101	1009	1046
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.0	0.0	20.2	21.8	0.0	20.1	37.0	18.1	18.1	42.8	21.6	21.6
Incr Delay (d2), s/veh	0.3	0.0	2.2	0.1	0.0	0.0	3.0	2.3	2.2	10.8	0.9	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	8.6	0.9	0.0	0.1	3.8	11.3	11.8	0.4	6.9	7.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.3	0.0	22.4	21.9	0.0	20.1	39.9	20.4	20.3	53.6	22.5	22.5
LnGrp LOS	C	A	C	C	A	C	D	C	C	D	C	C
Approach Vol, veh/h		646			63			1819			891	
Approach Delay, s/veh		22.6			21.8			24.2			23.1	
Approach LOS		C			C			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	49.4		32.0	16.7	39.3		32.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	64.0		36.0	19.0	50.0		36.0				
Max Q Clear Time (g_c+I1), s	2.8	31.3		24.8	10.9	19.1		4.0				
Green Ext Time (p_c), s	0.0	13.0		2.3	0.8	6.1		0.3				

Intersection Summary			
HCM 6th Ctrl Delay		23.6	
HCM 6th LOS		C	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	274	20	45	10	80	1407	15	679
Future Volume (vph)	274	20	45	10	80	1407	15	679
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	32.0	32.0	32.0	32.0	10.0	23.0	10.0	23.0
Total Split (s)	47.0	47.0	47.0	47.0	11.0	63.0	10.0	62.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	9.2%	52.5%	8.3%	51.7%
Yellow Time (s)	4.0	4.0	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	1.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)		35.4		35.4	53.7	51.7	50.6	46.8
Actuated g/C Ratio		0.35		0.35	0.53	0.51	0.50	0.46
v/c Ratio		0.85		0.18	0.31	0.86	0.11	0.62
Control Delay		50.5		21.3	14.8	29.0	13.0	22.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		50.5		21.3	14.8	29.0	13.0	22.4
LOS		D		C	B	C	B	C
Approach Delay		50.5		21.3		28.2		22.2
Approach LOS		D		C		C		C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 100.9	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 29.0	Intersection LOS: C
Intersection Capacity Utilization 83.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Center Dr & Bobs Hollow Ln

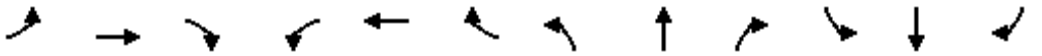




Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	383	84	84	1497	16	933
v/c Ratio	0.85	0.18	0.31	0.86	0.11	0.62
Control Delay	50.5	21.3	14.8	29.0	13.0	22.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.5	21.3	14.8	29.0	13.0	22.4
Queue Length 50th (ft)	229	29	26	415	5	243
Queue Length 95th (ft)	#444	72	52	#671	15	326
Internal Link Dist (ft)	147	236		701		1014
Turn Bay Length (ft)			85		100	
Base Capacity (vph)	556	562	273	2055	152	1918
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.15	0.31	0.73	0.11	0.49

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	274	20	70	45	10	25	80	1407	15	15	679	207
Future Volume (veh/h)	274	20	70	45	10	25	80	1407	15	15	679	207
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.98	1.00		0.97	1.00		0.97	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1841	1841	1841	1870	1870	1870	1841	1841	1841
Adj Flow Rate, veh/h	288	21	67	47	11	12	84	1481	15	16	715	194
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	5	5	4	4	4	2	2	2	4	4	4
Cap, veh/h	402	24	76	362	85	78	349	1829	19	172	1293	351
Arrive On Green	0.30	0.30	0.30	0.30	0.30	0.30	0.05	0.51	0.51	0.02	0.48	0.48
Sat Flow, veh/h	1089	79	253	971	282	259	1781	3603	36	1753	2716	737
Grp Volume(v), veh/h	376	0	0	70	0	0	84	730	766	16	460	449
Grp Sat Flow(s),veh/h/ln	1422	0	0	1512	0	0	1781	1777	1862	1753	1749	1704
Q Serve(g_s), s	18.9	0.0	0.0	0.0	0.0	0.0	2.0	29.9	30.0	0.4	16.3	16.3
Cycle Q Clear(g_c), s	21.7	0.0	0.0	2.8	0.0	0.0	2.0	29.9	30.0	0.4	16.3	16.3
Prop In Lane	0.77		0.18	0.67		0.17	1.00		0.02	1.00		0.43
Lane Grp Cap(c), veh/h	502	0	0	525	0	0	349	902	945	172	833	811
V/C Ratio(X)	0.75	0.00	0.00	0.13	0.00	0.00	0.24	0.81	0.81	0.09	0.55	0.55
Avail Cap(c_a), veh/h	752	0	0	776	0	0	383	1184	1241	240	1145	1115
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	0.0	22.2	0.0	0.0	12.0	17.9	17.9	15.7	16.2	16.2
Incr Delay (d2), s/veh	2.3	0.0	0.0	0.1	0.0	0.0	0.4	3.3	3.1	0.2	0.6	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.5	0.0	0.0	1.1	0.0	0.0	0.8	11.7	12.3	0.2	6.1	6.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	30.8	0.0	0.0	22.3	0.0	0.0	12.4	21.2	21.1	15.9	16.8	16.8
LnGrp LOS	C	A	A	C	A	A	B	C	C	B	B	B
Approach Vol, veh/h		376			70			1580			925	
Approach Delay, s/veh		30.8			22.3			20.7			16.8	
Approach LOS		C			C			C			B	

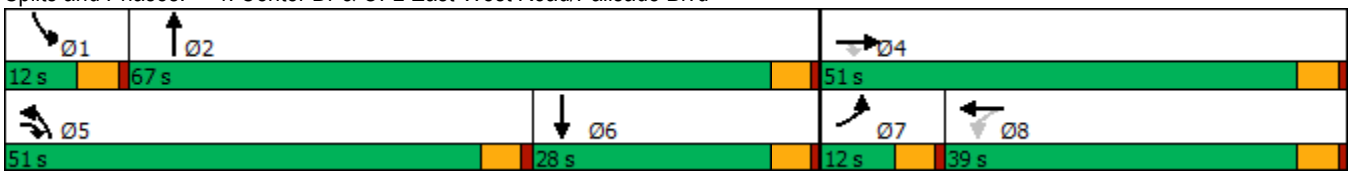
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.6	49.2		31.3	9.3	46.5		31.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	58.0		42.0	6.0	57.0		42.0				
Max Q Clear Time (g_c+I1), s	2.4	32.0		23.7	4.0	18.3		4.8				
Green Ext Time (p_c), s	0.0	12.2		2.4	0.0	6.8		0.4				

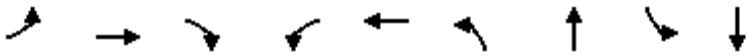
Intersection Summary												
HCM 6th Ctrl Delay			20.8									
HCM 6th LOS			C									

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	157	92	536	35	190	1201	490	35	330
Future Volume (vph)	157	92	536	35	190	1201	490	35	330
Turn Type	Prot	NA	pm+ov	Perm	NA	Prot	NA	Prot	NA
Protected Phases	7	4	5		8	5	2	1	6
Permitted Phases			4	8					
Detector Phase	7	4	5	8	8	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	10.0	39.0	10.0	39.0	39.0	10.0	27.0	10.0	27.0
Total Split (s)	12.0	51.0	51.0	39.0	39.0	51.0	67.0	12.0	28.0
Total Split (%)	9.2%	39.2%	39.2%	30.0%	30.0%	39.2%	51.5%	9.2%	21.5%
Yellow Time (s)	4.0	4.0	4.0	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	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes			Yes	Yes				
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	7.0	34.0	80.2	22.0	22.0	46.2	67.3	6.7	23.1
Actuated g/C Ratio	0.06	0.29	0.68	0.19	0.19	0.39	0.57	0.06	0.20
v/c Ratio	0.86	0.18	0.30	0.16	0.75	0.97	0.27	0.39	0.99
Control Delay	93.7	31.8	4.8	40.6	57.7	54.4	15.3	68.6	66.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	31.8	4.8	40.6	57.7	54.4	15.3	68.6	66.3
LOS	F	C	A	D	E	D	B	E	E
Approach Delay		25.7			55.5		42.8		66.4
Approach LOS		C			E		D		E

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 118.3	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 44.9	Intersection LOS: D
Intersection Capacity Utilization 94.4%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 4: Center Dr & OFL East-West Road/Palisade Blvd

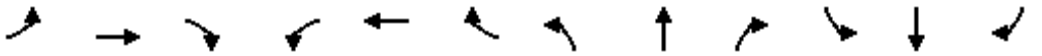




Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	165	97	564	37	253	1264	532	37	727
v/c Ratio	0.86	0.18	0.30	0.16	0.75	0.97	0.27	0.39	0.99
Control Delay	93.7	31.8	4.8	40.6	57.7	54.4	15.3	68.6	66.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	93.7	31.8	4.8	40.6	57.7	54.4	15.3	68.6	66.3
Queue Length 50th (ft)	64	56	55	24	177	473	112	27	225
Queue Length 95th (ft)	#145	98	76	54	266	#741	183	69	#410
Internal Link Dist (ft)		400			463		1014		681
Turn Bay Length (ft)	250		250			115		115	
Base Capacity (vph)	191	716	1884	367	517	1307	1954	99	736
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.86	0.14	0.30	0.10	0.49	0.97	0.27	0.37	0.99

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	157	92	536	35	190	50	1201	490	15	35	330	361
Future Volume (veh/h)	157	92	536	35	190	50	1201	490	15	35	330	361
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1900	1900	1900	1900	1900	1885	1885	1885	1841	1841	1796
Adj Flow Rate, veh/h	165	97	499	37	200	20	1264	516	14	37	347	218
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	5	0	0	0	0	0	1	1	1	4	4	7
Cap, veh/h	214	533	1881	291	291	29	1359	1968	53	54	400	247
Arrive On Green	0.06	0.28	0.28	0.17	0.17	0.17	0.39	0.55	0.55	0.03	0.19	0.19
Sat Flow, veh/h	3374	1900	2764	1315	1693	169	3483	3560	96	1753	2071	1275
Grp Volume(v), veh/h	165	97	499	37	0	220	1264	259	271	37	292	273
Grp Sat Flow(s),veh/h/ln	1687	1900	1382	1315	0	1862	1742	1791	1865	1753	1749	1597
Q Serve(g_s), s	5.3	4.3	8.0	2.6	0.0	12.2	38.4	8.4	8.4	2.3	17.9	18.4
Cycle Q Clear(g_c), s	5.3	4.3	8.0	2.6	0.0	12.2	38.4	8.4	8.4	2.3	17.9	18.4
Prop In Lane	1.00		1.00	1.00		0.09	1.00		0.05	1.00		0.80
Lane Grp Cap(c), veh/h	214	533	1881	291	0	320	1359	990	1031	54	338	309
V/C Ratio(X)	0.77	0.18	0.27	0.13	0.00	0.69	0.93	0.26	0.26	0.69	0.86	0.88
Avail Cap(c_a), veh/h	214	792	2257	470	0	573	1451	1006	1047	111	364	333
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.9	30.1	7.3	39.0	0.0	42.9	32.2	12.9	12.9	53.0	43.1	43.3
Incr Delay (d2), s/veh	15.8	0.2	0.1	0.2	0.0	2.6	10.5	0.1	0.1	14.4	17.9	22.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	2.0	2.3	0.9	0.0	5.9	17.5	3.3	3.4	1.2	9.3	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	66.7	30.3	7.4	39.2	0.0	45.6	42.8	13.0	13.0	67.4	61.1	65.7
LnGrp LOS	E	C	A	D	A	D	D	B	B	E	E	E
Approach Vol, veh/h		761			257			1794			602	
Approach Delay, s/veh		23.2			44.6			34.0			63.5	
Approach LOS		C			D			C			E	

Timer - Assigned Phs	1	2		4	5	6	7	8
Phs Duration (G+Y+Rc), s	8.4	66.0		36.0	48.1	26.4	12.0	24.0
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	7.0	62.0		46.0	46.0	23.0	7.0	34.0
Max Q Clear Time (g_c+I1), s	4.3	10.4		10.0	40.4	20.4	7.3	14.2
Green Ext Time (p_c), s	0.0	3.4		2.9	2.7	0.9	0.0	1.3

Intersection Summary			
HCM 6th Ctrl Delay		37.6	
HCM 6th LOS		D	

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	30	50	130	567	676
Future Volume (vph)	30	50	130	567	676
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	7		5	2	6
Permitted Phases		7	2		
Detector Phase	7	7	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	10.0	36.0	24.0	12.0
Total Split (s)	18.0	18.0	40.0	102.0	62.0
Total Split (%)	15.0%	15.0%	33.3%	85.0%	51.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None
Act Effct Green (s)	8.7	8.7	34.9	39.4	24.5
Actuated g/C Ratio	0.18	0.18	0.73	0.82	0.51
v/c Ratio	0.11	0.17	0.20	0.21	0.47
Control Delay	28.3	11.7	3.1	2.5	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	11.7	3.1	2.5	14.7
LOS	C	B	A	A	B
Approach Delay	18.0			2.6	14.7
Approach LOS	B			A	B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 47.8	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 9.2	Intersection LOS: A
Intersection Capacity Utilization 44.0%	ICU Level of Service A
Analysis Period (min) 15	

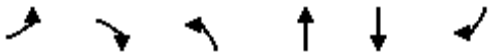
Splits and Phases: 5: Center Dr & Civic Dr





Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	32	53	137	597	759
v/c Ratio	0.11	0.17	0.20	0.21	0.47
Control Delay	28.3	11.7	3.1	2.5	14.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	28.3	11.7	3.1	2.5	14.7
Queue Length 50th (ft)	8	0	11	27	90
Queue Length 95th (ft)	44	34	25	48	239
Internal Link Dist (ft)	652			681	2072
Turn Bay Length (ft)	150		115		
Base Capacity (vph)	635	611	1342	3421	2935
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.05	0.09	0.10	0.17	0.26

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	30	50	130	567	676	45
Future Volume (veh/h)	30	50	130	567	676	45
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1841	1900	1885	1870	1767	1707
Adj Flow Rate, veh/h	32	4	137	597	712	42
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	0	1	2	9	13
Cap, veh/h	75	69	572	2324	1269	75
Arrive On Green	0.04	0.04	0.11	0.65	0.39	0.39
Sat Flow, veh/h	1753	1610	1795	3647	3309	190
Grp Volume(v), veh/h	32	4	137	597	371	383
Grp Sat Flow(s),veh/h/ln	1753	1610	1795	1777	1678	1732
Q Serve(g_s), s	0.6	0.1	1.2	2.3	5.7	5.7
Cycle Q Clear(g_c), s	0.6	0.1	1.2	2.3	5.7	5.7
Prop In Lane	1.00	1.00	1.00			0.11
Lane Grp Cap(c), veh/h	75	69	572	2324	661	683
V/C Ratio(X)	0.43	0.06	0.24	0.26	0.56	0.56
Avail Cap(c_a), veh/h	691	635	2283	10456	2902	2995
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	15.4	15.1	4.5	2.4	7.8	7.8
Incr Delay (d2), s/veh	3.8	0.4	0.2	0.1	0.7	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.1	0.2	0.0	1.3	1.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.2	15.5	4.7	2.4	8.5	8.5
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	36			734	754	
Approach Delay, s/veh	18.8			2.9	8.5	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		26.6		6.4	8.6	18.0
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		97.0		13.0	35.0	57.0
Max Q Clear Time (g_c+I1), s		4.3		2.6	3.2	7.7
Green Ext Time (p_c), s		4.5		0.0	0.4	5.3

Intersection Summary		
HCM 6th Ctrl Delay		6.0
HCM 6th LOS		A

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	357	220	499	525	495
Future Volume (vph)	357	220	499	525	495
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4			
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	28.0	28.0	10.0	39.0	39.0
Total Split (s)	41.0	41.0	30.0	79.0	49.0
Total Split (%)	34.2%	34.2%	25.0%	65.8%	40.8%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None
Act Effct Green (s)	27.6	27.6	21.8	62.2	35.1
Actuated g/C Ratio	0.28	0.28	0.22	0.62	0.35
v/c Ratio	0.81	0.41	0.79	0.53	0.85
Control Delay	50.6	6.5	49.1	13.7	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	6.5	49.1	13.7	31.8
LOS	D	A	D	B	C
Approach Delay	33.8			31.0	31.8
Approach LOS	C			C	C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 100.3	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 31.9	Intersection LOS: C
Intersection Capacity Utilization 75.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6: DuPont Steilacoom Rd & Center Dr

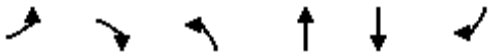




Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	372	229	520	547	998
v/c Ratio	0.81	0.41	0.79	0.53	0.85
Control Delay	50.6	6.5	49.1	13.7	31.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	50.6	6.5	49.1	13.7	31.8
Queue Length 50th (ft)	236	0	170	188	261
Queue Length 95th (ft)	378	58	#280	320	384
Internal Link Dist (ft)	1791			3455	484
Turn Bay Length (ft)			150		
Base Capacity (vph)	624	679	789	1261	1476
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.60	0.34	0.66	0.43	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	357	220	499	525	495	463
Future Volume (veh/h)	357	220	499	525	495	463
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1826	1781	1722	1752	1767	1767
Adj Flow Rate, veh/h	372	56	520	547	516	341
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	5	8	12	10	9	9
Cap, veh/h	433	376	647	1078	659	435
Arrive On Green	0.25	0.25	0.20	0.62	0.34	0.34
Sat Flow, veh/h	1739	1510	3182	1752	2005	1265
Grp Volume(v), veh/h	372	56	520	547	452	405
Grp Sat Flow(s),veh/h/ln	1739	1510	1591	1752	1678	1503
Q Serve(g_s), s	15.0	2.1	11.4	12.8	17.8	17.8
Cycle Q Clear(g_c), s	15.0	2.1	11.4	12.8	17.8	17.8
Prop In Lane	1.00	1.00	1.00			0.84
Lane Grp Cap(c), veh/h	433	376	647	1078	577	517
V/C Ratio(X)	0.86	0.15	0.80	0.51	0.78	0.78
Avail Cap(c_a), veh/h	852	739	1082	1764	1005	900
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.4	21.5	27.9	7.9	21.6	21.7
Incr Delay (d2), s/veh	5.1	0.2	2.4	0.4	2.4	2.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.4	0.0	4.2	3.5	6.5	5.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.5	21.7	30.3	8.3	24.0	24.3
LnGrp LOS	C	C	C	A	C	C
Approach Vol, veh/h	428			1067	857	
Approach Delay, s/veh	30.2			19.0	24.2	
Approach LOS	C			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		50.2		23.3	19.9	30.3
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		74.0		36.0	25.0	44.0
Max Q Clear Time (g_c+I1), s		14.8		17.0	13.4	19.8
Green Ext Time (p_c), s		3.6		1.3	1.5	5.5

Intersection Summary			
HCM 6th Ctrl Delay		22.9	
HCM 6th LOS		C	

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	75	15	10	150	130	65
Future Vol, veh/h	75	15	10	150	130	65
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	5	5	2	2	9	9
Mvmt Flow	77	15	10	155	134	67
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	8.6	9	8.8
HCM LOS	A	A	A

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	83%	0%
Vol Thru, %	0%	100%	0%	67%
Vol Right, %	0%	0%	17%	33%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	10	150	90	195
LT Vol	10	0	75	0
Through Vol	0	150	0	130
RT Vol	0	0	15	65
Lane Flow Rate	10	155	93	201
Geometry Grp	7	7	2	5
Degree of Util (X)	0.016	0.211	0.126	0.245
Departure Headway (Hd)	5.423	4.92	4.897	4.382
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	662	731	733	822
Service Time	3.141	2.638	2.922	2.399
HCM Lane V/C Ratio	0.015	0.212	0.127	0.245
HCM Control Delay	8.2	9	8.6	8.8
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0	0.8	0.4	1

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	766	446	0	146
Demand Flow Rate, veh/h	781	455	0	150
Vehicles Circulating, veh/h	128	155	709	411
Vehicles Exiting, veh/h	433	554	200	199
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.6	7.0	0.0	5.7
Approach LOS	B	A	-	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	781	455	0	150
Cap Entry Lane, veh/h	1211	1178	670	907
Entry HV Adj Factor	0.980	0.981	1.000	0.976
Flow Entry, veh/h	766	446	0	146
Cap Entry, veh/h	1187	1156	670	886
V/C Ratio	0.645	0.386	0.000	0.165
Control Delay, s/veh	11.6	7.0	5.4	5.7
LOS	B	A	A	A
95th %tile Queue, veh	5	2	0	1

Intersection	
Intersection Delay, s/veh	17.8
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	165	0	153	60	196	0	176	346	89	90	5
Future Vol, veh/h	0	165	0	153	60	196	0	176	346	89	90	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	179	0	166	65	213	0	191	376	97	98	5
Number of Lanes	0	1	0	1	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	1
HCM Control Delay	17.6	14.1	22	14.2
HCM LOS	C	B	C	B

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	100%	0%	100%	0%	100%	0%	0%	95%
Vol Right, %	0%	100%	0%	0%	0%	100%	0%	5%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	176	346	165	153	60	196	89	95
LT Vol	0	0	0	153	0	0	89	0
Through Vol	176	0	165	0	60	0	0	90
RT Vol	0	346	0	0	0	196	0	5
Lane Flow Rate	191	376	179	166	65	213	97	103
Geometry Grp	8	8	8	7	7	7	8	8
Degree of Util (X)	0.403	0.717	0.426	0.368	0.135	0.399	0.241	0.241
Departure Headway (Hd)	7.575	6.86	8.545	7.962	7.451	6.734	8.968	8.415
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	474	527	420	451	480	533	399	424
Service Time	5.344	4.629	6.333	5.728	5.215	4.498	6.758	6.205
HCM Lane V/C Ratio	0.403	0.713	0.426	0.368	0.135	0.4	0.243	0.243
HCM Control Delay	15.4	25.3	17.6	15.3	11.4	13.9	14.6	13.9
HCM Lane LOS	C	D	C	C	B	B	B	B
HCM 95th-tile Q	1.9	5.8	2.1	1.7	0.5	1.9	0.9	0.9

MOVEMENT SUMMARY

Site: 101 [INT 10 No Action_AM (Site Folder: DuPont)]

DuPont-Steilacoom Rd & I-5 On and Off-Ramps
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: DuPont-Steilacoom Rd														
8	T1	85	0.0	92	0.0	0.125	7.4	LOS A	0.7	18.0	0.67	0.68	0.67	35.9
18	R2	140	0.0	152	0.0	0.125	7.2	LOS A	0.8	19.8	0.67	0.67	0.67	34.9
Approach		225	0.0	245	0.0	0.125	7.3	LOS A	0.8	19.8	0.67	0.68	0.67	35.3
East: I-5 On- and Off-Ramps														
1	L2	105	0.0	114	0.0	0.332	10.0	LOS B	2.3	58.4	0.30	0.50	0.30	36.8
16	R2	884	1.0	961	1.0	0.332	3.8	LOS A	2.3	58.4	0.13	0.47	0.13	36.4
Approach		989	0.9	1075	0.9	0.332	4.4	LOS A	2.3	58.4	0.14	0.48	0.14	36.5
North: DuPont Steilacoom Rd														
7	L2	670	1.0	728	1.0	0.277	10.1	LOS B	1.6	40.7	0.28	0.61	0.28	34.6
4	T1	90	0.0	98	0.0	0.277	4.0	LOS A	1.6	40.7	0.27	0.60	0.27	34.9
Approach		760	0.9	826	0.9	0.277	9.4	LOS A	1.6	40.7	0.28	0.61	0.28	34.6
All Vehicles		1974	0.8	2146	0.8	0.332	6.7	LOS A	2.3	58.4	0.26	0.55	0.26	35.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	165	4	5	75	5
Future Vol, veh/h	10	165	4	5	75	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	0	0	20	0	0
Mvmt Flow	11	179	4	5	82	5

