



MITIGATED DETERMINATION OF NON-SIGNIFICANCE
Littlerock Mixed Use
Permit No. TUM-22-0189
December 8, 2023

Description of Proposal: The applicant is proposing a mixed-use commercial (3,811sf)/residential (114 units) development with associated open space, parking, landscaping and infrastructure.

Applicant: MCS-Littlerock, LLC, 7908 Sweet Iron Court SE, Tumwater, WA, 98501.

Representative: Brandon Johnson, PE – JSA Civil, LLC; 111 Tumwater Blvd, SE, Suite C210, Tumwater, WA 98501

Location of Proposal: 5945 Littlerock Road SW, Tumwater, WA 98512 and adjacent unaddressed lot. Tax Parcel Numbers: 1270321600 and 12703220700.

Lead agency: City of Tumwater, Community Development Department.

The lead agency for this proposal has determined that, as conditioned, does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed environmental checklist and other information on file with the lead-agency. This information is available to the public on request.

This MDNS assumes that the applicant will comply with all City ordinances and development standards governing the type of development proposed, including but not limited to, street standards, storm water standards, high groundwater hazard areas ordinance standards, water and sewer utility standards, critical areas ordinance standards, tree protection standards, zoning ordinance standards, land division ordinance standards, building and fire code standards, and level of service standards relating to traffic. These ordinances and standards provide mitigation for adverse environmental impacts of the proposed development.

Condition of Approval for mitigating environmental impacts:

Findings:

1. The Tumwater Boulevard/I-5 northbound ramps intersection currently operates at LOS F during both peak periods for the northbound left-turn movement. The project is projected to add one hundred seventy-seven trips to this intersection. The City has recently developed a SEPA improvement project for the Tumwater Boulevard/I-5 interchange that include intersection improvements at the northbound I-5 ramps intersection, with a peak hour per trip impact fee of \$4,219 for each trip entering the interchange area.
2. The project shall build out the required transportation improvements as described in City plans. Additionally, the City will continue to evaluate the transportation network and make any changes necessary to promote safe traffic patterns.

Mitigation Measures:

1. Prior to issuance of the Building Permit:
 - a. Construct a roundabout at the northbound Interstate 5 On/Off Ramp and Tumwater Boulevard intersection; or
 - b. Voluntarily pay a mitigation fee of \$4,219 per peak trip generated by this project under RCW 82.02.020 to be used as described herein:

Tumwater Boulevard/I-5 Interchange: The City's planned transportation improvements at the Tumwater Boulevard/I-5 interchange include converting the interchange to a roundabout diamond interchange by replacing the southbound on/off ramp signal and northbound stop controlled intersections with roundabouts. If the subject development has trips to the interchange before the roundabout is constructed, a temporary signal will be required.

This MDNS is issued under WAC 197-11-350; the lead agency will not act on this proposal for 14 days from the date below. Comments must be submitted no later than December 22, 2023, by 5:00 p.m.

Date: December 8, 2023

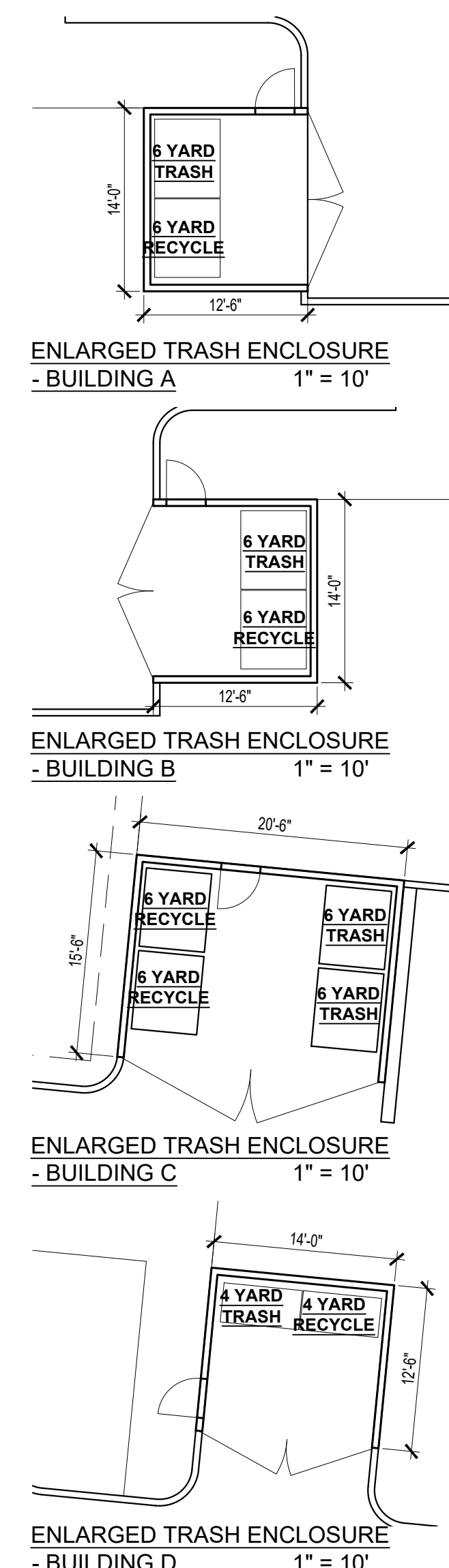
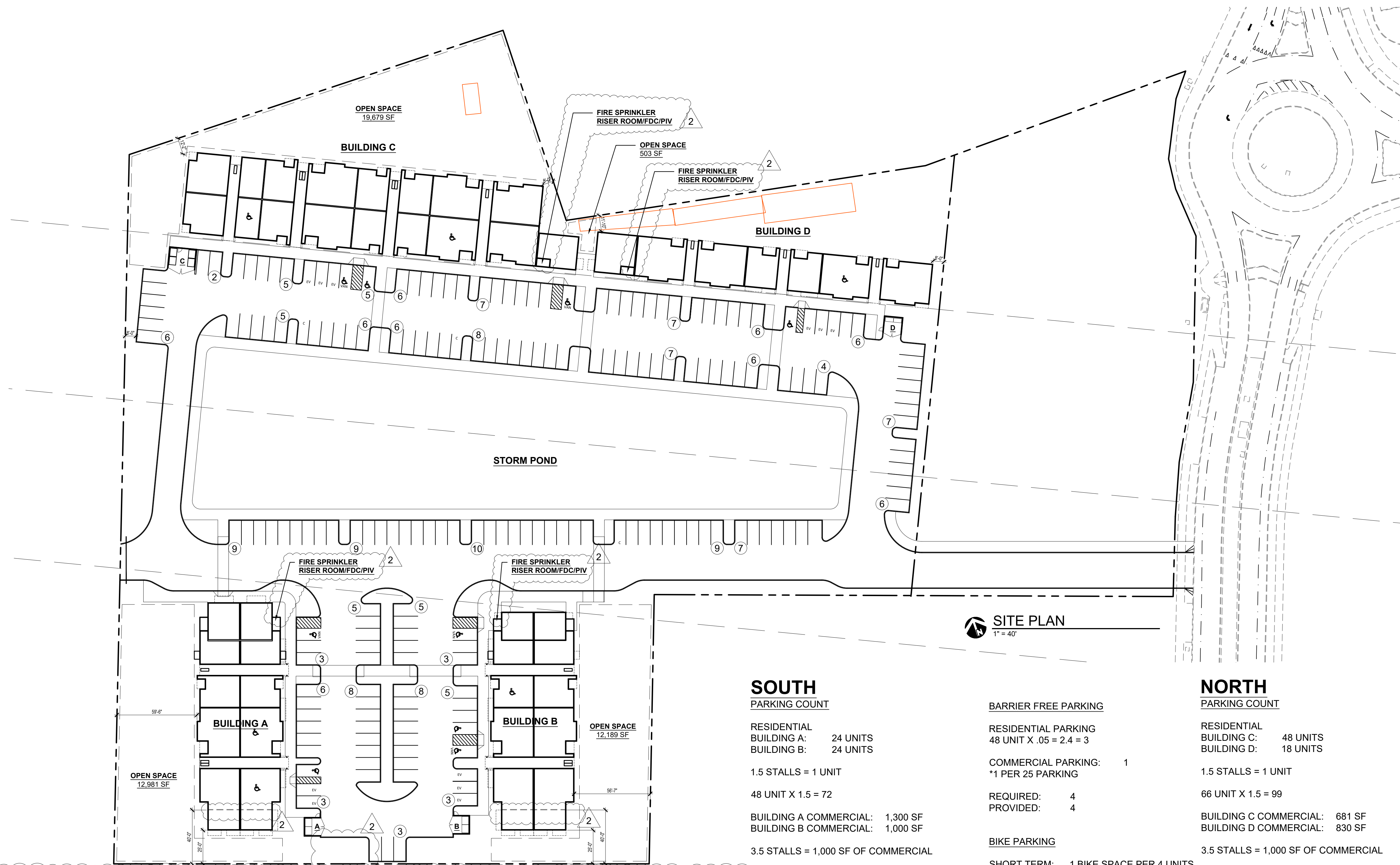
Responsible Official:



Michael Matlock, AICP
Community Development Director

Contact person: Alex Baruch, Associate Planner
555 Israel Road SW
Tumwater, WA 98501
abaruch@ci.tumwater.wa.us

Appeals of this MDNS must be made to the City of Tumwater Community Development Department, no later than December 29, 2023, by 5:00 p.m. All appeals shall be in writing, be signed by the appellant, be accompanied by a filing fee of \$175, and set forth the specific basis for such appeal, error alleged and relief requested.



SOUTH PARKING COUNT

RESIDENTIAL
 BUILDING A: 24 UNITS
 BUILDING B: 24 UNITS
 1.5 STALLS = 1 UNIT
 48 UNIT X 1.5 = 72
 BUILDING A COMMERCIAL: 1,300 SF
 BUILDING B COMMERCIAL: 1,000 SF
 3.5 STALLS = 1,000 SF OF COMMERCIAL
 2.3 X 3.5 = 8.05 = 9

TOTAL PARKING REQUIRED: 81
 TOTAL PARKING PROVIDED: 96
 5% EV PARKING
 96 PARKING X .05 = 4.8 = 5 EV PARKING
 REQUIRED: 5
 PROVIDED: 5

SITE PLAN
 1" = 40'

NORTH PARKING COUNT

RESIDENTIAL
 BUILDING C: 48 UNITS
 BUILDING D: 18 UNITS
 1.5 STALLS = 1 UNIT
 66 UNIT X 1.5 = 99
 BUILDING C COMMERCIAL: 681 SF
 BUILDING D COMMERCIAL: 830 SF
 3.5 STALLS = 1,000 SF OF COMMERCIAL
 1.51 X 3.5 = 5.28 = 6

TOTAL PARKING REQUIRED: 105
 TOTAL PARKING PROVIDED: 105
 5% EV PARKING
 105 PARKING X .05 = 5.25 = 6 EV PARKING
 REQUIRED: 6
 PROVIDED: 6

OPEN SPACE REQUIREMENT

OPEN SPACE REQUIREMENT: 15% OF SITE AREA
 COMMERCIAL OPEN SPACE REQUIREMENT: 1% OF COMMERCIAL AREA + 1% OF SITE
 1% OF COMMERCIAL = 3,811 SF X .01 = 38.11 SF
 1% OF SITE = 281,740 SF X .01 = 2,817.4 SF
 REQUIRED: 6.47 ACRE = 281,740 SF X 15% = 42,261 SF + 2,817.4 SF = 45,078.4 SF
 PROVIDED: 45,352 SF

BARRIER FREE PARKING

RESIDENTIAL PARKING
 66 UNIT X .05 = 3.3 = 4
 COMMERCIAL PARKING: 1
 *1 PER 25 PARKING
 REQUIRED: 5
 PROVIDED: 5

BIKE PARKING

SHORT TERM: 1 BIKE SPACE PER 4 UNITS
 LONG TERM: 1 PER UNIT
 REQUIRED: 66 UNITS / 4 = 16.5 = 17
 LONG TERM: 66
 PROVIDED: 18
 LONG TERM: 66

2018 WSBC DATA CHART		2018 WSBC DATA CHART		2018 WSBC DATA CHART		2018 WSBC DATA CHART	
BUILDING A	BUILDING B	BUILDING C	BUILDING D	BUILDING A	BUILDING B	BUILDING C	BUILDING D
RESIDENTIAL	RESIDENTIAL	RESIDENTIAL	RESIDENTIAL	RESIDENTIAL	RESIDENTIAL	RESIDENTIAL	RESIDENTIAL
OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B	OCCUPANCY R-2, B
TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA	TYPE OF CONSTRUCTION TYPE VA
SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)	SPRINKLER SYSTEM NFPA 13R (RESIDENTIAL) NFPA 13 (COMMERCIAL)
LEVEL 1 10,158 SF	LEVEL 1 9,807 SF	LEVEL 1 16,804 SF	LEVEL 1 7,554 SF	LEVEL 2 9,767 SF	LEVEL 2 9,460 SF	LEVEL 2 15,852 SF	LEVEL 2 6,654 SF
LEVEL 2 9,047 SF	LEVEL 2 9,460 SF	LEVEL 3 15,852 SF	LEVEL 3 6,654 SF	LEVEL 3 9,047 SF	LEVEL 3 9,460 SF	LEVEL 3 15,852 SF	LEVEL 3 6,654 SF
GROSS FLOOR AREA [SF] 28,972 SF	GROSS FLOOR AREA [SF] 28,727 SF	GROSS FLOOR AREA [SF] 48,508 SF	GROSS FLOOR AREA [SF] 20,862 SF	GROSS FLOOR AREA [SF] 28,972 SF	GROSS FLOOR AREA [SF] 28,727 SF	GROSS FLOOR AREA [SF] 48,508 SF	GROSS FLOOR AREA [SF] 20,862 SF

Date:	08/15/2022
By:	WC
Description:	PRELIMINARY SITE PLAN SUBMITTAL PRELIMINARY SITE PLAN REVIEW RESPONSE 27 FORMAL SITE PLAN REVIEW RESPONSE

LITTLEROCK ROAD MIXED-USE
 5945 LITTLEROCK RD SW
 TUMWATER, WA

veer
 ARCHITECTURE PLLC
 520 112th Ave. N.E.
 Suite 250
 Bellevue, WA 98004
 T 425.401.6828
 www.VeerArchitecture.com

SITE PLAN

SHEET NO.
A101
 202201

2023-03-14 FORMAL SITE PLAN REVIEW RESPONSE



CITY OF TUMWATER
555 ISRAEL RD. SW, TUMWATER, WA 98501

Email: cdd@ci.tumwater.wa.us
(360) 754-4180

TUM- 23 - 0150

02-02-2023

RECEIVED BY: Unknown

Any person proposing to develop in the incorporated limits of the City of Tumwater is required to submit an environmental checklist unless the project is exempt as specified in WAC 197-11-800 (Categorical Exemptions) of the State Environmental Policy Act Rules. **SUBMITTAL REQUIREMENTS** are as follows:

1. **A COMPLETE ENVIRONMENTAL CHECKLIST.** If the project is located within the Port of Olympia property, the checklist must also be signed by a representative of the Port.
2. **FEE OF \$880.00 TO BE PAID UPON SUBMITTAL.** This includes the Public Notice fee.
3. **NAME AND ADDRESS LIST OF PROPERTY OWNERS WITHIN 300 FEET OF THE SUBJECT PROPERTY.**

SEPA ENVIRONMENTAL CHECKLIST
UPDATED 2015

Purpose of checklist:

Governmental agencies use this checklist to help determine whether the environmental impacts of your proposal are significant. This information is also helpful to determine if available avoidance, minimization or compensatory mitigation measures will address the probable significant impacts or if an environmental impact statement will be prepared to further analyze the proposal.

Instructions for applicants: [\[help\]](#)

This environmental checklist asks you to describe some basic information about your proposal. Please answer each question accurately and carefully, to the best of your knowledge. You may need to consult with an agency specialist or private consultant for some questions. You may use "not applicable" or "does not apply" only when you can explain why it does not apply and not when the answer is unknown. You may also attach or incorporate by reference additional studies reports. Complete and accurate answers to these questions often avoid delays with the SEPA process as well as later in the decision-making process.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency to which you submit this checklist may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impacts.

Instructions for Lead Agencies:

Please adjust the format of this template as needed. Additional information may be necessary to evaluate the existing environment, all interrelated aspects of the proposal and an analysis of adverse impacts. The checklist is considered the first but not necessarily the only source of information needed to make an adequate threshold determination. Once a threshold determination is made, the lead agency is responsible for the completeness and accuracy of the checklist and other supporting documents.

Use of checklist for nonproject proposals: [\[help\]](#)

For nonproject proposals (such as ordinances, regulations, plans and programs), complete the applicable parts of sections A and B plus the [SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS \(part D\)](#). Please completely answer all questions that apply and note that the words "project," "applicant," and "property or site" should be read as "proposal," "proponent," and "affected geographic area," respectively. The lead

agency may exclude (for non-projects) questions in Part B - Environmental Elements – that do not contribute meaningfully to the analysis of the proposal.

A. Background [\[help\]](#)

**EVALUATION FOR
AGENCY USE ONLY**

1. Name of proposed project, if applicable: [\[help\]](#)
Littlerock Road Mixed-Use Development

2. Name of applicant: [\[help\]](#)
MCS-Littlerock, LLC - Attn: Spencer Kelley

3. Address and phone number of applicant and contact person: [\[help\]](#)
7908 Sweet Iron Court SE, Tumwater, WA 98501
Phone: 360.556.9049

4. Date checklist prepared: [\[help\]](#) December 22, 2022

5. Agency requesting checklist: [\[help\]](#)
City of Tumwater

6. Proposed timing or schedule (including phasing, if applicable): [\[help\]](#)
Begin construction in Spring 2023.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain. [\[help\]](#)
The existing building(s) on the eastern portion of the site will likely be redeveloped in the future. It is anticipated that Land Use permitting/SEPA review will be required as part of permitting additional development/redevelopment.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal. [\[help\]](#)
A Geotechnical Report, dated March 15, 2022, has been prepared by South Sound Geotechnical; a Gopher Report, dated July 12, 2022, has been prepared by Krippner Consulting, LLC; a Cultural Resource Assessment, dated August 2, 2022, has been prepared by Aqua Terra Cultural Resource Consultants; a Wetland Evaluation, dated November 6, 2022, has been prepared by EnvioVector; and a Traffic Impact Analysis report, dated December 19, 2022, has been prepared by SCJ Alliance. The reports listed above are enclosed for review.

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain. [\[help\]](#)
There are no known pending applications.

10. List any government approvals or permits that will be needed for your proposal, if known. [\[help\]](#)

City of Tumwater SEPA Determination, Land Use
Approval, Building Permit, Boundary Line Adjustment

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page. (Lead agencies may modify this form to include additional specific information on project description.) [\[help\]](#)

Proposal includes construction of a commercial/residential mixed-use development on +/- 6.64 acres
providing a total of +/- 3,811 SF of commercial space and 114 apartment units. The project includes
on-site parking, underground utilities, and stormwater facilities to serve the development.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist. [\[help\]](#)

The project is located at 5945 Littlerock Road SW
on Thurston TPNs 12703211600 & 12703220700
Section 3, Township 17N, Range 02W - Please
refer to the enclosed survey for legal descriptions.

B. ENVIRONMENTAL ELEMENTS [\[help\]](#)

1. Earth

- a. General description of the site [\[help\]](#)
 Flat Rolling Hilly Steep Slopes Mountainous
 Other: _____
- b. What is the steepest slope on the site (approximate percent slope)?
[\[help\]](#) Approximately 3%

**EVALUATION FOR
AGENCY USE ONLY**

Site development
grading

- c. What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any agricultural land of long-term commercial significance and whether the proposal results in removing any of these soils. [\[help\]](#)

Per the USDA Natural Resources Conservation Service Web Soil Survey, the site contains

Nisqually loamy fine sand, a hydrologic group A soil, which is considered prime farmland if irrigated.

- d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe. [\[help\]](#)

There are no known surface indications or history of unstable soils in the immediate vicinity.

- e. Describe the purpose, type, total area, and approximate quantities and total affected area of any filling, excavation, and grading proposed. Indicate source of fill. [\[help\]](#)

Site grading will include approximately 8,500 CY of material cut and approximately 8,500 CY of material fill. Import fill will be sourced from an approved local borrow pit.

- f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe. [\[help\]](#)

**Erosion is always a possibility during construction.
BMPs will be maintained to limit erosion impacts.**

- g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)? [\[help\]](#)

Approximately 55% of the site will be covered with impervious surfaces after construction.

- h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any: [\[help\]](#)

BMPs such as a stabilized construction entrance, silt fencing, and covering exposed soils will be used during construction. BMPs will be updated as necessary to limit erosion.

2. Air

- a. What types of emissions to the air would result from the proposal during construction, operation, and maintenance when the project is completed?

If any, generally describe and give approximate quantities if known. [\[help\]](#)

Emissions from equipment and dust may be present during construction but are expected to be minor. Emissions from vehicles entering and exiting the facility will be present at completion.

- b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe. [\[help\]](#)

There are no known off-site sources of emissions or odor that may affect the proposed project.

- c. Proposed measures to reduce or control emissions or other impacts to air, if any: [\[help\]](#)

Construction equipment will not be allowed to idle for extended periods of time.

3. **Water**

- a. Surface Water: [\[help\]](#)

- 1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into. [\[help\]](#)

Trosper Lake, the nearest surface water body, is located approximately 1,230 feet from the project site.

- 2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans. [\[help\]](#)

No work will be performed over, in, or adjacent to the described waters.

- 3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material. [\[help\]](#)

No fill or dredge material will be placed in or removed from surface water or wetlands.

- 4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and

approximate quantities if known. [\[help\]](#)

**No, the proposal will not require surface water
withdrawals or diversions.**

- 5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan. [\[help\]](#)

No, per FEMA FIRM 53067C0281E, the site is not within a 100-year floodplain.

- 6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge. [\[help\]](#)

No waste materials will be discharged to surface waters.

The project will be served by municipal sanitary sewer.

b. Ground Water:

- 1) Will groundwater be withdrawn from a well for drinking water or other purposes? If so, give a general description of the well, proposed uses and approximate quantities withdrawn from the well. Will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known. [\[help\]](#)

**No groundwater will be withdrawn from a well,
the project will be connected to municipal water service.**

- 2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals. . . ; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve. [\[help\]](#)

No waste will be discharged into the ground from septic tanks

the project will be connected to City of Tumwater sanitary sewer.

c. Water runoff (including stormwater):

- 1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow?

Will this water flow into other waters? If so, describe. [\[help\]](#)

**Stormwater runoff will be collected, treated, and
infiltrated in an on-site stormwater pond facility.**

- 2) Could waste materials enter ground or surface waters? If so, generally describe. [\[help\]](#)

It is unlikely that waste materials will enter ground or surface waters. Sanitary refuse
will be stored in covered containers/dumpsters before removal by a refuse company.

- 3) Does the proposal alter or otherwise affect drainage patterns in the vicinity of the site? If so, describe.

No, stormwater will be infiltrated on-site.

- d. Proposed measures to reduce or control surface, ground, and runoff water, and drainage pattern impacts, if any:

**Stormwater will be collected, treated, and
infiltrated on-site to limit drainage pattern impacts.**

4. **Plants** [\[help\]](#)

- a. Check the types of vegetation found on the site: [\[help\]](#)

- deciduous tree: alder, maple, aspen, other
- evergreen tree: fir, cedar, pine, other
- shrubs
- grass
- pasture
- crop or grain
- orchards, vineyards or other permanent crops.
- wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
- water plants: water lily, eelgrass, milfoil, other
other types of vegetation

- b. What kind and amount of vegetation will be removed or altered?
[\[help\]](#)

Approximately 4.5-acres of existing vegetation including trees, brush, & grass will be removed.

- c. List threatened and endangered species known to be on or near the site. [\[help\]](#)

According to the U.S. Fish & Wildlife's IPaC map, Golden Paintbrush is a threatened flowering plant species which may be affected by project activities in this location. There is no known presence of Golden Paintbrush on the project site, however, we are noting the potential.

- d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any: [\[help\]](#)

Landscaping will be installed to meet or exceed
minimum City code requirements.

- e. List all noxious weeds and invasive species known to be on or near the site.

Per Thurston County GeoData, Bohemian Knotweed,
a noxious weed, was discovered on-site in 2004.

5. Animals

- a. List any birds and other animals which have been observed on or near the site or are known to be on or near the site. Examples include: [\[help\]](#)

- birds: hawk, heron, eagle, songbirds, other:
- mammals: deer, bear, elk, beaver, other:
- fish: bass, salmon, trout, herring, shellfish
- other:

birds: typical crows and raptors found in urban environments

mammals: opossum, raccoons, squirrels, mice

- b. List any threatened and endangered species known to be on or near the site. [\[help\]](#)

Per IPaC mapping, threatened species include: Olympia Pocket Gopher, Yelm Pocket Gopher, Marbled Murrelet, Streaked Horned Lark, Yellow-billed Cuckoo, Oregon Spotted Frog, & Bull Trout. Endangered species include the Taylor's Checkerspot. There are no known instances of the aforementioned species on-site, however we are noting the potential.

