City of Yelm
EST. 1924
WASHINGTON

STATE ENVIRONMENTAL POLICY ACT

MITIGATED DETERMINATION OF NON-SIGNIFICANCE

April 6, 2023

Lead Agency:	City of Yelm
Agency Contact:	Sara Williams, SaraW@YelmWA.gov, (360) 458-8496
Agency File Number:	2020.0031
Description of Proposal:	Construction of a new 2,333 square foot building for use as a fast food restaurant and site improvements.
Location of the Proposal:	1405 Yelm Ave. E, Yelm, WA 98597, Tax Parcel Number: 22730140400
Applicant Information:	Jeff Stavert, jeff@2812architecture.com, (425) 252-2153

The City of Yelm as lead agency for this action has determined that this proposal does not have a probable significant adverse impact on the environment. Therefore, an environmental impact statement (EIS) will not be 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 determination is based on the following findings and conclusions:

1. A future connection stub out must be made on the West side of the parcel to provide for a future connecting street/driveway into the adjacent parcel (22730140300).
2. New corner development must enhance the property's visual qualities at the corner by one of the following methods per Chapter 18.59.020 YMC:
    a. Installing substantial landscaping of at least 200 square feet at or near the corner of the lot.
    b. Installing a decorative screen wall at least three feet high, a trellis or other continuous architectural element with a length of at least 20 feet, along the front property line.
    c. Providing a pedestrian walkway from corner to building entry and/or a building entry at the corner of the building nearest the intersection.
    d. Locate the building within 15 feet of either or both front property lines.

3. The building must be architecturally accentuated by one of the following design elements per Chapter 18.36.040 K YMC:
    a. At least 100 square feet of sidewalk or pedestrian oriented open space in addition to required building setback.
    b. Corner entrance to courtyard, building lobby, atrium or pedestrian pathway.
    c. Corner architectural elements such as bay windows, roof deck or balconies on upper stories, notched or curved facade surfaces.
    d. Sculpture or artwork or distinctive use of materials.
    e. Special treatment of pedestrian weather protection canopy.
    f. Building corner entry.
4. A dense sight barrier of 15 feet shall be established between the residential property to the south and the proposed development.

This MDNS is issued under WAC 197-11-350 and the comment period will end on April 20, 2023.