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	7	9
Stage 1	-	-	0	0
Stage 2	-	-	7	9
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	1019	890
Stage 1	-	-	-	-
Stage 2	-	-	1021	892
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	1019	0
Mov Cap-2 Maneuver	-	-	1019	0
Stage 1	-	-	-	0
Stage 2	-	-	1021	0

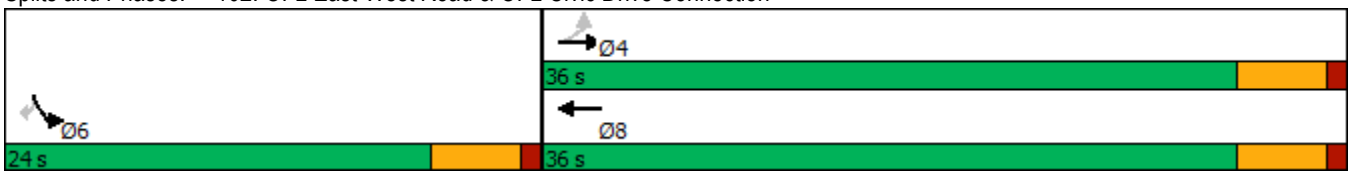
Approach	NB	SB
HCM Control Delay, s	0	8.9
HCM LOS		A

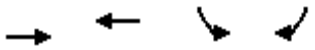
Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	1019
HCM Lane V/C Ratio	-	-	0.085
HCM Control Delay (s)	-	-	8.9
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.3

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	5	780	1748	5	10
Future Volume (vph)	5	780	1748	5	10
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		4	8	6	
Permitted Phases	4				6
Detector Phase	4	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0
Total Split (s)	36.0	36.0	36.0	24.0	24.0
Total Split (%)	60.0%	60.0%	60.0%	40.0%	40.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0	5.0	5.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	Min	Min
Act Effct Green (s)		29.8	29.8	7.7	7.7
Actuated g/C Ratio		0.62	0.62	0.16	0.16
v/c Ratio		0.30	0.61	0.02	0.05
Control Delay		5.1	7.3	16.0	12.3
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		5.1	7.3	16.0	12.3
LOS		A	A	B	B
Approach Delay		5.1	7.3	13.5	
Approach LOS		A	A	B	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 47.7	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 6.6	Intersection LOS: A
Intersection Capacity Utilization 46.4%	ICU Level of Service A
Analysis Period (min) 15	

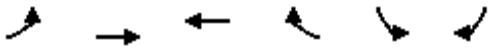
Splits and Phases: 102: OFL East-West Road & OFL Civic Drive Connection





Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	853	1904	5	11
v/c Ratio	0.30	0.61	0.02	0.05
Control Delay	5.1	7.3	16.0	12.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	5.1	7.3	16.0	12.3
Queue Length 50th (ft)	25	75	1	1
Queue Length 95th (ft)	81	224	8	11
Internal Link Dist (ft)	1305	400	797	
Turn Bay Length (ft)				
Base Capacity (vph)	3029	3279	706	530
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.28	0.58	0.01	0.02

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	780	1748	4	5	10
Future Volume (veh/h)	5	780	1748	4	5	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1604	1885	1885	1900	1900	1604
Adj Flow Rate, veh/h	5	848	1900	4	5	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	1	1	0	0	20
Cap, veh/h	96	3074	3281	7	230	173
Arrive On Green	0.62	0.62	0.62	0.62	0.13	0.13
Sat Flow, veh/h	5	5123	5473	11	1810	1359
Grp Volume(v), veh/h	318	535	1229	675	5	11
Grp Sat Flow(s),veh/h/ln	1851	1561	1716	1883	1810	1359
Q Serve(g_s), s	0.0	3.1	8.4	8.4	0.1	0.3
Cycle Q Clear(g_c), s	3.0	3.1	8.4	8.4	0.1	0.3
Prop In Lane	0.02			0.01	1.00	1.00
Lane Grp Cap(c), veh/h	1238	1932	2123	1165	230	173
V/C Ratio(X)	0.26	0.28	0.58	0.58	0.02	0.06
Avail Cap(c_a), veh/h	1526	2460	2704	1484	874	656
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	3.4	3.5	4.5	4.5	15.0	15.1
Incr Delay (d2), s/veh	0.1	0.1	0.3	0.5	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.4	1.3	1.5	0.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	3.5	3.5	4.7	4.9	15.1	15.3
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		853	1904		16	
Approach Delay, s/veh		3.5	4.8		15.2	
Approach LOS		A	A		B	

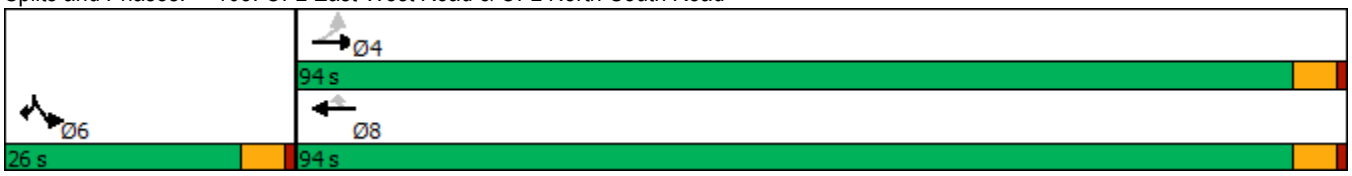
Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		29.3		10.0	29.3
Change Period (Y+Rc), s		5.0		5.0	5.0
Max Green Setting (Gmax), s		31.0		19.0	31.0
Max Q Clear Time (g_c+I1), s		5.1		2.3	10.4
Green Ext Time (p_c), s		6.3		0.0	14.0

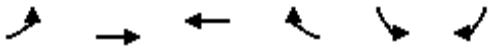
Intersection Summary		
HCM 6th Ctrl Delay	4.5	
HCM 6th LOS	A	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	16	552	1115	643	233	11
Future Volume (vph)	16	552	1115	643	233	11
Turn Type	Perm	NA	NA	Perm	Prot	Prot
Protected Phases		4	8		6	6
Permitted Phases	4			8		
Detector Phase	4	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	94.0	94.0	94.0	94.0	26.0	26.0
Total Split (%)	78.3%	78.3%	78.3%	78.3%	21.7%	21.7%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	46.1	46.1	46.1	46.1	11.6	11.6
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.17	0.17
v/c Ratio	0.07	0.26	0.52	0.56	0.48	0.04
Control Delay	4.6	4.5	6.2	2.2	32.5	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	4.5	6.2	2.2	32.5	17.3
LOS	A	A	A	A	C	B
Approach Delay		4.5	4.8		31.9	
Approach LOS		A	A		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 68.6	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.56	
Intersection Signal Delay: 7.3	Intersection LOS: A
Intersection Capacity Utilization 52.3%	ICU Level of Service A
Analysis Period (min) 15	

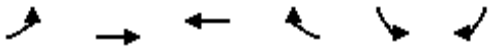
Splits and Phases: 103: OFL East-West Road & OFL North-South Road





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	17	600	1212	699	253	12
v/c Ratio	0.07	0.26	0.52	0.56	0.48	0.04
Control Delay	4.6	4.5	6.2	2.2	32.5	17.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.6	4.5	6.2	2.2	32.5	17.3
Queue Length 50th (ft)	2	38	100	0	46	0
Queue Length 95th (ft)	9	77	187	28	117	16
Internal Link Dist (ft)		587	1305		2086	
Turn Bay Length (ft)	150					
Base Capacity (vph)	352	3396	3396	1508	1045	528
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.18	0.36	0.46	0.24	0.02

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	552	1115	643	233	11
Future Volume (veh/h)	16	552	1115	643	233	11
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1870	1781	1900
Adj Flow Rate, veh/h	17	600	1212	699	253	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	2	8	0
Cap, veh/h	382	2469	2469	1084	414	203
Arrive On Green	0.68	0.68	0.68	0.68	0.13	0.13
Sat Flow, veh/h	468	3705	3705	1585	3291	1610
Grp Volume(v), veh/h	17	600	1212	699	253	12
Grp Sat Flow(s),veh/h/ln	468	1805	1805	1585	1646	1610
Q Serve(g_s), s	0.9	3.3	8.4	13.1	3.8	0.3
Cycle Q Clear(g_c), s	9.3	3.3	8.4	13.1	3.8	0.3
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	382	2469	2469	1084	414	203
V/C Ratio(X)	0.04	0.24	0.49	0.64	0.61	0.06
Avail Cap(c_a), veh/h	855	6113	6113	2684	1315	643
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	6.2	3.1	4.0	4.7	21.8	20.2
Incr Delay (d2), s/veh	0.0	0.1	0.2	0.6	1.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	0.6	1.6	2.4	1.4	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	6.2	3.2	4.1	5.3	23.2	20.4
LnGrp LOS	A	A	A	A	C	C
Approach Vol, veh/h		617	1911		265	
Approach Delay, s/veh		3.3	4.6		23.1	
Approach LOS		A	A		C	

Timer - Assigned Phs		4		6	8
Phs Duration (G+Y+Rc), s		40.9		11.6	40.9
Change Period (Y+Rc), s		5.0		5.0	5.0
Max Green Setting (Gmax), s		89.0		21.0	89.0
Max Q Clear Time (g_c+I1), s		11.3		5.8	15.1
Green Ext Time (p_c), s		5.1		0.8	20.8

Intersection Summary	
HCM 6th Ctrl Delay	6.0
HCM 6th LOS	A

Intersection	
Intersection Delay, s/veh	6.5
Intersection LOS	A

Approach	EB	WB	NB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	313	445	372
Demand Flow Rate, veh/h	313	445	372
Vehicles Circulating, veh/h	74	223	203
Vehicles Exiting, veh/h	594	352	184
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	4.9	7.5	6.5
Approach LOS	A	A	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LR
Assumed Moves	TR	LT	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	313	445	372
Cap Entry Lane, veh/h	1280	1099	1122
Entry HV Adj Factor	1.000	1.000	1.000
Flow Entry, veh/h	313	445	372
Cap Entry, veh/h	1280	1099	1122
V/C Ratio	0.245	0.405	0.332
Control Delay, s/veh	4.9	7.5	6.5
LOS	A	A	A
95th %tile Queue, veh	1	2	1

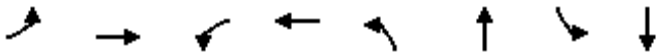
No Action (2044) Improved Scenario PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	10	15	130	25	60	1398	80	1963
Future Volume (vph)	10	15	130	25	60	1398	80	1963
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	34.0	34.0	34.0	34.0	10.0	26.0	10.0	26.0
Total Split (s)	34.0	34.0	34.0	34.0	10.0	73.0	13.0	76.0
Total Split (%)	28.3%	28.3%	28.3%	28.3%	8.3%	60.8%	10.8%	63.3%
Yellow Time (s)	4.0	4.0	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	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)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)	17.0	17.0	17.0	17.0	73.8	69.9	77.2	71.6
Actuated g/C Ratio	0.16	0.16	0.16	0.16	0.69	0.66	0.72	0.67
v/c Ratio	0.05	0.20	0.66	0.30	0.42	0.72	0.38	0.89
Control Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
Total Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	27.5
LOS	D	B	E	B	B	B	A	C
Approach Delay		20.8		40.8		16.6		26.8
Approach LOS		C		D		B		C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 106.5	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.89	
Intersection Signal Delay: 23.3	Intersection LOS: C
Intersection Capacity Utilization 87.0%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: Center Dr & Wilmington Dr





Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	11	58	137	94	63	1614	84	2077
v/c Ratio	0.05	0.20	0.66	0.30	0.42	0.72	0.38	0.89
Control Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	23.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4
Total Delay	37.4	17.6	57.2	16.9	19.2	16.5	9.9	27.5
Queue Length 50th (ft)	7	10	90	16	9	358	13	579
Queue Length 95th (ft)	23	45	155	60	47	621	38	#1035
Internal Link Dist (ft)		126		229		940		666
Turn Bay Length (ft)			75		65		75	
Base Capacity (vph)	351	480	359	488	149	2238	237	2322
Starvation Cap Reductn	0	0	0	0	0	0	0	192
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.12	0.38	0.19	0.42	0.72	0.35	0.98

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	10	15	40	130	25	65	60	1398	135	80	1963	10
Future Volume (veh/h)	10	15	40	130	25	65	60	1398	135	80	1963	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	11	16	7	137	26	11	63	1472	137	84	2066	11
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	0	0	1	1	1	1	1	1	1	1	1
Cap, veh/h	244	179	78	257	179	76	204	2191	203	277	2397	13
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.05	0.66	0.66	0.05	0.66	0.66
Sat Flow, veh/h	1377	1253	548	1399	1252	530	1795	3314	306	1795	3653	19
Grp Volume(v), veh/h	11	0	23	137	0	37	63	791	818	84	1012	1065
Grp Sat Flow(s),veh/h/ln	1377	0	1801	1399	0	1782	1795	1791	1830	1795	1791	1882
Q Serve(g_s), s	0.7	0.0	1.1	9.4	0.0	1.8	1.1	26.7	27.3	1.5	44.4	44.6
Cycle Q Clear(g_c), s	2.5	0.0	1.1	10.5	0.0	1.8	1.1	26.7	27.3	1.5	44.4	44.6
Prop In Lane	1.00		0.30	1.00		0.30	1.00		0.17	1.00		0.01
Lane Grp Cap(c), veh/h	244	0	257	257	0	255	204	1184	1210	277	1175	1235
V/C Ratio(X)	0.05	0.00	0.09	0.53	0.00	0.15	0.31	0.67	0.68	0.30	0.86	0.86
Avail Cap(c_a), veh/h	449	0	525	465	0	519	204	1224	1250	340	1277	1342
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	37.0	41.6	0.0	37.3	19.0	10.2	10.3	9.6	13.5	13.6
Incr Delay (d2), s/veh	0.1	0.0	0.1	1.7	0.0	0.3	0.8	1.3	1.4	0.6	5.8	5.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.5	3.3	0.0	0.8	0.9	9.6	10.1	0.6	17.3	18.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	38.5	0.0	37.2	43.3	0.0	37.6	19.9	11.6	11.7	10.2	19.4	19.2
LnGrp LOS	D	A	D	D	A	D	B	B	B	B	B	B
Approach Vol, veh/h		34			174			1672			2161	
Approach Delay, s/veh		37.6			42.1			12.0			18.9	
Approach LOS		D			D			B			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.5	70.8		19.2	10.0	70.3		19.2				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	8.0	68.0		29.0	5.0	71.0		29.0				
Max Q Clear Time (g_c+I1), s	3.5	29.3		4.5	3.1	46.6		12.5				
Green Ext Time (p_c), s	0.1	17.4		0.1	0.0	18.7		0.5				

Intersection Summary												
HCM 6th Ctrl Delay			17.2									
HCM 6th LOS			B									

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	62	40	390	40	55	25	493	950	25	1623
Future Volume (vph)	62	40	390	40	55	25	493	950	25	1623
Turn Type	Perm	NA	pt+ov	Perm	NA	pt+ov	Prot	NA	Prot	NA
Protected Phases		4	4 5		8	8 1	5	2	1	6
Permitted Phases	4			8						
Detector Phase	4	4	4 5	8	8	8 1	5	2	1	6
Switch Phase										
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	7.0	5.0	7.0
Minimum Split (s)	31.0	31.0		31.0	31.0		10.0	26.0	10.0	26.0
Total Split (s)	31.0	31.0		31.0	31.0		23.0	78.0	11.0	66.0
Total Split (%)	25.8%	25.8%		25.8%	25.8%		19.2%	65.0%	9.2%	55.0%
Yellow Time (s)	4.0	4.0		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	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0			5.0		5.0	5.0	5.0	5.0
Lead/Lag							Lead	Lag	Lead	Lag
Lead-Lag Optimize?										
Recall Mode	None	None		None	None		None	None	None	None
Act Effct Green (s)		24.5	47.5		24.5	35.4	18.0	75.4	5.9	61.1
Actuated g/C Ratio		0.21	0.40		0.21	0.30	0.15	0.64	0.05	0.52
v/c Ratio		0.37	0.65		0.33	0.05	1.02	0.47	0.31	1.02
Control Delay		44.5	33.2		43.1	0.2	95.1	12.9	64.5	55.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		44.5	33.2		43.1	0.2	95.1	12.9	64.5	55.5
LOS		D	C		D	A	F	B	E	E
Approach Delay		35.5			34.3			40.3		55.7
Approach LOS		D			C			D		E

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 118.6	
Natural Cycle: 120	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.02	
Intersection Signal Delay: 46.5	Intersection LOS: D
Intersection Capacity Utilization 90.1%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 2: Center Dr & McNeil St



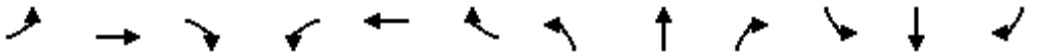


Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	107	411	100	26	519	1037	26	1801
v/c Ratio	0.37	0.65	0.33	0.05	1.02	0.47	0.31	1.02
Control Delay	44.5	33.2	43.1	0.2	95.1	12.9	64.5	55.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.5	33.2	43.1	0.2	95.1	12.9	64.5	55.5
Queue Length 50th (ft)	71	241	66	0	~222	221	20	~786
Queue Length 95th (ft)	126	356	118	1	#332	272	51	#928
Internal Link Dist (ft)	2890		342			666		1862
Turn Bay Length (ft)		295		140	210		100	
Base Capacity (vph)	306	619	325	484	508	2184	87	1767
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.66	0.31	0.05	1.02	0.47	0.30	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	40	390	40	55	25	493	950	35	25	1623	88
Future Volume (veh/h)	62	40	390	40	55	25	493	950	35	25	1623	88
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1841	1841	1841	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	65	42	400	42	58	7	519	1000	35	26	1708	90
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	4	4	4	1	1	1	1	1	1
Cap, veh/h	244	147	586	175	225	376	523	2238	78	43	1759	92
Arrive On Green	0.22	0.22	0.22	0.22	0.22	0.22	0.15	0.63	0.63	0.02	0.51	0.51
Sat Flow, veh/h	903	677	1598	609	1037	1560	3483	3530	124	1795	3462	181
Grp Volume(v), veh/h	107	0	400	100	0	7	519	507	528	26	878	920
Grp Sat Flow(s),veh/h/ln	1580	0	1598	1646	0	1560	1742	1791	1863	1795	1791	1853
Q Serve(g_s), s	0.6	0.0	25.4	0.0	0.0	0.4	17.8	17.3	17.3	1.7	56.8	58.2
Cycle Q Clear(g_c), s	6.1	0.0	25.4	5.5	0.0	0.4	17.8	17.3	17.3	1.7	56.8	58.2
Prop In Lane	0.61		1.00	0.42		1.00	1.00		0.07	1.00		0.10
Lane Grp Cap(c), veh/h	391	0	586	399	0	376	523	1135	1181	43	910	941
V/C Ratio(X)	0.27	0.00	0.68	0.25	0.00	0.02	0.99	0.45	0.45	0.60	0.97	0.98
Avail Cap(c_a), veh/h	391	0	586	399	0	376	523	1135	1181	90	911	942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.1	0.0	32.1	38.9	0.0	34.7	50.9	11.2	11.2	57.9	28.5	28.8
Incr Delay (d2), s/veh	0.4	0.0	3.2	0.3	0.0	0.0	37.4	0.3	0.3	12.5	21.7	23.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.7	0.0	10.2	2.5	0.0	0.2	10.5	6.7	6.9	0.9	28.7	30.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	39.5	0.0	35.3	39.2	0.0	34.7	88.3	11.5	11.5	70.5	50.2	52.6
LnGrp LOS	D	A	D	D	A	C	F	B	B	E	D	D
Approach Vol, veh/h		507			107			1554			1824	
Approach Delay, s/veh		36.2			38.9			37.1			51.7	
Approach LOS		D			D			D			D	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.9	81.0		31.0	23.0	65.9		31.0				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	6.0	73.0		26.0	18.0	61.0		26.0				
Max Q Clear Time (g_c+I1), s	3.7	19.3		27.4	19.8	60.2		7.5				
Green Ext Time (p_c), s	0.0	8.8		0.0	0.0	0.7		0.4				

Intersection Summary			
HCM 6th Ctrl Delay		43.7	
HCM 6th LOS		D	

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	206	20	20	15	45	862	15	1661
Future Volume (vph)	206	20	20	15	45	862	15	1661
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		4		8	5	2	1	6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	32.0	32.0	32.0	32.0	10.0	23.0	10.0	23.0
Total Split (s)	32.0	32.0	32.0	32.0	10.0	78.0	10.0	78.0
Total Split (%)	26.7%	26.7%	26.7%	26.7%	8.3%	65.0%	8.3%	65.0%
Yellow Time (s)	4.0	4.0	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	1.0
Lost Time Adjust (s)		0.0		0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0		5.0	5.0	5.0	5.0	5.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	None	None	None	None
Act Effct Green (s)		25.8		25.8	79.1	77.1	77.1	73.2
Actuated g/C Ratio		0.22		0.22	0.68	0.66	0.66	0.63
v/c Ratio		0.93		0.14	0.35	0.42	0.04	0.98
Control Delay		79.9		31.6	15.1	10.7	6.1	36.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		79.9		31.6	15.1	10.7	6.1	36.6
LOS		E		C	B	B	A	D
Approach Delay		79.9		31.6		10.9		36.4
Approach LOS		E		C		B		D

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 116.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.98	
Intersection Signal Delay: 32.6	Intersection LOS: C
Intersection Capacity Utilization 86.4%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 3: Center Dr & Bobs Hollow Ln



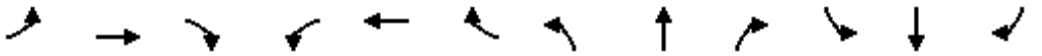


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	285	48	47	944	16	2083
v/c Ratio	0.93	0.14	0.35	0.42	0.04	0.98
Control Delay	79.9	31.6	15.1	10.7	6.1	36.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	79.9	31.6	15.1	10.7	6.1	36.6
Queue Length 50th (ft)	211	23	10	146	4	~808
Queue Length 95th (ft)	#377	56	28	241	10	#1021
Internal Link Dist (ft)	147	236		701		1014
Turn Bay Length (ft)			85		100	
Base Capacity (vph)	323	360	134	2265	377	2135
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.88	0.13	0.35	0.42	0.04	0.98

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	206	20	45	20	15	10	45	862	35	15	1661	318
Future Volume (veh/h)	206	20	45	20	15	10	45	862	35	15	1661	318
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.98	1.00		0.96	1.00		0.97	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1900	1900	1900	1885	1885	1885	1900	1900	1900
Adj Flow Rate, veh/h	217	21	41	21	16	2	47	907	37	16	1748	322
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	0	0	0	1	1	1	0	0	0
Cap, veh/h	298	23	46	223	160	18	139	2238	91	403	1904	340
Arrive On Green	0.21	0.21	0.21	0.21	0.21	0.21	0.03	0.64	0.64	0.02	0.62	0.62
Sat Flow, veh/h	1133	110	214	818	746	85	1795	3503	143	1810	3058	546
Grp Volume(v), veh/h	279	0	0	39	0	0	47	464	480	16	1008	1062
Grp Sat Flow(s),veh/h/ln	1457	0	0	1649	0	0	1795	1791	1854	1810	1805	1799
Q Serve(g_s), s	19.5	0.0	0.0	0.0	0.0	0.0	1.1	14.6	14.6	0.4	55.3	62.9
Cycle Q Clear(g_c), s	21.5	0.0	0.0	2.0	0.0	0.0	1.1	14.6	14.6	0.4	55.3	62.9
Prop In Lane	0.78		0.15	0.54		0.05	1.00		0.08	1.00		0.30
Lane Grp Cap(c), veh/h	367	0	0	401	0	0	139	1144	1185	403	1124	1120
V/C Ratio(X)	0.76	0.00	0.00	0.10	0.00	0.00	0.34	0.41	0.41	0.04	0.90	0.95
Avail Cap(c_a), veh/h	395	0	0	430	0	0	156	1144	1185	450	1138	1134
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	44.0	0.0	0.0	36.5	0.0	0.0	27.9	10.2	10.2	8.3	18.7	20.1
Incr Delay (d2), s/veh	7.8	0.0	0.0	0.1	0.0	0.0	1.4	0.2	0.2	0.0	9.5	15.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.5	0.0	0.0	0.9	0.0	0.0	0.9	5.5	5.7	0.1	24.1	28.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.8	0.0	0.0	36.6	0.0	0.0	29.3	10.4	10.4	8.3	28.2	35.8
LnGrp LOS	D	A	A	D	A	A	C	B	B	A	C	D
Approach Vol, veh/h		279			39			991			2086	
Approach Delay, s/veh		51.8			36.6			11.3			31.9	
Approach LOS		D			D			B			C	