- c. Is the site part of a migration route? If so, explain. [\[help\]](#)

Yes, the site is located within the Pacific Flyway.

- d. Proposed measures to preserve or enhance wildlife, if any: [\[help\]](#)

No measures are proposed.

- e. List any invasive animal species known to be on or near the site.

There are no known invasive animal species on or near the site.

6. Energy and natural resources

- a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc. [\[help\]](#)

Electricity will be used to meet the project's energy needs for heating, lighting, etc.

- b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe. [\[help\]](#)

The proposed project is not anticipated to affect the potential use of solar energy by adjacent properties.

- c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any: [\[help\]](#)

The project will be designed to comply with current energy code. Energy conservation

features may include LED lighting, building insulation, & energy efficient windows.

7. Environmental health

- a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe. [\[help\]](#)

- 1) Describe any known or possible contamination at the site from present or past uses.

The site, previously known as Tumwater Pickup Parts, was listed by Ecology as a known contaminated site but cleanup has been completed and an NFA was issued by Ecology following cleanup activities.

- 2) Describe existing hazardous chemicals/conditions that might affect project development and design. This includes underground hazardous liquid and gas transmission pipelines located within the project area and in the vicinity.

There are no known hazardous chemicals/conditions that might affect development and design. Per the National Pipeline Mapping System, there are no hazardous liquid or gas transmission pipelines in the vicinity.

- 3) Describe any toxic or hazardous chemicals that might be stored, used, or produced during the project's development or construction, or at any time during the operating life of the project.

Gasoline, oil, and diesel fuels may be stored and used during construction. No hazardous chemicals will be produced by the project during construction or at completion.

- 4) Describe special emergency services that might be required.

No special emergency services are anticipated.

- 5) Proposed measures to reduce or control environmental health hazards, if any:

Gasoline, oil, and/or diesel fuels for heavy equipment will be kept in sealed & approved containers.

b. Noise

- 1) What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)? [\[help\]](#)

Traffic on adjacent roadways creates noise in the area but is not anticipated to affect the project.

- 2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)?

Indicate what hours noise would come from the site. [\[help\]](#)

During construction and development, noise may be present from heavy equipment and contractor's tools. Construction work will be performed during typical daytime work hours.

At completion, traffic from vehicles entering and exiting the completed project will occur but noise is expected to be minor.

- 3) Proposed measures to reduce or control noise impacts, if any: [\[help\]](#)

Work will be limited to typical daytime work hours and equipment

will not be allowed to idle for extended periods of time.

8. Land and shoreline use

- a. What is the current use of the site and adjacent properties? Will the proposal affect current land uses on nearby or adjacent properties? If so, describe. [\[help\]](#)

The site is currently vacant. Surrounding uses include Tumwater

Middle School, vacant land, commercial retail, and a cemetery.

- b. Has the project site been used as working farmlands or working forest lands? If so, describe. How much agricultural or forest land of long-term commercial significance will be converted to other uses as a result of the proposal, if any? If resource lands have not been designated, how many acres in farmland or forest land tax status will be converted to nonfarm or nonforest use? [\[help\]](#)

No, the site has not been used as working farmlands or forest lands.

- 1) Will the proposal affect or be affected by surrounding working farm or forest land normal business operations, such as oversize equipment access, the application of pesticides, tilling, and harvesting? If so, how:

No, the project will not affect or be affected by surrounding working farm or forest land operations.

- c. Describe any structures on the site. [\[help\]](#)

There are no structures on the project site.

- d. Will any structures be demolished? If so, what? [\[help\]](#)

No, the site is vacant.

- e. What is the current zoning classification of the site? [\[help\]](#)
The site is zoned GC - General Commercial.
-
- f. What is the current comprehensive plan designation of the site? [\[help\]](#)
The comprehensive plan designation is GC - General Commercial.
-
- g. If applicable, what is the current shoreline master program designation of the site? [\[help\]](#)
Not applicable.
-
- h. Has any part of the site been classified as a critical area by the city or county? If so, specify. [\[help\]](#)
Yes, the site is located within a Class 1 Critical Aquifer Recharge Area and a Class I Agricultural Critical Aquifer Recharge Area.
-
- i. Approximately how many people would reside or work in the completed project? [\[help\]](#)
Approximately 16-20 people will work in the completed project and approximately 285 people will reside in the completed project.
-
- j. Approximately how many people would the completed project displace? [\[help\]](#)
No people will be displaced by the completed project.
-
- k. Proposed measures to avoid or reduce displacement impacts, if any: [\[help\]](#)
No displacement impacts are anticipated, no measures are proposed.
-
- L. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any: [\[help\]](#)
The project will be reviewed by City of Tumwater staff to ensure land use compatibility.
-
- m. Proposed measures to ensure the proposal is compatible with nearby agricultural and forest lands of long-term commercial significance, if any:
No impacts to nearby agricultural or forest lands of long-term commercial significance are anticipated, no measures are proposed.
-

9. **Housing**

- a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing. [\[help\]](#)
114 middle-income housing units will be provided.
- b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing. [\[help\]](#)
No housing units will be eliminated by the project.
- c. Proposed measures to reduce or control housing impacts, if any: [\[help\]](#)
No housing impacts are anticipated, no measures are proposed.

10. **Aesthetics**

- a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed? [\[help\]](#)
The tallest height of the proposed buildings is +/- 41 feet. The principal exterior building materials are brick veneer and Hardie siding.
- b. What views in the immediate vicinity would be altered or obstructed? [\[help\]](#)
No views in the immediate vicinity will be altered or obstructed.
- c. Proposed measures to reduce or control aesthetic impacts, if any: [\[help\]](#)
The project will be designed to comply with City of Tumwater guidelines for development and construction, and will be reviewed by City staff to ensure compatibility with aesthetic requirements for permit approval.

11. **Light and glare**

- a. What type of light or glare will the proposal produce? What time of day would it mainly occur? [\[help\]](#)
Light will be produced during evening hours from exterior and pathway lighting, and luminaires within parking areas
- b. Could light or glare from the finished project be a safety hazard or interfere with views? [\[help\]](#)
It is unlikely that light or glare from the finished project will cause safety hazards or view interference.
- c. What existing off-site sources of light or glare may affect your proposal? [\[help\]](#)
There are no known off-site sources of light or glare that will affect the proposed project.

**Lighting shall meet
Tumwater
ordinance
regulations for light
trespass and
fixture type.**

- d. Proposed measures to reduce or control light and glare impacts, if any: [\[help\]](#)

Exterior lighting will be positioned to prevent light exposure onto adjacent properties.

12. **Recreation**

- a. What designated and informal recreational opportunities are in the immediate vicinity? [\[help\]](#)

Trosper Lake Park, an undeveloped neighborhood park which provides access to Trosper Lake, is located adjacent to the project site.

- b. Would the proposed project displace any existing recreational uses? If so, describe. [\[help\]](#)

No, the proposed project will not displace any existing recreational uses.

- c. Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any: [\[help\]](#)

An open space playfield will be constructed within the development for use by residents and their guests.

13. **Historic and cultural preservation**

- a. Are there any buildings, structures, or sites, located on or near the site that are over 45 years old listed in or eligible for listing in national, state, or local preservation registers located on or near the site? If so, specifically describe. [\[help\]](#)

Yes, the Olympia-Grand Coulee No. 1 Transmission Line (overhead high-voltage line) bisects the project site. Per the Department of Archaeology and Historic Preservation's WISAARD map, the Transmission Line is property ID no. 725297. The Union Cemetery - Pioneer Cavalry Cemetery, listing no. 97000323 is located along the northern boundary of the site.

- b. Are there any landmarks, features, or other evidence of Indian or historic use or occupation? This may include human burials or old cemeteries. Are there any material evidence, artifacts, or areas of cultural importance on or near the site? Please list any professional studies conducted at the site to identify such resources. [\[help\]](#)

The site is mapped in an area of Moderate Risk to contain environmental factors with archaeological resources. It is also in an area of Tribal interest for the Nisqually, Squaxin, Cowlitz, and Confederated Tribes of the Chehalis Reservation. Additionally, the site is adjacent to the Tumwater Pioneer Cemetery and potentially contains unmarked graves. The site plan has been designed to limit disturbances to potential grave sites to the maximum extent practicable.

- c. Describe the methods used to assess the potential impacts to cultural and historic resources on or near the project site. Examples include consultation with tribes and the department of archeology and historic preservation, archaeological surveys, historic maps, GIS data, etc. [\[help\]](#)

A Cultural Resources Report, dated August 2, 2022, has been prepared by Aqua Terra Cultural Resource Consultants and is enclosed for review. A query of the Department of Archaeology & Historic Preservation's WISAARD map system was also performed on 8/22/2022.

- d. Proposed measures to avoid, minimize, or compensate for loss, changes to, and disturbance to resources. Please include plans for the above and any permits that may be required.

If cultural or historic resources are discovered during demolition, grading, or construction,

activities will cease until a qualified archaeologist evaluates the situation and outlines a course of action.

14. Transportation

- a. Identify public streets and highways serving the site or affected geographic area and describe proposed access to the existing street system. Show on site plans, if any. [\[help\]](#)

The site is served by Littlerock Road SW. The existing access driveway from Littlerock Road SW will be revised and extended west within an easement to serve the development.

- b. Is the site or affected geographic area currently served by public transit? If so, generally describe. If not, what is the approximate distance to the nearest transit stop? [\[help\]](#)

Yes, the site and geographic area are served by Intercity Transit.

- c. How many additional parking spaces would the completed project or non-project proposal have? How many would the project or proposal eliminate? [\[help\]](#)

The completed project will have 201 parking spaces. No spaces will be eliminated by the project.

- d. Will the proposal require any new or improvements to existing roads, streets, pedestrian, bicycle or state transportation facilities, not including driveways? If so, generally describe (indicate whether public or private). [\[help\]](#)

No new roads or improvements to existing roads are proposed. Access

will be provided by one right-in-right-out driveway from Littlerock Road.

- e. Will the project or proposal use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe. [\[help\]](#)

No, the project will not use or occur in the immediate vicinity of water, rail, or air transportation.

- f. How many vehicular trips per day would be generated by the completed project or proposal? If known, indicate when peak volumes would occur and what percentage of the volume would be trucks (such as commercial and nonpassenger vehicles).

EVALUATION FOR AGENCY USE ONLY

Follow requirements outlined by DAHP in their review of the cultural resource study.

What data or transportation models were used to make these estimates? [\[help\]](#)

The project will generate approximately 787 trips per day. The ITE Manual was used

to make this estimate. Please refer to the enclosed Traffic Impact Analysis report.

g. Will the proposal interfere with, affect or be affected by the movement of agricultural and forest products on roads or streets in the area? If so, generally describe:

No, the project will not interfere with, affect, or be affected by movement of agricultural or forest products in the area.

h. Proposed measures to reduce or control transportation impacts, if any: [\[help\]](#)

No measures are proposed at this time as the Traffic Impact Analysis prepared for the project confirms that nearby intersections will operate within acceptable level of service (LOS) thresholds. Please refer to the enclosed Traffic Impact Analysis report for additional information.

15. Public services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, public transit, health care, schools, other)? If so, generally describe. [\[help\]](#)

The project is likely to result in an increased need for public services such as fire protection, police, public transit, health care, and schools to accommodate residents of the completed project.

b. Proposed measures to reduce or control direct impacts on public services, if any. [\[help\]](#)

Impacts are anticipated to be minor, no measures are proposed.

16. Utilities

a. Circle utilities currently available at the site: [\[help\]](#)

electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed. [\[help\]](#)

Electricity - Puget Sound Energy	Refuse - LeMay Pacific Disposal
Water - City of Tumwater	Telephone - Lumen
Sanitary Sewer - City of Tumwater	Cable - Comcast

C. Signature [\[HELP\]](#)

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: 

Name of signee: Nick Wheeler

Position: Business Manager

Agency/Organization: JSA Civil, LLC

Date Submitted: February 2, 2023

D. Signature – Property Owner’s Review, Port of Olympia (if applicable)

I certify that I have reviewed the above environmental checklist prepared by the applicant and that the project is consistent with the tenant’s lease for Port property. The Port’s comments have been incorporated in the document as submitted or as noted.

Port of Olympia – Please Print: _____

Port of Olympia – Signature: _____

Date Submitted: _____

E. CITY OF TUMWATER

Reviewed by: Alex Baruch, Associate Planner

Date: 12-06-2023

F. Supplemental sheet for nonproject actions [\[help\]](#)
(IT IS NOT NECESSARY to use this sheet for project actions)

Because these questions are very general, it may be helpful to read them in conjunction with the list of the elements of the environment.

**EVALUATION FOR
AGENCY USE ONLY**

When answering these questions, be aware of the extent the proposal, or the types of activities likely to result from the proposal, would affect the item at a greater intensity or at a faster rate than if the proposal were not implemented. Respond briefly and in general terms.

**EVALUATION FOR
AGENCY USE ONLY**

1. How would the proposal be likely to increase discharge to water; emissions to air; production, storage, or release of toxic or hazardous substances; or production of noise?

Proposed measures to avoid or reduce such increases are:

2. How would the proposal be likely to affect plants, animals, fish, or marine life?

Proposed measures to protect or conserve plants, animals, fish, or marine life are:

3. How would the proposal be likely to deplete energy or natural resources?

Proposed measures to protect or conserve energy and natural resources are:

4. How would the proposal be likely to use or affect environmentally sensitive areas or areas designated (or eligible or under study) for governmental protection; such as parks, wilderness, wild and scenic rivers, threatened or endangered species habitat, historic or cultural sites, wetlands, floodplains, or prime farmlands?

Proposed measures to protect such resources or to avoid or reduce impacts are:

5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

Proposed measures to avoid or reduce shoreline and land use impacts are:

6. How would the proposal be likely to increase demands on transportation or public services and utilities?

Proposed measures to reduce or respond to such demand(s) are:

7. Identify, if possible, whether the proposal may conflict with local state, or federal laws or requirements for the protection of the environment.

**EVALUATION FOR
AGENCY USE ONLY**

SUF

SOUND URBAN FORESTRY

Appraisals, Planning, Urban Landscape Design and Management

Littlerock Road Mixed-Use Project

5945 Littlerock Road SW
Tumwater, Washington 98501

Tree Protection Plan

Prepared for: MCS – Littlerock, LLC, Applicant

JSA Civil, Applicants Representative

Prepared by: Kevin M. McFarland, SUF
Consulting Urban Forester/ISA Certified Arborist & Tree Risk Assessor Qualified

Date: 1/22/2023

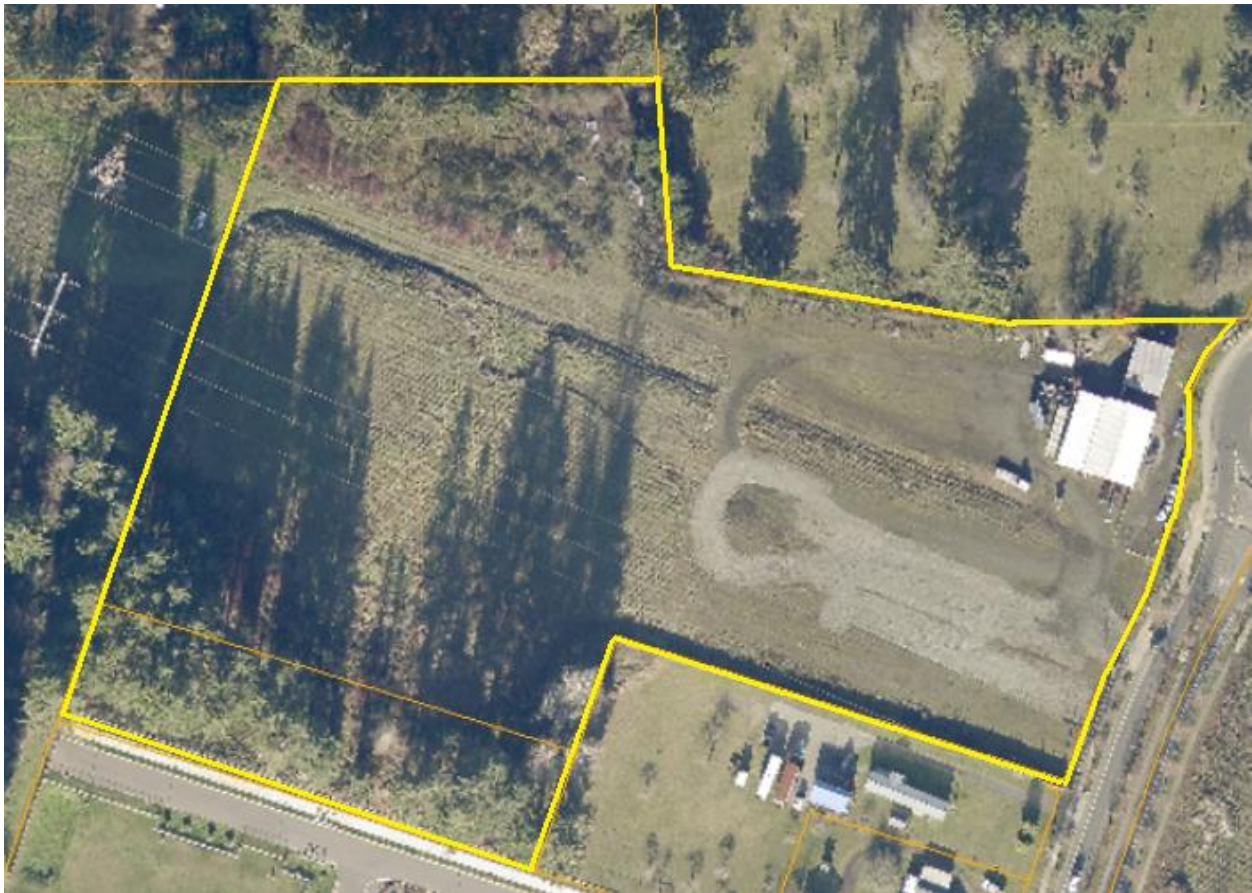
This report has been developed as part of the proposed 8-acre Littlerock Road mixed-use project at 5945 Littlerock Road SW, in Tumwater, Washington. This plan will satisfy the requirements as specified by the City of Tumwater Protection of Trees and Vegetation Ordinance (TMC 16.08) and Development Guidelines and Standards.

I. Overall Site & Vegetation Description

The 8-acre site is currently classified as two parcels, #12703211600 (7.07-acres) and #12703220700 (.92-acres). As part of the project, a separate application is submitted for a boundary line adjustment. The western apartment parcel will cover 6.46 +/- acres while the commercial property along Littlerock Road will cover 1.52 +/- acres.

The apartment parcel is mostly open, mowed field grass. There are a few trees along the northern property line and a wooded area in the southwest bump-out. The trees are dominated by Douglas fir with a few scattered big leaf maple and cottonwood. They are in fair to good condition. Understory in the forested area include salal, sword fern and mahonia. Patches of Himalayan blackberry are found around the forest edge. The commercial parcel contains no trees and is a mix of field grass and gravel.

Aerial of Property



II. Inventory of Trees

A nearly 100% survey of the trees was conducted in 2022 which was then verified by Sound Urban Forestry LLC in January 2023. Several of the trees originally surveyed are dead and a few species misidentified. An overview of all trees within the site is presented in the table below.

Table 1. Inventory of Trees within Apartment Parcel

Species	DBH	Number of Trees
Douglas Fir	6-12"	13
	12-18"	30
	18-24"	22
	24-30"	11
	30-36"	5
	36"+	2
Big Leaf Maple	6-12"	3
	12-18"	2
*Cottonwood	6-12"	3
	12-18"	1
	18-24"	2
*Willow	12"	1
		Total = 95

*Do not count toward tree retention calculations per TMC

Landmark Trees

I found no trees within the site that would be considered specimen or 'Landmark' trees.

Off-Site & Edge Trees

No offsite trees were identified with the potential of impacts.

III. Tree Retention Calculations

Trees to be retained are located along the northern perimeter and within the open space areas around the apartment buildings in the southwest corner. A summary of those trees can be found within Table 2 and they are highlighted in green on the attached site plan. Per the TMC, trees that measure 24" and greater count as two trees and cottonwoods do not count at all.

Table 2. Inventory of Trees to be Retained within the Apartment Parcel

Species	DBH	Number of Trees	Count Toward Retention
Douglas Fir	6-23"	31	31
Douglas Fir	24"+	8	16
Big Leaf Maple	8"	1	1
Cottonwood	8-24"	5	0
			Total = 48

Table 3. Summary of Tree Retention Calculations for the Apartment Parcel

Gross Acreage	6.46
Total Trees Within Site (Table 1)	88
20% Tree Retention	18 Trees
*12 Trees/ Acre Retention	78 Trees
Proposed Tree Retention	48 Trees
Shortfall on Required Retention	30 Trees
Required Replanting (3:1)	90 Trees

*This is the greater amount and therefore required by TMC

Table 4. Summary of Tree Retention Calculations for the Commercial Parcel

Gross Acreage	1.52
Total Trees Within Site	0
20% Tree Retention	NA
*12 Trees/ Acre Retention	18 Trees
Proposed Tree Retention	NA
Shortfall on Required Retention	18 Trees
Required Replanting (1:1)	18 Trees

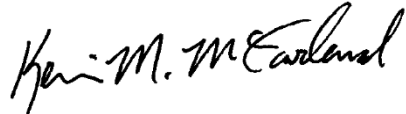
IV. Replanting

Replanting will be necessary within both parcels. Because it would be possible to meet the minimum in the apartment parcel, the applicant will be required to replant at a rate of 3:1. Per the standards outlined in TMC 16.08.070, priority must be given to replanting within a tree protection open space in order to obtain 80% coverage in 15 years. There is ample room around the trees to be retained for replanting. These requirements will be addressed with the submitted landscape plans.

IV. Tree Protection

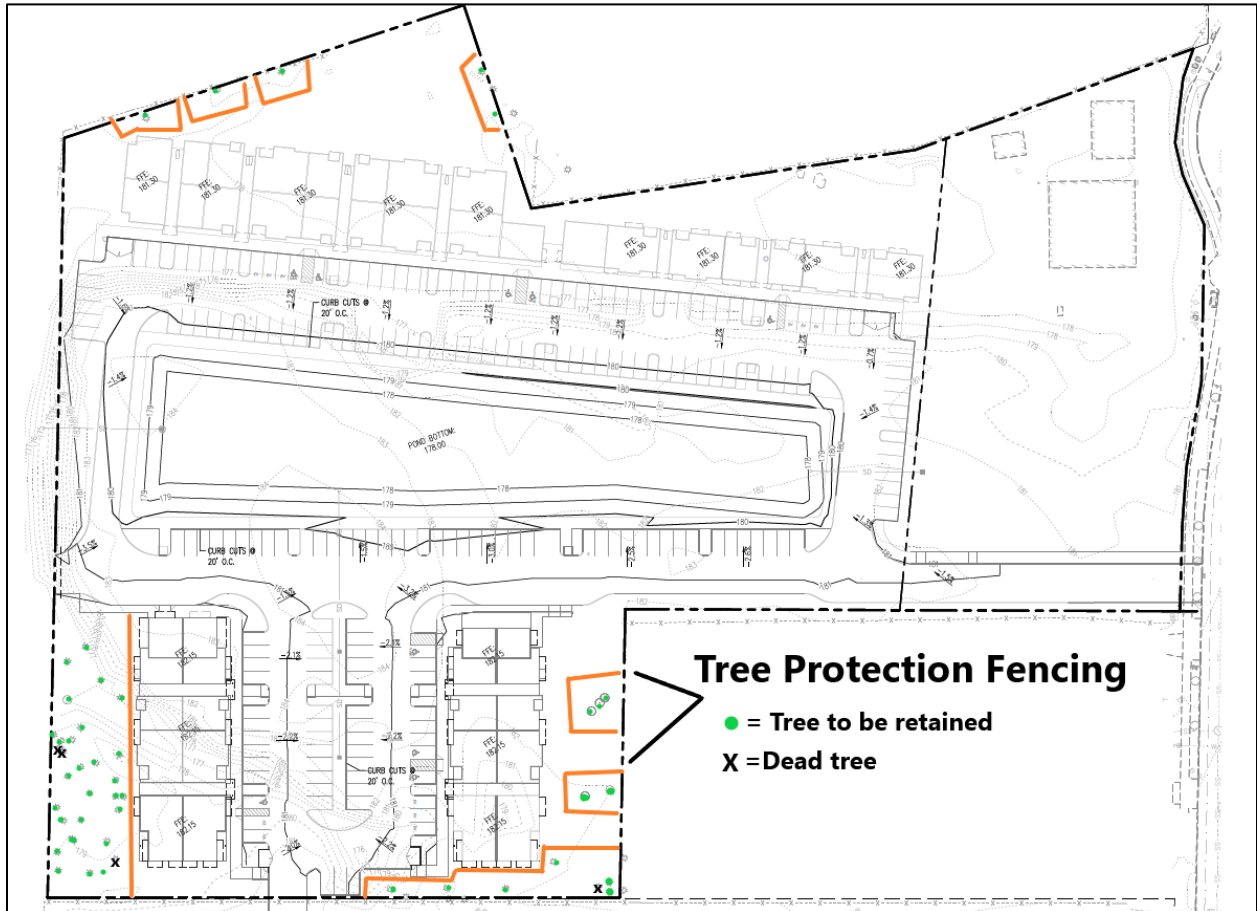
Tree protection fencing is recommended at multiple locations, as indicated in orange on the attached site plan. This fencing should meet the City's standards and remain in place the entire duration of the construction process.