Date of Issue: April 6, 2023
Comment Deadline: April 20, 2023 at 5 PM

Gary Cooper

Gary Cooper, Planning and Building Manager

901 Rhoton Rd. NW, Yelm, WA 98597

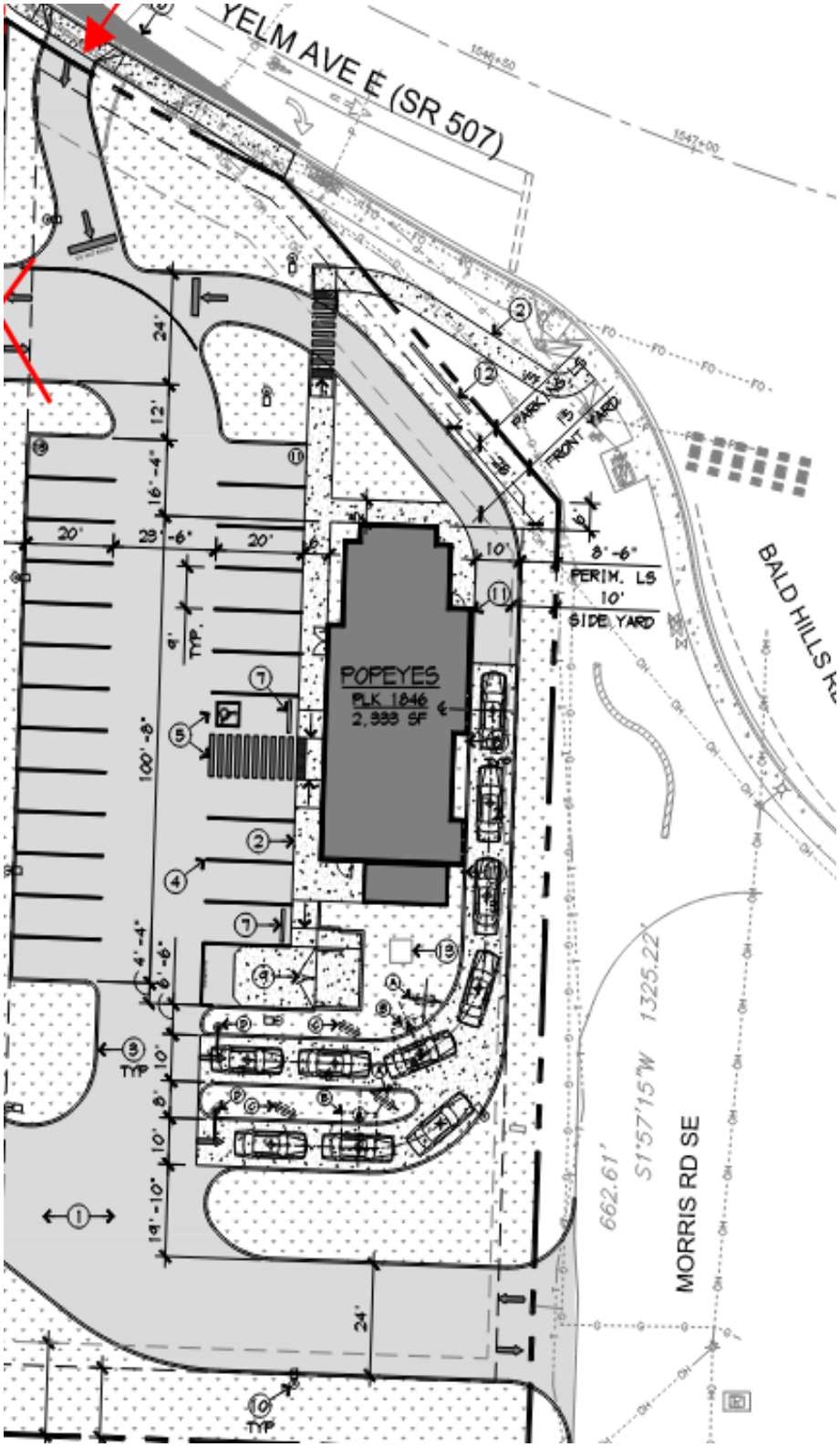
GaryC@YelmWA.gov

(360) 458-8408

This project will be required to be consistent with all applicable development regulations and the City's Comprehensive Plan. Information necessary to analyze this proposal are on file with the City of Yelm, Planning and Building Department and may be reviewed online at https://www.ci.yelm.wa.us/. If you have any questions about this proposal, please contact the Planning and Building Department at SaraW@YelmWA.gov for information.

Appeal

There is no local appeal for the MDNS process.


YELM AVE E (SR 507)
POPEYES
PLK 1846
2,933 SF
PERIM. LS
10'
SIDE YARD
FRONT YARD
BALD HILLS
MORRIS RD SE
S1°57'15"W 1325.22'
662.61'
TYP

City of Yelm

Community Development Department

ENVIRONMENTAL CHECKLIST

Instructions:

Fee
Date Received
By
File No.

The State Environmental Policy Act (SEPA) requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. The purpose of this checklist is to provide information to help identify impacts from your proposal, to reduce or avoid impacts from the proposal if it can be done, and to help the City decide whether an EIS is required. An environmental impact statement (EIS) must be prepared for any proposal with probable significant adverse impacts on environmental quality.

This environmental checklist asks you to describe some basic information about your proposal. The City will use this checklist to determine whether the environmental impacts of your proposal are significant and require preparation of an EIS. You must answer each question accurately, carefully and to the best of your knowledge. Answer the questions briefly, but give the best description you can. In most cases, you should be able to answer the questions from your own observations or project plans without the need for experts. If you do not know the answer, or if a question does not apply to your proposal, write "do not know" or "does not apply". Complete answers to the questions now may avoid delays later. If the space provided is too small, feel free to attach additional sheets.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the city staff can assist you.

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

Nonproject Proposals Only:

Complete both the checklist (even though many questions may be answered "does not apply") and the **Supplemental Sheet for Nonproject Actions** (part D). For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic area," respectively.