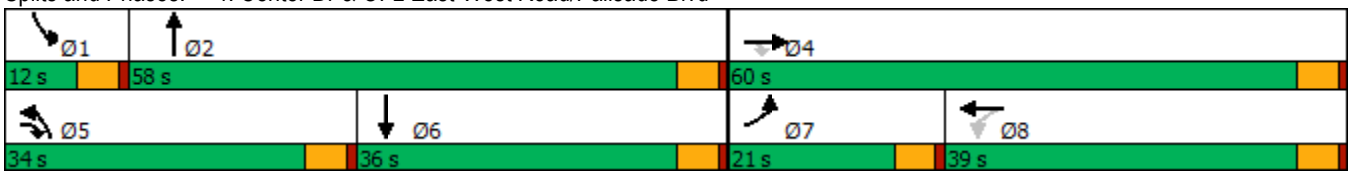
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.0	79.0		29.8	8.9	77.1		29.8				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	5.0	73.0		27.0	5.0	73.0		27.0				
Max Q Clear Time (g_c+I1), s	2.4	16.6		23.5	3.1	64.9		4.0				
Green Ext Time (p_c), s	0.0	7.6		0.5	0.0	7.2		0.1				

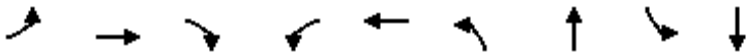
Intersection Summary			
HCM 6th Ctrl Delay		27.6	
HCM 6th LOS		C	

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	404	223	1374	40	124	743	315	35	580
Future Volume (vph)	404	223	1374	40	124	743	315	35	580
Turn Type	Prot	NA	pm+ov	Perm	NA	Prot	NA	Prot	NA
Protected Phases	7	4	5		8	5	2	1	6
Permitted Phases			4	8					
Detector Phase	7	4	5	8	8	5	2	1	6
Switch Phase									
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0	5.0	7.0	5.0	7.0
Minimum Split (s)	10.0	39.0	10.0	39.0	39.0	10.0	27.0	10.0	27.0
Total Split (s)	21.0	60.0	34.0	39.0	39.0	34.0	58.0	12.0	36.0
Total Split (%)	16.2%	46.2%	26.2%	30.0%	30.0%	26.2%	44.6%	9.2%	27.7%
Yellow Time (s)	4.0	4.0	4.0	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	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead		Lead	Lag	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize?	Yes			Yes	Yes				
Recall Mode	None	None	None	None	None	None	None	None	None
Act Effct Green (s)	16.1	38.4	67.6	17.3	17.3	29.2	58.4	6.7	31.2
Actuated g/C Ratio	0.14	0.34	0.59	0.15	0.15	0.26	0.51	0.06	0.27
v/c Ratio	0.92	0.38	0.89	0.25	0.61	0.92	0.20	0.37	0.90
Control Delay	74.5	30.0	23.9	44.5	50.7	58.9	17.6	64.7	52.4
Queue Delay	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.5	30.0	24.3	44.5	50.7	58.9	17.6	64.7	52.4
LOS	E	C	C	D	D	E	B	E	D
Approach Delay		35.1			49.5		46.0		52.9
Approach LOS		D			D		D		D

Intersection Summary	
Cycle Length: 130	
Actuated Cycle Length: 113.8	
Natural Cycle: 130	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.92	
Intersection Signal Delay: 42.3	Intersection LOS: D
Intersection Capacity Utilization 89.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 4: Center Dr & OFL East-West Road/Palisade Blvd

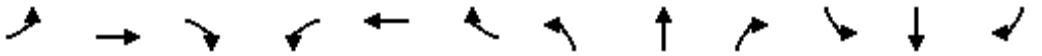




Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	425	235	1446	42	168	782	353	37	838
v/c Ratio	0.92	0.38	0.89	0.25	0.61	0.92	0.20	0.37	0.90
Control Delay	74.5	30.0	23.9	44.5	50.7	58.9	17.6	64.7	52.4
Queue Delay	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	74.5	30.0	24.3	44.5	50.7	58.9	17.6	64.7	52.4
Queue Length 50th (ft)	155	129	403	27	108	278	73	26	288
Queue Length 95th (ft)	#307	193	506	60	175	#497	137	69	#515
Internal Link Dist (ft)		400			463		1014		681
Turn Bay Length (ft)	250		250			115		115	
Base Capacity (vph)	464	892	1631	337	538	850	1739	107	931
Starvation Cap Reductn	0	0	30	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.26	0.90	0.12	0.31	0.92	0.20	0.35	0.90

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	404	223	1374	40	124	35	743	315	20	35	580	216
Future Volume (veh/h)	404	223	1374	40	124	35	743	315	20	35	580	216
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.97	1.00		0.98	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1900	1900	1900	1900	1900	1870	1870	1870	1900	1900	1856
Adj Flow Rate, veh/h	425	235	1379	42	131	18	782	332	17	37	611	196
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	3	0	0	0	0	0	2	2	2	0	0	3
Cap, veh/h	432	781	1785	342	399	55	790	1519	77	52	650	208
Arrive On Green	0.13	0.41	0.41	0.25	0.25	0.25	0.23	0.44	0.44	0.03	0.24	0.24
Sat Flow, veh/h	3428	1900	2768	1161	1628	224	3456	3435	175	1810	2683	859
Grp Volume(v), veh/h	425	235	1379	42	0	149	782	171	178	37	411	396
Grp Sat Flow(s),veh/h/ln	1714	1900	1384	1161	0	1852	1728	1777	1834	1810	1805	1738
Q Serve(g_s), s	15.7	10.5	45.4	3.6	0.0	8.4	28.6	7.5	7.6	2.6	28.3	28.4
Cycle Q Clear(g_c), s	15.7	10.5	45.4	3.6	0.0	8.4	28.6	7.5	7.6	2.6	28.3	28.4
Prop In Lane	1.00		1.00	1.00		0.12	1.00		0.10	1.00		0.49
Lane Grp Cap(c), veh/h	432	781	1785	342	0	454	790	786	811	52	437	421
V/C Ratio(X)	0.98	0.30	0.77	0.12	0.00	0.33	0.99	0.22	0.22	0.71	0.94	0.94
Avail Cap(c_a), veh/h	432	824	1848	368	0	496	790	786	811	100	441	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.3	25.1	16.4	37.5	0.0	39.3	48.8	21.8	21.9	61.1	47.1	47.2
Incr Delay (d2), s/veh	38.6	0.2	2.0	0.2	0.0	0.4	29.4	0.1	0.1	16.4	28.0	29.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.1	4.8	14.0	1.0	0.0	3.9	15.5	3.2	3.3	1.4	16.1	15.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	93.9	25.3	18.4	37.6	0.0	39.7	78.2	22.0	22.0	77.5	75.2	76.4
LnGrp LOS	F	C	B	D	A	D	E	C	C	E	E	E
Approach Vol, veh/h		2039			191			1131			844	
Approach Delay, s/veh		35.0			39.2			60.8			75.9	
Approach LOS		C			D			E			E	

Timer - Assigned Phs	1	2		4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.6	61.1		57.1	34.0	35.7	21.0	36.1				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0	5.0	5.0				
Max Green Setting (Gmax), s	7.0	53.0		55.0	29.0	31.0	16.0	34.0				
Max Q Clear Time (g_c+I1), s	4.6	9.6		47.4	30.6	30.4	17.7	10.4				
Green Ext Time (p_c), s	0.0	2.2		4.7	0.0	0.3	0.0	0.9				

Intersection Summary												
HCM 6th Ctrl Delay			50.3									
HCM 6th LOS			D									

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	40	110	30	724	721
Future Volume (vph)	40	110	30	724	721
Turn Type	Prot	Perm	pm+pt	NA	NA
Protected Phases	7		5	2	6
Permitted Phases		7	2		
Detector Phase	7	7	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	10.0	10.0	36.0	24.0	12.0
Total Split (s)	25.0	25.0	36.0	95.0	59.0
Total Split (%)	20.8%	20.8%	30.0%	79.2%	49.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None
Act Effct Green (s)	9.0	9.0	26.3	29.1	23.6
Actuated g/C Ratio	0.21	0.21	0.61	0.67	0.55
v/c Ratio	0.12	0.28	0.05	0.33	0.42
Control Delay	25.6	9.3	3.2	4.3	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	9.3	3.2	4.3	12.3
LOS	C	A	A	A	B
Approach Delay	13.6			4.3	12.3
Approach LOS	B			A	B

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 43.3	
Natural Cycle: 65	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 8.7	Intersection LOS: A
Intersection Capacity Utilization 37.4%	ICU Level of Service A
Analysis Period (min) 15	

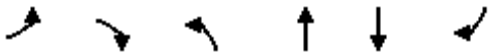
Splits and Phases: 5: Center Dr & Civic Dr





Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	42	116	32	762	776
v/c Ratio	0.12	0.28	0.05	0.33	0.42
Control Delay	25.6	9.3	3.2	4.3	12.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	25.6	9.3	3.2	4.3	12.3
Queue Length 50th (ft)	7	0	2	38	40
Queue Length 95th (ft)	54	48	9	68	245
Internal Link Dist (ft)	652			681	2072
Turn Bay Length (ft)	150		115		
Base Capacity (vph)	950	942	1379	3388	3133
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.04	0.12	0.02	0.22	0.25

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	40	110	30	724	721	16
Future Volume (veh/h)	40	110	30	724	721	16
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1796	1900	1885	1856	1870	1737
Adj Flow Rate, veh/h	42	15	32	762	759	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	7	0	1	3	2	11
Cap, veh/h	107	101	480	2159	1462	31
Arrive On Green	0.06	0.06	0.04	0.61	0.41	0.41
Sat Flow, veh/h	1711	1610	1795	3618	3652	75
Grp Volume(v), veh/h	42	15	32	762	379	396
Grp Sat Flow(s),veh/h/ln	1711	1610	1795	1763	1777	1857
Q Serve(g_s), s	0.7	0.3	0.3	3.3	4.9	4.9
Cycle Q Clear(g_c), s	0.7	0.3	0.3	3.3	4.9	4.9
Prop In Lane	1.00	1.00	1.00			0.04
Lane Grp Cap(c), veh/h	107	101	480	2159	730	763
V/C Ratio(X)	0.39	0.15	0.07	0.35	0.52	0.52
Avail Cap(c_a), veh/h	1112	1047	2219	10312	3118	3259
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	13.6	4.5	2.9	6.8	6.8
Incr Delay (d2), s/veh	2.3	0.7	0.1	0.1	0.6	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.3	0.0	0.2	1.2	1.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.2	14.3	4.6	3.0	7.4	7.3
LnGrp LOS	B	B	A	A	A	A
Approach Vol, veh/h	57			794	775	
Approach Delay, s/veh	15.7			3.1	7.3	
Approach LOS	B			A	A	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		23.8		6.9	6.2	17.6
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		90.0		20.0	31.0	54.0
Max Q Clear Time (g_c+I1), s		5.3		2.7	2.3	6.9
Green Ext Time (p_c), s		6.5		0.1	0.1	5.7

Intersection Summary	
HCM 6th Ctrl Delay	5.6
HCM 6th LOS	A

Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Configurations					
Traffic Volume (vph)	406	478	307	390	565
Future Volume (vph)	406	478	307	390	565
Turn Type	Prot	Perm	Prot	NA	NA
Protected Phases	4		5	2	6
Permitted Phases		4			
Detector Phase	4	4	5	2	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	7.0	7.0
Minimum Split (s)	28.0	28.0	10.0	39.0	39.0
Total Split (s)	46.0	46.0	22.0	74.0	52.0
Total Split (%)	38.3%	38.3%	18.3%	61.7%	43.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0
Lead/Lag			Lead		Lag
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	None
Act Effct Green (s)	30.2	30.2	14.7	57.0	37.0
Actuated g/C Ratio	0.31	0.31	0.15	0.58	0.38
v/c Ratio	0.80	0.68	0.68	0.40	0.81
Control Delay	44.7	11.9	50.4	13.5	28.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	11.9	50.4	13.5	28.4
LOS	D	B	D	B	C
Approach Delay	27.0			29.8	28.4
Approach LOS	C			C	C

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 97.8	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.81	
Intersection Signal Delay: 28.3	Intersection LOS: C
Intersection Capacity Utilization 74.1%	ICU Level of Service D
Analysis Period (min) 15	

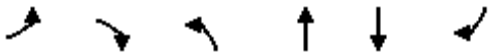
Splits and Phases: 6: DuPont Steilacoom Rd & Center Dr





Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	423	498	320	406	1068
v/c Ratio	0.80	0.68	0.68	0.40	0.81
Control Delay	44.7	11.9	50.4	13.5	28.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	44.7	11.9	50.4	13.5	28.4
Queue Length 50th (ft)	248	46	101	131	264
Queue Length 95th (ft)	408	173	174	238	404
Internal Link Dist (ft)	1791			3455	484
Turn Bay Length (ft)			150		
Base Capacity (vph)	756	878	574	1266	1693
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.56	0.57	0.56	0.32	0.63

Intersection Summary



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	406	478	307	390	565	460
Future Volume (veh/h)	406	478	307	390	565	460
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1841	1781	1811	1856	1856
Adj Flow Rate, veh/h	423	147	320	406	589	358
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	2	4	8	6	3	3
Cap, veh/h	497	435	434	1050	787	478
Arrive On Green	0.28	0.28	0.13	0.58	0.38	0.38
Sat Flow, veh/h	1781	1560	3291	1811	2179	1268
Grp Volume(v), veh/h	423	147	320	406	498	449
Grp Sat Flow(s),veh/h/ln	1781	1560	1646	1811	1763	1592
Q Serve(g_s), s	15.9	5.3	6.6	8.6	17.3	17.3
Cycle Q Clear(g_c), s	15.9	5.3	6.6	8.6	17.3	17.3
Prop In Lane	1.00	1.00	1.00			0.80
Lane Grp Cap(c), veh/h	497	435	434	1050	665	600
V/C Ratio(X)	0.85	0.34	0.74	0.39	0.75	0.75
Avail Cap(c_a), veh/h	1032	904	791	1766	1171	1058
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.1	20.3	29.5	8.1	19.1	19.1
Incr Delay (d2), s/veh	4.2	0.5	2.5	0.2	1.7	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.8	0.1	2.7	2.9	6.8	6.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.3	20.8	32.0	8.3	20.8	21.0
LnGrp LOS	C	C	C	A	C	C
Approach Vol, veh/h	570			726	947	
Approach Delay, s/veh	26.4			18.7	20.9	
Approach LOS	C			B	C	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		46.0		24.7	14.3	31.7
Change Period (Y+Rc), s		5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		69.0		41.0	17.0	47.0
Max Q Clear Time (g_c+I1), s		10.6		17.9	8.6	19.3
Green Ext Time (p_c), s		2.9		1.8	0.7	7.3

Intersection Summary		
HCM 6th Ctrl Delay		21.6
HCM 6th LOS		C

Intersection	
Intersection Delay, s/veh	10.1
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	20	15	135	235	120
Future Vol, veh/h	105	20	15	135	235	120
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles, %	2	2	1	1	0	0
Mvmt Flow	108	21	15	139	242	124
Number of Lanes	1	0	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	1
HCM Control Delay	9.4	9.1	10.7
HCM LOS	A	A	B

Lane	NBLn1	NBLn2	EBLn1	SBLn1
Vol Left, %	100%	0%	84%	0%
Vol Thru, %	0%	100%	0%	66%
Vol Right, %	0%	0%	16%	34%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	15	135	125	355
LT Vol	15	0	105	0
Through Vol	0	135	0	235
RT Vol	0	0	20	120
Lane Flow Rate	15	139	129	366
Geometry Grp	7	7	2	5
Degree of Util (X)	0.024	0.199	0.185	0.44
Departure Headway (Hd)	5.646	5.142	5.167	4.33
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	634	697	692	831
Service Time	3.384	2.88	3.215	2.361
HCM Lane V/C Ratio	0.024	0.199	0.186	0.44
HCM Control Delay	8.5	9.2	9.4	10.7
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	0.1	0.7	0.7	2.3

Intersection	
Intersection Delay, s/veh	8.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	495	685	0	195
Demand Flow Rate, veh/h	505	699	0	199
Vehicles Circulating, veh/h	49	72	499	665
Vehicles Exiting, veh/h	815	427	55	106
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.5	9.0	0.0	8.7
Approach LOS	A	A	-	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	505	699	0	199
Cap Entry Lane, veh/h	1313	1282	829	700
Entry HV Adj Factor	0.981	0.980	1.000	0.979
Flow Entry, veh/h	495	685	0	195
Cap Entry, veh/h	1287	1257	829	686
V/C Ratio	0.385	0.545	0.000	0.284
Control Delay, s/veh	6.5	9.0	4.3	8.7
LOS	A	A	A	A
95th %tile Queue, veh	2	3	0	1

Intersection	
Intersection Delay, s/veh	32.2
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	100	5	385	175	123	5	122	214	220	200	0
Future Vol, veh/h	0	100	5	385	175	123	5	122	214	220	200	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	109	5	418	190	134	5	133	233	239	217	0
Number of Lanes	0	1	0	1	1	1	0	1	1	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	1
HCM Control Delay	18	44.8	20.2	25
HCM LOS	C	E	C	C

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	4%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	96%	0%	95%	0%	100%	0%	0%	100%
Vol Right, %	0%	100%	5%	0%	0%	100%	0%	0%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	127	214	105	385	175	123	220	200
LT Vol	5	0	0	385	0	0	220	0
Through Vol	122	0	100	0	175	0	0	200
RT Vol	0	214	5	0	0	123	0	0
Lane Flow Rate	138	233	114	418	190	134	239	217
Geometry Grp	8	8	8	7	7	7	8	8
Degree of Util (X)	0.36	0.559	0.327	0.981	0.419	0.268	0.634	0.546
Departure Headway (Hd)	9.398	8.652	10.3	8.443	7.929	7.209	9.552	9.035
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	382	416	349	431	457	501	378	400
Service Time	7.158	6.412	8.071	6.143	5.629	4.909	7.309	6.792
HCM Lane V/C Ratio	0.361	0.56	0.327	0.97	0.416	0.267	0.632	0.542
HCM Control Delay	17.4	21.9	18	68.1	16.2	12.5	27.5	22.2
HCM Lane LOS	C	C	C	F	C	B	D	C
HCM 95th-tile Q	1.6	3.3	1.4	12	2	1.1	4.2	3.2

MOVEMENT SUMMARY

Site: 101 [INT 10 No Action_PM (Site Folder: DuPont)]

DuPont-Steilacoom Rd & I-5 On and Off-Ramps
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: DuPont-Steilcoom Rd														
8	T1	100	0.0	109	0.0	0.216	11.8	LOS B	1.4	35.1	0.86	0.87	0.86	33.6
18	R2	140	0.0	152	0.0	0.216	11.1	LOS B	1.6	39.2	0.88	0.84	0.88	32.9
Approach		240	0.0	261	0.0	0.216	11.4	LOS B	1.6	39.2	0.87	0.85	0.87	33.2
East: I-5 On- and Off-Ramps														
1	L2	230	0.0	250	0.0	0.315	10.1	LOS B	2.2	55.5	0.34	0.57	0.34	35.6
16	R2	657	1.0	714	1.0	0.315	3.8	LOS A	2.2	55.5	0.09	0.48	0.09	36.3
Approach		887	0.7	964	0.7	0.315	5.4	LOS A	2.2	55.5	0.16	0.51	0.16	36.1
North: RoadName														
7	L2	938	1.0	1020	1.0	0.472	11.1	LOS B	3.3	83.8	0.53	0.68	0.53	34.0
4	T1	125	0.0	136	0.0	0.472	4.9	LOS A	3.3	83.8	0.52	0.66	0.52	34.4
Approach		1063	0.9	1155	0.9	0.472	10.4	LOS B	3.3	83.8	0.53	0.68	0.53	34.0
All Vehicles		2190	0.7	2380	0.7	0.472	8.5	LOS A	3.3	83.8	0.42	0.63	0.42	34.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Intersection	
Int Delay, s/veh	8.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	10	36	5	10	140	5
Future Vol, veh/h	10	36	5	10	140	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	10	0	0	20	0	0
Mvmt Flow	11	39	5	11	152	5

Major/Minor	Major1		Minor2	
Conflicting Flow All	0	0	11	16
Stage 1	-	-	0	0
Stage 2	-	-	11	16
Critical Hdwy	-	-	6.4	6.5
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.4	5.5
Follow-up Hdwy	-	-	3.5	4
Pot Cap-1 Maneuver	-	-	1014	882
Stage 1	-	-	-	-
Stage 2	-	-	1017	886
Platoon blocked, %	-	-		
Mov Cap-1 Maneuver	-	-	1014	0
Mov Cap-2 Maneuver	-	-	1014	0
Stage 1	-	-	-	0
Stage 2	-	-	1017	0

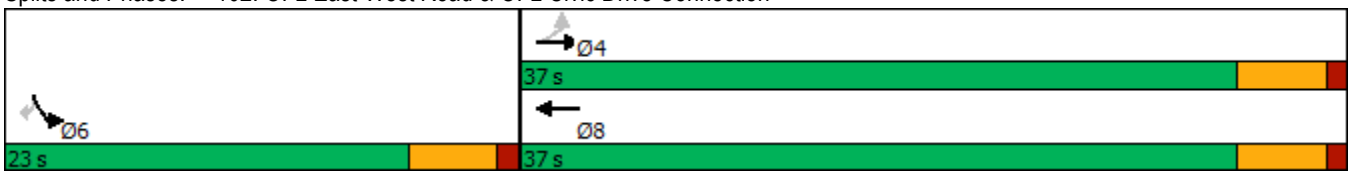
Approach	NB	SB
HCM Control Delay, s	0	9.2
HCM LOS		A

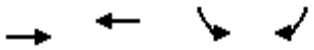
Minor Lane/Major Mvmt	NBT	NBR	SBLn1
Capacity (veh/h)	-	-	1014
HCM Lane V/C Ratio	-	-	0.155
HCM Control Delay (s)	-	-	9.2
HCM Lane LOS	-	-	A
HCM 95th %tile Q(veh)	-	-	0.5

Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	10	1996	1078	5	10
Future Volume (vph)	10	1996	1078	5	10
Turn Type	Perm	NA	NA	Prot	Perm
Protected Phases		4	8	6	
Permitted Phases	4				6
Detector Phase	4	4	8	6	6
Switch Phase					
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0
Total Split (s)	37.0	37.0	37.0	23.0	23.0
Total Split (%)	61.7%	61.7%	61.7%	38.3%	38.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0
Total Lost Time (s)		5.0	5.0	5.0	5.0
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	Min	Min
Act Effct Green (s)		32.3	32.3	7.7	7.7
Actuated g/C Ratio		0.64	0.64	0.15	0.15
v/c Ratio		0.73	0.36	0.02	0.05
Control Delay		9.2	5.2	16.6	10.0
Queue Delay		0.0	0.0	0.0	0.0
Total Delay		9.2	5.2	16.6	10.0
LOS		A	A	B	A
Approach Delay		9.2	5.2	12.1	
Approach LOS		A	A	B	