Professionally Submitted,

A handwritten signature in black ink that reads "Kevin M. McFarland". The signature is written in a cursive, flowing style.

Kevin M. McFarland, Principal
ISA Certified Arborist PN-0373 & ISA Tree Risk Assessment Qualified
Sound Urban Forestry, LLC

Locations of Retained Trees and Recommended Tree Protection Fencing



Traffic Impact Analysis

Littlerock Road Mixed Use Development

Tumwater, Washington

Prepared For:

JSA Civil, LLC

Prepared By:

SCJ Alliance

8730 Tallon Lane NE, Suite 200

Lacey, WA 98516

360.352.1465

June 2023



SCJ ALLIANCE
CONSULTING SERVICES

Traffic Impact Analysis

Project Information

Project: Littlerock Road Mixed Use Development

Prepared for: JSA Civil, LLC

Reviewing Agency

Jurisdiction: City of Tumwater

Project Representative

Prepared by: SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
360.352.1465
scjalliance.com

Contact: Ryan Shea, PTP, Senior Transportation Planner

Project Reference: SCJ #22-000200

Path: N:\Projects\5275 JSA Civil, LLC\22-000200
Littlerock Road Apartments\Phase 02 - Traffic Impact
Analysis\3 - Dels\Traffic Impact Analysis 2023-0614.docx

Signature

The technical material and data contained in the Traffic Impact Analysis were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



Prepared by Ryan Shea, PTP, Senior Transportation
Planner



06/14/22

Approved by Perry Shea, PE, Principal

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List of Appendices

Appendix A	Traffic Volume Counts
Appendix B	Traffic Volume Calculation Worksheets
Appendix C	Capacity Analysis Worksheets

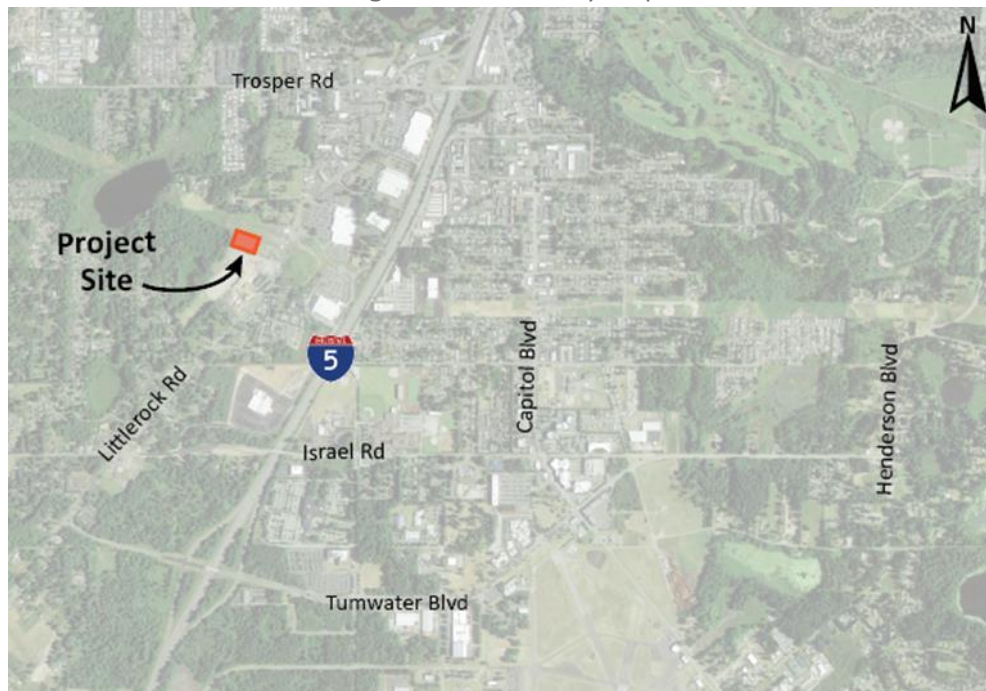
1 Introduction

1.1 Project Overview

The Littlerock Road Mixed Use Development is being proposed west of Littlerock Road and immediately north of Tumwater Middle School, near the Littlerock Road/Kingswood Drive Intersection in Tumwater, Washington. The proposed project includes 114 apartment units and approximately 3,800-square feet of general commercial space.

Figure 1 illustrates the site vicinity and the transportation network serving the project area.

Figure 1. Site Vicinity Map



1.2 Study Context

This report has been prepared to provide the traffic analysis and project information based on City of Tumwater TIA guidelines, to assist the city in reviewing the development proposal. A Traffic Scoping Letter was prepared and submitted to the city, which documented the trip generation, distribution, and assignment of estimated project trips. The city approved the methodology and requested the following intersections be included for analysis:

- ◆ Trospen Road at Littlerock Road
- ◆ Trospen Road at I-5 SB Ramps/Tyee Drive
- ◆ Littlerock Road at Kingswood Drive
- ◆ Littlerock Road at Odegard Road
- ◆ Littlerock Road at Israel Road
- ◆ Proposed Site Driveway

Operational analysis has been prepared for existing 2022 PM peak hour conditions and forecasted 2024 PM peak hour conditions with and without completion of the development.

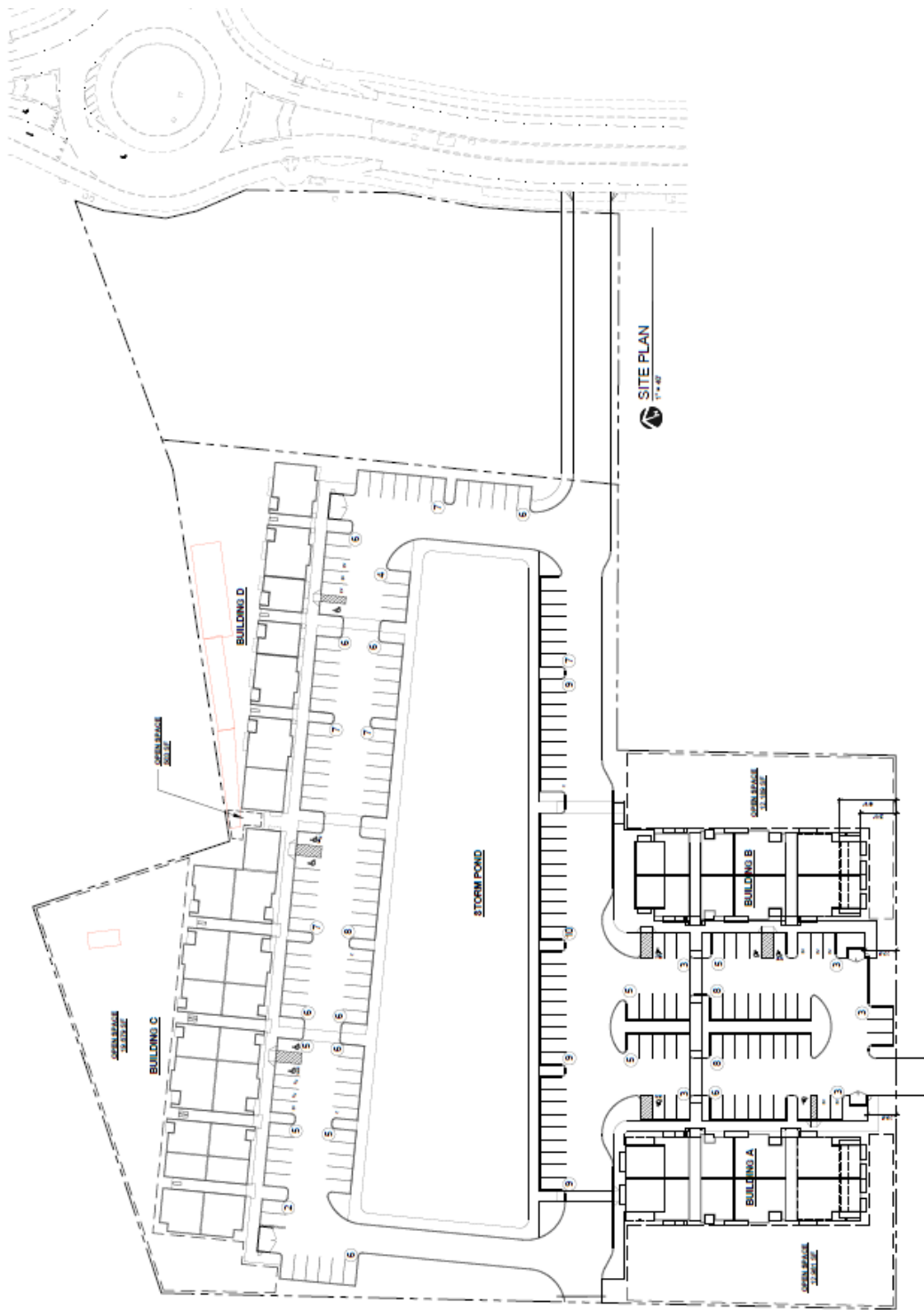
2 Project Description

2.1 Development Proposal

The proposed project would construct 114 apartment units and 3,800-square feet of general commercial space on undeveloped land in the City of Tumwater. Access to the project will be provided by one right-in-right-out driveway onto Littlerock Road. An emergency only access is proposed on the existing private road currently used as the northern Tumwater Middle School driveway. The project is anticipated to open in 2024.

The preliminary site plan is provided on **Figure 2**.

Figure 2. Preliminary Site Plan



3 Existing Conditions

3.1 Area Land Uses

The proposed project will be located on undeveloped land west of Littlerock Road and immediately north of Tumwater Middle School, near the Littlerock Road/Kingswood Drive Intersection in Tumwater, Washington. The site is currently zoned GC General Commercial. The adjacent land uses include single family and multifamily residential, educational, office/commercial, and cemetery/memorial.

3.2 Roadway Inventory

3.2.1 Littlerock Road

Littlerock Road is classified by City of Tumwater as arterial. In the project vicinity, Littlerock Road provides one lane in each direction with sidewalks and bicycle lanes on both sides. Between Kingswood Drive and Tumwater Boulevard, this roadway is divided by a planter strip median. The posted speed limit is 35 mph.

3.2.2 Trospen Road

Trospen Road is an east-west arterial with a posted speed limit of 25 mph. In the project vicinity, this roadway provides two travel lanes in each direction with sidewalks on both sides. Trospen Road provides connections to and from Interstate 5.

3.2.3 Odegard Road

Odegard Road is a two lane east-west roadway classified by the City of Tumwater as collector and has a posted speed limit of 25 mph. The intersection of Odegard Road and Littlerock Road operates under roundabout control and provides a location for U-turn maneuvers on Littlerock Road.

3.2.4 Kingswood Drive

Kingswood Drive is an east-west collector extending from Littlerock Road to Tye Drive. This roadway has two travel lanes with a two-way left turn lane (TWLTL) and sidewalks on both sides. Kingswood Drive has a posted speed limit of 25 mph.

3.2.5 Israel Road

Israel Road is an east-west collector street that runs from 70th Avenue and Littlerock Road on the west to Tumwater Boulevard on the east, serving destinations in the south side of the City of Tumwater. In the project vicinity the roadway has a single lane in each direction with paved shoulders that transition to bicycle lanes just east of the intersection with Old Israel Road. Sidewalks are provided along the south side of the street through the study area, and on the north side between Old Israel Road and Littlerock Road. The street has a posted speed limit of 35 mph.

A summary of the existing intersection channelization and control type for each of the study intersections is provided in **Figure 3**.

3.3 Traffic Volume Data

Traffic Count Consultants, TC2, a transportation data collection service, provided evening peak period turning movement counts at each of the study intersections. These counts were collected in 2015 and

2022 between 4:00 and 6:00 PM for the PM peak hour. The turning movement count diagrams are provided in **Appendix A**.

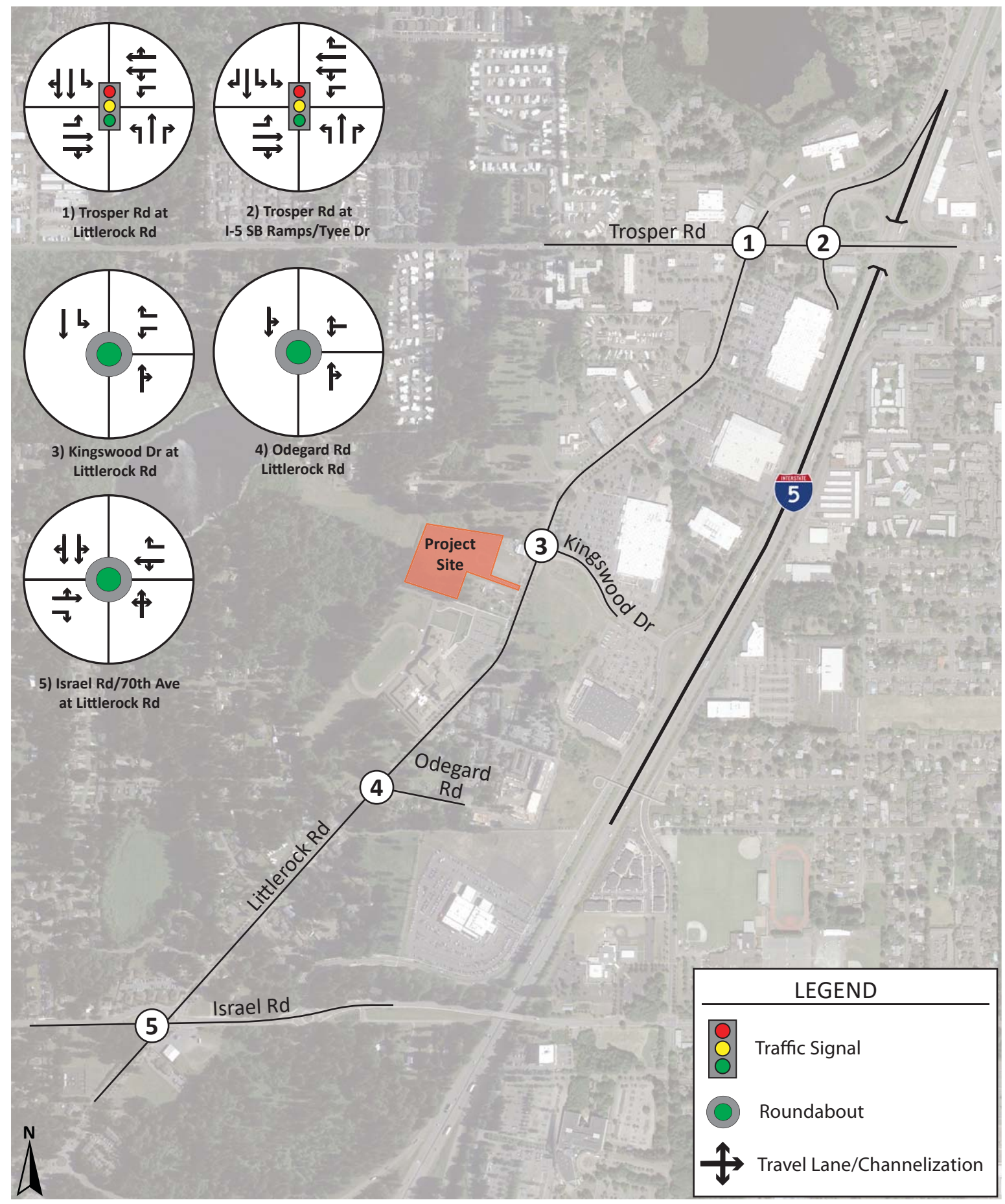
3.4 Traffic Volume Adjustments

Due to Covid-19, traffic volumes have been reduced in most areas in comparison with 2019 levels, which may cause peak period traffic counts to be low. To help provide more accurate traffic volumes, pre-pandemic PM peak hour counts from the 2015 Tumwater Transportation Plan were used for comparison to the collected 2022 count volumes to determine if any adjustments should be made to these counts.

An annual growth rate of 2% was applied to the 2015 traffic volume counts to establish a baseline volume for 2022. The current turning movement count volumes were then compared to this baseline. Based on this comparison, it was determined that a small reduction in traffic volumes during the PM peak hour is still occurring. An adjustment rate of 10% was applied to all study area intersections

After these initial adjustment calculations, the volumes were compared to historic counts and individual traffic movements were balanced to better match the historic count, where available, and also balance with up or down stream volumes. All of these volume adjustments are provided in **Appendix B**.

Figure 4 shows the adjusted existing 2022 PM peak hour traffic volumes for the study intersections.



1) Trosper Rd at Littlerock Rd




2) Trosper Rd at I-5 SB Ramps/Tyee Dr

3) Kingswood Dr at Littlerock Rd

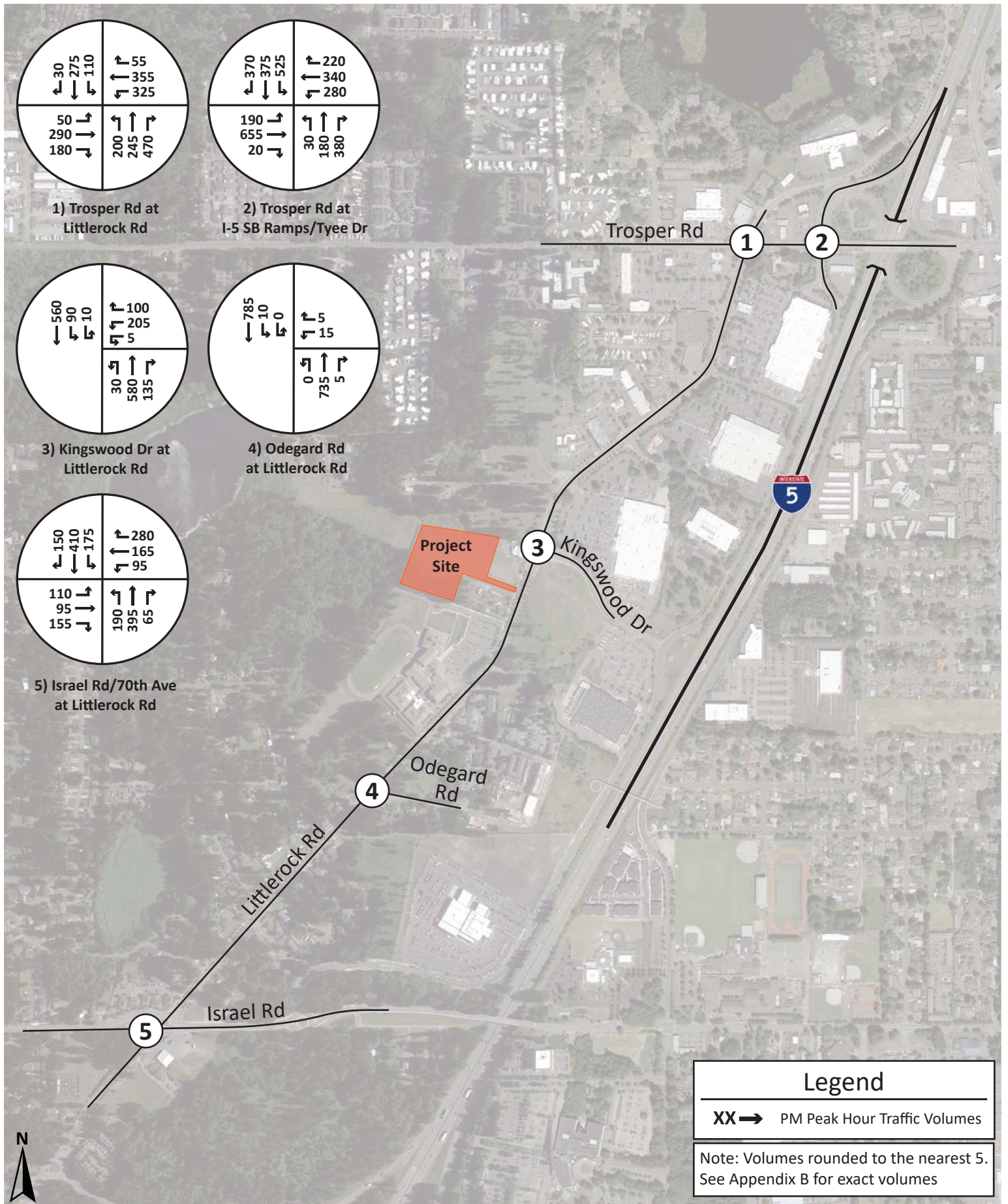
4) Odegard Rd Littlerock Rd

5) Israel Rd/70th Ave at Littlerock Rd

LEGEND

-  Traffic Signal
-  Roundabout
-  Travel Lane/Channelization





3.5 Crash History

The Washington Department of Transportation provides crash data for study area roadways. The data was collected over the five-year span between January 1, 2017 and December 31, 2021. We have summarized the crash data for the study intersections in **Table 1**.

Table 1. Existing Crash Severity by Study Intersection

Intersection	Fatal	Serious Injury	Minor Injury	Possible Injury	Property Damage Only	Unknown	Total
Littlerock Road/Trospen Road/South 2 nd Ave	0	0	1	8	29	0	38
Trospen Road/I-5 SB Ramps/Tyee Drive	0	0	2	8	38	0	48
Kingswood Drive/Littlerock Road	0	0	0	4	6	0	10
Odegard Road/Littlerock Road	0	0	2	1	8	1	12
Littlerock Road/Israel Road	0	0	0	2	18	0	20
Total Crashes	0	0	5	23	99	1	128

Overall, approximately 75% of all the reported crashes were classified as property damage only (no apparent injury). There were no fatal or serious injury crashes reported.

3.6 Transit and Non-Motorized Facilities

Intercity Transit currently serves the City of Tumwater with transit services providing connections to Lacey, Olympia, and Yelm. The closest transit stop is located approximately 0.17 miles south of the project site along Littlerock Road.

In the project vicinity, sidewalks and bike lanes are currently provided along both sides of Littlerock Road.

4 Project Traffic Characteristics

The project-related characteristics having the most effect on area traffic conditions are peak hour trip generation and the directional distribution of traffic volumes on the surrounding roadway network. The PM peak hour was selected as the traffic analysis period as it represents the highest potential traffic condition on area roadways.

4.1 Site-Generated Traffic Volumes

Vehicle trip generation was calculated using the trip generation rates contained in the 11th edition of the Trip Generation Manual by the *Institute of Transportation Engineers (ITE)*. Multifamily Housing (Low-Rise) Not Close to rail Transit (land use code 220), and Strip Retail Plaza (<40k) (land use code 822) land use categories match the proposed development and have been used to calculate the trip generation.

For this analysis, the “fitted-curve” equation was used when available to estimate trips in preference to using the average trip rate as this approach was recommended by ITE.

Internal Capture

Internal capture calculations were prepared to reflect on-site interaction between the mix of uses in the proposed Littlerock Road Mixed Use Development. Given the small size of the proposed project the city of Tumwater has directed that no internal capture reduction be assumed.

Pass-By

It is anticipated that this project will attract some traffic from people already driving on adjacent roadways. These trips are not new trips added to the local roadway system (primary trips) but represent “pass-by” trips according to the following definition:

Pass-by trips: Pass-by trips are trips made as an intermediate stop from an origin to a primary destination (i.e., stopping to shop on the way home from work) by vehicles passing directly by the project driveway.

The pass-by percentage for shopping center, contained in the 3rd edition of the Trip Generation Handbook by ITE was used for the commercial component of the Littlerock Road Mixed Use Development with a PM Peak hour rate of 34 percent. In the vicinity of project site, Littlerock Road has a median therefore all pass-by trips were assigned as coming from the north and leaving to the south.

The trip generation rates used for the PM peak hour are shown in **Table 2**.

Table 2. PM Peak Hour Trip Generation Rates

Land Use Category	Land Use Code (LUC)	Unit	Trip Rate	Internal Capture Rate	Pass-By Rate	Enter %	Exit %
Multi-family Housing (Low-Rise) Not Close to Rail Transit	220	Dwelling Units	0.51	0%	0%	63%	37%
Strip Retail Plaza (<40k)	822	1,000 sqft	10.31*	0%	34%	50%	50%

*Fitted curve equation rate

The total trip generation expected from this project is calculated by applying the unit measure for each land use category to the appropriate trip generation rate. The PM peak hour trip generation calculations are shown in **Table 3** and provided in **Appendix B**.