105 Yelm Ave W (360) 458-3835 Yelm, WA 98597 (360) 458-3144 FAX www.ci.yelm.wa.us

CITY OF YELM *CITY USE ONLY*

FEE: $150.00

ENVIRONMENTAL CHECKLIST DATE REC'D BY:

FILE NO.

A. BACKGROUND

1. Name of proposed project, if any:

- Yelm Popeyes

2. Name of applicant:

- 2812 Architecture

3. Address, phone number and email address of applicant and of any other contact person:

- Adam Clark - 2812 Colby Avenue, Everett, WA 98201; (425) 252-2153

4. Date checklist prepared:

- June 2022

5. Agency requesting checklist:

- City of Yelm

6. Proposed timing or schedule (including phasing, if applicable):

- Permitting the project in summer of 2022 with construction starting after in the Fall/Winter.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

- No plans for future additions or expansions are proposed at this time.

8. List any environmental information that has been prepared, or will be prepared, directly related to this proposal.

- SEPA checklist, drainage report, geotechnical report, landscape planting plan, traffic impact analysis. Stormwater site plan, and elevations

9. Do you know whether applications are pending for go know governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

- None are known at this time.

10. List any government approvals or permits that will be needed for your proposal, if known.

- Land use approval, building permit, sewer and water permits, Administrative Site Plan Review, and Civil review

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.

- This project proposes the construction of an approximately 2,333 sq foot Popeyes restaurant and associated site improvements including parking and landscaping. The .97-acre project site is currently developed with a parking area.

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. You need not duplicate maps or detailed plans submitted with any permit applications related to this checklist.

- The project is located at 1405 Yelm Ave E (TPN 22730140400).
- Section 30 Township 17 Range 2E Quarter SE NE COM 576.5 F N OF E4 SEC COR W 150F, N 349.55F, S51-45E 191F, S231.3F POB; LESS ROW SR510 TO BALD HILLS RD VIC 3418621; EXC PTN FOR SR507 PER
- Site plan, vicinity map, and topographic map are included with the submittal.

B. ENVIRONMENTAL ELEMENTS

1. **Earth**

a. General description of the site (circle one):

flat, ~~rolling, hilly, steep slopes, mountainous, other~~

- Flat

b. What is the steepest slope on the site (approximate percent slope)?

- The steepest slope on the site is less than 5%. The site has previously been cleared for past development activities.

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 prime farmland.

- Review of the USDA Web Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx) shows that the project site is predominately Spanaway Gravelly Sandy Loam (0-3% slopes).

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

- There are no known indications of unstable soils in the immediate vicinity.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

- The proposed project will impact approximately 0.97 acres including the removal of existing vegetation. The site will be graded to allow construction of the restaurant site and associated site improvements including site utilities, asphalt and concrete paving, and walkways.
- Total impervious surfaces are anticipated to be approximately 23,000 sq ft.
- Estimated excavation is approximately 1,000 cubic yards. Estimated fill is approximately 1,000 cubic yards. New fill will be a combination of excavated soils that meet the site fill standards and off-site fill material obtained locally from reputable sources.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

- Erosion may occur during site clearing and construction. To address this possibility, erosion and sediment control measures will be employed and maintained throughout the construction process as site conditions warrant. Upon completion of construction, the site will be stabilized with pavement and vegetation including grass and landscaping. Once stabilized, no erosion is expected due to use of the completed project improvements

g. About what percent of the site will be covered with impervious surfaces after project construction such as asphalt or buildings?

- The project encompasses .97 total acres of land. Approximately 55% percent will be impervious surfaces upon project completion.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

- Erosion may occur during site clearing and construction. To address this possibility, erosion and sediment control measures will be employed and maintained throughout the construction process as site conditions warrant. Upon completion of construction, the site will be stabilized with pavement and vegetation including grass and landscaping. Once stabilized, no erosion is expected due to use of the completed project improvements

2. **Air**

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile exhaust, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

- The only expected air emissions are from automobiles and equipment associated with construction and the typical traffic associated with commercial communities within the surrounding area. Once completed, HVAC units and customer vehicles are anticipated to produce emissions.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

- Emissions from vehicular traffic on area roadways would be present but would not be anticipated to affect the proposal.