Intersection Summary	
Cycle Length: 60	
Actuated Cycle Length: 50.1	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 7.8	Intersection LOS: A
Intersection Capacity Utilization 57.9%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 102: OFL East-West Road & OFL Civic Drive Connection

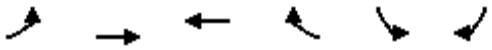




Lane Group	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	2181	1177	5	11
v/c Ratio	0.73	0.36	0.02	0.05
Control Delay	9.2	5.2	16.6	10.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.2	5.2	16.6	10.0
Queue Length 50th (ft)	100	37	1	0
Queue Length 95th (ft)	#303	114	8	10
Internal Link Dist (ft)	1305	400	797	
Turn Bay Length (ft)				
Base Capacity (vph)	3007	3227	632	521
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.73	0.36	0.01	0.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	1996	1078	5	5	10
Future Volume (veh/h)	10	1996	1078	5	5	10
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1604	1900	1900	1900	1900	1752
Adj Flow Rate, veh/h	11	2170	1172	5	5	11
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	20	0	0	0	0	10
Cap, veh/h	89	3271	3473	15	210	172
Arrive On Green	0.65	0.65	0.65	0.65	0.12	0.12
Sat Flow, veh/h	6	5178	5502	23	1810	1485
Grp Volume(v), veh/h	818	1363	760	417	5	11
Grp Sat Flow(s),veh/h/ln	1881	1573	1729	1896	1810	1485
Q Serve(g_s), s	0.0	11.5	4.2	4.2	0.1	0.3
Cycle Q Clear(g_c), s	11.3	11.5	4.2	4.2	0.1	0.3
Prop In Lane	0.01			0.01	1.00	1.00
Lane Grp Cap(c), veh/h	1310	2050	2253	1235	210	172
V/C Ratio(X)	0.62	0.67	0.34	0.34	0.02	0.06
Avail Cap(c_a), veh/h	1479	2340	2571	1410	757	621
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	4.6	4.6	3.4	3.4	16.9	16.9
Incr Delay (d2), s/veh	0.7	0.6	0.1	0.2	0.0	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	1.7	0.6	0.7	0.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	5.3	5.2	3.4	3.5	16.9	17.1
LnGrp LOS	A	A	A	A	B	B
Approach Vol, veh/h		2181	1177		16	
Approach Delay, s/veh		5.2	3.5		17.0	
Approach LOS		A	A		B	

Timer - Assigned Phs			4		6	8
Phs Duration (G+Y+Rc), s			33.0		10.0	33.0
Change Period (Y+Rc), s			5.0		5.0	5.0
Max Green Setting (Gmax), s			32.0		18.0	32.0
Max Q Clear Time (g_c+I1), s			13.5		2.3	6.2
Green Ext Time (p_c), s			14.6		0.0	9.0

Intersection Summary	
HCM 6th Ctrl Delay	4.7
HCM 6th LOS	A

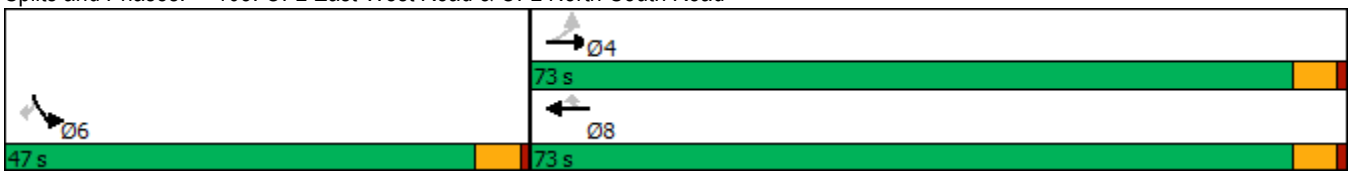
Notes

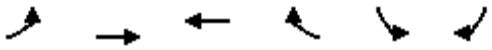
User approved volume balancing among the lanes for turning movement.

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	14	1308	768	320	698	19
Future Volume (vph)	14	1308	768	320	698	19
Turn Type	Perm	NA	NA	Perm	Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4			8		6
Detector Phase	4	4	8	8	6	6
Switch Phase						
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	23.0	23.0	23.0	23.0	23.0	23.0
Total Split (s)	73.0	73.0	73.0	73.0	47.0	47.0
Total Split (%)	60.8%	60.8%	60.8%	60.8%	39.2%	39.2%
Yellow Time (s)	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
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None	None	None	None	Min	Min
Act Effct Green (s)	46.7	46.7	46.7	46.7	26.7	26.7
Actuated g/C Ratio	0.55	0.55	0.55	0.55	0.32	0.32
v/c Ratio	0.05	0.73	0.43	0.34	0.73	0.04
Control Delay	10.6	17.2	12.1	2.2	31.4	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	17.2	12.1	2.2	31.4	10.4
LOS	B	B	B	A	C	B
Approach Delay		17.1	9.2		30.8	
Approach LOS		B	A		C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 84.2	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 0.73	
Intersection Signal Delay: 17.5	Intersection LOS: B
Intersection Capacity Utilization 64.4%	ICU Level of Service C
Analysis Period (min) 15	

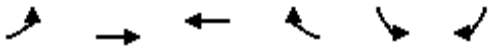
Splits and Phases: 103: OFL East-West Road & OFL North-South Road





Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	15	1422	835	348	759	21
v/c Ratio	0.05	0.73	0.43	0.34	0.73	0.04
Control Delay	10.6	17.2	12.1	2.2	31.4	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	17.2	12.1	2.2	31.4	10.4
Queue Length 50th (ft)	3	266	122	0	176	0
Queue Length 95th (ft)	15	472	223	39	323	18
Internal Link Dist (ft)		587	1305		2086	
Turn Bay Length (ft)	150					
Base Capacity (vph)	432	2854	2854	1340	1757	844
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.50	0.29	0.26	0.43	0.02

Intersection Summary



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	14	1308	768	320	698	19
Future Volume (veh/h)	14	1308	768	320	698	19
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1856	1900
Adj Flow Rate, veh/h	15	1422	835	348	759	21
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	3	0
Cap, veh/h	400	2040	2040	910	968	454
Arrive On Green	0.56	0.56	0.56	0.56	0.28	0.28
Sat Flow, veh/h	668	3705	3705	1610	3428	1610
Grp Volume(v), veh/h	15	1422	835	348	759	21
Grp Sat Flow(s),veh/h/ln	668	1805	1805	1610	1714	1610
Q Serve(g_s), s	0.9	18.5	8.6	7.9	13.4	0.6
Cycle Q Clear(g_c), s	9.4	18.5	8.6	7.9	13.4	0.6
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	400	2040	2040	910	968	454
V/C Ratio(X)	0.04	0.70	0.41	0.38	0.78	0.05
Avail Cap(c_a), veh/h	717	3750	3750	1673	2200	1033
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	10.7	10.2	8.1	7.9	21.7	17.1
Incr Delay (d2), s/veh	0.0	0.4	0.1	0.3	1.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	6.0	2.8	2.3	5.1	0.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	10.8	10.7	8.2	8.2	23.1	17.1
LnGrp LOS	B	B	A	A	C	B
Approach Vol, veh/h		1437	1183		780	
Approach Delay, s/veh		10.7	8.2		22.9	
Approach LOS		B	A		C	

Timer - Assigned Phs	4	6	8
Phs Duration (G+Y+Rc), s	42.0	23.5	42.0
Change Period (Y+Rc), s	5.0	5.0	5.0
Max Green Setting (Gmax), s	68.0	42.0	68.0
Max Q Clear Time (g_c+I1), s	20.5	15.4	10.6
Green Ext Time (p_c), s	16.5	3.1	9.2

Intersection Summary	
HCM 6th Ctrl Delay	12.6
HCM 6th LOS	B

Notes

User approved volume balancing among the lanes for turning movement.

Intersection	
Intersection Delay, s/veh	8.8
Intersection LOS	A

Approach	EB	WB	NB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	698	450	255
Demand Flow Rate, veh/h	698	450	255
Vehicles Circulating, veh/h	174	153	437
Vehicles Exiting, veh/h	429	539	435
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	10.8	6.8	7.2
Approach LOS	B	A	A

Lane	Left	Left	Left
Designated Moves	TR	LT	LR
Assumed Moves	TR	LT	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	698	450	255
Cap Entry Lane, veh/h	1155	1180	884
Entry HV Adj Factor	1.000	1.000	1.000
Flow Entry, veh/h	698	450	255
Cap Entry, veh/h	1155	1180	884
V/C Ratio	0.604	0.381	0.289
Control Delay, s/veh	10.8	6.8	7.2
LOS	B	A	A
95th %tile Queue, veh	4	2	1

FEHR PEERS

Memorandum

Date: August 29, 2024

To: Barbara Kincaid, City of DuPont

From: Michael Adamson and Dan Grayuski, Fehr & Peers

Subject: Transportation Alternative 2 (High-End) Conditions

TC22-0061

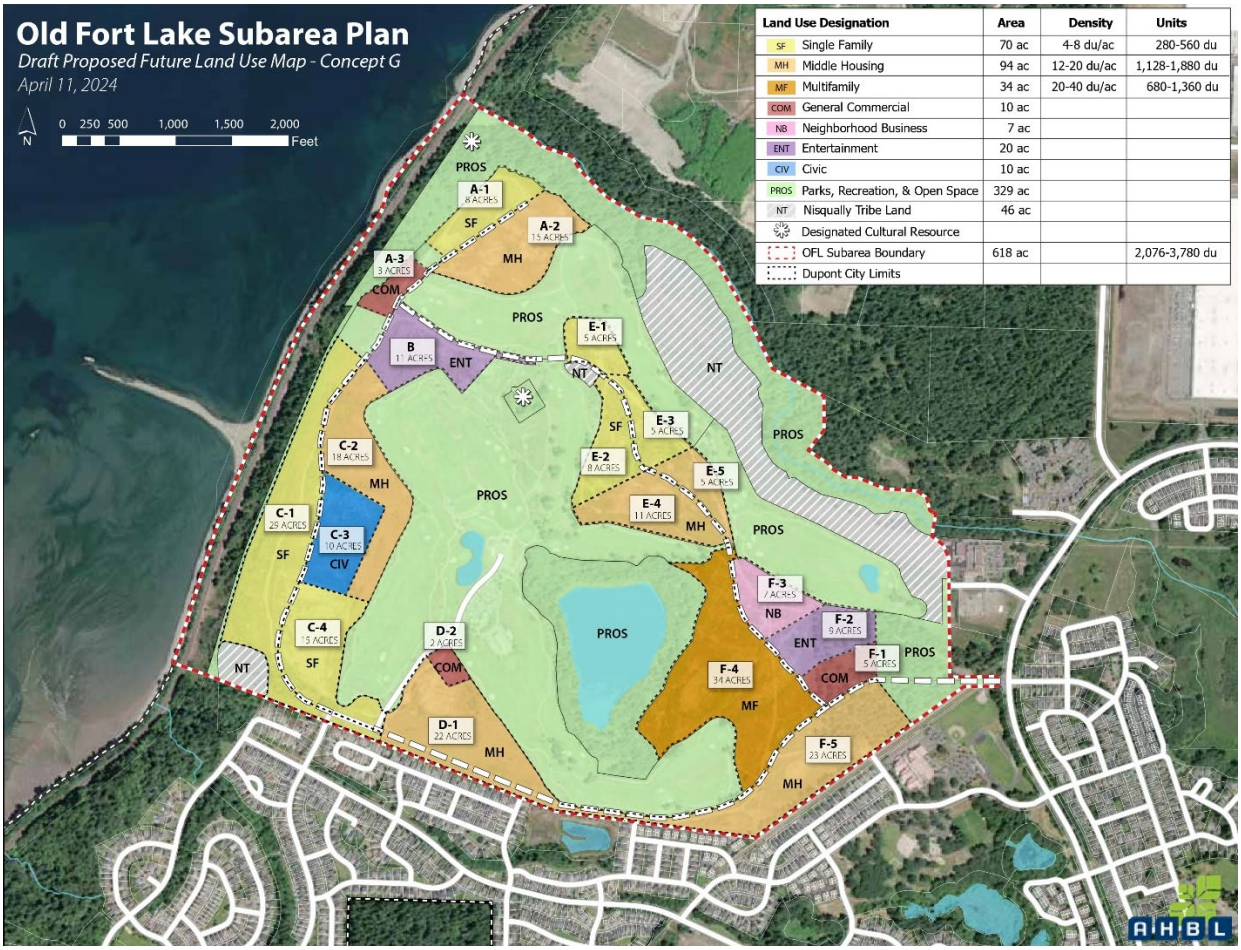
The purpose of this memorandum is to summarize the Alternative 2 (High-End) Condition forecasts and baseline impacts on the transportation network due to growth and other pipeline developments. Per discussions with the City, the High-End Condition represents a proposed buildout of the Old Fort Lake Subarea based on a high-end zoning proposal. Summarized in this memorandum are the High-End Condition volumes, traffic operations under these assumptions, and an assessment of freight truck movements, active transportation, safety, and transit.

The zoning districts within the Old Fort Lake Subarea under the High-End Condition are shown in **Figure 1**, divided as A through F. Each of these zoning districts represents a combination of uses, as detailed in **Table 1**. A more complete breakdown of these uses is provided in **Attachment A**. Under the High-End Condition, four accesses to the site are being considered:

- Civic Drive at Center Drive
- Palisade Drive at Center Drive
- Hoffman Hill Boulevard at McNeil Street
- Wren Road northwest of Bobs Hollow Lane

Note that the Wren Road access is a new access considered specifically under Alternative 2 (High-End) conditions. This additional access was assumed under the High-End Condition and not under Alternative 1 (No Action) because the mix of uses under the High-End Condition includes a much larger proportion of residential traditional retail uses, which will generate much lower heavy vehicle traffic than under No Action. Should the Wren Road access move forward, it is assumed that necessary traffic calming and other safety measures would be put in place to encourage lower speeds and safer driving near the Middle School.

Figure 1. Old Fort Lake Subarea Zoning, Alternative 2 (High-End)



Source: AHBL *"Old Fort Lake Subarea Plan, Draft Proposed Future Land Use Map – Concept G,"* April 11, 2024.

Table 1. Proposed Old Fort Lake Land Uses by Zoning District, High-End Condition

Use	ITE Code[1]	Unit[2]	Quantity by Zoning District(s)						
			Total	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F
Single-family residences	210	Dwelling Units	560	64	0	352	0	144	0
Middle housing (Townhomes)	215	Dwelling Units	1860	300	0	340	440	320	460
Multifamily Residences (Low-Rise)	220	Dwelling Units	1360	0	0	0	0	0	1360
Service[3]	822	KSF	40	0	0	0	0	0	40
Retail Trade	822	KSF	145	30	30	0	0	0	85
Restaurant/Drinking Establishments	932	KSF	61.5	10	10	0	3	0	38.5
Office/R&D	760	KSF	40	0	0	0	0	0	40
Hotel	310	Rooms	300	0	150	0	0	0	150
Convention Center	-	Attendees	150	0	150	0	0	0	0
Wellness Village – Retail[4]	822	KSF	12	0	0	0	12	0	0
Wellness Village - Medical-Office[4]	720	KSF	18	0	0	0	18	0	0
Auto Repair/Service	942	KSF	3	0	0	0	0	0	3
Entertainment or Cinema	445	Seats	200	0	200	0	0	0	0
Manufacturing (Processing)	140	KSF	20	0	0	0	0	0	20
Elementary School	520	Students	500	0	0	500	0	0	0

Notes:
1. ITE = Institute of Transportation Engineers
2. KSF = Thousand Square Feet
3. The "Service" use represents a variety of potential uses. To provide a conservatively high estimate of trip generation for this use, the ITE 822 "Strip Retail" rate was assumed, consistent with the "Retail Trade" use.
4. The "Wellness Village" use was assumed to be approximately 40% retail uses and 60% medical office uses.

Source: Fehr & Peers; David Sherrard and Associates, 2024

High-End Condition

This section summarizes how the roadway network around the Subarea would be utilized, including how vehicles, pedestrians, bicyclists, freight and transit riders would access the Subarea under the High-End Condition. Other than traffic operations, all remaining modal networks are largely reflective of conditions summarized previously for the No Action Condition.

Active Transportation Network

It is anticipated that the buildout of the Subarea under the High-End Condition would lead to increases in pedestrian and bicycle traffic, particularly connecting to retail, service and residential uses. The active transportation network facilities providing access to the Subarea are shown in **Figure 2**, and summarized below:

- **Accessing via Palisade Drive:** There is a shared-use path on Center Drive from the I-5 on- and off-ramps to Haskell Street. The path then converts to a sidewalk in the vicinity of the Subarea. The portion of Center Drive that is north/east of Palisade Drive has a sidewalk on the west side of the street. Pedestrians can access the Subarea from both directions using this facility.

  There are striped bike lanes throughout Center Drive. Bicyclists may use the shared use path on the west/southern portion of Center Drive but have to use the striped bike lanes once the path ends. In addition to these connections, the Yehle Village/Palisade Village Connector Trail provides an active mode connection between the project site and the neighborhoods southwest of the site.

- **Accessing via Hoffman Hill Boulevard:** There is a shared use path on the north side of McNeil Street extending from Hoffman Hill Boulevard to Center Drive. Sidewalks exist on all residential and collector roadways along and around Hoffman Hill Boulevard, facilitating pedestrian access to the Subarea.

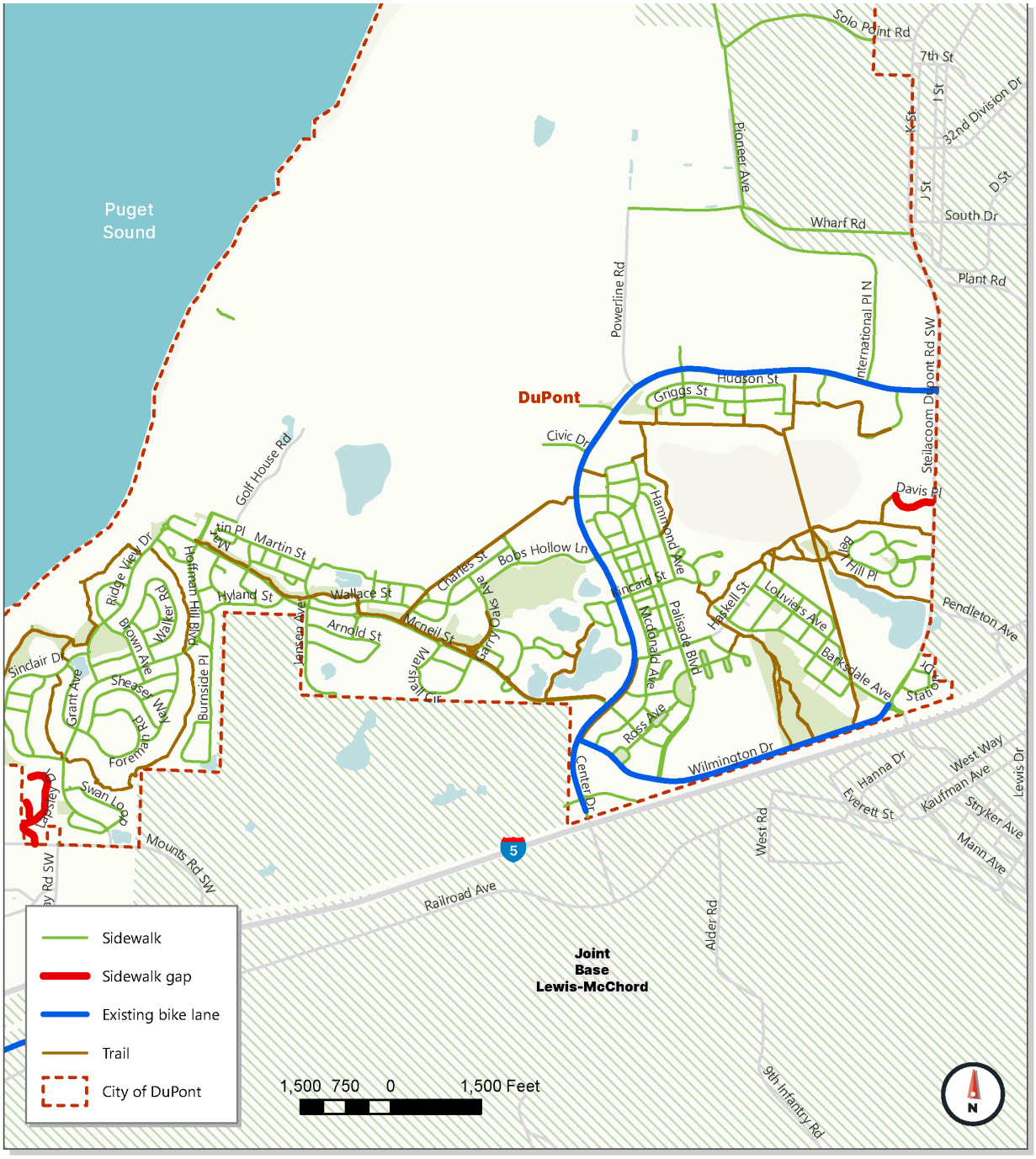
  The McNeil Street shared use path also serves as a bicycle connection to Hoffman Hill Boulevard. In addition to this, the low-speed nature of the residential roadways along and around Hoffman Hill Boulevard would facilitate access to the Subarea from surrounding neighborhoods via bicycle.

- **Accessing via Wren Road:** There are sidewalks and striped bicycle lanes on both sides of Wren Road from Bobs Hollow Road to the entrance to the Subarea. These facilities connect to the sidewalks existing along Bobs Hollow Lane, in addition to the multiple shared use paths and trails within and around DuPont Powerworks Park.

All study intersections have marked crosswalks and pedestrian countdown timers in the case of signalized intersections. However, the intersections at Palisade Boulevard, Civic Drive, and DuPont-Steilacoom Road are non-ADA compliant as they lack curb cuts or truncated domes, which pose a potential barrier for pedestrians accessing the project site.

Under the High-End Condition, pedestrian facility improvements, such as high visibility crosswalks, curb cuts, truncated domes, and pedestrian crossing signs could make accessing the Subarea more comfortable for travelers walking or biking to the Subarea.

Figure 2. Active Transportation Facilities



Source: Fehr and Peers, 2024.

Safety

The DuPont Local Road Safety Plan (LRSP) completed in March 2022 proposes a list of prioritized projects. While the LRSP does not state a definitive date or commitment for implementing these projects, they are considered as possible safety improvements under High-End Conditions. The LRSP projects are described below:

1. Citywide reflective striping and signage treatment improvements at roundabouts
2. Citywide crosswalk striping and signage improvements
3. Citywide crosswalk improvements through Rectangular Rapid Flashing Beacons (RRFB's)[1]
4. Citywide lighting data collection

As traffic volumes are expected to increase under the High-End Conditions, so are the number of conflicts between motorized and non-motorized road users. The stated projects are intended to improve traffic safety throughout the City, particularly for vulnerable groups such as pedestrians and bicyclists.

Transit Network

Currently the Subarea does not have any transit access. The DuPont Station is served by two peak period express routes (Sound Transit 592 and 594), having limited service in the reverse commute direction. Because of this, they are likely not viable routes for those commuting to the Subarea via bus.