Table 3. PM Peak Hour Project Trip Generation

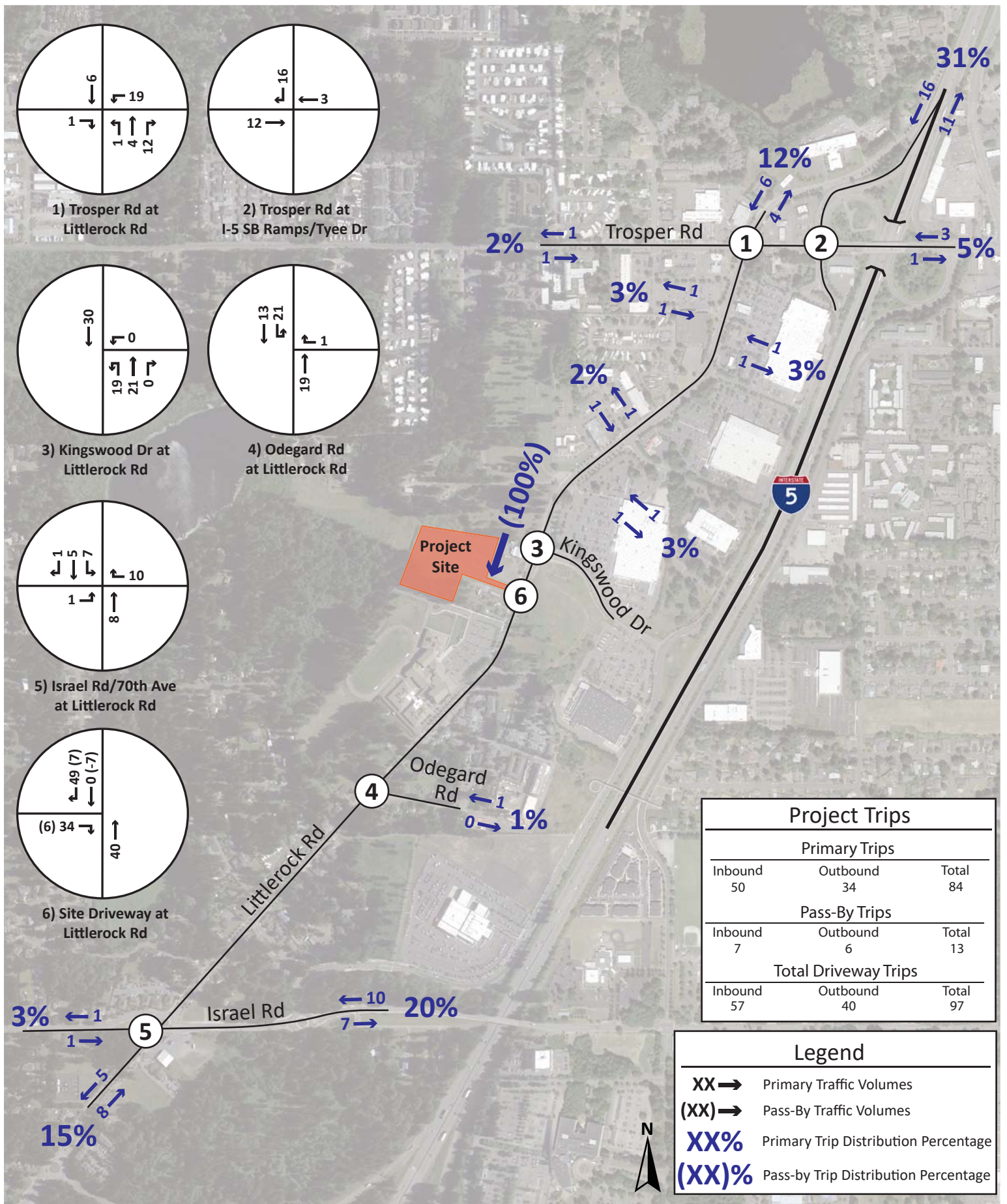
Land Use	Size	Total Trips	Internal Capture Trips	Pass-By Trips	New-to-Network Total	Enter	Exit
Apartments	114	58	0	0	58	37	21
General Commercial	3.8	39	0	13	26	13	13
Total Project Trips	-	97	0	13	84	50	34

4.2 Site Traffic Distribution and Assignment

We have prepared a trip distribution and assignment for the proposed development. The directional distribution of traffic to and from the proposed project was estimated using the regional transportation model. The Thurston Regional Planning Council (TRPC) created the area-wide transportation model with cooperation from local jurisdictions within the county. The model, developed using the Emme/4 software package, has been calibrated to represent the existing vehicle travel patterns throughout the entire county.

The Littlerock Road Mixed Use Development is located within TAZ 275 of the regional transportation model. A distribution analysis was performed for this project by conducting a “Select Zone Analysis” for this TAZ. This feature of the Emme/4 software package allows all of the traffic into and out of a particular zone to be isolated and shown separately from the rest of the traffic on the network. This graphically shows the percentage of vehicles currently using each of the available routes into and out of the area (Interstate 5, Israel Road, Littlerock Road, etc.). From this information, regional distribution percentages were calculated for future traffic traveling to and from the Littlerock Road Mixed Use Development. This select zone analysis plot is included in **Appendix B** to document the percentage of project trips that would travel through the Tumwater Boulevard interchange.

The resultant traffic distribution percentages and traffic assignments are shown on **Figure 5** for the PM peak hour.



Littlelock Road Mixed Use
Tumwater, Washington
Traffic Impact Analysis

Figure 5
 Site-Generated Traffic Volumes
 PM Peak Hour

5 Future Traffic Conditions

5.1 Roadway Network Improvements

The City of Tumwater Transportation Master Plan and the 2020-2025 Transportation Improvement Program identifies the following roadway improvements within the vicinity of the project:

- ◆ Transportation Plan Project #R31– Odegard Road – Littlerock Road to Tyee Drive. Construct 2 lane road with on-street parking.
- ◆ Transportation Plan Project #R32 – Bishop Road Littlerock Road to Tyee Drive. Construct 2 lane road with on-street parking.
- ◆ Tyee Drive and Kingswood Drive intersection improvements – This intersection is planned to be improved to roundabout control as part of a separate development project.

None of these projects are expected to be complete before the proposed project and were not accounted for in the intersection analysis.

5.2 Future Traffic Volumes

Traffic volume forecasts were prepared for PM peak hour conditions for the 2024 opening year. The future traffic volume forecast includes non-specific background traffic growth, pipeline development traffic and estimated traffic generated by the proposed project.

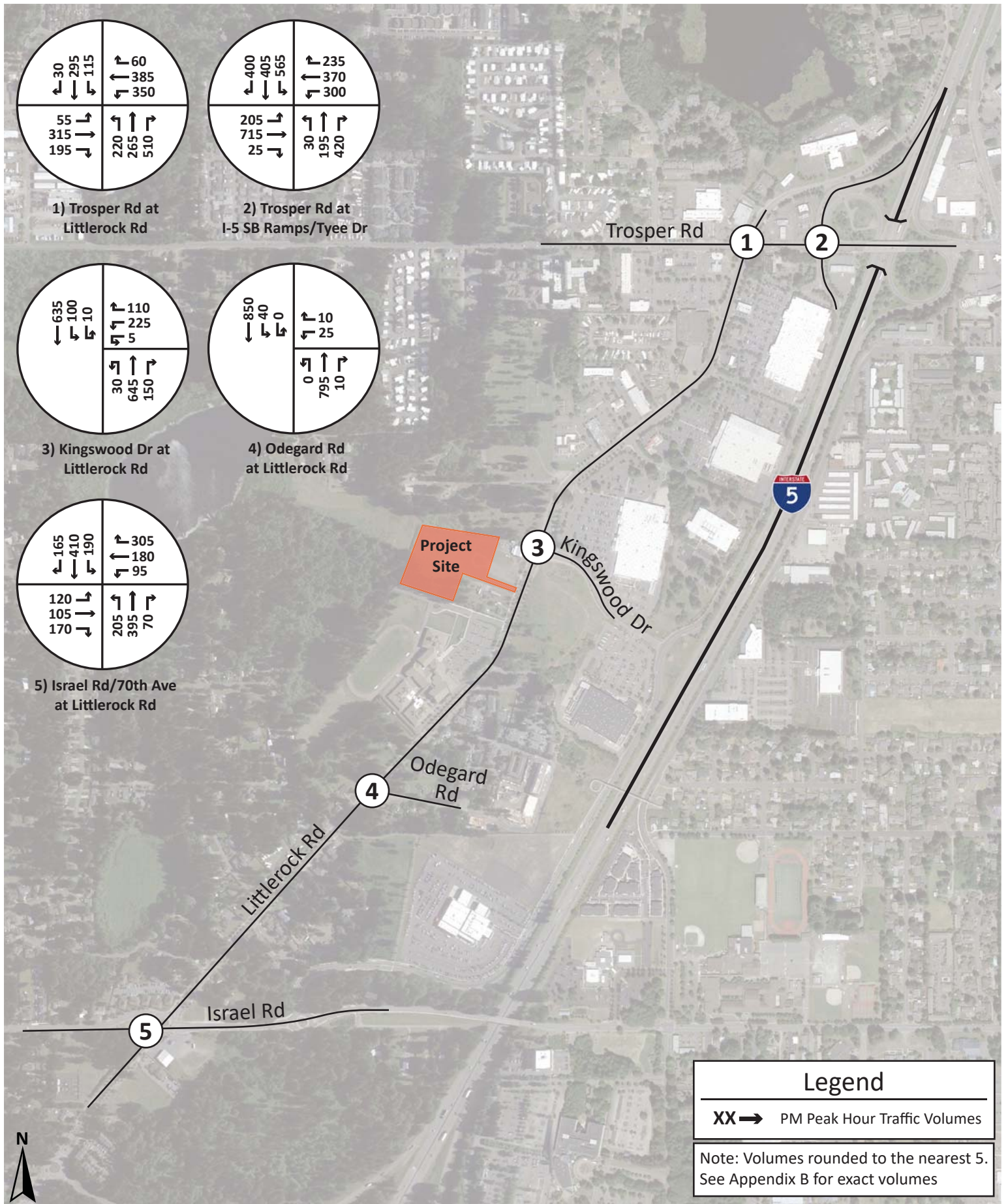
It is anticipated that background growth will occur within the study area and affect traffic volumes. To estimate the non-specific traffic growth that will occur at study intersections, an annual growth rate of 4% was applied to the base year traffic volumes, as identified by the City of Tumwater.

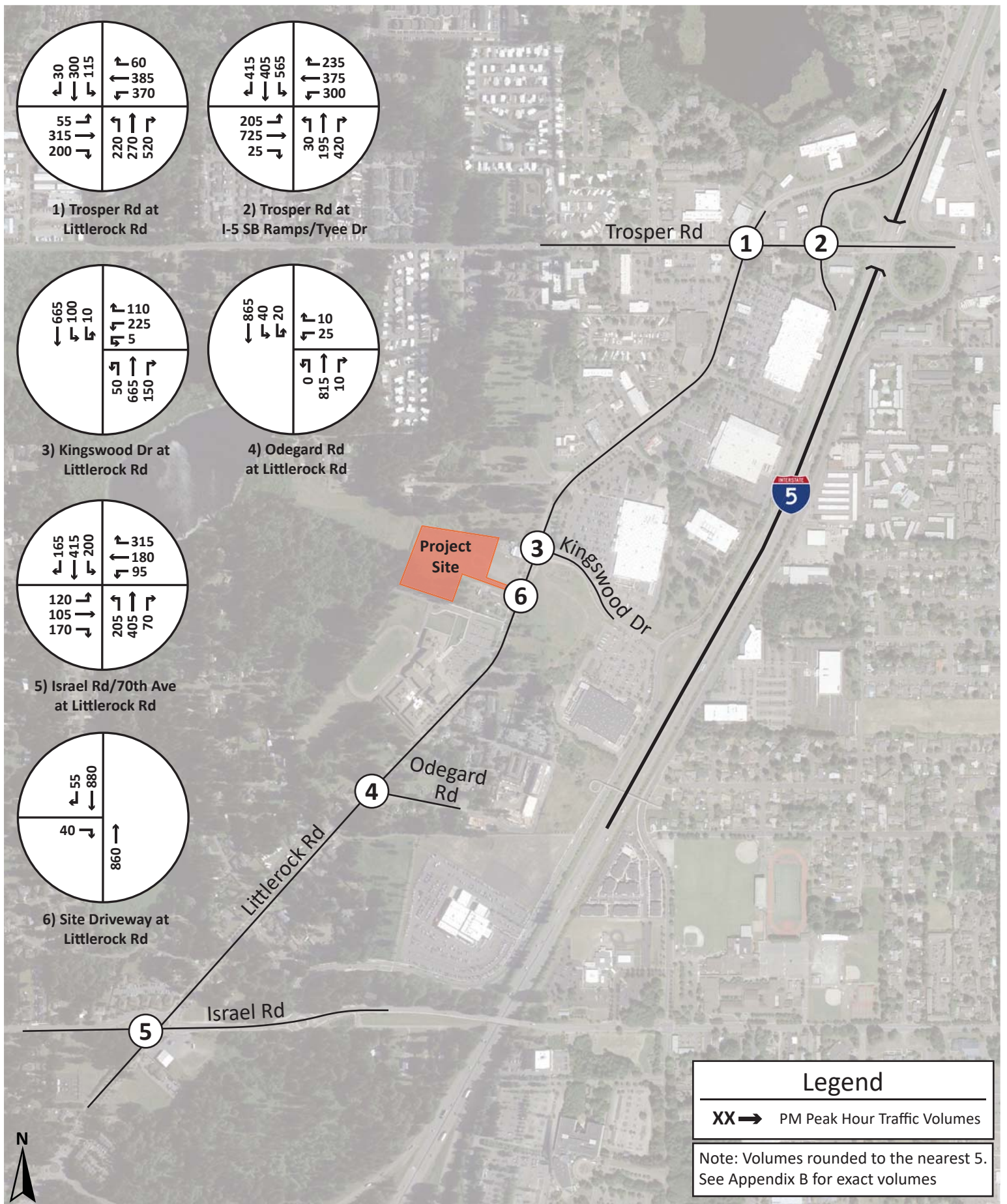
The following pipeline developments were identified by the City of Tumwater in the vicinity of the proposed project:

- ◆ Trospen Woods Subdivision
- ◆ Israel Road Self Storage
- ◆ Bishop Road Apartments

The projected 2024 traffic volumes without the project are shown on **Figure 6**. The projected 2024 traffic volumes with project are shown on **Figure 7**.

The traffic volume calculations for the study intersections are included in **Appendix B**.





6 Traffic Operations Analysis

Traffic analyses were conducted to identify any deficiencies within the study area for the PM peak hour in the 2022 base year and the 2024 project opening year. The PM peak hour was selected as the traffic analysis period as it represents the highest potential traffic condition on area roadways.

6.1 Level of Service

The acknowledged source for determining overall capacity for arterial segments and independent intersections is the current edition of the *Highway Capacity Manual* (HCM). Capacity analyses were completed for the 2022 base year and projected 2024 PM peak hour traffic volume scenarios for all study intersections.

Intersection analysis for stop-controlled intersections and traffic signal-controlled intersections was performed using the Synchro software package. This software implements the methods of the 6th edition HCM. The analysis for the intersections with roundabout control were performed using the SIDRA software package (version 9.0).

Capacity analysis results are described in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion).

The City of Tumwater has identified a city-wide mobility target of LOS D or better, except in Urban Core Areas, which has a mobility target of LOS E or better. The city has also identified strategy corridors throughout the city which are areas where street widening is a not preferred option to address traffic congestion problems. In strategy corridors, the LOS may not meet the adopted standards and mitigation would rely on using different approaches such as transit, bicycle and pedestrian facilities and services to improve operating efficiency. Littlerock Road and Trosper Road, in the vicinity of the project, are identified as strategy corridors with the ability to exceed the adopted standard.

6.1.1 Intersection Operations

For signalized and roundabout (RAB) intersections, the overall LOS grade represents the weighted average of all movements at the intersection. For intersections under minor street stop-sign control, the LOS of the most difficult movement (typically the minor street left turn) represents the intersection level of service. The LOS/delay criteria for stop sign-controlled intersections are different than for signalized intersections because driver expectation is that a signalized intersection is designed to carry higher traffic volumes and experience greater delay.

Table 4 shows the Level of Service criteria for stop-controlled intersections and signalized intersections.

Table 4. Level of Service Criteria for Intersections

Level of Service	Signalized/Roundabout Intersection Average Control Delay (seconds/vehicle)	Stop-Controlled Intersection Average Control Delay (seconds/vehicle)
A	≤ 10	≤ 10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

6.2 Volume to Capacity Ratio

Another measure of the performance of an intersection is the “degree of saturation” which is typically presented as the “volume to capacity” (v/c) ratio. Many factors affect the volume of traffic an intersection can accommodate during a specific time interval. These factors include the number of lanes, lane widths, the type of signal phasing, the number of parking maneuvers on the adjacent street, etc. Based on these factors, the intersection (or individual lane group) is determined to have a total theoretical vehicle carrying capacity “c” for the analysis period. The analysis period volume “v” is compared to the calculated carrying capacity and presented as a ratio. If the v/c ratio is below 1.0, the demand volume is less than the maximum capacity. If the v/c ratio is over 1.0, the demand volume is exceeding the available capacity.

6.3 Intersection Analysis

The analysis was conducted for the following scenarios:

- Existing 2022 traffic volumes
- Projected 2024 traffic volumes without the Project
- Projected 2024 traffic volumes with the Project

The intersection control and channelization are documented earlier in this report in Figure 3. The LOS analysis worksheets are included in **Appendix C**. Following is a description of the Level of Service analysis results for the study intersections with the scenarios listed above.

6.3.1.1 Littlerock Road/Trosper Road/South 2nd Ave

This is a four-legged intersection under traffic signal control. In PM peak hour, the intersection currently operates at a LOS D and is expected to remain at LOS D in the projected 2024 horizon with and without the project traffic.

6.3.1.2 Littlerock Road/Trosper Road/Tyee Drive

This is a four-legged intersection under traffic signal control. In PM peak hour, the intersection currently operates at a LOS D and is expected to operate at LOS E in the projected 2024 horizon with and without the project traffic.

6.3.1.3 Kingswood Drive/Littlerock Road

This is a three-legged intersection under RAB control. In the PM peak hour, the intersection currently operates at LOS A and would remain at LOS A in the projected 2024 horizon year with and without project traffic.

6.3.1.4 Odegard Road/Littlerock Road

This is a three-leg intersection under RAB control. In the PM peak hour, the intersection currently at LOS A and would remain at LOS A in the projected 2024 horizon year with and without project traffic.

6.3.1.5 Littlerock Road/Israel Road

This is a four-leg intersection under RAB control. In the PM peak hour, the intersection currently at LOS A and would remain at LOS A in the projected 2024 horizon year with and without project traffic.

6.3.2 Site Driveway/Littlerock Road

This intersection will be restricted to right-in-right-out and will operate under stop-sign control for the eastbound approach. For the PM peak hour, this intersection is projected to operate at LOS C in the opening year (2024).

The intersection operational results for the PM peak hour are presented in **Table 5**.

Table 5. PM Peak Hour Intersection Operating Conditions

Intersection	Control	Base Year 2022		Projected 2024 Without Project		Projected 2024 With Project	
		LOS (Delay)	Worst V/C Ratio	LOS (Delay)	Worst V/C Ratio	LOS (Delay)	Worst V/C Ratio
Littlerock Road/Trosper Road/South 2 nd Ave	Signal	D (46.5)	0.89	D (47.8)	0.90	D (48.0)	0.90
Trosper Road at I-5 SB Ramps/Tyee Drive	Signal	D (48.7)	1.03	E (61.5)	1.13	E (63.0)	1.14
Kingswood Drive at Littlerock Road	RAB ¹	A (6.3)	0.61	A (6.5)	0.68	A (6.7)	0.72
Odegard Road at Littlerock Road	RAB ¹	A (4.3)	0.61	A (4.6)	0.69	A (4.8)	0.71
Littlerock Road at Israel Road	RAB ¹	A (2.3)	0.38	A (8.8)	0.69	A (9.0)	0.70
Site Driveway at Littlerock Road	TWSC ²	-	-	-	-	C (19.0)	0.15

1. Roundabout
2. Two-Way Stop-Control

7 Summary and Conclusions

The Littlerock Road Mixed Use Development is being proposed west of Littlerock Road and immediately north of Tumwater Middle School, near the Littlerock Road/Kingswood Drive Intersection in Tumwater, Washington. The proposed project includes 114 apartment units and approximately 3,800-square feet of general commercial space

Access to the project will be provided by one right-in-right-out driveway onto Littlerock Road. An emergency only access is proposed on the existing private road currently used as the northern Tumwater Middle School driveway.

At full occupancy and operation, the project is estimated to generate approximately 84 new-to-network trip ends during the PM peak hour. An evaluation of the existing 2022 and project opening year (2024) with and without the project traffic was performed. All of the study area intersections operate within the LOS threshold.

Impact Fees

The City of Tumwater is currently collecting traffic mitigation fees from new developments to help fund roadway and intersection improvements throughout the City. The project developer will be responsible for a traffic impact fee contribution towards these improvements based on the new PM peak hour traffic generated by the Project. The City has also recently established a SEPA mitigation fee for peak hour trips added to the Tumwater Boulevard interchange. The mitigation fee calculation and SEPA mitigation fee calculation will be prepared by the City of Tumwater.

Appendix A

Traffic Volume Counts



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: S 2nd Ave SW/Littlerock Rd SW & Trosper Rd SW

Date of Count: Thu 04/28/2022

Location: Tumwater, Washington

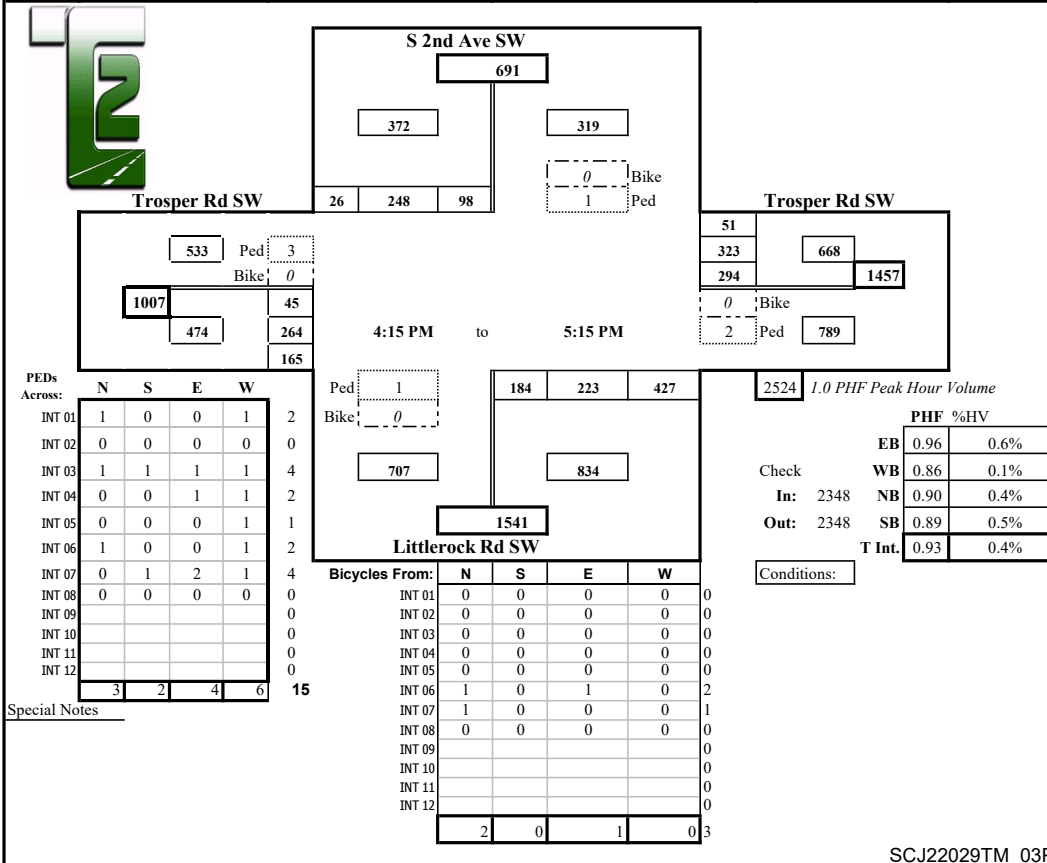
Checked By: Jen

Time Interval	From North on (SB) S 2nd Ave SW				From South on (NB) Littlerock Rd SW				From East on (WB) Trosper Rd SW				From West on (EB) Trosper Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	33	68	9	1	43	48	113	0	66	55	11	1	9	66	33	554
4:30 P	0	20	53	13	1	42	65	117	1	75	72	12	1	12	58	42	581
4:45 P	1	25	53	5	0	50	71	110	0	78	105	12	0	13	60	49	631
5:00 P	0	29	73	2	1	47	47	102	0	68	65	13	2	7	82	34	569
5:15 P	1	24	69	6	1	45	40	98	0	73	81	14	0	13	64	40	567
5:30 P	0	21	63	6	1	41	51	96	1	85	56	8	1	11	68	41	547
5:45 P	0	27	69	2	0	60	40	82	1	69	60	13	0	3	64	36	525
6:00 P	0	17	75	8	1	37	52	78	1	91	69	5	1	9	53	50	544
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	196	523	51	6	365	414	796	4	605	563	88	6	77	515	325	4518
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Peak Hour: 4:15 PM to 5:15 PM