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

- Proposed measures anticipated during construction are the use of dust control to prevent fugitive dust and avoiding unnecessary idling of construction equipment for extended periods of time. No other specific measures are proposed.

3. **Water**

a. Surface Water

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

- There are no water bodies or wetlands in the immediate vicinity of the project

site. Thurston County Geodata (https://geodata.org/) shows Yelm Creek approximately a quarter mile away from the site.

2) Will the project require any work over, in, or adjacent to (within 300 feet) the described waters? If yes, please describe and attach available plans.

- No work will be performed on or near water.

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.

- No fill or dredge material is proposed as part of this project.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

- The proposal will not require surface water withdrawals or diversions.

5) Does the proposal lie within a 100-year floodplain? If so, note elevation on the site plan.

- The project site is not in a 100-year floodplain. The project site is in flood zone X per review of the FEMA flood zone mapping (https://msc.fema.gov/portal/search).

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.

- The project is unlikely to involve any discharge of waste materials to surface waters. Contractors will use erosion control measures during construction to limit any sediment that may reach surface waters. Wastewater from the proposed store will be connected to sanitary sewer. A septic system is not proposed as part of the project.

b. Groundwater:

1) Will groundwater be withdrawn, or will water be discharged to groundwater? Give general description, purpose, and approximate quantities if known.

- The project does not propose withdrawal of groundwater. Stormwater will infiltrate to the ground after water quality treatment.

2) Describe the underlying aquifer with regard to quality and quantity, sensitivity, protection, recharge areas, etc.

- The project site is located within a Category 1 Critical Aquifer Recharge Area (CARA). To protect the groundwater, stormwater runoff from the project site will be treated using the best management water quality practices prior to infiltration.

3) Describe waste material that will be discharged into or onto the ground from septic tanks or other sources, if any (such as domestic sewage; industrial byproducts; agricultural chemicals).

- Project will not discharge waste material into the groundwater from septic tanks or other sources.

c. Water Runoff (including storm water):

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.

- Source of runoff will be rainfall from building rooftops and pavement areas. Rainfall will be collected and conveyed to bio-retention cells where stormwater will be treated for water quality prior to infiltrating.

2) Could waste materials enter ground or surface waters? If so, generally describe.

- No waste materials are anticipated to enter ground or surface waters from this site.

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

- It is not anticipated that drainage patterns will be altered or otherwise affected by this project proposal.

4. **Plants**

a. Check or circle types of vegetation found on the site:

__X__ deciduous tree: alder, maple, oak, aspen, other

_____ evergreen tree: fir, cedar, pine, other

__X__ shrubs

__X__ grasses

_____ pasture

_____ crops or grains

_____ wet soil plants: cattail, buttercup, bulrush, 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?

- Vegetation within the footprint of the project site will be removed as shown on the site plan.

c. List threatened or endangered species known to be on or near the site.

- Review of the US Fish and Wildlife database (https://ecos.fws.gov/ipac/location/index) shows that Golden Paintbrush and Water Howellia are known to be in the area of the project site. There are no indications that these plants are currently on the site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

- Landscaping buffers will be installed around the perimeter of the project site as

shown on the site plan. Native vegetation will be used in landscaping whenever possible on site; existing weedy vegetation will be removed and replaced with native/drought tolerant plants.

5. **Animals**

a. Circle any birds and animals that have been observed on or near the site or are known to be on or near the site:

birds: hawk, ~~heron, ducks,~~ eagle, songbirds,

other:

mammals: deer, ~~bear, elk, beaver, other~~:

fish: ~~bass, salmon, trout, shellfish, other:~~

b. List any priority, threatened or endangered species known to be on or near the site.

- Review of the US Fish and Wildlife database shows that pocket gophers, marbled murrelet, streaked horned lark, and yellow billed cuckoo are known to be in the area of the project site. There are no indications that any of these species exist on the site currently.

c. Is the site part of a migration route? If so, explain.

- The project site is located within the Pacific Flyway, a major north-south flyway for migratory birds in America extending from Alaska to Patagonia.

d. Proposed measures to preserve or enhance wildlife, if any:

- Landscaping is proposed using native vegetation which will provide some habitat for wildlife. Other than this no measures are proposed.