Under High-End Conditions, the City could consider the following options for improving transit connections to the Subarea:

- Coordinate with Pierce Transit to provide a limited-service fixed route bus service along Center Drive that connects DuPont Station to the rest of the City.
- Coordinate with Sound Transit to increase frequency of current routes.
- Coordinate with Pierce Transit, Sound Transit, and/or Intercity Transit to provide additional routes connecting to the surrounding communities, such as the Joint Base Lewis-McChord (LBLM), Lakewood, and Lacey.
- Implement active mode improvements on Wilmington Drive, Palisade Drive and Center Drive that facilitate access to the DuPont Station.

Freight Network

Although buildout of the Subarea under the High-End Condition is not planned to result in additions or changes to the existing freight network within the City of DuPont, some of the planned uses under the High-End condition could slightly increase the proportion of freight traffic along the City transportation

[1] RRFBs are pedestrian-actuated enhancements used to improve pedestrian safety and visibility t uncontrolled, marked sidewalks. The device includes two rectangular-shaped yellow indications, each with an LED-array-based light source, that flash with high frequency when activated. (FHWA, June 2018)

network. This would occur mostly along DuPont Steilacoom Road and Center Drive between DuPont-Steilacoom Road and Palisade Boulevard.

Traffic Operations

Study Intersections

The High-End Condition analysis included eight existing study intersections throughout the City of DuPont that may be affected by proposed development and land use changes in the Subarea. These study intersections were defined in scoping conversations with City staff. In addition to the eight existing study intersections, updates to the Barksdale Interchange will include the construction of an additional intersection north of the DuPont-Steilacoom Road and Barksdale Avenue intersection. This intersection will directly connect to the new interchange, absorbing any traffic that previously used DuPont-Steilacoom Road and Barksdale Avenue to access I-5. Buildout of the Subarea would also result in several new intersections internal to the Subarea; of these, 4 were included in the High-End Condition analysis.

The following intersections were studied under the High-End Condition (in **bold** are intersections only analyzed under the future alternatives):

1. Center Drive & Wilmington Drive
2. Center Drive & McNeil Street
3. Center Drive & Bob's Hollow Lane
4. Center Drive & Palisade Boulevard
5. Center Drive & Civic Drive
6. Center Drive & DuPont-Steilacoom Road
7. DuPont-Steilacoom Road/Wilmington Drive & Barksdale Avenue
8. Bobs Hollow Lane & McNeil Street
9. **Hoffman Hill Blvd & OFL East-West Road**
10. **I-5 Interchange & DuPont-Steilacoom Road**
11. **OFL Civic Drive Connection & Civic Drive**
12. **OFL East-West Road & OFL Civic Drive Connection**
13. **OFL East-West Road & OFL North-South Road**

The traffic controls for intersections 10 through 13 have not been defined, as these are planned intersections that will facilitate internal circulation within the Subarea. For the purposes of this analysis, side-street stop-control (SSSC) was assumed at these locations. The Manual on Uniform Traffic Control Devices (MUTCD) signal warrants were used to determine the need for signalization at intersections with qualifying traffic volumes and delay. Intersections with SSSC were also tested as roundabouts, to reduce side-street delay and provide traffic calming benefits.

Passenger Vehicle Trips

Trip Generation

The trip generation calculations for the High-End Condition are based on the Institute of Transportation Engineers' (ITE) *Trip Generation Manual*, 11th Edition (2021). Because of the mixed-use nature of the uses within the Subarea, it is anticipated that some trip internalization would occur, thus reducing overall vehicle trips generated. To identify this internalization, Fehr & Peers' MXD+ tool was used. This tool accounts for planned uses, size of the planned area, surrounding land uses and transportation infrastructure to determine reductions in trip generation related to internalization, ped/bike infrastructure, and transit usage. A breakdown of the methodology and assumptions for MXD+ is provided in **Attachment B**.

Using this tool, it was determined that there would likely be the following internalization rates, broken out by peak hour:

- AM Peak – 13% internalization (largely related to the proposed elementary school)
- PM Peak – 10% internalization
- Daily – 7% internalization

These internalization rates were assumed for the High-End Condition. Trips generated by the High-End Condition uses are provided in **Table 2**, including both internalized trips within the Subarea and trips entering or exiting the Subarea. These trips were added to the 2044 Baseline traffic volumes (developed in previous analyses) to determine High-End Condition traffic volumes along the roadway network. The process for developing the 2044 Baseline traffic volumes is provided in **Attachment C**.

Table 2. Trip Generation Rates for High-End Condition

Planned Use	ITE Land Use Code	Quantity	Units	Daily	AM Peak-Hour Trips			PM Peak-Hour Trips		
					In	Out	Total	In	Out	Total
Single-family residences	210	560	Dwelling Units	5282	98	295	393	332	195	527
Middle housing (Townhomes)	215	1860	Dwelling Units	13392	215	678	893	668	392	1060
Multifamily Residences (Low-Rise)	220	1360	Dwelling Units	9166	131	413	544	437	257	694
Service[3]	822	40	KSF	2179	56	37	93	132	132	264
Retail Trade	822	145	KSF	7896	204	136	340	477	477	954
Restaurant/Drinking Establishments	932	61.5	KSF	6593	325	265	590	340	217	557
Office/R&D	760	40	KSF	444	34	8	42	6	32	38
Hotel	310	300	Rooms	2398	78	60	138	90	86	176
Convention Center[3]	-	150	Attendees	300	113	0	113	0	120	120
Wellness Village - Retail	822	12	KSF	653	17	11	28	36	43	79
Wellness Village - Medical-Office	720	18	KSF	648	46	10	56	11	59	70
Auto Repair/Service	942	3	KSF	71	5	4	9	5	5	10
Entertainment or Cinema	445	200	Seats	352	0	0	0	30	28	58
Manufacturing (Processing)	140	20	KSF	95	10	4	14	6	9	15
Elementary School	520	500	Students	1135	270	100	370	34	46	80
Total Generated Trips				**50,604**	**1602**	**2021**	**3623**	**2,604**	**2,098**	**4,702**
Internalized Trips				**3,542**	**208**	**263**	**471**	**260**	**210**	**470**
External Trips			Total	47,062	1,394	1,758	3,152	2,344	1,888	4,232
			Truck Trips	*-96*	*-1*	*-4*	*-5*	*-3*	*-1*	*-4*
			Vehicle Trips[2]	**46,966**	**1,393**	**1,754**	**3,147**	**2,341**	**1,887**	**4,228**

Notes:

1. The "Service" use represents a variety of potential uses. To provide a conservatively high estimate of trip generation for this use, the ITE 822 "Strip Retail" rate was used, consistent with the "Retail Trade" use.
2. This external trips total reflects vehicles only. Truck trips were subtracted from the total and analyzed in the Truck Project Trips section of this report. It was assumed that internalized truck trips would be negligible.

3. ITE does not have a Convention Center use. To develop trip generation estimates for the Convention Center, it was assumed that events are all-day events (with 75% entering in the AM Peak and 80% leaving in the PM Peak); and that vehicle occupancy would be a conservative 1.0 passengers per vehicle.

Source: ITE *Trip Generation Manual*, 11th Edition; Fehr & Peers, 2024.

Trip Distribution

To develop a trip distribution for project-generated trips that mirrors local and regional travel trends, Fehr & Peers determined likely travel paths between major activity centers and the proposed land uses. To facilitate interpretation of trip routing for different land use types, two sets of trip distribution percentages are provided:

- **Residential Use Distribution:** This distribution is contained in **Figure 3**. The percentage breakdown of trips based on their origin/destination, as follows:
    - 5% to/from internal to the City of DuPont
    - 19% to/from the North via DuPont-Steilacoom Road
    - 5% to/from JBLM across I-5
    - 35% to/from the southwest via I-5
    - 36% to/from the northeast via I-5
- **Non-Residential Use Distribution:** This distribution is contained in **Figure 4**. The percentage breakdown of trips accessing at each major access point to the Subarea:
    - 60% dispersing to/from the various residential neighborhoods within the City of DuPont
    - 2% to/from the North via DuPont-Steilacoom Road
    - 20% to/from the southwest via I-5
    - 18% to/from the northeast via I-5

These figures also show the proportion of trips routed along each segment of the roadway network. Internalized trips were assigned consistent with the distribution and type of uses internal to the site, similar to No Action. Based on these trip distributions, trips were assigned to the roadway network. **Figure 5** shows the trip assignment for the proposed residential uses while **Figure 6** shows the trip assignment for the proposed non-residential uses and **Figure 7** shows the assignment for trips internalized to the Subarea for uses.[2] These three assignments were combined with the Baseline forecast to create the final High-End Condition forecast shown in **Figure 8**. Note that the traffic controls for study intersections 10-13 represented in these figures are for a base minimum, unimproved case. Subsequent sections provide recommendations on intersection controls and geometry for these Subarea-specific intersections under the High-End condition.

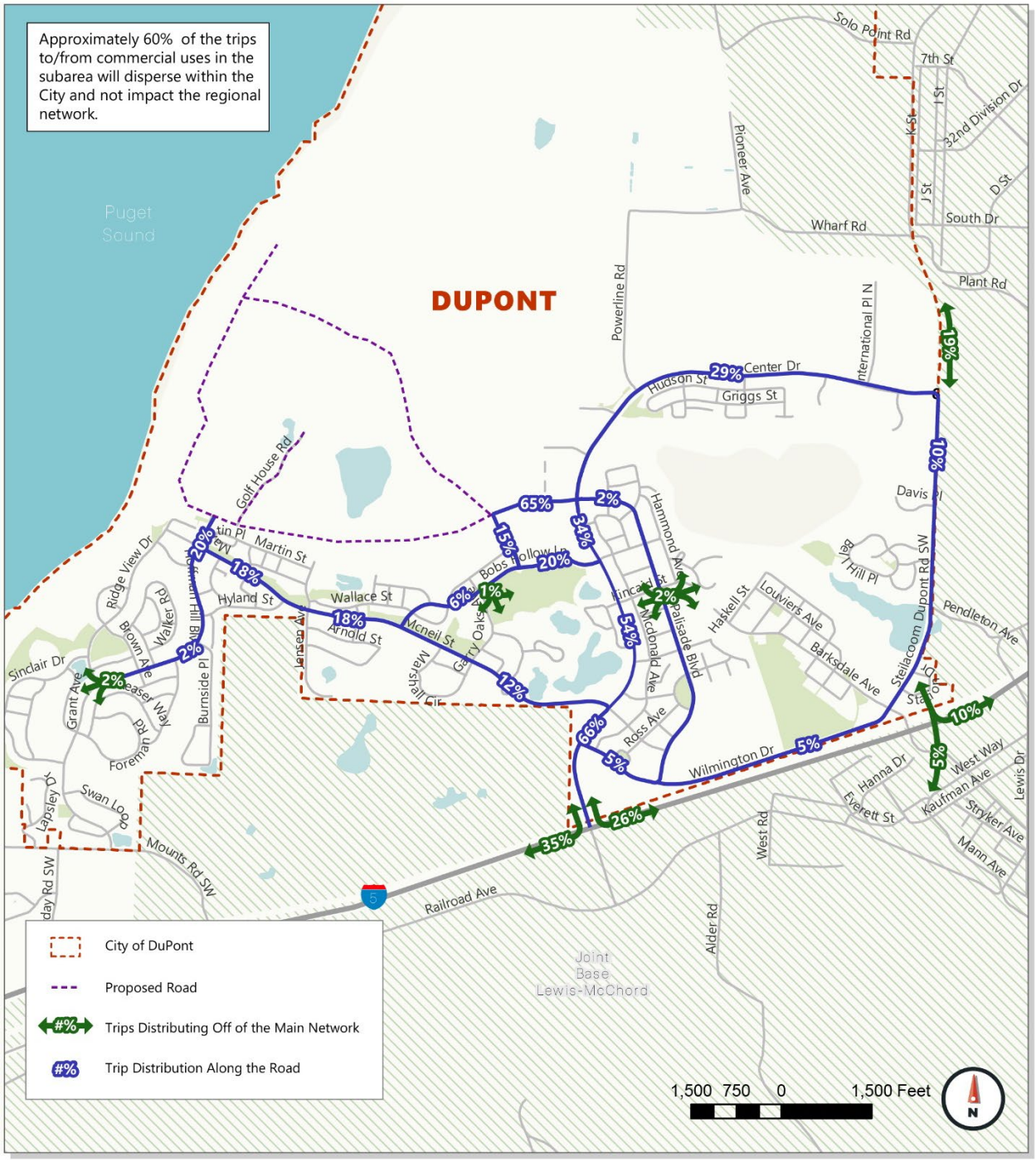
Of vehicle trips generated, the following are expected to use each of the two I-5 interchanges serving DuPont:

- Center Drive Interchange:
    - AM Peak: 1,451 total vehicle trips, with 911 entering the freeway and 540 exiting
    - PM Peak: 2,196 total vehicle trips, with 809 entering the freeway and 1,923 exiting
- Dupont-Steilacoom Road Interchange:

[2] Intersections 11 and 12 are the only internal study intersections that would facilitate internalized traffic, and as such are the only intersections in **Figure 7** that show volume.

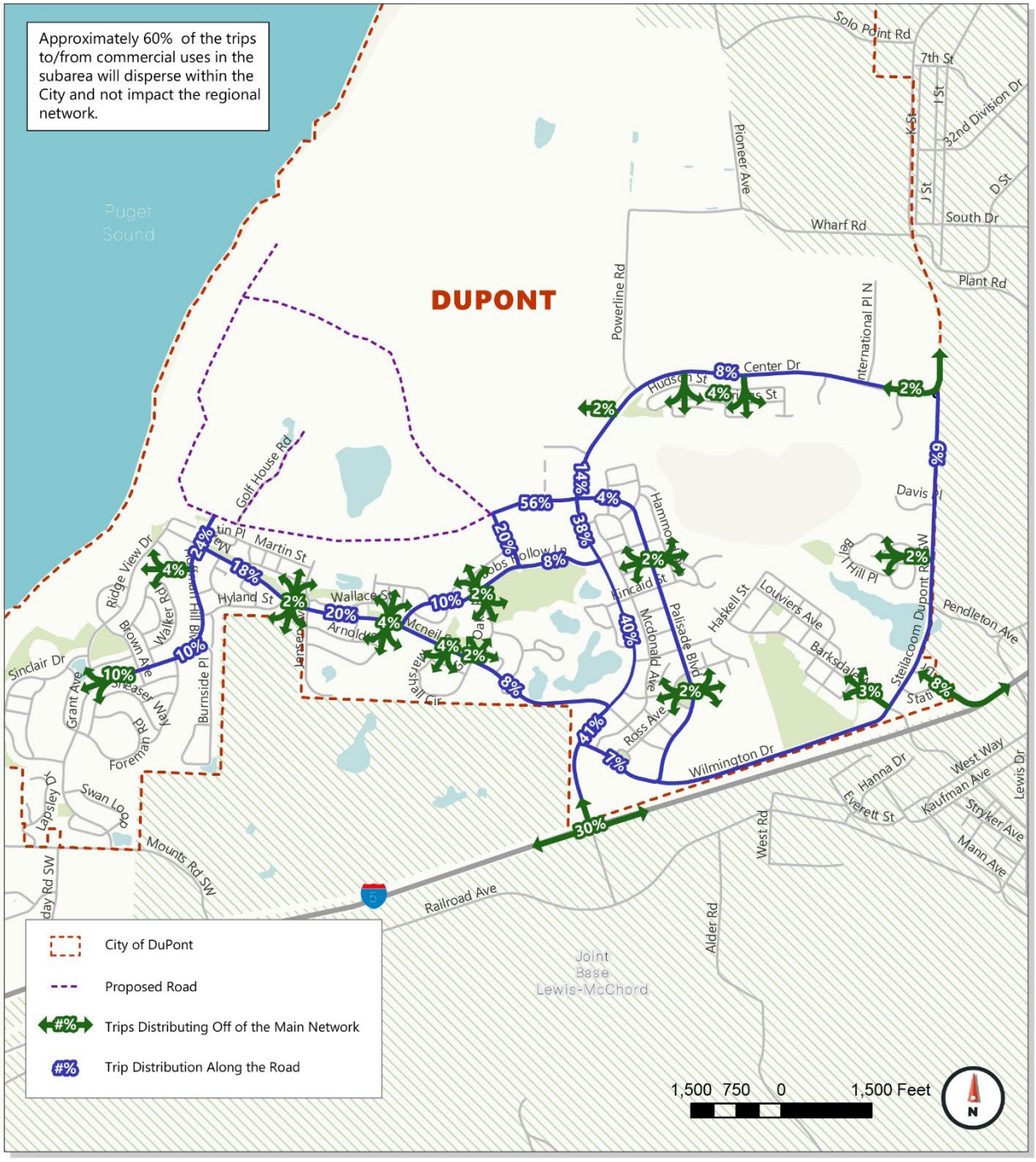
- AM Peak: 352 total vehicle trips, with 216 entering the freeway and 136 exiting
- PM Peak: 466 total vehicle trips, with 198 entering the freeway and 268 exiting

Figure 3. Residential Use Trip Distribution for High-End Condition



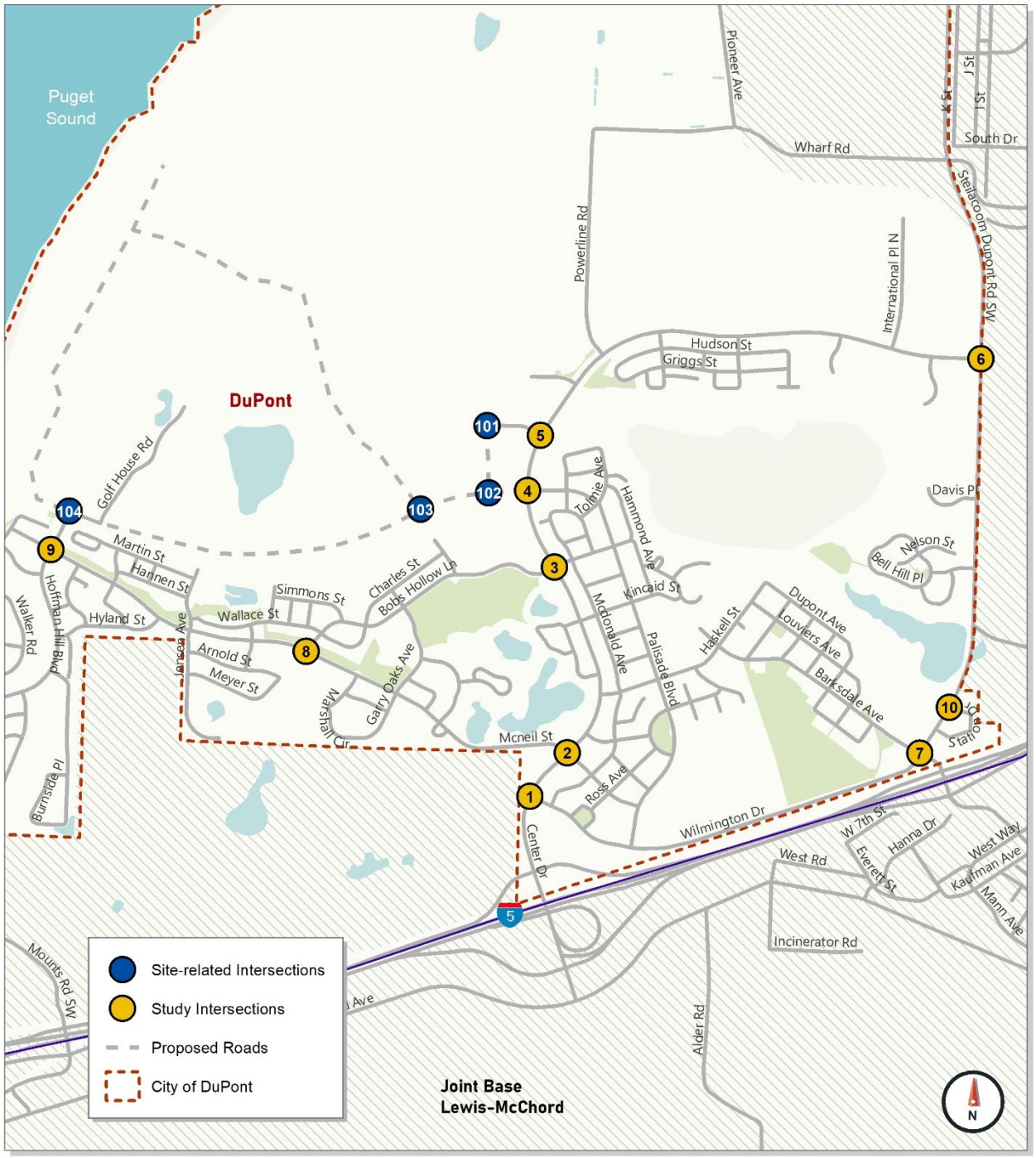
Source: Fehr and Peers, 2024.

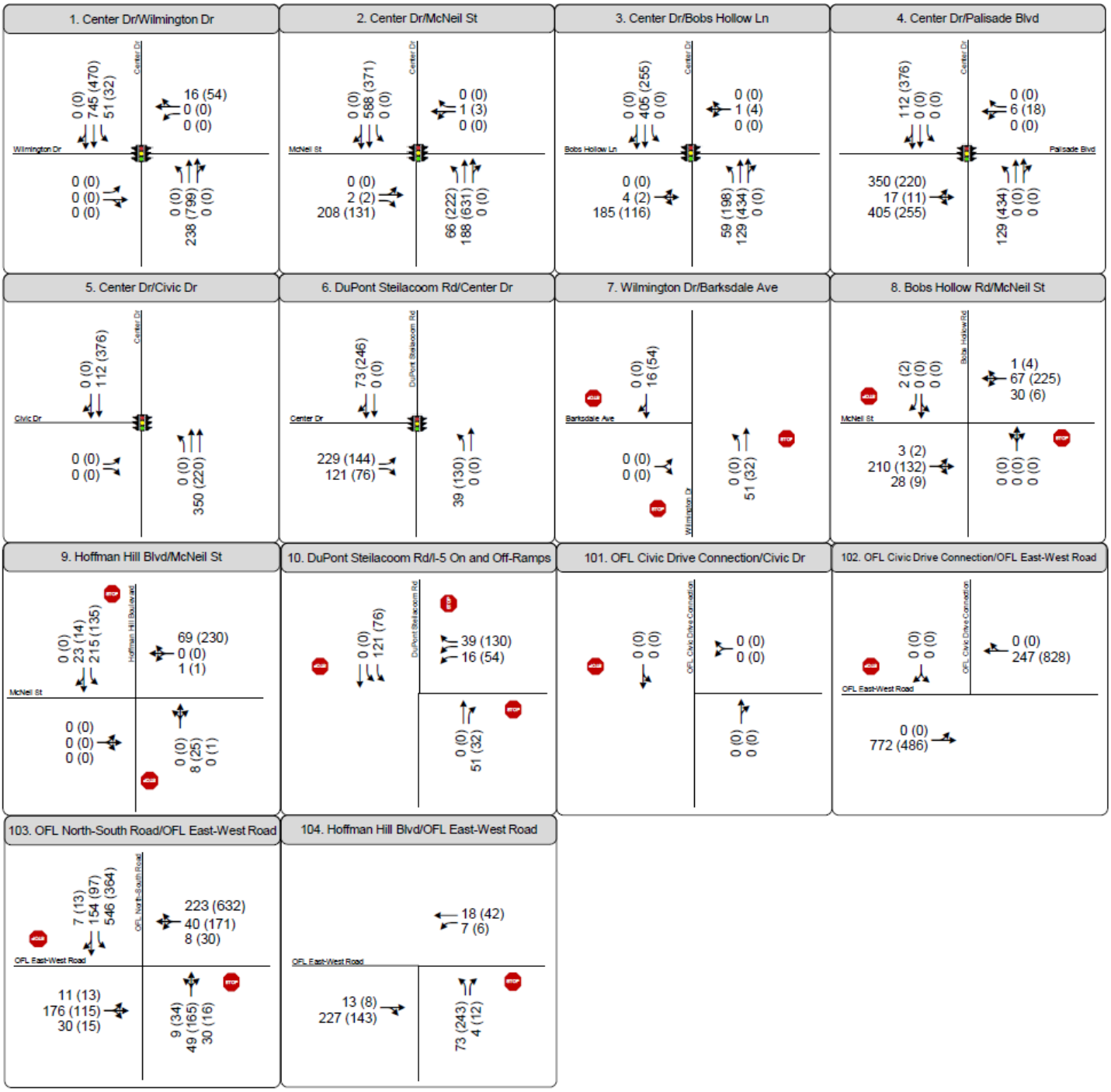
Figure 4. Non-Residential Use Trip Distribution for High-End Condition



Source: Fehr and Peers, 2024.