Total	2	98	248	26	3	184	223	427	1	294	323	51	3	45	264	165	2348
Approach	372				834				668				474				2348
%HV	0.5%				0.4%				0.1%				0.6%				0.4%
PHF	0.89				0.90				0.86				0.96				0.93





Prepared for: **SCJ Alliance/Shea Carr Jewell**
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: I-5 SB On/Off Ramp/Tyee Dr & Trospers Rd SW
 Location: Tumwater, Washington

Date of Count: Wed 3/05/2014
 Checked By: Jess

Time Interval Ending at	From North on (SB) I-5 SB On/Off Ramp				From South on (NB) Tyee Dr				From East on (WB) Trospers Rd SW				From West on (EB) Trospers Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	112	93	114	1	7	36	71	4	60	79	46	1	30	165	3	816
4:30 P	6	98	87	87	0	8	31	85	0	55	59	30	0	35	130	8	713
4:45 P	2	117	67	105	4	6	35	80	0	67	99	42	2	45	156	7	826
5:00 P	0	129	90	97	3	5	41	82	1	65	69	58	4	30	123	6	795
5:15 P	1	115	76	89	2	6	45	84	2	57	81	48	0	35	131	4	771
5:30 P	3	99	94	86	0	8	37	89	2	55	73	43	0	46	130	2	762
5:45 P	4	116	94	75	0	3	42	78	0	48	61	63	0	37	153	8	778
6:00 P	1	105	47	62	0	5	33	102	1	62	65	24	2	40	113	4	662
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	19	891	648	715	10	48	300	671	10	469	586	354	9	298	1101	42	6123
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Peak Hour: 4:30 PM to 5:30 PM

Total	6	460	327	377	9	25	158	335	5	244	322	191	6	156	540	19	3154
Approach	1164				518				757				715				3154
%HV	0.5%				1.7%				0.7%				0.8%				0.8%
PHF	0.92				0.96				0.91				0.86				0.95

I-5 SB On/Off Ramp
 1669

Trospers Rd SW
 1164, 505, 377, 327, 460, 724, 1439, 715, 156, 540, 19, 191, 322, 244, 757, 2092, 1335

Tyee Dr
 1108

4:30 PM to 5:30 PM

PHF 1.0 Peak Hour Volume

Check	PHF	%HV
EB	0.86	0.8%
WB	0.91	0.7%
In: 3154	0.90	1.7%
Out: 3154	0.92	0.5%
T Int	0.95	0.8%

Conditions:

Bicycles From:

	N	S	E	W
INT 01				0
INT 02				0
INT 03				0
INT 04		1		1
INT 05			1	1
INT 06				0
INT 07				0
INT 08				0
INT 09				0
INT 10				0
INT 11				0
INT 12				0
	0	1	1	0

PEDs Across:

	N	S	E	W
INT 01	3			3
INT 02	1	1		3
INT 03	1	3		5
INT 04		5		5
INT 05	1	2		4
INT 06	1			1
INT 07	1	1		2
INT 08				0
INT 09				0
INT 10				0
INT 11				0
INT 12				0
	8	12	0	3

Special Notes



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

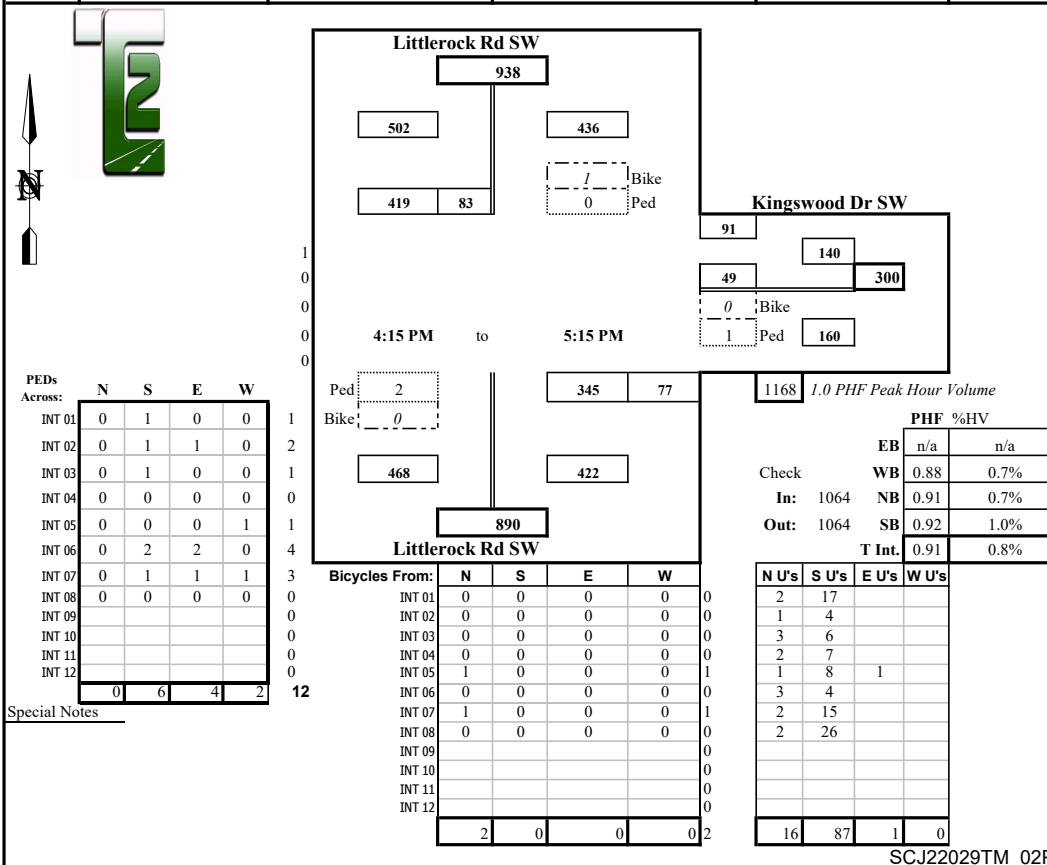
Intersection: Littlerock Rd SW & Kingswood Dr SW

Date of Count: Thu 04/28/2022

Location: Tumwater, Washington

Checked By: Jen

Time Interval	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Kingswood Dr SW				From West on (EB) 0				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	22	110	0	1	0	73	13	0	12	0	29	0	0	0	0	259
4:30 P	1	19	104	0	1	0	92	20	0	17	0	23	0	0	0	0	275
4:45 P	1	21	105	0	0	0	75	13	0	8	0	17	0	0	0	0	239
5:00 P	1	19	98	0	1	0	85	21	0	10	0	25	0	0	0	0	258
5:15 P	2	24	112	0	1	0	93	23	1	14	0	26	0	0	0	0	292
5:30 P	1	20	95	0	2	0	65	10	0	24	0	25	0	0	0	0	239
5:45 P	1	20	107	0	0	0	71	11	0	15	0	16	0	0	0	0	240
6:00 P	1	18	126	0	1	0	78	8	0	11	0	18	0	0	0	0	259
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	8	163	857	0	7	0	632	119	1	111	0	179	0	0	0	0	2061
Peak Hour: 4:15 PM to 5:15 PM																	
Total	5	83	419	0	3	0	345	77	1	49	0	91	0	0	0	0	1064
Approach	502				422				140				0				1064
%HV	1.0%				0.7%				0.7%				n/a				0.8%
PHF	0.92				0.91				0.88				n/a				0.91





Prepared for: **SCJ Alliance**
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Littlerock Rd SW & Odegard Rd SW
Location: Tumwater, Washington

Date of Count: Wed 6/24/2015
Checked By: Jess

Time Interval Ending at	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) Odegard Rd SW				From West on (EB) Odegard Rd SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	0	1	151	0	2	0	134	1	0	1	0	0	0	0	0	0	288
4:30 P	1	0	184	0	0	0	126	0	0	0	0	1	0	0	0	0	311
4:45 P	1	2	164	0	1	0	160	0	0	3	0	2	0	0	0	0	331
5:00 P	2	0	158	0	0	0	125	3	0	2	0	1	0	0	0	0	289
5:15 P	0	3	161	0	1	0	174	0	0	5	0	2	0	0	0	0	345
5:30 P	1	3	185	0	0	0	162	0	0	5	0	0	0	0	0	0	355
5:45 P	0	3	173	0	2	0	138	0	0	2	0	1	0	0	0	0	317
6:00 P	2	1	149	0	0	0	91	1	0	3	0	0	0	0	0	0	245
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	7	13	1325	0	6	0	1110	5	0	21	0	7	0	0	0	0	2481
Peak Hour: 4:30 PM to 5:30 PM																	
Total	4	8	668	0	2	0	621	3	0	15	0	5	0	0	0	0	1320
Approach	676				624				20				0				1320
%HV	0.6%				0.3%				n/a				n/a				0.5%
PHF	0.90				0.90				0.71				n/a				0.93

Littlerock Rd SW
1302

676 626

668 8 1 Bike 0 Ped

4:30 PM to 5:30 PM

5 20

15 31

0 Bike 1 Ped

1 Ped 1 Bike

683 624

Littlerock Rd SW
1307

1420 1.0 PHF Peak Hour Volume

Check	EB	%HV
In: 1320	0.71	n/a
Out: 1320	0.90	0.3%
T Int.	0.90	0.6%
	0.93	0.5%

Conditions:

PEDs Across:	N	S	E	W
INT 01				0
INT 02			1	1
INT 03				0
INT 04				0
INT 05			1	1
INT 06		1		1
INT 07				0
INT 08				0
INT 09				0
INT 10				0
INT 11				0
INT 12				0
	0	1	2	0

Special Notes

Bicycles From:	N	S	E	W
INT 01	6			6
INT 02	2	4		6
INT 03	1			1
INT 04				0
INT 05		1		1
INT 06				0
INT 07		1		1
INT 08	1	1		2
INT 09				0
INT 10				0
INT 11				0
INT 12				0
	10	7	0	17



Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

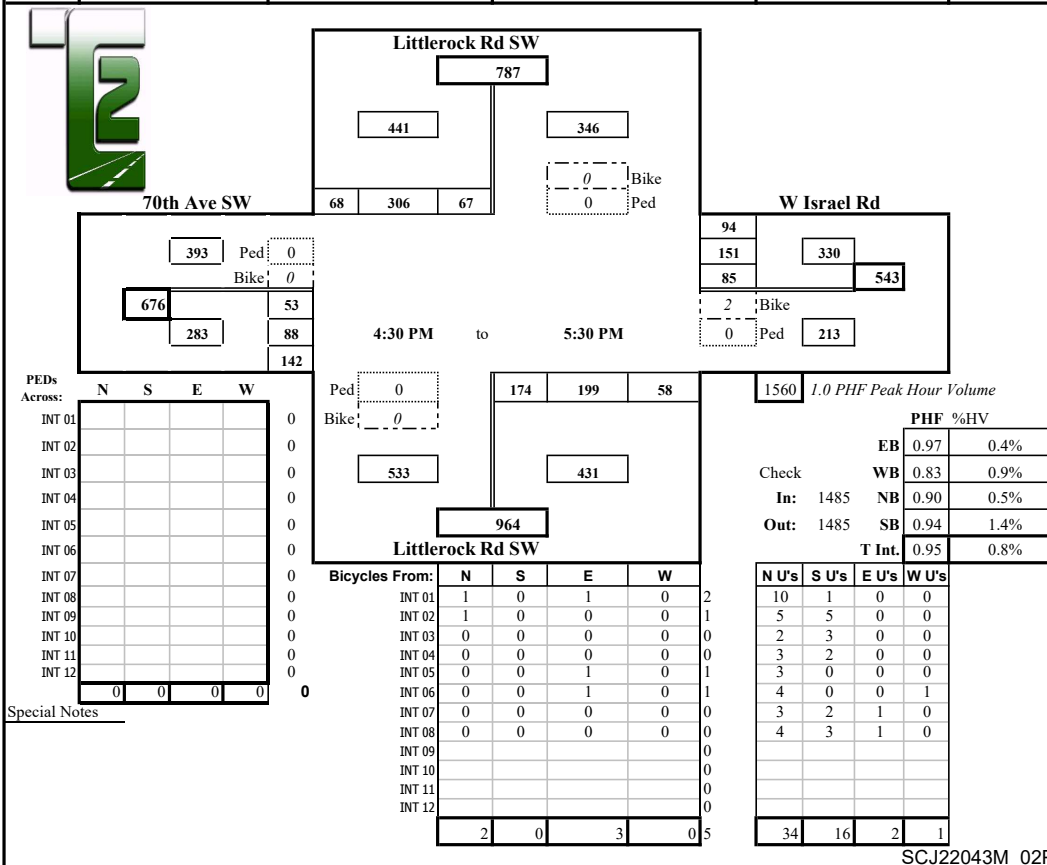
Intersection: Littlerock Rd SW & W Israel Rd/70th Ave SW

Date of Count: Tue 07/26/2022

Location: Tumwater, Washington

Checked By: Jen

Time Interval	From North on (SB) Littlerock Rd SW				From South on (NB) Littlerock Rd SW				From East on (WB) W Israel Rd				From West on (EB) 70th Ave SW				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	17	81	28	0	42	41	13	0	23	30	13	0	17	8	36	349
4:30 P	0	17	79	22	1	39	38	5	1	23	26	11	0	12	18	30	320
4:45 P	1	21	75	9	0	41	46	15	0	19	39	24	0	15	27	31	362
5:00 P	1	21	78	18	1	56	49	15	1	26	37	18	1	13	22	36	389
5:15 P	2	10	73	22	0	36	62	15	0	23	41	35	0	14	25	34	390
5:30 P	2	15	80	19	1	41	42	13	2	17	34	17	0	11	14	41	344
5:45 P	1	13	63	26	0	51	46	11	0	22	27	15	0	11	21	39	345
6:00 P	0	16	66	9	0	36	43	7	1	11	20	22	0	15	13	21	279
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	9	130	595	153	3	342	367	94	5	164	254	155	1	108	148	268	2778
Peak Hour: 4:30 PM to 5:30 PM																	
Total	6	67	306	68	2	174	199	58	3	85	151	94	1	53	88	142	1485
Approach	441				431				330				283				1485
%HV	1.4%				0.5%				0.9%				0.4%				0.8%
PHF	0.94				0.90				0.83				0.97				0.95



Appendix B

Traffic Volume Calculation Worksheets



Littlerock Road Mixed Use

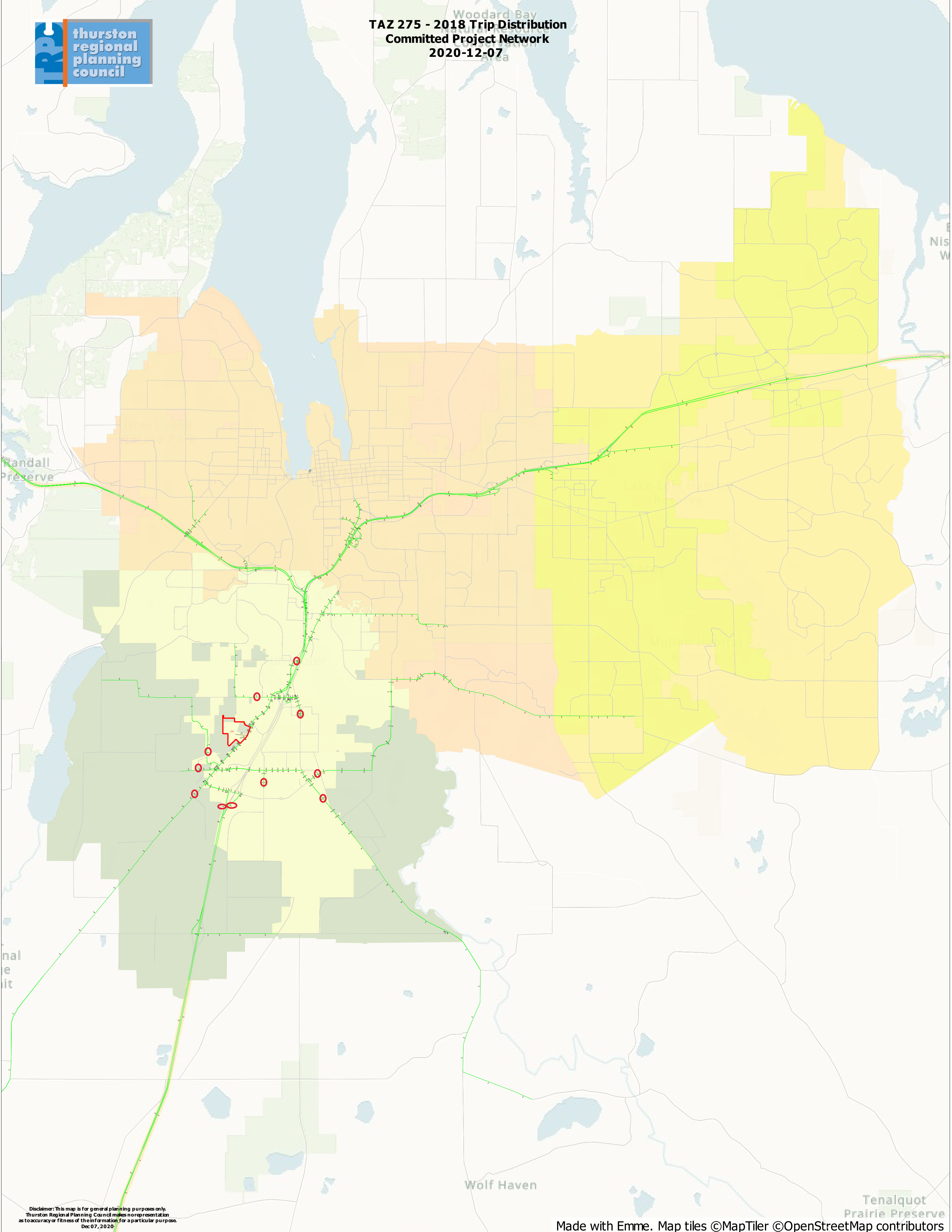
Trip Generation

PM Peak Hour Trip Generation																	
Site Plan Description	LUC	ITE Description	Variable	Value	Trip Rate	Distribution		Total Trips			Int. Capture		Pass-By Trips		Net New Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Apartments	220	Multifamily Housing (Low-Rise) Not Close to Rail Transit	Dwelling Units	114.0	0.51	63%	37%	37	21	58	0	0	0.0%	0	37	21	58
General Commercial	822	Strip Retail Plaza	ksqft	3.800	10.31	50%	50%	19	20	39	0	0	34.0%	13	13	13	26
Total								56	41	97	0	0	13	50	34	84	

822 Fitted Curve Equation 10.31

AM Peak Hour Trip Generation																	
Site Plan Description	LUC	ITE Description	Variable	Value	Trip Rate	Distribution		Total Trips			Int. Capture		Pass-By Trips		Net New Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	Total
Apartments	220	Multifamily Housing (Low-Rise) Not Close to Rail Transit	Dwelling Units	114.0	0.40	26%	74%	12	34	46	0%	0	0.0%	0	12	34	46
General Commercial	822	Strip Retail Plaza	ksqft	3.800	2.36	60%	40%	5	4	9	0%	0	0.0%	0	5	4	9
Total								17	38	55	0	0	0	17	38	55	

Daily Trip Generation																	
Site Plan Description	LUC	ITE Description	Variable	Value	Trip Rate	Distribution		Total Trips			Int. Capture		Pass-By Trips		Net New Trips		
						In	Out	In	Out	Total	%	Total	%	Total	In	Out	3
Apartments	220	Multifamily Housing (Low-Rise) Not Close to Rail Transit	Dwelling Units	114.0	6.74	50%	50%	384	384	768	0%	0	0.0%	0	384	384	768
General Commercial	822	Strip Retail Plaza	ksqft	3.800	54.45	50%	50%	103	104	207	0%	0	34.0%	70	68	69	137
Total								487	488	975	0	0	70	452	453	905	





Littlerock Road Mixed Use

PM Peak Hour Volumes Covid Adjustment Rate:

10%

 Growth Rate:

4.00%

Intersection	Movement		Existing	Adjusted	Background	Bishop Rd	Israel Storage	Trosper Woods	Baseline	Site	Site	Site	Projected
			2022	2022	2024	Pipeline	Pipeline	Pipeline	2024	Generated	Generated	Generated	2024
			Volumes	Volumes	Growth	Volumes	Volumes	Volumes	Volumes	Pass-By	Primary	Total	Volumes
1 Trosper Road Littlerock Road TMC Date: 04/28/2022 4:15 - 5:15 PHF: 0.93	EB	L	45	50	4	0	0	0	54	0	0	0	54
		T	264	290	23	0	0	0	313	0	0	0	313
		R	165	182	15	0	0	0	197	0	1	1	198
		L	294	323	26	0	0	0	349	0	19	19	368
	WB	T	323	355	28	0	0	0	383	0	0	0	383
		R	51	56	4	0	0	0	60	0	0	0	60
		L	184	202	16	0	0	0	218	0	1	1	219
		T	223	245	20	0	0	0	265	0	4	4	269
	SB	R	427	470	38	0	0	0	508	0	12	12	520
		L	98	108	9	0	0	0	117	0	0	0	117
		T	248	273	22	0	0	0	295	0	6	6	301
	R	26	29	2	0	0	0	31	0	0	0	31	
			2,348	2,583				2,790				2,833	
2 Trosper Road I-5 SB Ramps/Tyee Dr	EB	L	0	188	15	0	0	0	203	0	0	0	203
		T	0	656	52	0	0	6	714	0	12	12	726
		R	0	22	2	0	0	0	24	0	0	0	24
		L	0	278	22	0	0	0	300	0	0	0	300
	WB	T	0	342	27	0	0	3	372	0	3	3	375
		R	0	218	17	0	0	0	235	0	0	0	235
		L	0	29	2	0	0	0	31	0	0	0	31
		T	0	180	14	0	0	0	194	0	0	0	194
	NB	R	0	382	31	0	0	7	420	0	0	0	420
		L	0	524	42	0	0	0	566	0	0	0	566
	SB	T	0	373	30	0	0	0	403	0	0	0	403
R		0	370	30	0	0	0	400	0	16	16	416	
			0	3,562				3,862				3,893	
3 Kingswood Drive Littlerock Road TMC Date: 04/28/2022 4:15 - 5:15 PHF: 0.91	EB	L	0	0	0	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0	0	0	0
		R	0	0	0	0	0	0	0	0	0	0	0
		U	1	1	0	0	0	0	1	0	0	0	1
	WB	L	49	204	16	4	0	0	224	0	0	0	224
		T	0	0	0	0	0	0	0	0	0	0	0
		R	91	100	8	0	0	0	108	0	0	0	108
		U	25	28	2	0	0	0	30	0	19	19	49
	NB	L	0	0	0	0	0	0	0	0	0	0	0
		T	345	580	46	16	1	2	645	0	21	21	666
		R	77	135	11	2	0	0	148	0	0	0	148
U		7	8	1	0	0	0	9	0	0	0	9	
SB	L	83	91	7	0	0	0	98	0	0	0	98	
	T	419	561	45	25	1	2	634	0	30	30	664	
	R	0	0	0	0	0	0	0	0	0	0	0	
			1,097	1,707				1,896				1,966	



Littlerock Road Mixed Use

PM Peak Hour Volumes Covid Adjustment Rate:

10%

 Growth Rate:

4.00%

Intersection	Movement		Existing	Adjusted	Background	Bishop Rd	Israel Storage	Trosper Woods	Baseline	Site	Site	Site	Projected
			2022	2022	2024	Pipeline	Pipeline	Pipeline	2024	Generated	Generated	Generated	2024
			Volumes	Volumes	Growth	Volumes	Volumes	Volumes	Volumes	Pass-By	Primary	Total	Volumes
4 Odegard Road Littlerock Road	EB	L	0	0	0	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0	0	0	0
		R	0	0	0	0	0	0	0	0	0	0	0
		L	0	17	1	6	0	0	24	0	0	0	24
	WB	T	0	0	0	0	0	0	0	0	0	0	0
		R	0	6	0	2	0	0	8	0	1	1	9
		L	0	0	0	0	0	0	0	0	0	0	0
		T	0	733	59	0	1	2	795	0	19	19	814
	NB	R	0	3	0	9	0	0	12	0	0	0	12
		U	0	0	0	0	0	0	0	0	21	21	21
SB	L	0	9	1	29	0	0	39	0	0	0	39	
	T	0	785	63	0	1	1	850	0	13	13	863	
	R	0	0	0	0	0	0	0	0	0	0	0	
			0	1,552				1,727				1,781	
5 Israel Rd/70th Ave Littlerock Road TMC Date: 07/26/2022 4:30 - 5:30 PHF: 0.95	EB	L	53	108	9	0	0	2	119	0	1	1	120
		T	88	97	8	0	1	0	106	0	0	0	106
		R	142	156	12	0	0	0	168	0	0	0	168
		L	85	94	0	0	1	0	95	0	0	0	95
	WB	T	151	166	13	0	1	0	180	0	0	0	180
		R	94	278	22	0	1	3	304	0	10	10	314
		L	174	191	15	0	0	0	206	0	0	0	206
		T	199	394	0	0	0	1	395	0	8	8	403
	NB	R	58	64	5	0	1	0	70	0	0	0	70
		L	67	174	14	0	1	2	191	0	7	7	198
SB	T	306	412	0	0	0	0	412	0	5	5	417	
	R	68	150	12	0	0	1	163	0	1	1	164	
			1,485	2,284				2,409				2,441	
6 Site Driveway Littlerock Road TMC Date: 04/28/2022 4:15 - 5:15	EB	L	0	0	0	0	0	0	0	0	0	0	0
		T	0	0	0	0	0	0	0	0	0	0	0
		R	0	0	0	0	0	0	0	6	34	40	40
		L	0	0	0	0	0	0	0	0	0	0	0
	WB	T	0	0	0	0	0	0	0	0	0	0	0
		R	0	0	0	0	0	0	0	0	0	0	0
		L	0	0	0	0	0	0	0	0	0	0	0
		T	447	742	59	18	1	2	822	0	40	40	862
	NB	R	0	0	0	0	0	0	0	0	0	0	0
		L	0	0	0	0	0	0	0	0	0	0	0
SB	T	493	792	63	29	1	2	887	-7	0	-7	880	
	R	0	0	0	0	0	0	0	7	49	56	56	
			940	1,534				1,709				1,838	