6. **Energy and Natural Resources**

a. What kinds of energy (electric, natural gas, gasoline, heating oil, wood, solar etc.) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, transportation, etc.

- The project will use electricity as the primary source of energy on the site. Project facilities will connect with local energy infrastructure for energy needs. These energy sources will be used for lighting, heat, and for other typical commercial/food service uses.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

- The project would not affect the potential use of solar energy by adjacent residents.

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:

- The proposed project is being designed to current energy standards and will include energy conservation features as required by mechanical and electrical codes. The project will utilize energy efficient equipment where feasible.

7. **Environmental Health**

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spills, of hazardous waste, that could occur as a result of this proposal? If so, describe.

- There are no increased environmental health hazards or risks associated with this proposal. Review of the Department of Ecology "What's In My Neighborhood?" contaminants mapping (https://apps.ecology.wa.gov/neighborhood/) shows that there is no contamination on the site. There is a Shell and a Rite Aide located near the project site that are in "No Further Action" status in regards to contaminant cleanup.

1) Describe special emergency services that might be required.

- Emergency services will be provided by the City of Yelm. No special emergency services are anticipated to be required as part of the proposed project.

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

- All potentially hazardous materials used during construction would be handled and stored in accordance with state and federal hazardous materials handling requirements. If contaminated soil or groundwater are encountered during construction, a formal plan would be developed consistent with state and federal regulations for their removal and treatment or disposal. Also, if contaminants are encountered, measures would be implemented to minimize exposure to people in accordance with applicable regulations.

b. Noise

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

- Sources of ambient noise at the site are related primarily to automobile and transit traffic from the surrounding roadways. These noise sources will not change as part of this project and are not expected to affect this proposal.

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.

- This project will generate varying construction noises typical of a construction project. Routing of construction traffic and timing will be reviewed to minimize noise impacts to adjacent properties. Once complete, the commercial facility will operate in much the same way as neighboring commercial sites with noise generated from customer vehicles. No long-term increases to existing noise levels are anticipated due to this project.

3) Proposed measures to reduce or control noise impacts, if any:

- Construction activities will be limited to hours allowed by the City of Yelm ordinances and will not exceed allowable City noise limits. Construction equipment will, to the extent feasible, be equipped with mufflers to reduce noise impacts.

8. **Land and Shoreline Use**

a. What is the current use of the site and adjacent properties?

- The project site is currently used as parking. The property to the east is an auto repair shop. The property to the west is undeveloped. The property to the south is residential and to the north is commercial development.

b. Has the site been used for mineral excavation, agriculture or forestry? If so, describe.

- No resource lands of long-term commercial significance will be converted or lost as part of this project.

c. Describe any structures on the site.

- There is a small building on the south side of the project site.

There are no structures on the project site

d. Will any structures be demolished? If so, what?

- All structures existing on the site will be removed during the course of construction. There are no existing structures on the project site

e. What is the current comprehensive plan designation of the site?

- The comprehensive plan designation is commercial/urban growth area.

f. What is the current zoning classification of the site?

- Current zoning is commercial C-1.

g. If applicable, what is the current shoreline master program designation of the site?

- Not applicable

h. Has any part of the site been classified as a "natural resource", "critical" or "environmentally sensitive" area? If so, specify.

- The project is located in a critical aquifer recharge area.

i. Approximately how many people would reside or work in the completed project?

- Approximately 8 people will work on the largest shift.

j. Approximately how many people would the completed project displace?

- There is no housing existing on the site currently. No displacement will take place.

k. Proposed measures to avoid or reduce displacement impacts, if any:

- No measures are proposed at this time as no displacement will take place

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

- The project is a permitted use within the current zoning designation and the project will be designed to comply with city zoning code and design standards. Design and landscaping efforts will be made to align with

surrounding development trends.

9. **Housing**

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

- The project is intended to be a commercial facility. No residences will exist on site.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

- No units will be eliminated as none exist on site.

c. Proposed measures to reduce or control housing impacts, if any:

- As the proposed project complies with existing land use designations for this zoning and is compatible with adjacent uses and zoning requirements, additional measures to reduce or control housing impacts will not be necessary.