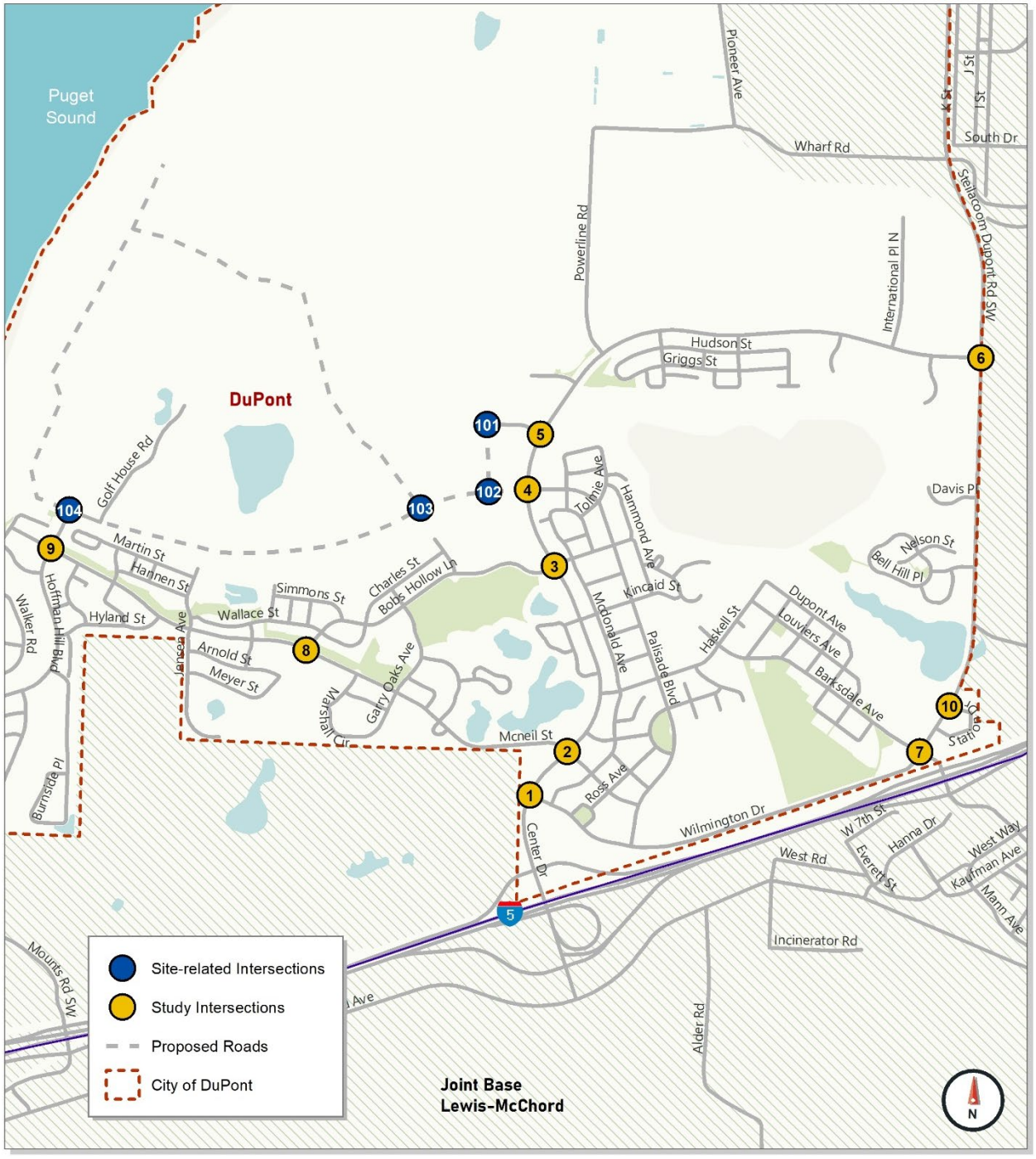
Figure 5. Trip Assignment for Entering/Exiting Trips For Residential Uses Under High-End Condition

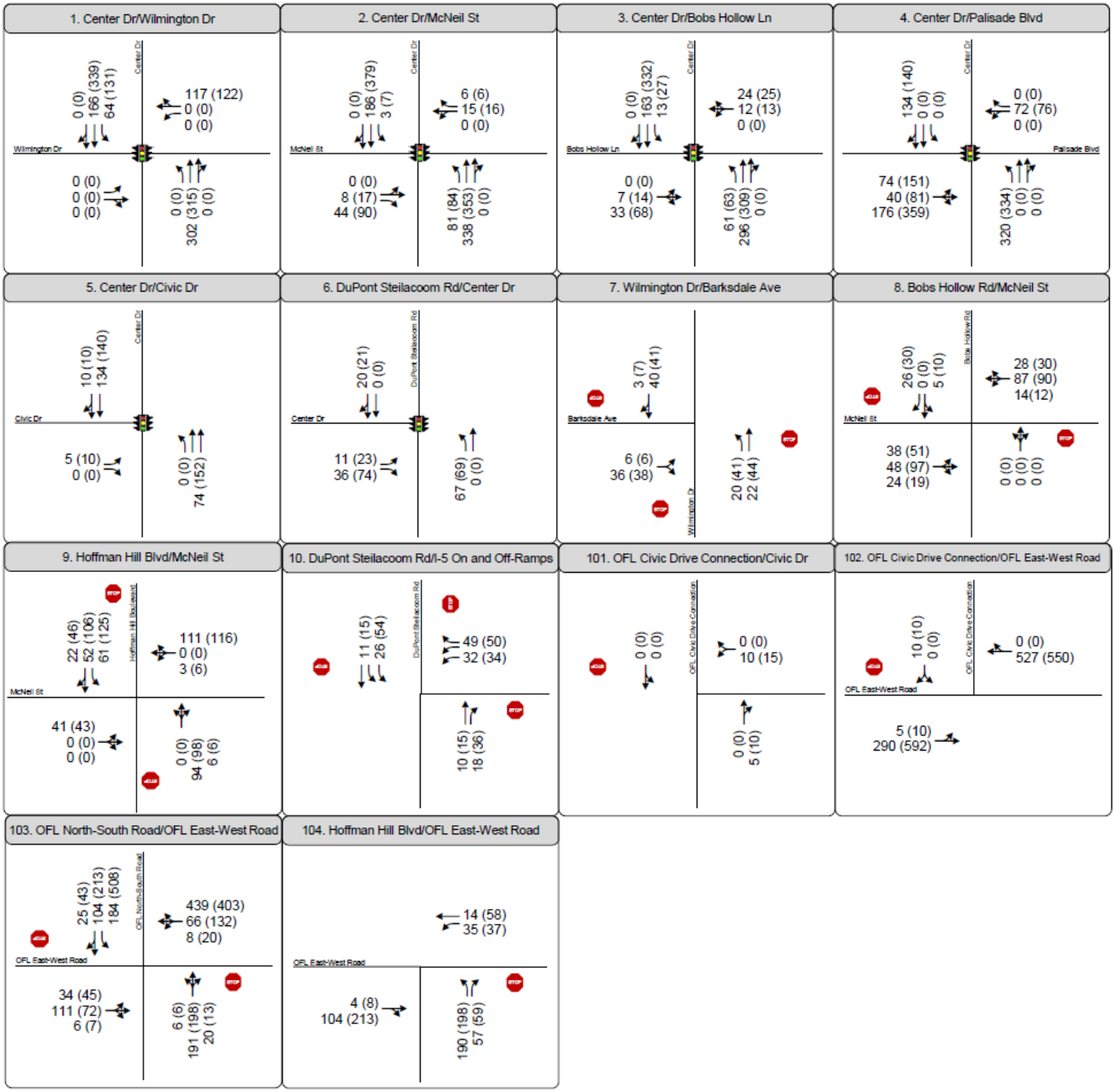




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

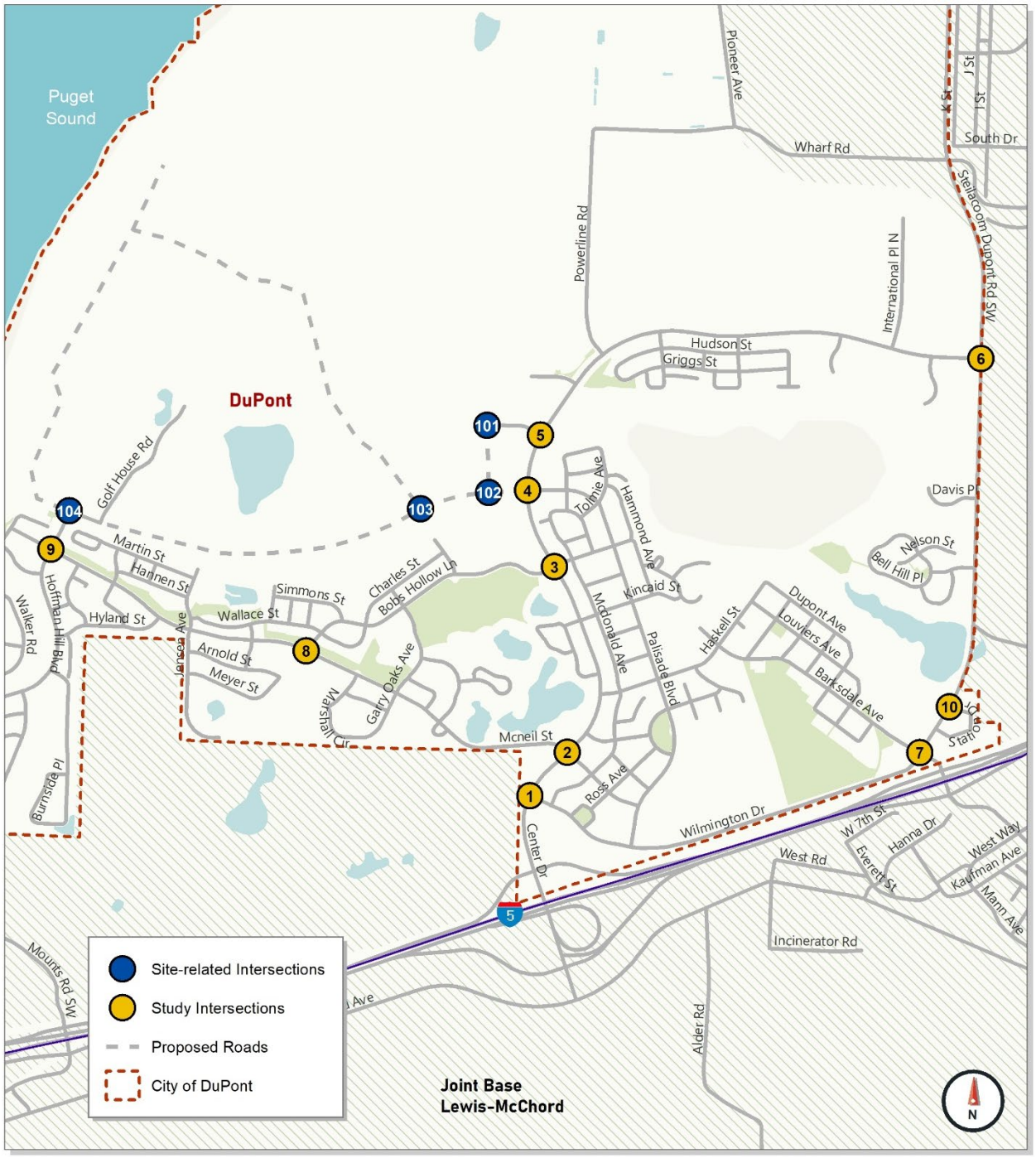
Figure 6. Trip Assignment for Entering/Exiting Trips For Non-Residential Uses Under High-End Condition

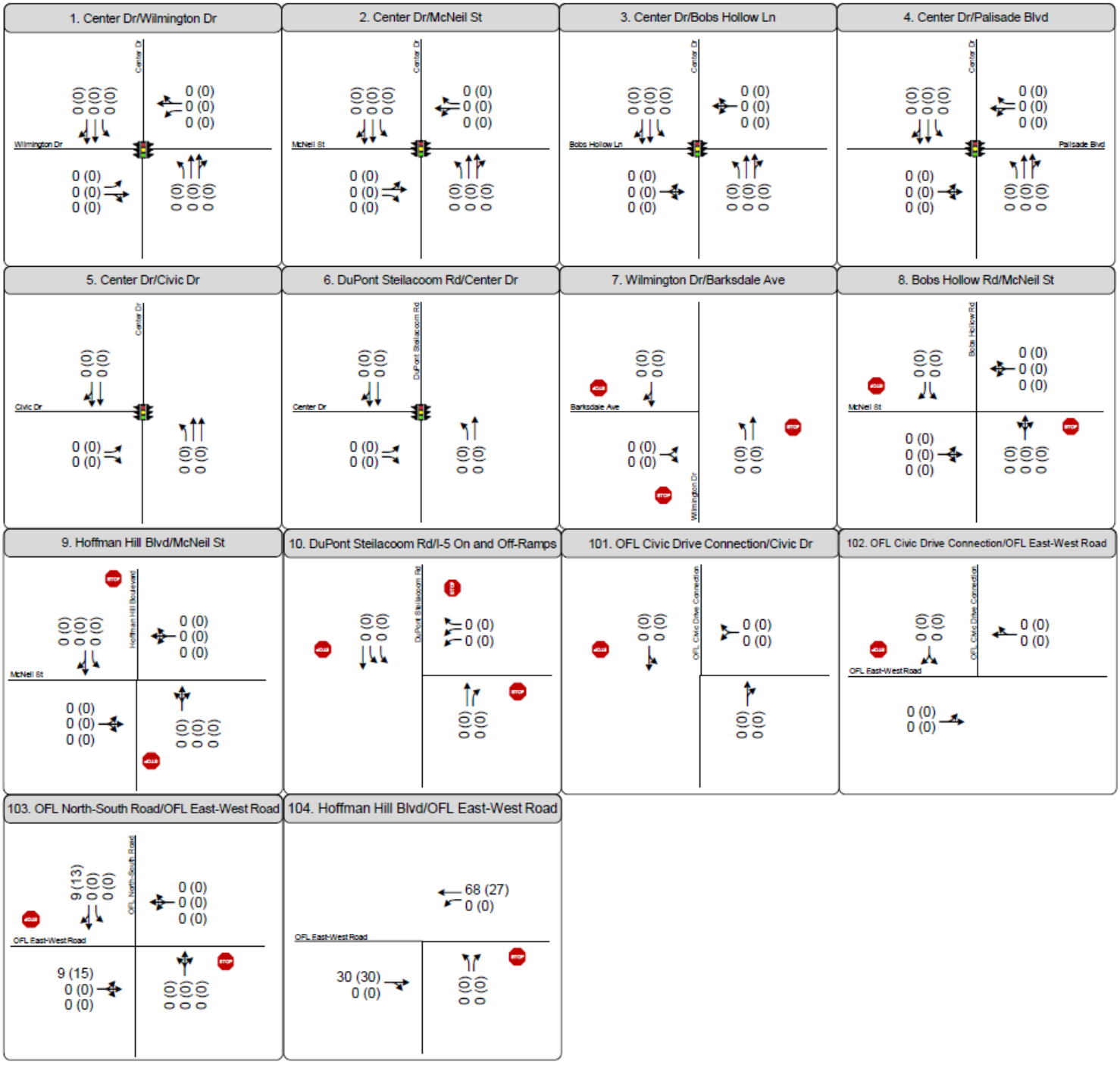




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

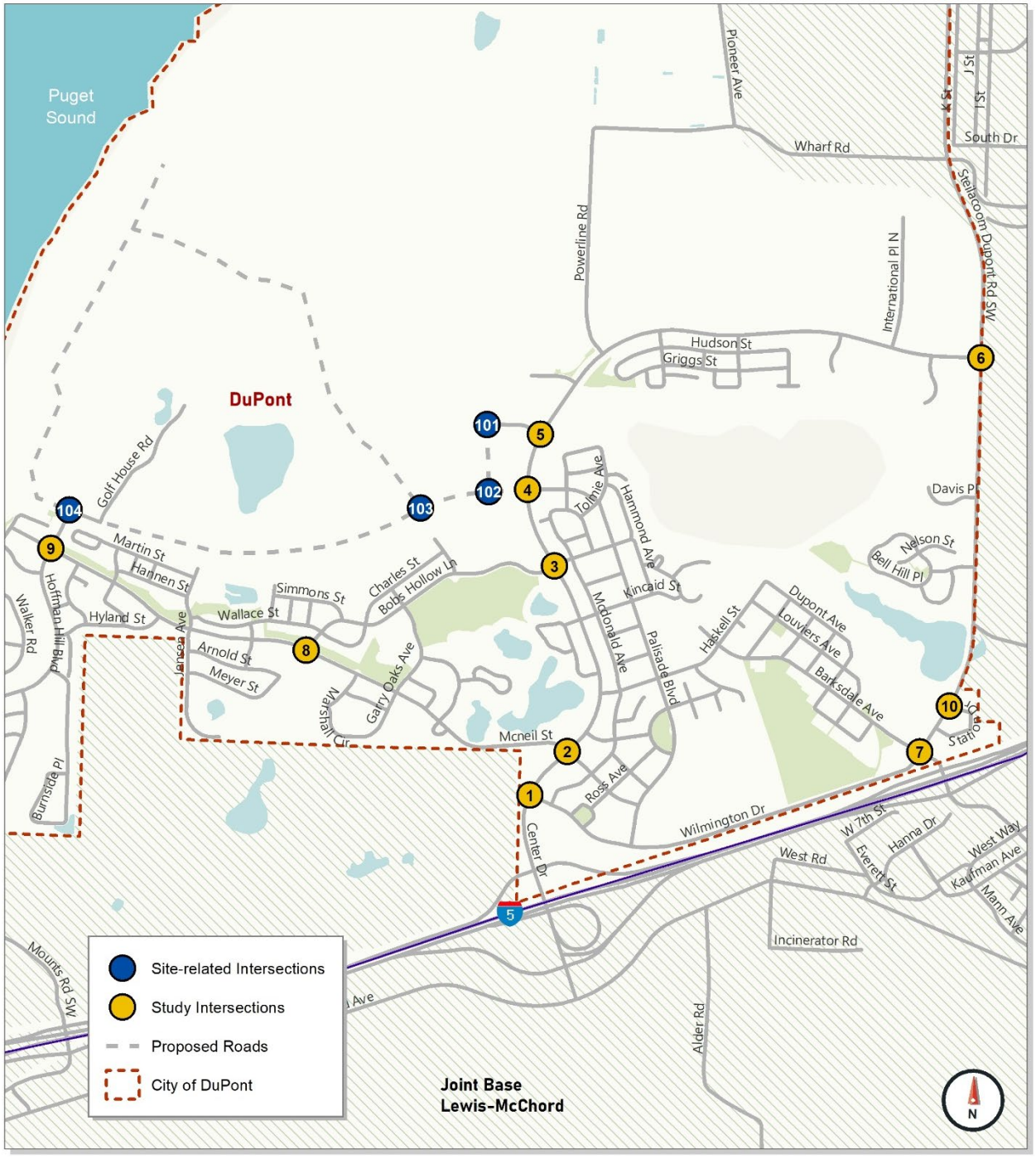
Figure 7. Trip Assignment for Internalized Trips Under High-End Condition

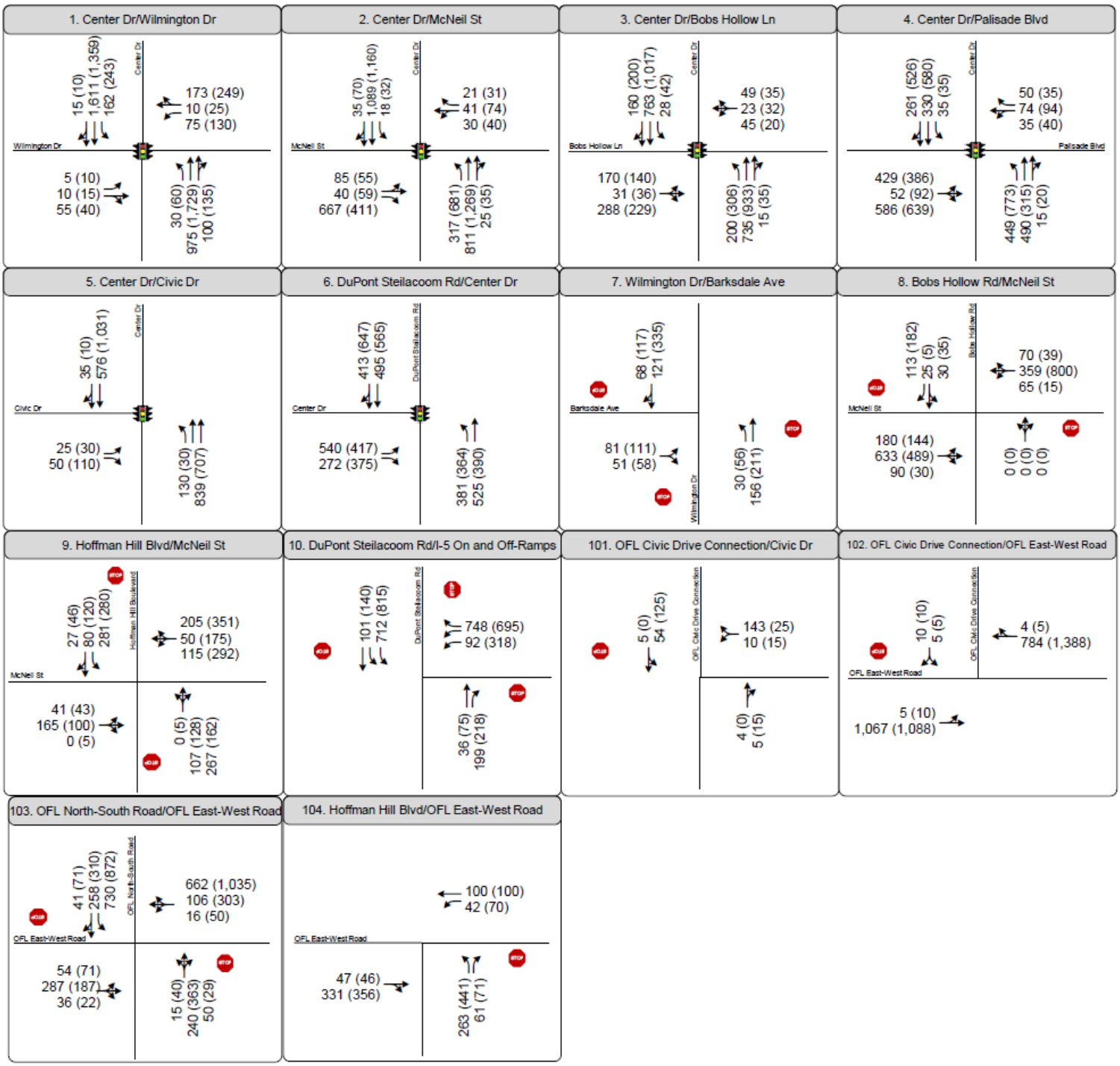




Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

Figure 8. Forecasted Traffic Volumes for the AM and PM Peak Hours Under High-End Condition





Source: Fehr and Peers, 2024. **Note, volumes denoted as AM Peak (PM Peak).**

Truck Project Trips

Truck Trip Generation

During Construction

Trips Generated

The exact phasing and intensity of buildout of the Subarea will depend on which areas are built out first, and what the final land use mix is. Because of this, determining exact construction truck trip generation will not be possible. For the purposes of the Old Fort Lake Subarea, it was assumed that peak construction truck trip generation would occur during the buildout of Zones E and F of the subarea, which are among the largest zones in terms of use and are also located near the Palisade Boulevard access to the Subarea. This buildout was assumed to take 10 years, and was assumed to require extensive grade work as part of construction of the various uses and roadway network. **Table 3** shows an estimate of average daily construction truck trip generation over the 10-year period for Zones E and F, divided into two construction truck types:

- **Vendor Trucks:** Trucks delivering construction materials. These trucks can be light, medium or heavy vehicles, depending on materials being delivered.
- **Haul Trucks:** Trucks delivering grade materials for roadway, paved area or foundation work. These trucks are typically heavy vehicles.