Appendix C

Capacity Analysis Worksheets

Lanes, Volumes, Timings
1: Littlerock Rd/2nd Ave & Trosper Rd

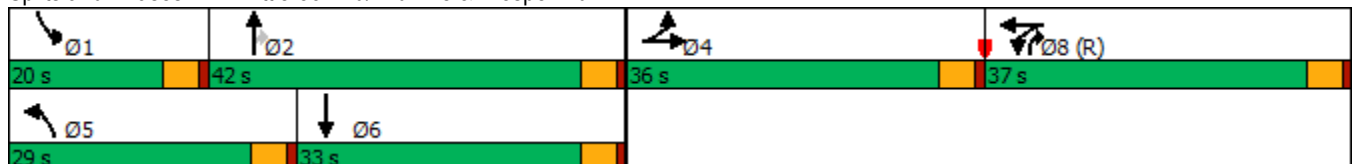
Existing 2022
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	290	180	325	355	55	200	245	470	110	275	30
Future Volume (vph)	50	290	180	325	355	55	200	245	470	110	275	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				25
Link Distance (ft)		528			484			673				312
Travel Time (s)		14.4			13.2			15.3				8.5
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	36.0	36.0		37.0	37.0		29.0	42.0	37.0	20.0	33.0	
Total Split (%)	26.7%	26.7%		27.4%	27.4%		21.5%	31.1%	27.4%	14.8%	24.4%	
Maximum Green (s)	31.4	31.4		32.4	32.4		24.4	37.4	32.4	15.4	28.4	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
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)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		3.0	3.0		3.0	2.5	3.0	3.0	2.5	
Recall Mode	None	None		C-Max	C-Max		None	None	C-Max	None	None	
Walk Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Flash Dont Walk (s)	25.0	25.0		23.0	23.0			20.0	23.0		21.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	

Intersection Summary

Area Type: Other
 Cycle Length: 135
 Actuated Cycle Length: 135
 Offset: 46 (34%), Referenced to phase 8:WBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Littlerock Rd/2nd Ave & Trosper Rd



HCM 6th Signalized Intersection Summary
 1: Littlerock Rd/2nd Ave & Trosper Rd

Existing 2022
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	290	180	325	355	55	200	245	470	110	275	30
Future Volume (veh/h)	50	290	180	325	355	55	200	245	470	110	275	30
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	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	54	312	194	263	502	59	215	263	505	118	296	32
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	516	615	373	431	795	93	242	485	793	143	658	70
Arrive On Green	0.29	0.29	0.29	0.24	0.24	0.24	0.13	0.26	0.26	0.08	0.20	0.20
Sat Flow, veh/h	1795	2141	1299	1795	3312	388	1795	1885	1592	1795	3262	350
Grp Volume(v), veh/h	54	260	246	263	285	276	215	263	505	118	161	167
Grp Sat Flow(s),veh/h/ln	1795	1791	1650	1795	1885	1814	1795	1885	1592	1795	1791	1820
Q Serve(g_s), s	3.0	16.3	16.9	17.6	18.3	18.4	15.9	16.3	31.5	8.7	10.7	10.9
Cycle Q Clear(g_c), s	3.0	16.3	16.9	17.6	18.3	18.4	15.9	16.3	31.5	8.7	10.7	10.9
Prop In Lane	1.00		0.79	1.00		0.21	1.00		1.00	1.00		0.19
Lane Grp Cap(c), veh/h	516	514	474	431	452	435	242	485	793	143	361	367
V/C Ratio(X)	0.10	0.50	0.52	0.61	0.63	0.63	0.89	0.54	0.64	0.83	0.45	0.45
Avail Cap(c_a), veh/h	516	514	474	431	452	435	325	522	824	205	377	383
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	0.74	0.74	0.74	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.4	40.1	40.3	45.7	45.9	46.0	57.4	43.3	25.0	61.2	47.3	47.4
Incr Delay (d2), s/veh	0.1	0.6	0.8	4.7	4.9	5.1	19.9	0.7	1.4	16.7	0.6	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	1.3	7.4	7.1	8.5	9.3	9.0	8.6	7.7	17.8	4.7	4.9	5.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	35.4	40.7	41.1	50.4	50.8	51.1	77.3	44.0	26.4	78.0	47.9	48.0
LnGrp LOS	D	D	D	D	D	D	E	D	C	E	D	D
Approach Vol, veh/h		560			824			983				446
Approach Delay, s/veh		40.4			50.8			42.2				55.9
Approach LOS		D			D			D				E
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.3	39.3		43.4	22.8	31.8		37.0				
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6				
Max Green Setting (Gmax), s	15.4	37.4		31.4	24.4	28.4		32.4				
Max Q Clear Time (g_c+I1), s	10.7	33.5		18.9	17.9	12.9		20.4				
Green Ext Time (p_c), s	0.1	1.2		2.3	0.3	1.4		3.6				

Intersection Summary

HCM 6th Ctrl Delay	46.5
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
2: Tye Dr/SB I-5 Ramps & Trosper Rd

Existing 2022
PM Peak Hour

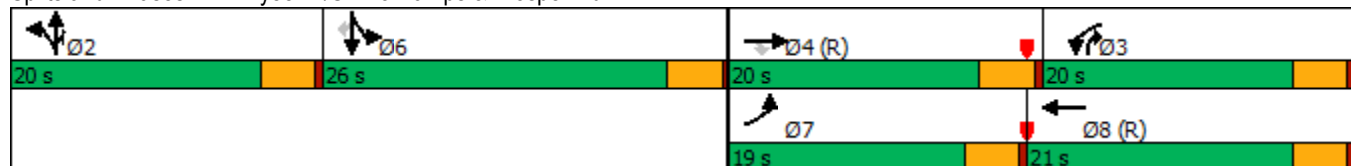


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗		↖	↗	↘	↗	↘	↘
Traffic Volume (vph)	190	655	20	280	340	220	30	180	380	525	375	370
Future Volume (vph)	190	655	20	280	340	220	30	180	380	525	375	370
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	350		0	100		0	0		0
Storage Lanes	1		1	1		0	1		1	2		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25				30
Link Distance (ft)		484			643			746				574
Travel Time (s)		13.2			17.5			20.3				13.0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	19.0	20.0	20.0	20.0	21.0		20.0	20.0		26.0	26.0	26.0
Total Split (%)	22.1%	23.3%	23.3%	23.3%	24.4%		23.3%	23.3%		30.2%	30.2%	30.2%
Maximum Green (s)	15.0	16.0	16.0	16.0	17.0		16.0	16.0		22.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		None	None	None
Walk Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0		0	0		0	0	0

Intersection Summary

Area Type: Other
 Cycle Length: 86
 Actuated Cycle Length: 86
 Offset: 38 (44%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 2: Tye Dr/SB I-5 Ramps & Trosper Rd



HCM 6th Signalized Intersection Summary
 2: Tyee Dr/SB I-5 Ramps & Trospers Rd

Existing 2022
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	190	655	20	280	340	220	30	180	380	525	375	370
Future Volume (veh/h)	190	655	20	280	340	220	30	180	380	525	375	370
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	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	200	689	21	295	358	0	32	189	400	553	395	0
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	1	1	1	2	2	2	1	1	1
Cap, veh/h	239	666	297	335	859		331	348	591	596	481	
Arrive On Green	0.13	0.19	0.19	0.19	0.24	0.00	0.19	0.19	0.19	0.26	0.26	0.00
Sat Flow, veh/h	1795	3582	1598	1795	3676	0	1781	1870	1585	2334	1885	1598
Grp Volume(v), veh/h	200	689	21	295	358	0	32	189	400	553	395	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	0	1781	1870	1585	1167	1885	1598
Q Serve(g_s), s	9.3	16.0	0.9	13.8	7.3	0.0	1.3	7.9	2.2	19.9	17.0	0.0
Cycle Q Clear(g_c), s	9.3	16.0	0.9	13.8	7.3	0.0	1.3	7.9	2.2	19.9	17.0	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	239	666	297	335	859		331	348	591	596	481	
V/C Ratio(X)	0.84	1.03	0.07	0.88	0.42		0.10	0.54	0.68	0.93	0.82	
Avail Cap(c_a), veh/h	313	666	297	335	859		331	348	591	597	482	
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)	0.72	0.72	0.72	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.4	35.0	28.9	34.0	27.6	0.0	29.0	31.7	22.6	31.3	30.2	0.0
Incr Delay (d2), s/veh	10.6	38.7	0.3	22.6	1.5	0.0	0.6	6.0	6.1	21.0	10.8	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	4.8	10.4	0.4	8.0	3.3	0.0	0.6	4.1	7.6	7.1	8.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.0	73.7	29.2	56.6	29.1	0.0	29.6	37.7	28.8	52.2	41.0	0.0
LnGrp LOS	D	F	C	E	C		C	D	C	D	D	
Approach Vol, veh/h		910			653	A		621			948	A
Approach Delay, s/veh		66.8			41.5			31.5			47.6	
Approach LOS		E			D			C			D	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.0	20.1	20.0		25.9	15.4	24.6				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		16.0	16.0	16.0		22.0	15.0	17.0				
Max Q Clear Time (g_c+I1), s		9.9	15.8	18.0		21.9	11.3	9.3				
Green Ext Time (p_c), s		1.5	0.0	0.0		0.1	0.2	1.4				

Intersection Summary

HCM 6th Ctrl Delay	48.7
HCM 6th LOS	D

Notes

Unsignalized Delay for [WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

 Site: 2 [Existing 2022 (Site Folder: General)]

Kingswood Dr at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist. ft]				
South: NB Littlerock Rd														
3u	U	30	1.0	32	1.0	0.612	12.8	LOS B	5.4	137.1	0.46	0.49	0.46	37.0
8	T1	580	1.0	624	1.0	0.612	4.9	LOS A	5.4	137.1	0.46	0.49	0.46	36.2
18	R2	135	1.0	145	1.0	0.612	4.9	LOS A	5.4	137.1	0.46	0.49	0.46	35.1
Approach		745	1.0	801	1.0	0.612	5.2	LOS A	5.4	137.1	0.46	0.49	0.46	36.0
East: WB Kingswood Dr														
1u	U	5	1.0	5	1.0	0.209	14.7	LOS B	1.4	35.4	0.70	0.76	0.70	33.9
1	L2	205	1.0	220	1.0	0.209	12.3	LOS B	1.4	35.4	0.70	0.76	0.70	33.2
16	R2	100	1.0	108	1.0	0.065	4.2	LOS A	0.0	0.0	0.00	0.49	0.00	36.5
Approach		310	1.0	333	1.0	0.209	9.8	LOS A	1.4	35.4	0.47	0.67	0.47	34.2
North: SB Littlerock Rd														
7u	U	10	1.0	11	1.0	0.112	13.3	LOS B	0.6	14.0	0.43	0.67	0.43	34.4
7	L2	90	1.0	97	1.0	0.112	10.9	LOS B	0.6	14.0	0.43	0.67	0.43	33.7
4	T1	560	1.0	602	1.0	0.426	5.1	LOS A	3.1	77.2	0.51	0.50	0.51	36.0
Approach		660	1.0	710	1.0	0.426	6.0	LOS A	3.1	77.2	0.50	0.53	0.50	35.7
All Vehicles		1715	1.0	1844	1.0	0.612	6.3	LOS A	5.4	137.1	0.48	0.54	0.48	35.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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MOVEMENT SUMMARY

 Site: 4 [Existing 2022 (Site Folder: General)]

Odegard Rd at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3u	U	5	1.0	5	1.0	0.566	12.1	LOS B	4.7	118.0	0.15	0.38	0.15	38.3
8	T1	735	1.0	790	1.0	0.566	4.1	LOS A	4.7	118.0	0.15	0.38	0.15	37.3
18	R2	5	1.0	5	1.0	0.566	4.1	LOS A	4.7	118.0	0.15	0.38	0.15	36.2
Approach		745	1.0	801	1.0	0.566	4.2	LOS A	4.7	118.0	0.15	0.38	0.15	37.3
East: WB Odegard Rd														
1u	U	1	1.0	1	1.0	0.013	12.0	LOS B	0.0	0.0	0.00	0.65	0.00	36.2
1	L2	15	1.0	16	1.0	0.013	9.6	LOS A	0.0	0.0	0.00	0.65	0.00	35.4
16	R2	5	1.0	5	1.0	0.013	4.0	LOS A	0.0	0.0	0.00	0.65	0.00	34.4
Approach		21	1.0	23	1.0	0.013	8.4	LOS A	0.0	0.0	0.00	0.65	0.00	35.2
North: SB Littlerock Rd														
7u	U	5	1.0	5	1.0	0.610	12.2	LOS B	5.2	131.4	0.18	0.39	0.18	38.1
7	L2	10	1.0	11	1.0	0.610	9.8	LOS A	5.2	131.4	0.18	0.39	0.18	37.2
4	T1	785	1.0	844	1.0	0.610	4.2	LOS A	5.2	131.4	0.18	0.39	0.18	37.2
Approach		800	1.0	860	1.0	0.610	4.3	LOS A	5.2	131.4	0.18	0.39	0.18	37.2
All Vehicles		1566	1.0	1684	1.0	0.610	4.3	LOS A	5.2	131.4	0.16	0.39	0.16	37.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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MOVEMENT SUMMARY

 Site: 1 [Existing 2022 (Site Folder: General)]

PM Peak Hour
Israel Rd at Littlerock Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3	L2	175	1.0	184	1.0	0.383	10.7	LOS B	2.3	58.9	0.45	0.61	0.45	35.2
8	T1	200	1.0	211	1.0	0.383	5.3	LOS A	2.3	58.9	0.45	0.61	0.45	35.3
18	R2	60	1.0	63	1.0	0.383	5.3	LOS A	2.3	58.9	0.45	0.61	0.45	34.3
Approach		435	1.0	458	1.0	0.383	7.5	LOS A	2.3	58.9	0.45	0.61	0.45	35.1
East: WB Israel Rd														
1	L2	85	1.0	89	1.0	0.197	11.2	LOS B	1.2	30.8	0.56	0.63	0.56	35.0
6	T1	150	1.0	158	1.0	0.197	5.8	LOS A	1.2	30.8	0.56	0.63	0.56	35.0
16	R2	95	1.0	100	1.0	0.071	4.7	LOS A	0.4	9.4	0.39	0.51	0.39	35.8
Approach		330	1.0	347	1.0	0.197	6.9	LOS A	1.2	30.8	0.51	0.60	0.51	35.2
North: SB Littlerock Rd														
7	L2	65	1.0	68	1.0	0.203	11.6	LOS B	1.2	29.2	0.56	0.66	0.56	34.8
4	T1	305	1.0	321	1.0	0.203	6.3	LOS A	1.2	30.8	0.55	0.62	0.55	35.3
14	R2	70	1.0	74	1.0	0.203	6.0	LOS A	1.2	30.8	0.54	0.59	0.54	34.6
Approach		440	1.0	463	1.0	0.203	7.0	LOS A	1.2	30.8	0.55	0.63	0.55	35.1
West: EB 70th Ave														
5	L2	55	1.0	58	1.0	0.137	10.7	LOS B	0.6	14.2	0.44	0.62	0.44	35.1
2	T1	90	1.0	95	1.0	0.137	5.6	LOS A	0.6	14.2	0.44	0.62	0.44	35.1
12	R2	140	1.0	147	1.0	0.128	5.2	LOS A	0.5	12.9	0.41	0.60	0.41	35.5
Approach		285	1.0	300	1.0	0.137	6.4	LOS A	0.6	14.2	0.42	0.61	0.42	35.3
All Vehicles		1490	1.0	1568	1.0	0.383	7.0	LOS A	2.3	58.9	0.49	0.61	0.49	35.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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Lanes, Volumes, Timings
1: Littlerock Rd/2nd Ave & Trosper Rd

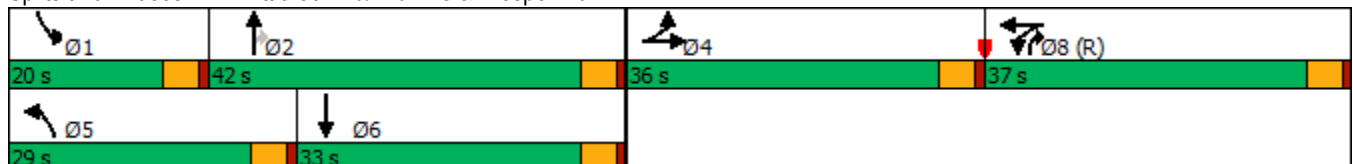
Projected 2024 without Project
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	315	195	350	385	60	220	265	510	115	295	30
Future Volume (vph)	55	315	195	350	385	60	220	265	510	115	295	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				25
Link Distance (ft)		528			484			673				312
Travel Time (s)		14.4			13.2			15.3				8.5
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	36.0	36.0		37.0	37.0		29.0	42.0	37.0	20.0	33.0	
Total Split (%)	26.7%	26.7%		27.4%	27.4%		21.5%	31.1%	27.4%	14.8%	24.4%	
Maximum Green (s)	31.4	31.4		32.4	32.4		24.4	37.4	32.4	15.4	28.4	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
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)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		3.0	3.0		3.0	2.5	3.0	3.0	2.5	
Recall Mode	None	None		C-Max	C-Max		None	None	C-Max	None	None	
Walk Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Flash Dont Walk (s)	25.0	25.0		23.0	23.0			20.0	23.0		21.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	

Intersection Summary























Area Type: Other
 Cycle Length: 135
 Actuated Cycle Length: 135
 Offset: 46 (34%), Referenced to phase 8:WBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Littlerock Rd/2nd Ave & Trosper Rd



HCM 6th Signalized Intersection Summary
 1: Littlerock Rd/2nd Ave & Trosper Rd

Projected 2024 without Project
 PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	315	195	350	385	60	220	265	510	115	295	30
Future Volume (veh/h)	55	315	195	350	385	60	220	265	510	115	295	30
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	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	59	339	210	285	541	65	237	285	548	124	317	32
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	481	573	348	431	793	95	263	515	818	149	687	69
Arrive On Green	0.27	0.27	0.27	0.24	0.24	0.24	0.15	0.27	0.27	0.08	0.21	0.21
Sat Flow, veh/h	1795	2141	1300	1795	3303	396	1795	1885	1592	1795	3286	329
Grp Volume(v), veh/h	59	282	267	285	308	298	237	285	548	124	172	177
Grp Sat Flow(s),veh/h/ln	1795	1791	1650	1795	1885	1813	1795	1885	1592	1795	1791	1824
Q Serve(g_s), s	3.4	18.5	19.0	19.4	20.0	20.2	17.5	17.5	34.5	9.2	11.3	11.5
Cycle Q Clear(g_c), s	3.4	18.5	19.0	19.4	20.0	20.2	17.5	17.5	34.5	9.2	11.3	11.5
Prop In Lane	1.00		0.79	1.00		0.22	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	481	480	442	431	452	435	263	515	818	149	374	381
V/C Ratio(X)	0.12	0.59	0.60	0.66	0.68	0.68	0.90	0.55	0.67	0.83	0.46	0.46
Avail Cap(c_a), veh/h	481	480	442	431	452	435	325	522	825	205	377	384
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	0.68	0.68	0.68	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.4	43.0	43.2	46.3	46.6	46.7	56.6	42.0	24.4	61.0	46.7	46.8
Incr Delay (d2), s/veh	0.1	1.6	2.0	5.4	5.6	5.9	23.3	1.0	1.9	18.6	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	1.5	8.5	8.1	9.4	10.2	9.9	9.7	8.3	19.4	5.0	5.2	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.5	44.6	45.2	51.7	52.2	52.5	79.9	43.1	26.3	79.6	47.4	47.4
LnGrp LOS	D	D	D	D	D	D	E	D	C	E	D	D
Approach Vol, veh/h		608			891			1070			473	
Approach Delay, s/veh		44.2			52.1			42.7			55.8	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.8	41.5		40.8	24.4	32.8		37.0				
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6				
Max Green Setting (Gmax), s	15.4	37.4		31.4	24.4	28.4		32.4				
Max Q Clear Time (g_c+I1), s	11.2	36.5		21.0	19.5	13.5		22.2				
Green Ext Time (p_c), s	0.1	0.4		2.3	0.3	1.5		3.5				

Intersection Summary

HCM 6th Ctrl Delay	47.8
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
2: Tye Dr/SB I-5 Ramps & Trospers Rd

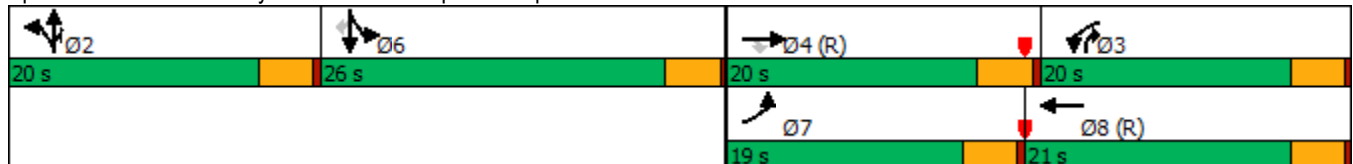
Projected 2024 without Project
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	715	25	300	370	235	30	195	420	565	405	400
Future Volume (vph)	205	715	25	300	370	235	30	195	420	565	405	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	350		0	100		0	0		0
Storage Lanes	1		1	1		0	1		1	2		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25				30
Link Distance (ft)		484			643			746				574
Travel Time (s)		13.2			17.5			20.3				13.0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	19.0	20.0	20.0	20.0	21.0		20.0	20.0		26.0	26.0	26.0
Total Split (%)	22.1%	23.3%	23.3%	23.3%	24.4%		23.3%	23.3%		30.2%	30.2%	30.2%
Maximum Green (s)	15.0	16.0	16.0	16.0	17.0		16.0	16.0		22.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		None	None	None
Walk Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0		0	0		0	0	0

Intersection Summary

Area Type: Other
 Cycle Length: 86
 Actuated Cycle Length: 86
 Offset: 38 (44%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 2: Tye Dr/SB I-5 Ramps & Trospers Rd



HCM 6th Signalized Intersection Summary
 2: Tyee Dr/SB I-5 Ramps & Trosper Rd

Projected 2024 without Project
 PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	715	25	300	370	235	30	195	420	565	405	400
Future Volume (veh/h)	205	715	25	300	370	235	30	195	420	565	405	400
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	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	216	753	26	316	389	0	32	205	442	595	426	0
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	1	1	1	2	2	2	1	1	1
Cap, veh/h	255	666	297	334	825		331	348	590	597	482	
Arrive On Green	0.14	0.19	0.19	0.19	0.23	0.00	0.19	0.19	0.19	0.26	0.26	0.00
Sat Flow, veh/h	1795	3582	1598	1795	3676	0	1781	1870	1585	2334	1885	1598
Grp Volume(v), veh/h	216	753	26	316	389	0	32	205	442	595	426	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	0	1781	1870	1585	1167	1885	1598
Q Serve(g_s), s	10.1	16.0	1.2	15.0	8.1	0.0	1.3	8.6	4.9	21.9	18.7	0.0
Cycle Q Clear(g_c), s	10.1	16.0	1.2	15.0	8.1	0.0	1.3	8.6	4.9	21.9	18.7	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	666	297	334	825		331	348	590	597	482	
V/C Ratio(X)	0.85	1.13	0.09	0.95	0.47		0.10	0.59	0.75	1.00	0.88	
Avail Cap(c_a), veh/h	313	666	297	334	825		331	348	590	597	482	
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)	0.68	0.68	0.68	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.0	35.0	29.0	34.6	28.6	0.0	29.0	32.0	23.5	32.0	30.8	0.0
Incr Delay (d2), s/veh	11.8	71.5	0.4	35.3	1.9	0.0	0.6	7.1	8.5	35.9	17.4	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	5.2	13.5	0.5	9.7	3.6	0.0	0.6	4.6	8.9	8.9	10.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.8	106.5	29.4	69.8	30.5	0.0	29.6	39.1	32.0	67.9	48.1	0.0
LnGrp LOS	D	F	C	E	C		C	D	C	E	D	
Approach Vol, veh/h		995			705	A		679			1021	A
Approach Delay, s/veh		91.8			48.1			34.0			59.6	
Approach LOS		F			D			C			E	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0		26.0	16.2	23.8				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		16.0	16.0	16.0		22.0	15.0	17.0				
Max Q Clear Time (g_c+I1), s		10.6	17.0	18.0		23.9	12.1	10.1				
Green Ext Time (p_c), s		1.5	0.0	0.0		0.0	0.2	1.4				