This estimate is based on general assumptions documented in California Air Pollution Control Officers Association's (CAPCOA's) *CaLEEMod* Emissions Model (2022). There are several variables that impact construction truck trip generation, and the estimates provided in **Table 3** should be treated as order of magnitude estimates only. Exact construction truck trip generation and impacts will need to be assessed in detail on an individual basis as different land uses within the subarea are developed.

Mitigations

One particular factor that would need to be addressed both during construction and after completion of the Subarea development is the proximity of the proposed roadway network (and the construction/freight trucks using it) to Pioneer Middle School. Contractors would need to consider this proximity during construction to ensure safety concerns are addressed, and appropriate signage and/or barriers should be considered along the new roadway network.

It is anticipated that focusing on implementing measures for construction activities to mitigate any potential impacts would address truck trip generation during construction. There are several measures to mitigate any potential impacts due to truck trip generation during and post-construction of the High-End Condition. Examples of these mitigations include:

- All construction activity parking (workers vehicles and trucks hauling materials) must be provided on-site (off-street)

- Construction access would be limited during the AM and PM peak hours
- Trucks must only access the construction areas via defined routes (as established by DuPont Municipal Code)
- Flaggers must be present to facilitate movement of construction traffic on public street access points
- Construction measures and signage should minimize interference/obstruction of pedestrian, bicycle or transit trip-making
- Heightened awareness of the adjacent middle school, ensuring adequate safety measures regarding school-related activities

Table 3. Peak Construction Truck Trip Generation Estimate for High-End Condition, Zones E and F

Planned Use	Rate per Unit[1]	Quantity Planned for Zones E and F[2]	Unit	Daily Trip Generation
Vendor Trucks	-	-	-	150
Residential (Single-Family)	*0.053/DU*	*144*	*DU*	*5*
Residential (Multi-Family)	*0.053/DU*	*2,140*	*DU*	*115*
Office	*0.082/KSF*	*40*	*KSF*	*5*
Commercial/Manufacturing	*0.082/KSF*	*337*	*KSF*	*25*
Haul Trucks[3]	-	-	-	75
Approximate Construction Truck Trips				**225**

Source: Fehr & Peers, 2024. Rates adapted from California Air Pollution Control Officers Association's *CaLEEMod* Emissions Model (2022).

1. These rates are adapted from studies performed as part of development of CAPCOA's *CaLEEMod* tools, with the daily trip generation rates halved to account for a 10-year buildout rather than a 5-year. This is an estimate, and will vary significantly depending on planned land use, construction phasing, and intensity of construction.
2. Vendor truck trip rates are focused on only four uses; to estimate trip generation for all planned uses within the subarea, quantities of all uses were consolidated into these four categories.
3. Trip generation for haul tracks is dependent on a variety of variables, and will differ depending on the final construction plan. The following assumptions were used to develop these order of magnitude haul truck trip generation estimates:
    a. 16 cubic yards of material per truck load
    b. 6 ft excavation depth across all pertinent land use areas, consistent with the most recent area plan acreage estimates (see **Figure 1**). Road/paved area excavation and replacement will likely be lower in terms of depth, but building excavation will likely be higher, so this average depth was assumed.
    c. One-way load assumed, meaning trucks will not be phased to take materials and deliver in the same trip. This equates to 2 trips to drop off and 2 trips to pick up materials and carry them off-site, or a total of 4 trips per one load of new material. This is a conservatively high assumption.

Post-Construction

On review of the ITE *Trip Generation Manual*, 11th Edition truck trip generation appendices, the post-construction truck trip generation of all land uses under the High-End Condition would largely be negligible during the AM and PM peak hours, with the exception of the manufacturing and restaurant uses. Truck trip generation rates and volumes under the High-End Condition are presented in **Table 3**.

Table 4. Truck Trip Generation for High-End Condition

Planned Use	ITE Land Use Code	Units	Daily	AM Peak-Hour Trips			PM Peak-Hour Trips		
				In	Out	Total	In	Out	Total
Restaurant/Drinking Establishments	932	20 KSF	33	1	2	3	1	0	1
Manufacturing	140	140 KSF	63	0	2	2	2	1	3
New Truck Trips			**96**	**1**	**4**	**5**	**3**	**1**	**4**

Source: ITE *Trip Generation Manual*, 11th Edition; Fehr & Peers, 2024.

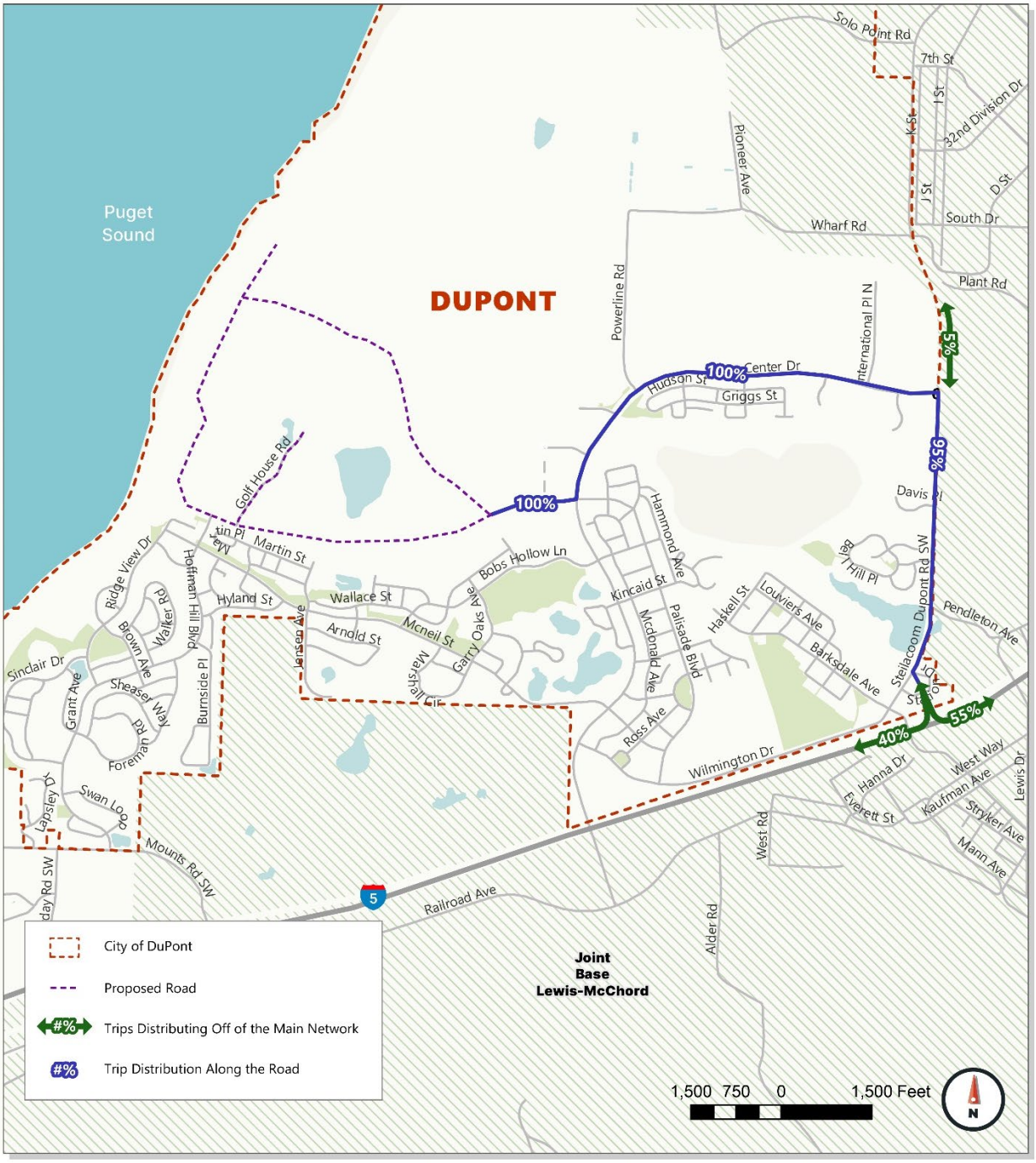
Truck Trip Distribution

The Puget Sound Regional Council (PSRC) model was used to inform the truck trip distribution. This distribution remains relatively consistent with the assumptions in the 2021 TIA, with the exception of trips distributing north along DuPont-Steilacoom Road; under the updated distribution, it is assumed that more of these trips would route north via I-5 instead. The proposed truck trip distribution is shown on **Figure 9**, including a breakdown of anticipated distribution of trucks to Palisade Boulevard. It is anticipated that all generated trucks will distribute along DuPont-Steilacoom Road to Center Drive, and then to Palisade Boulevard.

Of truck trips generated, the following are expected to use the new DuPont-Steilacoom Road Interchange:

- AM Peak – 5 total truck trips, with 4 entering the freeway and 1 exiting
- PM Peak – 4 total truck trips, with 1 entering the freeway and 3 exiting

Figure 9. Truck Trip Distribution for High-End Condition



Source: Fehr and Peers, 2024

Intersection Level of Service

LOS Methodology

Level of Service (LOS) is a term that describes the operating performance of an intersection or roadway. LOS is measured quantitatively and reported on a scale from A to F, with A representing the best performance and F the worst.

Table 4 provides a brief description of each LOS letter designation and an accompanying average delay per vehicle for both signalized and unsignalized intersections. The *Highway Capacity Manual 6th Edition (HCM 6)* methodology was used in this study to remain consistent with "state of the practice" professional standards. This methodology has different quantitative evaluations for signalized and unsignalized intersections. For signalized intersections, the LOS is provided for the overall intersection (weighted average of all approach delays). For side-street stop-controlled intersections, the LOS is provided for the worst performing movement. Synchro Traffic Analysis Software, 11th Edition, was used to perform the calculations. In any instances where a roundabout control was planned or proposed, SIDRA 9 Traffic Analysis Software was used to estimate roundabout conditions[3].

The City currently has an LOS D standard. There are exceptions to the standard outlined in the 2015 Comprehensive Plan. Exceptions can be approved through a variance to the Public Works Standards.

[3] Fehr & Peers analyzed all roundabouts consistent with the WSDOT SIDRA Policy Settings: https://wsdot.wa.gov/sites/default/files/2021-03/TrafficOps-WSDOTSidraPolicyAndSettings.pdf

Table 5. Level of Service Descriptions

LOS	Description	Signalized Intersections Avg. Delay (sec/veh)[1]	Unsignalized Intersections Avg. Delay (sec/veh)[2]
A	*Free Flow / Insignificant Delay* Extremely favorable progression. Individual users are virtually unaffected by others in the traffic stream.	< 10.0	< 10.0
B	*Stable Operations / Minimum Delays* Good progression. The presence of other users in the traffic stream becomes noticeable.	> 10.0 to 20.0	> 10.0 to 15.0
C	*Stable Operations / Acceptable Delays* Fair progression. The operation of individual users is affected by interactions with others in the traffic stream	> 20.0 to 35.0	> 15.0 to 25.0
D	*Approaching Unstable Flows / Tolerable Delays* Marginal progression. Operating conditions are noticeably more constrained.	> 35.0 to 55.0	> 25.0 to 35.0
E	*Unstable Operations / Significant Delays Can Occur* Poor progression. Operating conditions are at or near capacity.	> 55.0 to 80.0	> 35.0 to 50.0
F	*Forced, Unpredictable Flows / Excessive Delays* Unacceptable progression with forced or breakdown of operating conditions.	> 80.0	> 50.0

1. Overall intersection LOS and average delay (seconds/vehicle) for all approaches.
2. Worst movement LOS and delay (seconds/vehicle) only.

Source: Fehr & Peers, based on *Highway Capacity Manual 6th Edition*.

Traffic Analysis Results

To provide recommendations on appropriate mitigations under the full buildout of the Subarea, the following Synchro models were developed:

- **High-End Condition Unimproved:** This Synchro model assumes High-End Condition intersection controls and geometry for existing study intersections. For study intersections 9 to 12 (those internal to the Subarea) this Synchro model assumes side-street stop-control to provide a starting point for identifying improvements. Likewise, for roadway segments internal to the Subarea, a basic 2-lane cross-section was assumed. The purpose of this Synchro model was to identify improvements to the Subarea roadway network needed based on projected peak hour volumes and intersection operations. This includes improvements needed at the accesses to the Subarea (the intersections of Center Drive & Civic Drive, Center Drive & Palisade Boulevard, and Hoffman Hill Boulevard & Internal East-West Roadway).
- **High-End Condition with Improvements:** This Synchro model incorporates improvements identified in the High-End Condition Unimproved model to calculate final projected LOS under

the High-End Condition, assuming all improvements are constructed as part of buildout of the Subarea.

Table 5 contains the High-End Condition LOS and delay for each of the study intersections for both the AM and PM peak hours. Note that Intersections 1 and 2 have two alternate mitigations, so mitigated results were reported for both options. **Attachment D** provides detailed LOS calculation results for all study intersections, including detailed queuing reports. As with No Action Conditions, it was assumed that signal timing would be optimized to account for High-End Condition volumes; for the improved case, it was also assumed that signal timing would be optimized to account for geometric or other changes implemented. The following subsection identifies recommended improvements to bring these intersections to operate at acceptable levels of delay, in addition to providing adequate segment capacity for projected traffic within the Subarea.

Anticipated Impacts

Under the High-End Condition Unimproved model, all study intersections would operate within the City LOS standards with the exception of the Center Drive & Palisade Boulevard intersection in the PM peak hour. Queuing impacts include:

- The 95th percentile queuing for the northbound left at Center Drive & McNeil Street and Center Drive & Palisade Boulevard is anticipated to exceed available storage capacity during the PM peak hour.
- The 95th percentile queueing for the northbound left-turn of the intersection of DuPont-Steilacoom Road & Center Drive is anticipated to exceed available storage capacity during the AM peak hour.[4]
- The 95th percentile queueing for the northbound through movement and the southbound left-turn movement of the intersection of Center Drive & Wilmington Drive are anticipated to exceed available storage capacity during the PM peak hour.
- The 95th percentile queueing for the northbound left-turn movement of the intersection of Center Drive & McNeil Street is anticipated to exceed available storage capacity during the PM peak hour.
- The 95th percentile queueing for the eastbound right-turn movement of the intersection of Center Drive & Bobs Hollow Lane is anticipated to exceed available storage capacity during the AM and PM peak hours.

For the planned intersections internal to the Subarea, it is anticipated that the Intersections 10-12 would exceed the city's LOS and delay standards for basic side-street stop control configurations.

Approximately 24% of residential use trips generated and 20% of non-residential use trips generated under the High-End Condition are expected to route to/from Hoffman Hill Boulevard via McNeil Street

[4] See **Attachment D** for detailed queueing reports for each signalized intersection.

(approximately 6,550 daily trips, 460 AM peak trips and 610 PM peak trips). Many of these trips are expected to disperse into the neighborhoods along McNeil as they route to/from Hoffman Hill Boulevard. These trips would largely be comprised of commute trips from residents within the subarea, in addition to DuPont resident trips to/from non-residential uses within the Subarea. Although this would represent a sizeable increase in traffic on McNeil Street, it is recommended that Hoffman Hill Boulevard be maintained as a full access to the Subarea in order to facilitate access for residents south of the Subarea and take away traffic from the Palisade Boulevard and Wren Road accesses, which are anticipated to serve the large majority of Subarea traffic.

Recommended Network Improvements For High-End Condition

Based on the High-End Condition Unimproved model, the following improvements are recommended for both study intersections and segments internal to the Subarea. These improvements address LOS and 95th percentile queuing impacts identified under the traffic analyses. Improvements identified in *italics* differ from mitigations proposed under No Action conditions:

Study Intersections

- **Center Drive & Wilmington Drive (Int 1):**
    - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, including implementing either a 100s or 130s cycle length at both signals, depending on the final mitigation alternative selected for Center Drive & McNeil Street.*
    - *Extend the southbound left-turn storage to be approximately 200 feet, aligning directly with the northbound left-turn storage of the Center Drive & McNeil Street intersection.*
- **Center Drive & McNeil Street (Int 2):** The mitigation measures outlined below represent two potential alternative mitigation strategies.
    - (1) Implement northbound dual left turn lanes and increase the length to provide adequate storage. This is the same mitigation outlined above for Existing Subarea Plan and Zoning traffic distribution, with differences in italics.
        - This mitigation alternative includes the following additional mitigations:
            - In order to accommodate two left turns from Center Drive, a second westbound receiving lane would be required to receive these two movements on McNeil Street
            - *Extend northbound left-turn storage to be a total of 300 feet, aligning directly with the southbound left-turn storage lane of the Center Drive & Wilmington Drive intersection*
            - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, with a 100s cycle length at both signals. The shortened cycle length provides less time between cycles for left-turn*

movements, but also decreases the overall wait time for all movements at the intersection.

- This option would address the demand for PM Peak hour left turns northbound to westbound onto McNeil Street. This would provide adequate capacity to meet demand within the signal cycle without excessive delay, and would allow more signal time to be dedicated to other movements.

- (2) Make no improvements and presume that sufficient drivers will make the choice to avoid congestion and delay by bypassing this left turn and forgoing the opportunity to travel via McNeil Street:
  - This mitigation alternative includes the following additional mitigations:
    - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, with a 130s cycle length at both signals. The lengthened cycle length provides more time for left turn movements, but adds delay to the southbound approach, which is the largest movement at the intersection.*
    - *Extend northbound left-turn storage to be a total of 300 feet, aligning directly with the southbound left-turn storage lane of the Center Drive & Wilmington Drive intersection. This would be functional only with a reduction in northbound left turns through rerouting of trips through driver recognition of delay.*
  - *Drivers re-routing would presumably continue north on Center Drive to less congested intersections with less delay.*
  - *This option would be enhanced by the additional mitigation measure of Realignment of Civic Drive Access (described in a subsequent section). This mitigation would provide a second access for the subarea to Center Drive, reducing left turn volumes at other intersections and providing for less congestion along the entire Center Drive corridor*

- **Center Drive & Bobs Hollow Lane (Int 3):**
  - *Construct an eastbound right-turn storage lane.*
- **Center Drive & Palisade Drive (Int 4):**
  - Construct a dual left-turn for the northbound left-turn movement with protected phasing.
  - Implement an eastbound right-turn overlap phase with the northbound left-turn protected phase.
  - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
  - *Construct dual left-turn (with protected phasing), single right-turn and a separated through-right-turn lane for the eastbound approach to the intersection.*
  - *Add dedicated right-turn storage lane to the southbound approach.*
  - *Implement right-turn overlap for the eastbound and southbound right-turn movements.*
- **DuPont-Steilacoom Road & Center Drive (Int 6):**

    - Construct a dual left-turn for the northbound left-turn movement.
- **McNeil Street & Bobs Hollow Lane (Int 8):**
    - Change the intersection control from a side-street stop-control to a single lane roundabout.
- **Hoffman Hill Boulevard & McNeil Street (Int 9):**
    - Change the intersection control from a side-street stop-control to an all-way stop-control
    - Implement the following turn storage lanes, by approach and movement:
        - Northbound right-turn
        - Southbound left-turn
        - Westbound left-turn and right-turn
    - Alternatively, a single-lane roundabout could be considered at this location
- **OFL East-West Road & OFL Civic Drive Connection (Int 102):**
    - Construct separated southbound left-turn and right-turn lanes.
    - Construct three through lanes in each direction for the eastbound and westbound approaches.
    - Offset this intersection as far west as possible from the Center Drive & Palisade Boulevard intersection to build in adequate storage capacity.
    - Signalize this intersection, offsetting signal timing from the nearby Center Drive & Palisade Boulevard intersection to facilitate east-west throughput. This may require signal coordination between these two intersections.
        - It should be noted that a signal would not be warranted based on the volumes currently planned at this intersection. However, it is anticipated that other uses independent from the Subarea will be constructed along the OFL Civic Drive Connection that would likely cause volumes to increase at this intersection to the point of warranting a signal. An alternative mitigation for this intersection would be to designate the southbound approach as right-in right-out only, with appropriate channelization improvements.
- **OFL East-West Road & OFL North-South Road (Int 103):**
    - *Construct a multi-lane roundabout with two circulating lanes from the westbound to the eastbound approach, and one circulating lane from the eastbound to the westbound.*
- **Hoffman Hill Blvd & OFL East-West Road (Int 104):**
    - Construct a single-lane roundabout.

Segments

Recommended roadway cross sections for planned roadways internal to the Subarea under High-End Conditions are shown in **Figure 10**. These cross sections are based on forecasted vehicle traffic anticipated along these segments during the AM and PM peak hours. As such, they are dependent on final planned uses and the distribution of uses between the zoning districts and should be reevaluated as

uses are developed. These cross sections represent through travel lanes; individual turn storage lanes are also recommended where turn lane warrants are met.

Civic Drive Access Realignment

Another mitigation to address overall traffic congestion along Center Drive anticipated under the High-End Alternative would be to realign the Civic Drive access to the subarea so that it directly intersects with the OFL North-South Road, rather than the OFL East-West Road. This would make the Center Drive access to the subarea more attractive to drivers, particularly those routing along DuPont-Steilacoom Road, and would likely reduce the number of drivers accessing at Palisade Drive and increase the proportion that use the DuPont-Steilacoom Road interchange rather than Center Drive. Should this mitigation be implemented, it is recommended that the following improvements also be implemented at Civic Drive & Center Drive (including the improvements identified in the base access case:

- **Northbound Left-Turn:**
    - Convert northbound left-turn to protected phasing
    - Optimize signal timing to provide priority to left-turn movement
    - Increase storage length of northbound left-turn to align with the southbound left-turn storage lane at Palisade Drive & Center Drive
- **Eastbound Direction:**
    - Add one additional receiving lane on the south leg of the intersection to receive eastbound right-turning traffic. This coincides with southbound right-turn improvements proposed at Palisade Drive & Center Drive, and the additional receiving lane should be extended to connect with those improvements.
    - Convert the eastbound right-turn to yield control, including channelization of the right-turn lane
    - Increase the striped eastbound left-turn storage within the existing two-way left-turn lane

The unmitigated and mitigated impacts of this access realignment on Center Drive & Civic Drive are included in **Attachment D**.

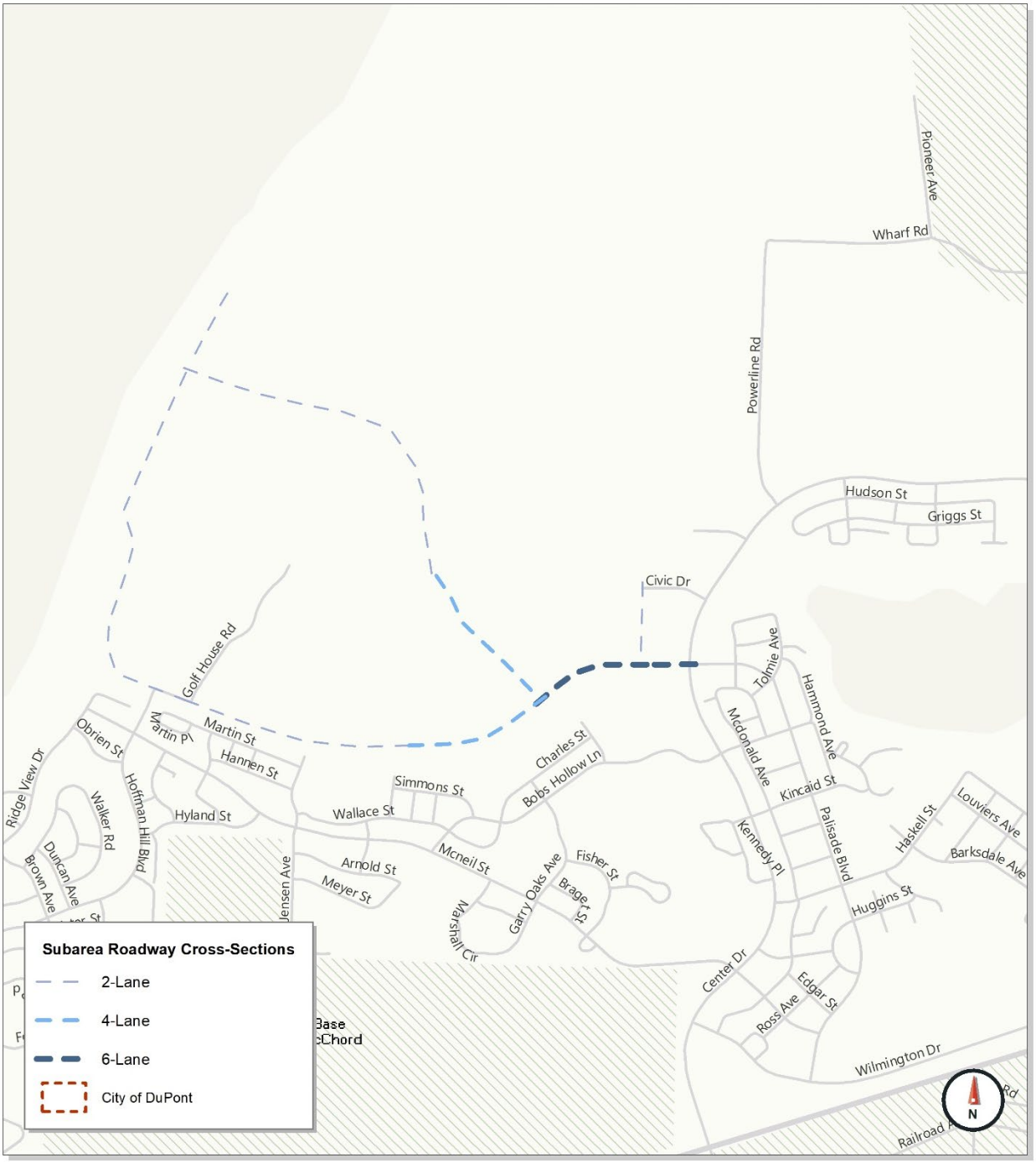
Table 6. Study Intersection Delay and Level of Service Under High-End Conditions

ID	Study Intersection[1]	No Action Unimproved		High-End Unimproved[2]		High-End with Improvements[2,3]			
		AM LOS / Delay (s)	PM LOS / Delay (s)	AM LOS / Delay (s)	PM LOS / Delay (s)	AM LOS / Delay (s)		PM LOS / Delay (s)	
					Mitigation Alternatives (for Intersections 1 & 2)	(1)	(2)	(1)	(2)
1	Center Drive & Wilmington Drive	B/11	B/17	B/13	C/24	A/8	A/7	D/33	C/23
2	Center Drive & McNeil Street	C/22	**F/80**	D/36	D/52	C/28	C/31	D/40	D/52
3	Center Drive & Bob's Hollow Lane	B/21	C/28	C/25	C/30	B/17		C/26	
4	Center Drive & Palisade Boulevard	**F/317**	**F/581**	**F/151**	**F/353**	C/20		C/32	
5	Center Drive & Civic Drive	A/6	A/6	A/6	A/6	A/5		A/6	
6	Center Drive & DuPont-Steilacoom Road	D/46	C/30	D/51	D/52	C/29		C/30	
7	DuPont-Steilacoom Road/Wilmington Drive & Barksdale Avenue	A/9	B/11	A/9	B/13	A/9		B/12	
8	McNeil Street & Bobs Hollow Lane	**F/79 (SBL)**	**E/38 (SBL)**	**F/164 (SBL)**	**F/235 (SBL)**	C/15		B/15	
9	Hoffman Hill Boulevard & McNeil Street	**F/637 (SB)**	**F/260 (NB)**	**F/1,070 (SB)**	**F/423 (NB)**	C/23		D/28	
10	I-5 Access Road & DuPont-Steilacoom Road	A/7	A/9	A/7	A/8	A/7		A/8	
101	OFL Civic Drive Connection & Civic Drive	A/9 (SB)	A/9 (SB)	A/9 (SB)	A/9 (SB)	A/9 (SB)		A/9 (SB)	
102	OFL East-West Road & OFL Civic Drive Connection	**F/142 (SB)**	**F/351 (SB)**	D/32 (SB)	**F/100 (SB)**	A/6		A/5	
103	OFL East-West Road & OFL North-South Road	**F/2,380 (SB)**	**F/11,489 (SB)**	**F/181**	**F/1,698 (SB)**	A/9		B/14	
104	Hoffman Hill Blvd & OFL East-West Road	D/32 (NBL)	**F/101 (NBL)**	C/17 (NBL)	**F/50 (NBL)**	A/5		A/7	

1. Study intersections 1-6 are signalized; Study intersection 7 is all-way stop-controlled; Study intersections 8-9 are side-street stop-controlled; Study intersection 10 is a single-lane roundabout.
2. Underline represents a change in LOS when compared to No Action; **bold** represents delay that exceeds the City's LOS standard.
3. Under the High-End Condition Improved model, study intersection 101 is side-street stop-controlled; Study intersections 102-103 are signalized; and Study intersection 104 is a single-lane roundabout.

Source: Fehr and Peers, 2024.

Figure 10. Recommended Roadway Cross Sections for Roadways Internal to the Subarea Under High-End Condition



Source: Fehr and Peers, 2024

Mitigation Considerations

Although both mitigation alternatives at Center Drive/McNeil Street would result in acceptable levels of delay at both the McNeil Street and Wilmington Drive intersections, there are a couple of differences of note between these two mitigation options

- Mitigation option (1) mitigates both delay and queueing issues at both intersections irrespective of what other mitigations are applied system-wide, adding more capacity to the McNeil Street intersection and allowing time to be more frequently applied to all movements.
- By contrast, Mitigation option (2) does not include the northbound dual left-turn lane and additional receiving lane, and attempts to mitigate queueing and delay through coordinated signal timing and increased turn storage capacity alone. This would continue to result in excessive queues, leading to some vehicles opting to re-route rather than turning left at McNeil Street. Even assuming some vehicles will re-route, queueing issues are expected to persist at these intersections, leading to the following issues:
    - **Center Drive & McNeil Street:** Northbound left-turn 95th percentile queueing will continue to exceed exiting storage, as well as maximum available storage length, spilling back into the through lanes and potentially leading to minor additional delays at the intersection of Center Drive & Wilmington Drive. Average queuing is likewise anticipated to exceed existing and maximum available storage.
    - **Center Drive & Wilmington Drive:** Northbound through 95th percentile queueing will continue to exceed available storage, leading to occasional blockage of the southbound off-ramps of I-5. Average queueing is not anticipated to exceed available storage.
- The only way in which mitigation option (2) would adequately address delay and queueing issues is if it were coupled with the Civic Drive Access Realignment mitigation, which will result in additional re-routing of Subarea trips from routing via McNeil to routing via Palisade Drive or Civic Drive.

Key Findings and Subarea Implications

- The High-End Condition would generate approximately 50,604 new daily trips. Of these trips, approximately 3,542 are anticipated to remain internal to the site. Vehicle trips generated that are expected to use each I-5 interchange are as follows:
    - Center Drive Interchange:
        - AM Peak: 1,451 total vehicle trips, with 911 entering the freeway and 540 exiting
        - PM Peak: 2,196 total vehicle trips, with 809 entering the freeway and 1,923 exiting
    - Dupont-Steilacoom Road Interchange:
        - AM Peak: 352 total vehicle trips, with 216 entering the freeway and 136 exiting
        - PM Peak: 466 total vehicle trips, with 198 entering the freeway and 268 exiting
- The planned project would generate 307 daily truck trips, with 21 in the AM peak hour and 19 in the PM peak hour. Truck trips generated that are expected to use the DuPont-Steilacoom Road Interchange are as follows:
    - AM Peak – 5 total truck trips, with 1 entering the freeway and 4 exiting
    - PM Peak – 4 total truck trips, with 3 entering the freeway and 1 exiting
- Approximately 24% of residential use trips generated and 20% of non-residential use trips generated under the High-End Condition are expected to route to/from Hoffman Hill Boulevard via McNeil Street (approximately 6,550 daily trips, 460 AM peak trips and 610 PM peak trips). Additional trips are expected to disperse into the neighborhoods along McNeil as they approach Hoffman Hill Boulevard. Although this would represent a sizeable increase in traffic on McNeil Street, it is recommended that Hoffman Hill Boulevard be maintained as a full access to the Subarea in order to facilitate access for residents south of the Subarea and take away traffic from the Palisade Boulevard access, which is anticipated to serve the large majority of Subarea traffic.
- The generated trips would result in multiple LOS and queuing impacts on the existing roadway network. Recommended intersection improvements are summarized below (italicized improvements are those that differ from No Action), while recommended roadway segment cross-sections within the Subarea are given in **Figure 10**.
    - **Center Drive & Wilmington Drive (Int 1):**
        - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, including implementing either a 100s or 130s cycle length at both signals, depending on the final mitigation alternative selected for Center Drive & McNeil Street.*
        - *Extend the southbound left-turn storage to be approximately 200 feet, aligning directly with the northbound left-turn storage of the Center Drive & McNeil Street intersection.*

- **Center Drive & McNeil Street (Int 2): The mitigation measures outlined below represent two potential alternative mitigation strategies.**
  - (1) Implement northbound dual left turn lanes and increase the length to provide adequate storage. This is the same mitigation outlined above for Existing Subarea Plan and Zoning traffic distribution, with differences in italics.
    - In order to accommodate two left turns from Center Drive, a second westbound receiving lane would be required to receive these two movements on McNeil Street
    - *Extend northbound left-turn storage to be a total of 300 feet, aligning directly with the southbound left-turn storage lane of the Center Drive & Wilmington Drive intersection*
    - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, with a 100s cycle length at both signals. The shortened cycle length provides less time between cycles for left-turn movements, but also decreases the overall wait time for all movements at the intersection.*
  - (2) Make no improvements and presume that sufficient drivers will make the choice to avoid congestion and delay by bypassing this left turn and forgoing the opportunity to travel via McNeil Street:
    - *Implement signal coordination between Center Drive & McNeil Street and Center Drive & Wilmington Drive, with a 130s cycle length at both signals. The lengthened cycle length provides more time for left turn movements, but adds delay to the southbound approach, which is the largest movement at the intersection.*
    - *Extend northbound left-turn storage to be a total of 300 feet, aligning directly with the southbound left-turn storage lane of the Center Drive & Wilmington Drive intersection. This would be functional only with a reduction in northbound left turns through rerouting of trips through driver recognition of delay.*
- **Center Drive & Bobs Hollow Lane (Int 3):**
  - *Construct an eastbound right-turn storage lane.*
- **Center Drive & Palisade Drive (Int 4):**
  - Construct a dual left-turn for the northbound left-turn movement with protected phasing.
  - Implement an eastbound right-turn overlap phase with the northbound left-turn protected phase.
  - Offset the southbound and westbound approaches as needed to align with the adjusted eastbound and northbound approaches.
  - *Construct dual left-turn (with protected phasing), single right-turn and a separated through-right-turn lane for the eastbound approach to the intersection.*

        - *Add dedicated right- and left-turn storage lanes to the southbound approach.*
        - *Implement right-turn overlap for the eastbound and southbound right-turn movements.*
    - **DuPont-Steilacoom Road & Center Drive (Int 6):**
        - Construct a dual left-turn for the northbound left-turn movement.
    - **McNeil Street & Bobs Hollow Lane (Int 8):**
        - Change the intersection control from a side-street stop-control to a single lane roundabout.
    - **Hoffman Hill Boulevard & McNeil Street (Int 9):**
        - Change the intersection control from a side-street stop-control to an all-way stop-control
        - Implement the following turn storage lanes, by approach and movement:
            - Northbound right-turn
            - Southbound left-turn
            - Westbound left-turn and right-turn
        - Alternatively, a single-lane roundabout could be considered at this location
    - **OFL East-West Road & OFL Civic Drive Connection (Int 102):**
        - Signalize this intersection, offsetting signal timing from the nearby Center Drive & Palisade Boulevard intersection to facilitate east-west throughput. This may require signal coordination between these two intersections.
        - Construct separated southbound left-turn and right-turn lanes.
        - Construct three through lanes in each direction for the eastbound and westbound approaches.
        - Offset this intersection as far west as possible from the Center Drive & Palisade Boulevard intersection to build in adequate storage capacity.
    - **OFL East-West Road & OFL North-South Road (Int 103):**
        - *Construct a multi-lane roundabout with two circulating lanes from the westbound to the eastbound approach, and one circulating lane from the eastbound to the westbound.*
    - **Hoffman Hill Blvd & OFL East-West Road (Int 104):**
        - Construct a single-lane roundabout.
- Another mitigation identified for the High End Alternative would be realigning the Civic Drive access to the subarea so that it directly intersects with the OFL North-South Road, rather than the OFL East-West Road. This would make the Center Drive access to the subarea more attractive to drivers, particularly those routing along DuPont-Steilacoom Road, and would likely reduce the number of drivers accessing at Palisade Drive and increase the proportion that use the DuPont-Steilacoom Road interchange rather than Center Drive. Should this mitigation be implemented, it is recommended that the following improvements also be implemented at Civic Drive & Center Drive (including the improvements identified in the base access case:
    - **Northbound Left-Turn:**

        - Convert northbound left-turn to protected phasing
        - Optimize signal timing to provide priority to left-turn movement
        - Increase storage length of northbound left-turn to align with the southbound left-turn storage lane at Palisade Drive & Center Drive
    - **Eastbound Direction:**
        - Add one additional receiving lane on the south leg of the intersection to receive eastbound right-turning traffic. This coincides with southbound right-turn improvements proposed at Palisade Drive & Center Drive, and the additional receiving lane should be extended to connect with those improvements.
        - Convert the eastbound right-turn to yield control, including channelization of the right-turn lane
        - Increase the striped eastbound left-turn storage within the existing two-way left-turn lane
- **Important Notes on Center Drive/McNeil Street Mitigations:**
    - Mitigation option (1) mitigates both delay and queueing issues at both intersections irrespective of what other mitigations are applied system-wide, adding more capacity to the McNeil Street intersection and allowing time to be more frequently applied to all movements.
    - By contrast, Mitigation option (2) does not include the northbound dual left-turn lane and additional receiving lane, and attempts to mitigate queueing and delay through coordinated signal timing and increased turn storage capacity alone. This would continue to result in excessive queues, leading to some vehicles opting to re-route rather than turning left at McNeil Street. Even assuming some vehicles will re-route, queueing issues are expected to persist at these intersections, leading to the following issues:
        - **Center Drive & McNeil Street:** Northbound left-turn 95th percentile queueing will continue to exceed exiting storage, as well as maximum available storage length, spilling back into the through lanes and potentially leading to minor additional delays at the intersection of Center Drive & Wilmington Drive. Average queuing is likewise anticipated to exceed existing and maximum available storage.
        - **Center Drive & Wilmington Drive:** Northbound through 95th percentile queueing will continue to exceed available storage, leading to occasional blockage of the southbound off-ramps of I-5. Average queueing is not anticipated to exceed available storage.
    - The only way in which mitigation option (2) would adequately address delay and queueing issues is if it were coupled with the Civic Drive Access Realignment mitigation, which will result in additional re-routing of Subarea trips from routing via McNeil to routing via Palisade Drive or Civic Drive.
- Improvements, as mentioned in the Active Transportation Network, Safety, Transit Network, and Freight Network sections, to the pedestrian, bicycle, and transit infrastructure would be needed to

ensure safe and comfortable access to the Subarea from non-vehicle modes under the High-End Condition.

- It is recommended that the City consider the following options for improving connection to the Subarea via transit:
  - Coordinating with Pierce Transit to provide a limited-service fixed route along Center Drive that connects to DuPont Station to increase transit ridership to the Project site.
  - Coordinating with Sound Transit to increase frequency of current routes.
  - Coordinating with Pierce Transit, Sound Transit, and/or Intercity Transit to potentially provide additional routes connecting to the surrounding communities.
  - Emphasizing active mode improvements on Wilmington Drive, Palisade Drive and Center Drive that facilitate access to the DuPont Station.

Attachment A – Proposed Uses by Zoning District

Attachment B – MXD+ Methodology

Attachment C – Baseline Traffic Forecast Calculations

Attachment D – LOS Calculations

Gray & Osborne, Inc.
CONSULTING ENGINEERS

MEMORANDUM

TO:	BARBARA KINCAID, AICP CITY OF DUPONT
FROM:	DOMINIC J. MILLER, P.E
DATE:	NOVEMBER 7, 2024
SUBJECT:	*UPDATED* WATER AVAILABILITY FOR THREE SCENARIOS OF FOUNDERS RIDGE DEVELOPMENT CITY OF DUPONT, PIERCE COUNTY, WASHINGTON G&O #23218.00

INTRODUCTION

The City is working to update the Old Fort Lake Subarea Plan, which proposes to change the current land use and zoning to significantly increase residential density. The intent of this memo is to determine current capacity and availability of the City water system to deliver potable water under the proposed alternative build-out scenarios.

The City's Water System Plan (WSP) Update was approved by the Washington State Department of Health on April 8, 2020. This memo includes updated information on the City water system.

AVAILABLE WATER

The capacity of the City water system is typically assessed in terms of Equivalent Residential Units (ERUs). The WSP calculates the ERU value in the City as 231 gallons per day (gpd) includes the following:

Water System Capacity limits are summarized in Table 3-24 of the WSP. Storage capacity with current well control settings is the most limiting factor, followed by treatment capacity, then by source capacity, then be reservoir capacity with the operating intervals in both reservoirs reduced to one foot, then by instantaneous water rights, and finally by annual water rights. The Additional Available ERUs in Table 3-24 are based on a year 2017 Water Use of 6,172 ERUs.

WSP TABLE 3-24

Summary of Water System Capacity Limits

Limiting Factor	System Capacity Limit, ERUs	Additional Available ERUs
Storage Capacity with 5-Ft Operating Interval	8,812	2,640
Treatment Capacity	11,187	5,015
Storage Capacity with 1-Ft Operating Interval	11,378	5,206
Source Capacity	12,139	5,967
Instantaneous Water Rights	12,829	6,657
Annual Water Rights	12,985	6,813

The City's well production records and equivalent water usage in ERIs for the years 2018 to 2023 are included in Table 1.

TABLE 1

Water Usage and Availability

Year	Water Usage (MG)	Water Usage (mgd)	Equivalent Usage (ERUs)[1]
2018	536.1	1.469	6,358
2019	516.6	1.415	6,127
2020	442.8	1.213	5,252
2021	492.4	1.349	5,840
2022	445.3	1.220	5,281
2023	470.0	1.288	5,575

(1) Equivalent Residential Unit (ERU) is 231 gallons per day (gpd)

As shown in Table 1, the 2023 water usage is equivalent to 5,575 ERUs. Using the limiting factor analyses from Table 3-24 of the Water System Plan gives the following availability of water shown in Table 2:

TABLE 2

Current City Available Water

Water Needs	System Capacity Limit (ERUs)	2023 Water Usage (ERUs)	Available Water (ERUs)
Storage Capacity w/ 5-Ft Operating Interval	8,812	5,575	3,237
Treatment Capacity	11,187	5,575	5,612
Storage Capacity w/ 1-Ft Operating Interval	11,378	5,575	5,803
Source Capacity	12,139	5,575	6,564
Instantaneous Water Rights	12,829	5,575	7,254
Annual Water Rights	12,985	5,575	7,410

As shown in Table 2, the limiting factor in the City's available water is Storage Capacity with a 5-foot operating interval.

DEVELOPMENT SCENARIOS

The development proposal for the Old Fort Lake Subarea Plan currently includes the following three development scenarios:

- Scenario 1: No Action
- Scenario 2: Moderate Alternative
- Scenario 3: High Alternative

The projected water needs of each of the three development scenarios are included in Table 3:

TABLE 3

Projected Water Needs

Water Needs	Scenario 1: No Action	Scenario 2: Moderate Alternative	Scenario 3: High Alternative
Residential (ERUs)	850	2,695	3,253
Residential Daily (MGD)	0.196	0.623	0.751
Residential Annual (MG)	71.7	227.2	274.2
Non-Residential (ERUs)	1,182	711	711
Non-Residential Daily (MGD)	0.273	0.164	0.164
Non-Residential Annual (MG)	99.7	60.0	60.0
Total (ERUs)	2,032	3,406	3,964
Total (MGD)	**0.469**	**0.787**	**0.916**
Total (MG)	**171.3**	**287.2**	**334.2**

A comparison of the available water and the development scenario water needs for the City's limiting storage capacity is shown in Table 4:

TABLE 4

Available Water vs. Water Needs (ERUs)

Water Item	Scenario 1: No Action	Scenario 2: Moderate Alternative	Scenario 3: High Alternative
Available Water[1]	3,237	3,237	3,237
Total Water Need[2]	2,032	3,406	3,964
Surplus/(Deficit)	1,205	(169)	(727)

(1) Minimum number from Table 2 (Storage Capacity with 5-foot Operating Interval).
(2) Total Water Need from Table 3.

Table 4 indicates a deficit of water for the Moderate Alternative and High Alternative development scenarios. In order to provide adequate storage capacity for the Moderate and High alternatives, the City should consider the following two options:

- Option 1 – Provide Additional Storage with a new reservoir and booster pump station. Table 5 indicates the required additional water storage volume for each development scenario.

TABLE 5

Option 1 – Additional Storage Requirement

Water Item	Scenario 1: No Action	Scenario 2: Moderate Alternative	Scenario 3: High Alternative
ERUs Surplus/(Deficit) [1]	1,205	(169)	(727)
Additional Storage Required (Gallons) [2]	0	33,800	145,400

(1) From Table 4.
(2) Standby Storage Requirement of 200 gallons per ERU.

- Option 2 – Reduce the maximum operation interval of water storage reservoirs to 3 vertical feet. Table 6 includes that same comparison of available water and water needs with this operational change. This option would have the disadvantage of requiring the City to revise its normal operations to accommodate the storage demands on the water system.

TABLE 6

Option 2 -- Available Water vs. Water Needs (ERUs)
Revised for 3-foot Operating Interval

Water Item	Scenario 1: No Action	Scenario 2: Moderate Alternative	Scenario 3: High Alternative
Available Water[1]	4,520	4,520	4,520
Total Water Need[2]	2,032	3,406	3,964
Surplus/(Deficit)	2,488	1,114	556

(1) Storage Capacity with 3-foot Operating Interval.
(2) Total Water Need from Table 3.

SUMMARY

The City water system appears to have the capacity support the requested the three development scenarios for the Old Fort Lake Subarea, with mitigation options for increasing available storage capacity for the Moderate and High Alternatives..

DJM/sp