Intersection Summary

HCM 6th Ctrl Delay	61.5
HCM 6th LOS	E

Notes

Unsignalized Delay for [WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

 Site: 2 [Projected 2024 Without Project (Site Folder: General)]

Kingswood Dr at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3u	U	30	1.0	32	1.0	0.684	13.1	LOS B	6.9	174.2	0.55	0.52	0.55	36.8
8	T1	645	1.0	694	1.0	0.684	5.1	LOS A	6.9	174.2	0.55	0.52	0.55	35.9
18	R2	150	1.0	161	1.0	0.684	5.1	LOS A	6.9	174.2	0.55	0.52	0.55	34.9
Approach		825	1.0	887	1.0	0.684	5.4	LOS A	6.9	174.2	0.55	0.52	0.55	35.7
East: WB Kingswood Dr														
1u	U	5	1.0	5	1.0	0.250	15.2	LOS B	1.8	45.6	0.77	0.79	0.77	33.7
1	L2	225	1.0	242	1.0	0.250	12.9	LOS B	1.8	45.6	0.77	0.79	0.77	33.0
16	R2	110	1.0	118	1.0	0.071	4.3	LOS A	0.0	0.0	0.00	0.49	0.00	36.5
Approach		340	1.0	366	1.0	0.250	10.1	LOS B	1.8	45.6	0.52	0.70	0.52	34.0
North: SB Littlerock Rd														
7u	U	10	1.0	11	1.0	0.126	13.4	LOS B	0.6	16.2	0.46	0.68	0.46	34.4
7	L2	100	1.0	108	1.0	0.126	11.0	LOS B	0.6	16.2	0.46	0.68	0.46	33.6
4	T1	635	1.0	683	1.0	0.493	5.3	LOS A	3.9	97.2	0.58	0.52	0.58	35.8
Approach		745	1.0	801	1.0	0.493	6.2	LOS A	3.9	97.2	0.56	0.54	0.56	35.5
All Vehicles		1910	1.0	2054	1.0	0.684	6.5	LOS A	6.9	174.2	0.55	0.56	0.55	35.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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MOVEMENT SUMMARY

 Site: 4 [Projected 2024 without project (Site Folder: General)]

Odegard Rd at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3u	U	5	1.0	5	1.0	0.631	12.4	LOS B	5.9	149.9	0.31	0.41	0.31	37.6
8	T1	795	1.0	855	1.0	0.631	4.4	LOS A	5.9	149.9	0.31	0.41	0.31	36.7
18	R2	10	1.0	11	1.0	0.631	4.4	LOS A	5.9	149.9	0.31	0.41	0.31	35.7
Approach		810	1.0	871	1.0	0.631	4.5	LOS A	5.9	149.9	0.31	0.41	0.31	36.7
East: WB Odegard Rd														
1u	U	1	1.0	1	1.0	0.022	12.0	LOS B	0.0	0.0	0.00	0.64	0.00	36.4
1	L2	25	1.0	27	1.0	0.022	9.6	LOS A	0.0	0.0	0.00	0.64	0.00	35.6
16	R2	10	1.0	11	1.0	0.022	4.0	LOS A	0.0	0.0	0.00	0.64	0.00	34.6
Approach		36	1.0	39	1.0	0.022	8.1	LOS A	0.0	0.0	0.00	0.64	0.00	35.3
North: SB Littlerock Rd														
7u	U	5	1.0	5	1.0	0.688	12.3	LOS B	7.0	176.5	0.26	0.40	0.26	37.7
7	L2	40	1.0	43	1.0	0.688	10.0	LOS A	7.0	176.5	0.26	0.40	0.26	36.8
4	T1	850	1.0	914	1.0	0.688	4.4	LOS A	7.0	176.5	0.26	0.40	0.26	36.8
Approach		895	1.0	962	1.0	0.688	4.7	LOS A	7.0	176.5	0.26	0.40	0.26	36.8
All Vehicles		1741	1.0	1872	1.0	0.688	4.6	LOS A	7.0	176.5	0.28	0.41	0.28	36.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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MOVEMENT SUMMARY

 Site: 1 [Projected 2024 Without Project (Site Folder: General)]

PM Peak Hour
 Israel Rd at Littlerock Rd
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist ft]				
South: NB Littlerock Rd														
3	L2	205	1.0	216	1.0	0.688	14.8	LOS B	7.3	185.2	0.80	0.89	0.99	33.8
8	T1	395	1.0	416	1.0	0.688	9.4	LOS A	7.3	185.2	0.80	0.89	0.99	33.9
18	R2	70	1.0	74	1.0	0.688	9.4	LOS A	7.3	185.2	0.80	0.89	0.99	32.9
Approach		670	1.0	705	1.0	0.688	11.0	LOS B	7.3	185.2	0.80	0.89	0.99	33.8
East: WB Israel Rd														
1	L2	95	1.0	100	1.0	0.319	13.3	LOS B	2.5	64.1	0.85	0.80	0.85	34.0
6	T1	180	1.0	189	1.0	0.319	7.9	LOS A	2.5	64.1	0.85	0.80	0.85	34.1
16	R2	305	1.0	321	1.0	0.284	6.2	LOS A	2.0	51.0	0.69	0.69	0.69	35.1
Approach		580	1.0	611	1.0	0.319	7.9	LOS A	2.5	64.1	0.77	0.74	0.77	34.6
North: SB Littlerock Rd														
7	L2	190	1.0	200	1.0	0.385	12.4	LOS B	2.6	65.1	0.70	0.77	0.70	33.9
4	T1	410	1.0	432	1.0	0.385	7.0	LOS A	2.8	70.1	0.69	0.71	0.69	34.8
14	R2	165	1.0	174	1.0	0.385	6.7	LOS A	2.8	70.1	0.69	0.67	0.69	34.3
Approach		765	1.0	805	1.0	0.385	8.3	LOS A	2.8	70.1	0.69	0.72	0.69	34.4
West: EB 70th Ave														
5	L2	120	1.0	126	1.0	0.245	11.4	LOS B	1.2	29.0	0.59	0.73	0.59	34.5
2	T1	105	1.0	111	1.0	0.245	6.3	LOS A	1.2	29.0	0.59	0.73	0.59	34.4
12	R2	170	1.0	179	1.0	0.166	5.5	LOS A	0.7	17.6	0.48	0.64	0.48	35.3
Approach		395	1.0	416	1.0	0.245	7.5	LOS A	1.2	29.0	0.54	0.69	0.54	34.8
All Vehicles		2410	1.0	2537	1.0	0.688	8.8	LOS A	7.3	185.2	0.72	0.77	0.77	34.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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Lanes, Volumes, Timings
1: Littlerock Rd/2nd Ave & Trosper Rd

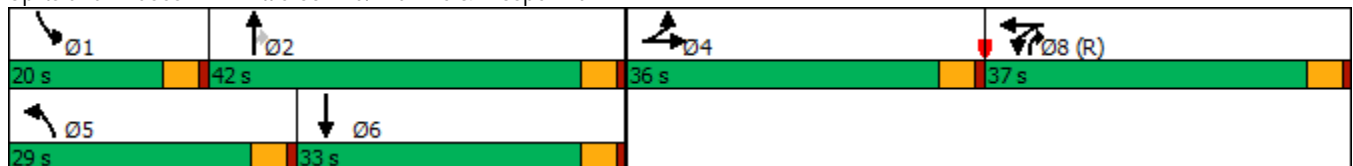
Projected 2024 with Project
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	315	200	370	385	60	220	270	520	115	300	30
Future Volume (vph)	55	315	200	370	385	60	220	270	520	115	300	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	150		0	250		0	150		250
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			30				25
Link Distance (ft)		528			484			673				312
Travel Time (s)		14.4			13.2			15.3				8.5
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	4	4		8	8		5	2	8	1	6	
Permitted Phases									2			
Detector Phase	4	4		8	8		5	2	8	1	6	
Switch Phase												
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	35.6	35.6		33.6	33.6		24.5	30.6	33.6	8.6	31.6	
Total Split (s)	36.0	36.0		37.0	37.0		29.0	42.0	37.0	20.0	33.0	
Total Split (%)	26.7%	26.7%		27.4%	27.4%		21.5%	31.1%	27.4%	14.8%	24.4%	
Maximum Green (s)	31.4	31.4		32.4	32.4		24.4	37.4	32.4	15.4	28.4	
Yellow Time (s)	3.6	3.6		3.6	3.6		3.6	3.6	3.6	3.6	3.6	
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)	4.6	4.6		4.6	4.6		4.6	4.6	4.6	4.6	4.6	
Lead/Lag							Lead	Lag		Lead	Lag	
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.5	2.5		3.0	3.0		3.0	2.5	3.0	3.0	2.5	
Recall Mode	None	None		C-Max	C-Max		None	None	C-Max	None	None	
Walk Time (s)	6.0	6.0		6.0	6.0			6.0	6.0		6.0	
Flash Dont Walk (s)	25.0	25.0		23.0	23.0			20.0	23.0		21.0	
Pedestrian Calls (#/hr)	0	0		0	0			0	0		0	

Intersection Summary

Area Type: Other
 Cycle Length: 135
 Actuated Cycle Length: 135
 Offset: 46 (34%), Referenced to phase 8:WBTL, Start of Green
 Natural Cycle: 130
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Littlerock Rd/2nd Ave & Trosper Rd



HCM 6th Signalized Intersection Summary
1: Littlerock Rd/2nd Ave & Trosper Rd

Projected 2024 with Project
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	55	315	200	370	385	60	220	270	520	115	300	30
Future Volume (veh/h)	55	315	200	370	385	60	220	270	520	115	300	30
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	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	59	339	215	292	562	65	237	290	559	124	323	32
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	474	560	348	431	796	92	263	521	824	149	700	69
Arrive On Green	0.26	0.26	0.26	0.24	0.24	0.24	0.15	0.28	0.28	0.08	0.21	0.21
Sat Flow, veh/h	1795	2120	1318	1795	3318	383	1795	1885	1592	1795	3292	324
Grp Volume(v), veh/h	59	285	269	292	319	308	237	290	559	124	175	180
Grp Sat Flow(s),veh/h/ln	1795	1791	1646	1795	1885	1815	1795	1885	1592	1795	1791	1825
Q Serve(g_s), s	3.4	18.8	19.4	19.9	20.9	21.0	17.5	17.8	35.3	9.2	11.5	11.7
Cycle Q Clear(g_c), s	3.4	18.8	19.4	19.9	20.9	21.0	17.5	17.8	35.3	9.2	11.5	11.7
Prop In Lane	1.00		0.80	1.00		0.21	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	474	473	435	431	452	436	263	521	824	149	381	388
V/C Ratio(X)	0.12	0.60	0.62	0.68	0.70	0.71	0.90	0.56	0.68	0.83	0.46	0.46
Avail Cap(c_a), veh/h	474	473	435	431	452	436	325	522	825	205	381	388
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	0.67	0.67	0.67	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.8	43.5	43.7	46.6	46.9	47.0	56.6	41.7	24.3	61.0	46.4	46.4
Incr Delay (d2), s/veh	0.1	1.9	2.4	5.7	6.1	6.4	23.3	1.1	2.1	18.6	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	1.5	8.7	8.3	9.7	10.7	10.4	9.7	8.5	19.8	5.0	5.3	5.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.9	45.4	46.0	52.2	53.0	53.4	79.9	42.8	26.4	79.6	47.0	47.1
LnGrp LOS	D	D	D	D	D	D	E	D	C	E	D	D
Approach Vol, veh/h		613			919			1086			479	
Approach Delay, s/veh		44.9			52.9			42.5			55.5	
Approach LOS		D			D			D			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.8	41.9		40.3	24.4	33.3		37.0				
Change Period (Y+Rc), s	4.6	4.6		4.6	4.6	4.6		4.6				
Max Green Setting (Gmax), s	15.4	37.4		31.4	24.4	28.4		32.4				
Max Q Clear Time (g_c+I1), s	11.2	37.3		21.4	19.5	13.7		23.0				
Green Ext Time (p_c), s	0.1	0.0		2.3	0.3	1.5		3.5				

Intersection Summary

HCM 6th Ctrl Delay	48.0
HCM 6th LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings 2: Tye Dr/SB I-5 Ramps & Trospers Rd

Projected 2024 with Project
PM Peak Hour

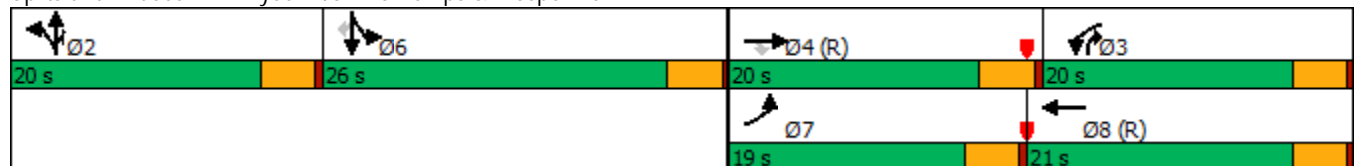


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	725	25	300	375	235	30	195	420	565	405	415
Future Volume (vph)	205	725	25	300	375	235	30	195	420	565	405	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	350		0	100		0	0		0
Storage Lanes	1		1	1		0	1		1	2		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25				30
Link Distance (ft)		484			643			746				574
Travel Time (s)		13.2			17.5			20.3				13.0
Turn Type	Prot	NA	Perm	Prot	NA		Split	NA	pt+ov	Split	NA	Perm
Protected Phases	7	4		3	8		2	2	2 3	6	6	
Permitted Phases			4									6
Detector Phase	7	4	4	3	8		2	2	2 3	6	6	6
Switch Phase												
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	19.0	20.0	20.0	20.0	21.0		20.0	20.0		26.0	26.0	26.0
Total Split (%)	22.1%	23.3%	23.3%	23.3%	24.4%		23.3%	23.3%		30.2%	30.2%	30.2%
Maximum Green (s)	15.0	16.0	16.0	16.0	17.0		16.0	16.0		22.0	22.0	22.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag							
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes							
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max		Max	Max		None	None	None
Walk Time (s)		5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	5.0
Flash Dont Walk (s)		11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)		0	0	0	0		0	0		0	0	0

Intersection Summary

Area Type: Other
 Cycle Length: 86
 Actuated Cycle Length: 86
 Offset: 38 (44%), Referenced to phase 4:EBT and 8:WBT, Start of Green
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 2: Tye Dr/SB I-5 Ramps & Trospers Rd



HCM 6th Signalized Intersection Summary
2: Tyee Dr/SB I-5 Ramps & Trospers Rd

Projected 2024 with Project
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	725	25	300	375	235	30	195	420	565	405	415
Future Volume (veh/h)	205	725	25	300	375	235	30	195	420	565	405	415
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	1885	1885	1885	1870	1870	1870	1885	1885	1885
Adj Flow Rate, veh/h	216	763	26	316	395	0	32	205	442	595	426	0
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	1	1	1	2	2	2	1	1	1
Cap, veh/h	255	666	297	334	825		331	348	590	597	482	
Arrive On Green	0.14	0.19	0.19	0.19	0.23	0.00	0.19	0.19	0.19	0.26	0.26	0.00
Sat Flow, veh/h	1795	3582	1598	1795	3676	0	1781	1870	1585	2334	1885	1598
Grp Volume(v), veh/h	216	763	26	316	395	0	32	205	442	595	426	0
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	1791	0	1781	1870	1585	1167	1885	1598
Q Serve(g_s), s	10.1	16.0	1.2	15.0	8.2	0.0	1.3	8.6	4.9	21.9	18.7	0.0
Cycle Q Clear(g_c), s	10.1	16.0	1.2	15.0	8.2	0.0	1.3	8.6	4.9	21.9	18.7	0.0
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	255	666	297	334	825		331	348	590	597	482	
V/C Ratio(X)	0.85	1.14	0.09	0.95	0.48		0.10	0.59	0.75	1.00	0.88	
Avail Cap(c_a), veh/h	313	666	297	334	825		331	348	590	597	482	
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)	0.68	0.68	0.68	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.0	35.0	29.0	34.6	28.6	0.0	29.0	32.0	23.5	32.0	30.8	0.0
Incr Delay (d2), s/veh	11.8	77.5	0.4	35.3	2.0	0.0	0.6	7.1	8.5	35.9	17.4	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	5.2	14.0	0.5	9.7	3.7	0.0	0.6	4.6	8.9	8.9	10.5	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.8	112.5	29.4	69.8	30.6	0.0	29.6	39.1	32.0	67.9	48.1	0.0
LnGrp LOS	D	F	C	E	C		C	D	C	E	D	
Approach Vol, veh/h		1005			711	A		679			1021	A
Approach Delay, s/veh		96.4			48.1			34.0			59.6	
Approach LOS		F			D			C			E	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		20.0	20.0	20.0		26.0	16.2	23.8				
Change Period (Y+Rc), s		4.0	4.0	4.0		4.0	4.0	4.0				
Max Green Setting (Gmax), s		16.0	16.0	16.0		22.0	15.0	17.0				
Max Q Clear Time (g_c+I1), s		10.6	17.0	18.0		23.9	12.1	10.2				
Green Ext Time (p_c), s		1.5	0.0	0.0		0.0	0.2	1.4				

Intersection Summary

HCM 6th Ctrl Delay	63.0
HCM 6th LOS	E

Notes

Unsignalized Delay for [WBR, SBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

Site: 2 [Projected 2024 With Project (Site Folder: General)]

Kingswood Dr at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3u	U	50	1.0	54	1.0	0.718	13.2	LOS B	7.8	196.4	0.58	0.53	0.58	36.6
8	T1	665	1.0	715	1.0	0.718	5.2	LOS A	7.8	196.4	0.58	0.53	0.58	35.7
18	R2	150	1.0	161	1.0	0.718	5.2	LOS A	7.8	196.4	0.58	0.53	0.58	34.7
Approach		865	1.0	930	1.0	0.718	5.7	LOS A	7.8	196.4	0.58	0.53	0.58	35.6
East: WB Kingswood Dr														
1u	U	5	1.0	5	1.0	0.263	15.6	LOS B	2.0	49.9	0.81	0.81	0.81	33.6
1	L2	225	1.0	242	1.0	0.263	13.3	LOS B	2.0	49.9	0.81	0.81	0.81	32.9
16	R2	110	1.0	118	1.0	0.071	4.3	LOS A	0.0	0.0	0.00	0.49	0.00	36.5
Approach		340	1.0	366	1.0	0.263	10.4	LOS B	2.0	49.9	0.55	0.71	0.55	34.0
North: SB Littlerock Rd														
7u	U	10	1.0	11	1.0	0.128	13.5	LOS B	0.7	16.4	0.47	0.69	0.47	34.3
7	L2	100	1.0	108	1.0	0.128	11.1	LOS B	0.7	16.4	0.47	0.69	0.47	33.6
4	T1	665	1.0	715	1.0	0.523	5.4	LOS A	4.2	105.9	0.61	0.53	0.61	35.7
Approach		775	1.0	833	1.0	0.523	6.3	LOS A	4.2	105.9	0.59	0.56	0.59	35.4
All Vehicles		1980	1.0	2129	1.0	0.718	6.7	LOS A	7.8	196.4	0.58	0.57	0.58	35.2

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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Project: N:\Projects\5275 JSA Civil, LLC\22-000200 Littlerock Road Apartments\Phase 02 - Traffic Impact Analysis\2 - Analysis\Sidra\Kingswood at Littlerock.sip9

MOVEMENT SUMMARY

Site: 4 [Projected 2024 with project (Site Folder: General)]

Odegard Rd at Littlerock Rd
 PM Peak Hour
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist. ft]				
South: NB Littlerock Rd														
3u	U	5	1.0	5	1.0	0.654	12.6	LOS B	6.4	161.4	0.37	0.42	0.37	37.4
8	T1	815	1.0	876	1.0	0.654	4.6	LOS A	6.4	161.4	0.37	0.42	0.37	36.5
18	R2	10	1.0	11	1.0	0.654	4.6	LOS A	6.4	161.4	0.37	0.42	0.37	35.5
Approach		830	1.0	892	1.0	0.654	4.7	LOS A	6.4	161.4	0.37	0.42	0.37	36.5
East: WB Odegard Rd														
1u	U	1	1.0	1	1.0	0.022	12.0	LOS B	0.0	0.0	0.00	0.64	0.00	36.4
1	L2	25	1.0	27	1.0	0.022	9.6	LOS A	0.0	0.0	0.00	0.64	0.00	35.6
16	R2	10	1.0	11	1.0	0.022	4.0	LOS A	0.0	0.0	0.00	0.64	0.00	34.6
Approach		36	1.0	39	1.0	0.022	8.1	LOS A	0.0	0.0	0.00	0.64	0.00	35.3
North: SB Littlerock Rd														
7u	U	20	1.0	22	1.0	0.711	12.3	LOS B	7.7	194.7	0.28	0.41	0.28	37.6
7	L2	40	1.0	43	1.0	0.711	10.0	LOS A	7.7	194.7	0.28	0.41	0.28	36.7
4	T1	865	1.0	930	1.0	0.711	4.4	LOS A	7.7	194.7	0.28	0.41	0.28	36.7
Approach		925	1.0	995	1.0	0.711	4.8	LOS A	7.7	194.7	0.28	0.41	0.28	36.7
All Vehicles		1791	1.0	1926	1.0	0.711	4.8	LOS A	7.7	194.7	0.32	0.42	0.32	36.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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Project: N:\Projects\5275 JSA Civil, LLC\22-000200 Littlerock Road Apartments\Phase 02 - Traffic Impact Analysis\2 - Analysis\Sidra\Odegard at Littlerock.sip9

MOVEMENT SUMMARY

Site: 1 [Projected 2024 With Project (Site Folder: General)]

PM Peak Hour
 Israel Rd at Littlerock Rd
 Site Category: (None)
 Roundabout

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV %	[Total veh/h	HV %				[Veh. veh	Dist] ft				
South: NB Littlerock Rd														
3	L2	205	1.0	216	1.0	0.704	15.2	LOS B	7.8	197.8	0.82	0.91	1.04	33.6
8	T1	405	1.0	426	1.0	0.704	9.8	LOS A	7.8	197.8	0.82	0.91	1.04	33.7
18	R2	70	1.0	74	1.0	0.704	9.8	LOS A	7.8	197.8	0.82	0.91	1.04	32.7
Approach		680	1.0	716	1.0	0.704	11.5	LOS B	7.8	197.8	0.82	0.91	1.04	33.5
East: WB Israel Rd														
1	L2	95	1.0	100	1.0	0.324	13.4	LOS B	2.6	66.0	0.87	0.81	0.87	34.0
6	T1	180	1.0	189	1.0	0.324	8.0	LOS A	2.6	66.0	0.87	0.81	0.87	34.0
16	R2	315	1.0	332	1.0	0.297	6.3	LOS A	2.2	54.2	0.71	0.70	0.71	35.0
Approach		590	1.0	621	1.0	0.324	8.0	LOS A	2.6	66.0	0.78	0.75	0.78	34.5
North: SB Littlerock Rd														
7	L2	200	1.0	211	1.0	0.393	12.5	LOS B	2.7	66.9	0.71	0.77	0.71	33.9
4	T1	415	1.0	437	1.0	0.393	7.1	LOS A	2.9	72.0	0.70	0.71	0.70	34.7
14	R2	165	1.0	174	1.0	0.393	6.8	LOS A	2.9	72.0	0.69	0.67	0.69	34.2
Approach		780	1.0	821	1.0	0.393	8.4	LOS A	2.9	72.0	0.70	0.72	0.70	34.4
West: EB 70th Ave														
5	L2	120	1.0	126	1.0	0.247	11.4	LOS B	1.2	29.4	0.60	0.73	0.60	34.4
2	T1	105	1.0	111	1.0	0.247	6.3	LOS A	1.2	29.4	0.60	0.73	0.60	34.4
12	R2	170	1.0	179	1.0	0.167	5.5	LOS A	0.7	17.7	0.48	0.64	0.48	35.3
Approach		395	1.0	416	1.0	0.247	7.5	LOS A	1.2	29.4	0.55	0.69	0.55	34.8
All Vehicles		2445	1.0	2574	1.0	0.704	9.0	LOS A	7.8	197.8	0.73	0.78	0.79	34.3

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). 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.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 6).

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.

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HCM 6th TWSC
6: Littlerock Rd & Site Driveway

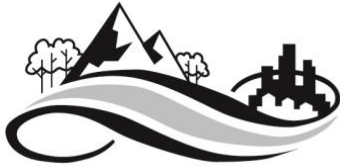
Projected 2024 with Project
PM Peak Hour

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↑	↘	
Traffic Vol, veh/h	0	40	0	860	880	55
Future Vol, veh/h	0	40	0	860	880	55
Conflicting Peds, #/hr	0	0	0	0	0	0
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	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	43	0	935	957	60

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	987	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	-
Pot Cap-1 Maneuver	0	300	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %			-
Mov Cap-1 Maneuver	-	300	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	19	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	-	300	-
HCM Lane V/C Ratio	-	0.145	-
HCM Control Delay (s)	-	19	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.5	-



July 12, 2022

Mike Drennon
Kaufman Construction & Development, Inc.
7908 Sweet Iron Court SE
Tumwater WA 98501

RE: Olympia Pocket Gopher Mound Survey Results for 5945 Littlerock Rd SW in Tumwater, WA

Dear Mr. Drennon,

Krippner Consulting, LLC conducted a habitat assessment and surveys for Olympia pocket gopher mounds for a development project at 5945 Littlerock Rd SW in June and July this year. This project site is approximately 8 acres in size and includes parcels 12703211600 and 12703220700. It is located west of Interstate 5 and southwest of the Littlerock Rd SW and Kingswood Dr SW roundabout in the City of Tumwater, Washington (Figures 1 and 2).

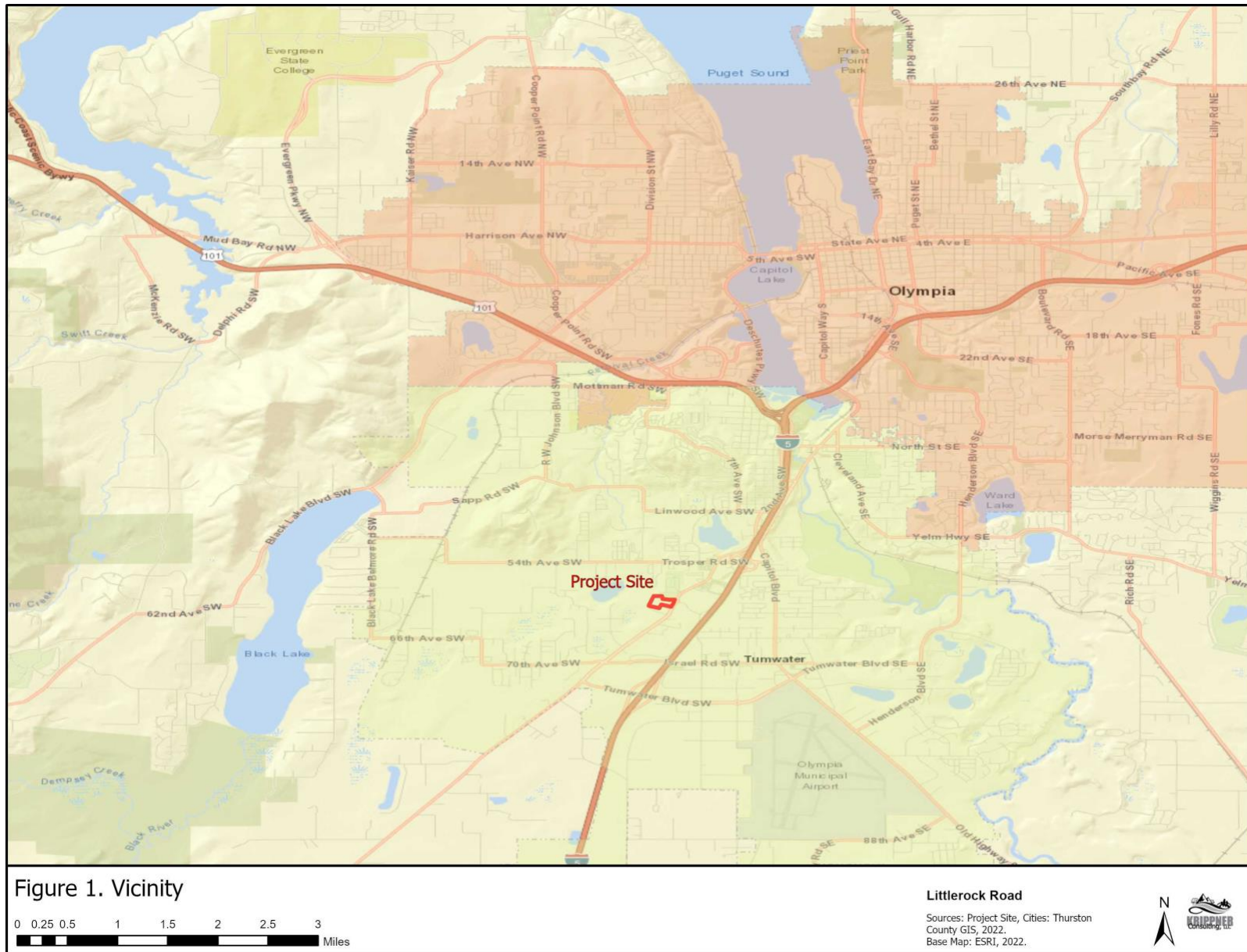
The project site is located within the range of the Olympia subspecies of Mazama pocket gopher. The Olympia pocket gopher is listed as a state and federal threatened species. Therefore, City of Tumwater requires that surveys be conducted for this species in suitable habitat areas to comply with Tumwater Municipal Code (TMC). Olympia pocket gophers are also protected in accordance with the federal Endangered Species Act (ESA).

Study Methods

This study included two field surveys, 30 days apart in accordance with 2018 USFWS guidance for conducting gopher mound surveys, to search for gopher mounds and assess habitat conditions. Linda Krippner and Steve Krippner conducted the habitat assessment and a gopher mound survey on June 1, 2022, and Linda Krippner, Steve Krippner, and Leilani Tuinukuafe conducted another gopher mound survey on the site on July 6, 2022. The site was mowed shortly after the first survey in June to ensure optimal survey conditions in July. Approximate locations of the survey tracks are shown in Figure 2. Dense shrub and forest areas in perimeter areas of the site were not surveyed for gopher mounds because these areas do not provide suitable habitat for the Olympia pocket gopher.

Study Results

This site is located beneath a major Bonneville Power Administration (BPA) powerline corridor. Most of this site has been cleared and graded in recent years and the north and east portions of the site have been used for parking vehicles for the past 20 years. Soils on the east portion of the site are covered with imported gravel (Photo 1). Buildings are also present on the site (Photo 2). The mapped soil type is Nisqually loamy fine sand, 0 to 3% slopes, a preferred soil type for the Olympia pocket gopher.



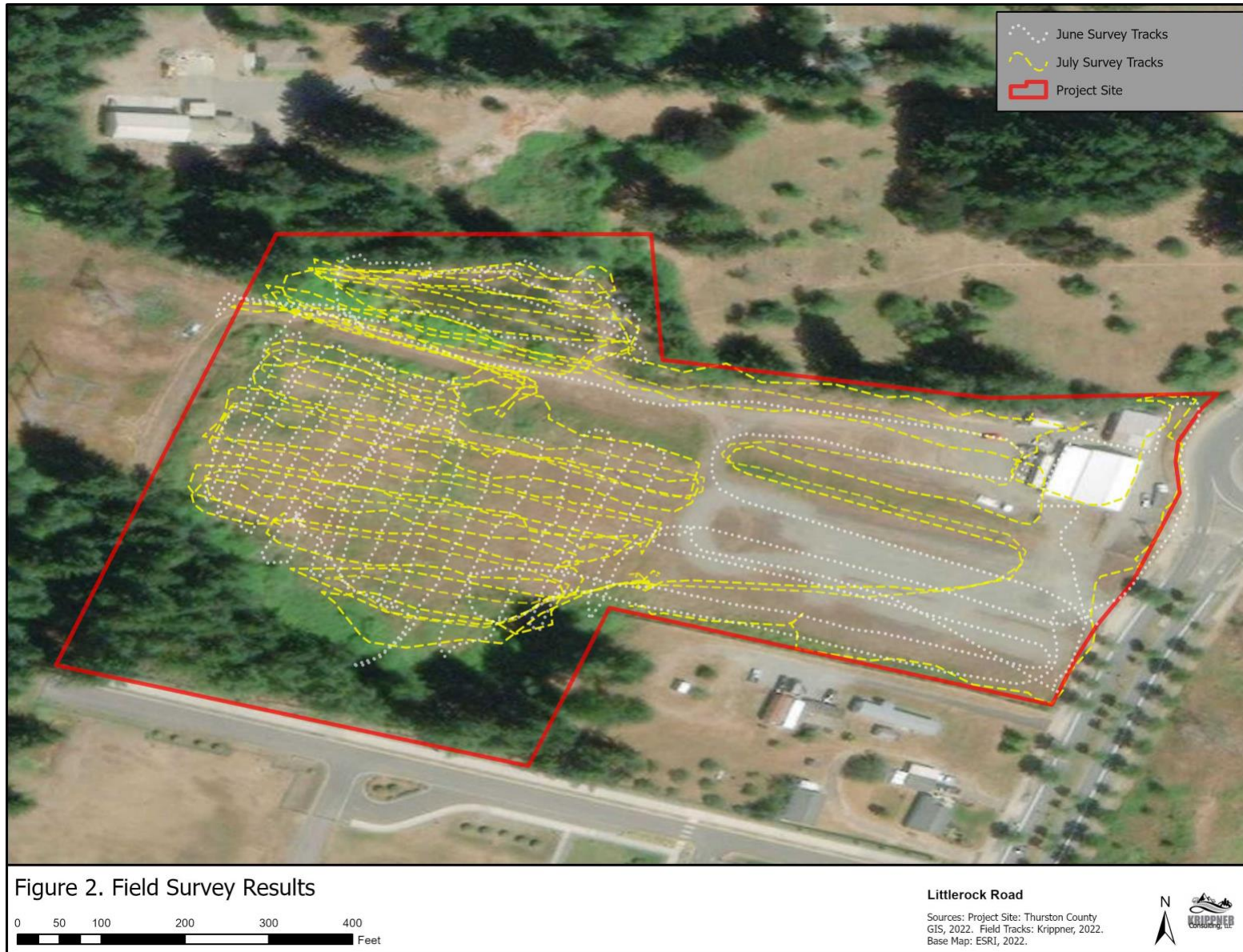




Photo 1. View west of the southeast portion of the site where soils are compacted and covered by gravel (June 1, 2022).



Photo 2. View east of the east portion of the site (July 6, 2022).

Vegetation in surveyed areas includes a mix of non-native grasses and forbs including red fescue, orchard grass, reed canarygrass, sweet vernal grass, oxeye daisy, sheep sorrel, dandelion, hairy cat's ear, white clover, common vetch, black medic, and chickweed (Photo 3). Bracken fern is also present.



Photo 3. Grassland vegetation beneath the powerlines on the west portion of the site (June 1, 2022).

No gopher mounds were observed during the June or July surveys. Mole mounds were observed on the site, mostly in perimeter areas. Soils in most areas of the site appear to be too compacted or disturbed by past dumping or staging of rip rap and other rock-based materials to provide habitat for gophers.

Thank you for the opportunity to conduct this study and prepare this letter report for you. Please call me if you have any questions regarding this study.

Sincerely,

A handwritten signature in black ink that reads "Linda Krippner". The signature is written in a cursive, flowing style.

Linda Krippner
Krippner Consulting, LLC

<p>Site Name and Parcel #</p>	<p>Parcel #: <u>12703211600 and 12703220700</u></p> <p>Project #: <u>TUM-22-0189</u></p> <p>Site/Landowner: <u>MCS-Littlerock LLC</u></p>
<p>How were the data collected? (circle the method for each)</p>	<p>Transect: <u>Trimble</u> <u>Garmin</u> <u>Aerial</u></p> <p>Mounds <u>Trimble</u> <u>Garmin</u> <u>Aerial</u></p> <p>Notes: <u>Transect data was collected using GAIA GPS on an iPhone.</u></p>
<p>Field Team Personnel: (Indicate all staff present, CIRCLE who filled out form)</p>	<p>Name: <u>Linda Krippner</u></p> <p>Name: Steve Krippner</p> <p>Name: Leilani Tuinukuafe (July 6 only)</p>
<p>Others onsite (name/affiliation)</p>	
<p>Site visit # (CIRCLE all that apply)</p>	<p><u>1st</u> and <u>2nd</u> Unable to screen</p> <p>Notes:</p>
<p>Do onsite conditions preclude the need for further visits?</p>	<p>Yes <u>No</u></p> <p>Dense woody cover that encompasses the entire site (trees/shrubs) that appears to preclude any potential MPG use.</p> <p>Impervious Compacted Graveled Flooded</p> <p>Other _____</p> <p>Notes:</p>
<p>Describe visibility for mound detection:</p>	<p>Poor Fair <u>Good</u> Notes:</p> <p>Vegetation was mowed shortly after the survey on June 1 to ensure good survey conditions on July 6. Survey conditions on June 1 were adequate for finding mounds.</p>
<p>Request mowing? (CIRCLE and DESCRIBE WHERE MOWING IS NEEDED and SHOW ON AERIAL PHOTO</p>	<p><u>Yes</u> No N/A Notes:</p> <p>See above for mow timing between the surveys. All grass-dominated areas on the site were mowed.</p>

Mounds observed over the whole site are characteristic of:	MPG Mounds	Likely MPG Mounds	Indeterminate	Likely Mole Mounds	Mole Mounds
Quantify or describe amount of each type and approx. # of mounds <i>Group = 3 mounds or more</i>					Mole mounds were only found in a few spots, mainly in perimeter areas.
	<input checked="" type="radio"/> No MPG mounds (circle)				
MPG mounds in GPS? (CIRCLE and DESCRIBE) If MPG mounds present, entered in GPS?	<input checked="" type="radio"/> None All Most Some Notes: Yes No <input checked="" type="radio"/> N/A				
Does woody vegetation onsite match aerial photo?	<input checked="" type="radio"/> Yes No - describe differences and show on parcel map/aerial:				
What portion(s) of the property was screened? (CIRCLE and DESCRIBE)	All <input checked="" type="radio"/> Part - describe and show on parcel map/aerial: All areas vegetated by grasses and forbs, see Figure 2.				
Notes -	Describe, and show on parcel map/aerial if applicable:				
Team reviewed and agreed to data recorded on form? (CIRCLE, and EXPLAIN if "No")	<input checked="" type="radio"/> Yes No Reviewed by initials: <u>SK</u> _____ _____ _____ Notes:				

2022 Thurston County Critical Areas Ordinance (CAO) Prairie Screening Data Sheet

Parcel Number: <u>12703211600 and 12703220700</u>	CAO prairie criteria met? Yes or <input checked="" type="radio"/> No
Property Owner: <u>MCS-Littlerock LLC</u>	Mima mounds present? Yes or <input checked="" type="radio"/> No
Surveyor(s): <u>Linda Krippner and Steve Krippner and Leilani Tuinukuafe</u> (July 6 only)	Oaks (<i>Quercus garryana</i>) present? Yes or <input checked="" type="radio"/> No
Date: <u>June 1 and July 6, 2022</u>	Mature: _____
Composition of Vegetation: <u>Most of the site has grassland vegetation. Vegetation density varies with very gravelly, compacted areas being more sparsely vegetated.</u>	Sapling: _____
	Seedling: _____

X Target species

Class* (circle)

None of the target species were observed on this site.

<i>Apocynum androsaemifolium</i>	1 2 3 4 5 N/A
<i>Balsamorhiza deltoidea</i>	Present / Absent
<i>Bistorta bistortoides</i>	Present / Absent
<i>Brodiaea coronaria</i>	1 2 3 4 5 N/A
<i>Camassia leichtlinii</i>	1 2 3 4 5 N/A
<u><i>Camassia quamash</i></u>	Present / Absent
<i>Carex densa</i>	Present / Absent
<i>Carex feta</i>	1 2 3 4 5 N/A
<i>Carex inops</i> ssp. <i>inops</i>	1 2 3 4 5 N/A
<i>Carex tumulicola</i>	1 2 3 4 5 N/A
<i>Carex unilateralis</i>	1 2 3 4 5 N/A
<i>Castilleja hispida</i>	1 2 3 4 5 N/A
<i>Castilleja levisecta</i>	Present / Absent
<i>Danthonia californica</i>	1 2 3 4 5 N/A
<i>Delphinium menziesii</i>	1 2 3 4 5 N/A
<i>Delphinium nuttallii</i>	1 2 3 4 5 N/A
<i>Deschampsia cespitosa</i>	1 2 3 4 5 N/A
<i>Deschampsia danthonioides</i>	1 2 3 4 5 N/A
<i>Dodecatheon hendersonii</i>	1 2 3 4 5 N/A
<i>Downingia yina</i>	1 2 3 4 5 N/A
<i>Erigeron speciosus</i>	1 2 3 4 5 N/A
<i>Eriophyllum lanatum</i>	Cover: ___ m ² N/A
<i>Eryngium petiolatum</i>	Present / Absent
<i>Festuca roemerii</i> (<i>F. idahoensis</i>)	1 2 3 4 5 N/A
<i>Fragaria virginiana</i>	Cover: ___ m ² N/A
<i>Fritillaria affinis</i>	1 2 3 4 5 N/A
<i>Hieracium scouleri</i>	1 2 3 4 5 N/A
<i>Hosackia pinnata</i> (<i>Lotus pinnatus</i>)	Present / Absent
<i>Koeleria macrantha</i> (<i>K. cristata</i>)	1 2 3 4 5 N/A
<i>Leptosiphon bicolor</i> (<i>Linanthus b.</i>)	1 2 3 4 5 N/A
<i>Lomatium bradshawii</i>	Present / Absent
<i>Lomatium nudicaule</i>	1 2 3 4 5 N/A
<i>Lomatium triternatum</i>	1 2 3 4 5 N/A
<u><i>Lomatium utriculatum</i></u>	Present / Absent

<i>Lupinus albicaulis</i>	1 2 3 4 5 N/A
<i>Lupinus lepidus</i> var. <i>lepidus</i>	1 2 3 4 5 N/A
<i>Lupinus polyphyllus</i>	1 2 3 4 5 N/A
<u><i>Micranthes integrifolia</i></u> (<i>Saxifraga i.</i>)	Present / Absent
<i>Micranthes oregana</i> (<i>Saxifraga o.</i>)	1 2 3 4 5 N/A
<i>Microseris laciniata</i>	Present / Absent
<i>Perideridia gairdneri</i>	1 2 3 4 5 N/A
<i>Plagiobothrys figuratus</i>	1 2 3 4 5 N/A
<u><i>Plectritis congesta</i></u>	Present / Absent
<i>Polemonium carneum</i>	Present / Absent
<u><i>Potentilla gracilis</i></u>	Present / Absent
<i>Ranunculus alismifolius</i>	1 2 3 4 5 N/A
<i>Ranunculus occidentalis</i>	Present / Absent
<i>Ranunculus orthorhynchus</i>	1 2 3 4 5 N/A
<i>Sericocarpus rigidus</i>	Present / Absent
<i>Sidalcea malviflora</i> var. <i>virgata</i>	Present / Absent
<i>Silene scouleri</i>	Present / Absent
<i>Sisyrinchium idahoense</i>	1 2 3 4 5 N/A
<i>Solidago missouriensis</i>	1 2 3 4 5 N/A
<i>Solidago simplex</i> (<i>S. spathulata</i>)	1 2 3 4 5 N/A
<i>Toxicoscordion venenosum</i> var. <i>venenosum</i> (<i>Zigadenus venenosus</i>)	1 2 3 4 5 N/A
<i>Trifolium willdenowii</i> (<i>T. tridentatum</i>)	1 2 3 4 5 N/A
<i>Triteleia grandiflora</i>	1 2 3 4 5 N/A
<i>Triteleia hyacinthina</i>	1 2 3 4 5 N/A
<i>Veratrum californicum</i>	1 2 3 4 5 N/A
<i>Veratrum viride</i>	1 2 3 4 5 N/A
<i>Viola adunca</i>	1 2 3 4 5 N/A
<i>Viola praemorsa</i> var. <i>nuttallii</i>	1 2 3 4 5 N/A

*Species Count Class:

- 1 = < 25
- 2 = 25 - 49
- 3 = 50 - 74
- 4 = 75 - 100
- 5 = >100

Prairie Plant Manual:

<https://www.thurstoncountywa.gov/planning/planningdocuments/cao-prairie-plant-manual-4.23.2018.pdf>

Non-CAO vegetation

Species or codons (i.e. "HYPRAD" for <i>Hypochaeris radicata</i>)		Notes
		Vegetation in surveyed areas on this site.
1 <i>Cytisus scoparius</i>	16 <i>Lathyrus sp.</i>	
2 <i>Hypochaeris radicata</i>	17 <i>Acer macrophyllum</i>	
3 <i>Daucus carota</i>	18 <i>Dactylis glomerata</i>	
4 <i>Anthoxanthum odoratum</i>	19 <i>Plantago lanceolata</i>	
5 <i>Rubus bifrons</i>	20 <i>Festuca rubra</i>	
6 <i>Agrostis sp.</i>	21 <i>Medicago lupulina</i>	
7 <i>Rumex acetosella</i>	22 <i>Navarettia squarosa</i>	
8 <i>Pseudotsuga menziesii</i>	23 <i>Mysotis discolor</i>	
9 <i>Lupinus bicolor</i>	24 <i>Trifolium repens</i>	
10 <i>Phalaris arundinacea</i>	25 <i>Taraxacum officinale</i>	
11 <i>Cirsium arvense</i>	26 <i>Vicia sativa</i>	
12 <i>Fallopia bohemica</i>	27 <i>Trifolium arvense</i>	
13 <i>Pteridium aquilinum</i>	28 <i>Parentucellia viscosa</i>	
14 <i>Stellaria media</i>	29 <i>Tanacetum vulgare</i>	
15 <i>Capsella bursa-pastoris</i>		

Prairie Habitat Criteria: If at any point at least three target species, totaling in general at least 25 plants each are encountered within about 5 meters of each other (WDFW 2015), the area in question meets the criteria to be established as occurrence of prairie. For certain plants such as WNHP rare plants (indicated here in bold), or species which serves as nectar or host plants for both TCB and either SCC or SGCN butterflies (indicated here with underline), presence is enough to meet prairie habitat criteria for such species, even if their count is less than 25 individual plants. CAO wet and dry prairie plant lists can be found in Tables 24.25-7 and 24.25-8, respectively. More info available at: <https://www.thurstoncountywa.gov/planning/Pages/hcp-prairie-review.aspx>

Mima mounds and oak habitat definitions can be found in TCC 24.03.010



Allyson Brooks Ph.D., Director
State Historic Preservation Officer

January 3, 2023

Alex Baruch
Associate Planner
City of Tumwater

In future correspondence please refer to:
Project Tracking Code: 2022-02-01129
Property: City of Tumwater Development South of Union/Cavalry Cemetery
Re: Archaeology - Concur with Survey; Follow Avoidance and Monitoring Plan

Dear Alex Baruch:

The State Historic Preservation Officer (SHPO) and the Department of Archaeology and Historic Preservation (DAHP) has been provided with documentation regarding the above referenced project. In response, we concur with the results and recommendations made in the survey report. Specifically, we agree with the following recommendations as outlined on page 50 of the report entitled "Cultural Resource Assessment for the 5945 Littlerock Road SW Development Project, Tumwater, Thurston County, Washington":

- The Historic Property Inventory (HPI) forms provided for the historic-aged structures located on the property have been reviewed and have been determined NOT Eligible for the National Register of Historic Places. Therefore, no further oversight is needed prior to demolition.
- We agree that GPR Grids 1, 2, 3, 12, and 14 should be avoided by the project. If they cannot be avoided, then the anomalies tentatively identified as human burials would require further archaeological evaluation prior to ground disturbing activities.
- We agree that archaeological monitoring should be undertaken for ground disturbance in:
 - GPR Grids 8, 9, 10, and 11, and;
 - Any ground disturbance within 50 feet of the existing cemetery fence line.
- All other work areas should follow a standard Inadvertent Discovery Plan, such as the one provided in Appendix A of the survey report.

Please note that the recommendations provided in this letter reflect only the opinions of DAHP. Any interested Tribes may have different recommendations. We appreciate receiving copies of any correspondence or comments from Tribes or other parties concerning cultural resource issues that you receive.

These comments are based on the information available at the time of this review and on behalf of the SHPO pursuant to Washington State law. Please note that should the project scope of work and/or location change significantly, please contact DAHP for further review.



Thank you for the opportunity to review and comment. Please ensure that the DAHP Project Number (a.k.a. Project Tracking Code) is attached to any future communications about this project. Should you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read "Stephanie Jolivette". The signature is fluid and cursive, with a large initial "S" and a prominent flourish at the end.

Stephanie Jolivette
Local Governments Archaeologist
(360) 628-2755
Stephanie.Jolivette@dahp.wa.gov