10. **Aesthetics** 15 foot dense site barrier will be required on the south side of the parcel due to conflicting uses of residential and commercial

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

- The building will not exceed 40 feet in height. Exterior building materials will consist of appropriate architectural materials meeting the intent of the City of Yelm Design Review.

b. What views in the immediate vicinity would be altered or obstructed?

- It is not expected that any views will be significantly altered by the completed project. There is a tree line between the project site and nearby residential housing which will remain.

c. Proposed measures to reduce or control aesthetic impacts, if any:

- Exterior building materials and project landscaping will be selected to compliment general aesthetic of the site.

11. **Light and Glare**

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

- Additional outdoor lighting similar to those currently located in the vicinity of the proposed project will be provided to light pedestrian walkways and parking areas and will utilize cut off type fixtures to minimize the potential for offsite lighting impacts or glare. Exterior lighting will be used throughout the evening hours.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

- This project would not produce light or glare that would be a safety hazard or interfere with views. In many situations, additional lighting will improve safety of local residence.

c. What existing off-site sources of light or glare may affect your proposal?

- There are no existing off-site sources of light or glare that will affect this proposal.

d. Proposed measures to reduce or control light and glare impacts, if any:

- Perimeter site vegetation and cut off type fixtures will be used to minimize the potential for offsite lighting impacts and potential glare.

12. **Recreation**

a. What designated and informal recreational opportunities are in the immediate vicinity?

- There are a few City parks located up the road from the project site. The project site is also located off of State Route 507 which allows access to multiple State and local parks. Multiple restaurants and shopping locations are near the site.

b. Would the proposed project displace any existing recreational uses? If so, describe.

- The proposed project would not displace any existing recreational uses.

c. Proposed measures to reduce or control impacts or provide recreation opportunities:

- The proposed project would not displace or adversely impact any existing recreational uses, no measures are proposed at this time.

13. **Historic and Cultural Preservation**

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

- No structures on site have been identified as or eligible for listing in national, state, or local preservation registrars per review of the Department of Archaeological and Historic Preservation Database WISAARD (https://wisaard.dahp.wa.gov/Map).

b. Generally describe any landmarks or evidence of historic, archeological, scientific, or cultural importance known to be on or next to the site.

- There are no known landmarks, features or other evidence of Indian or historic use or occupation on the project site. The WISAARD predictive model for archology identifies the surrounding area as “high risk”, partially attributed to tribal activities in the area.

c. Proposed measures to reduce or control impacts, if any:

- The applicant has consulted the data provided on the State of Washington’s main database of historic and cultural resources (WISAARD). Previous construction projects in this area have not yielded any evidence of cultural or historical findings. In the event that archeological deposits are inadvertently discovered during construction, ground-disturbing activities should be halted immediately, and the City or County Historic Preservation representative should be notified.

14. **Transportation**

a. Identify sidewalks, trails, public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.

- Current access to the site is from State Route 507 and Morris Road SE. Proposed access will be from these same points, with the access on Morris Road updated as shown on the site plan.

b. Is site currently served by public transit? By what means? If not, what plans exist for transit service?

- There is a bus stop right across from the project site on the corner or Bald Hills Rd SE and State Route 507.

c. How many parking spaces would the completed project have? How many would the project eliminate?

- There are currently 13 spots existing on the site. The parking lot will be redesigned and 11 spots will be added for a total of 24 parking stalls as shown on the site plan.

d. Will the proposal require any new sidewalks, trails, roads or streets, or improvements to existing sidewalks, trails, roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

- Driveway access from Morris Road SE will be revised as shown on the site plan and the cul-de-sac will be reconstructed.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

- The project will not use or occur water, rail, or air transportation. There is a Tacoma Rail line near the site but it will not be affected by the project.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

- There will be approximately 47 new AM peak hour trips and 36 new peak hour trips. 7-9 AM 48 new AM Peak hour trips, and 550 daily total trips

g. Proposed measures to reduce or control transportation impacts, if any:

- A trip generation report will be prepared as part of the initial submittal.

Traffic impact analysis was submitted, City of Yelm is building a roundabout at the intersection of Bald Hill Rd. SE. and Morris Rd. SE. within the next 5 years

15. **Public Services**

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

- It is not expected that the proposed project will create a significant increased need for public services.

b. Proposed measures to reduce or control direct impacts on public services, if any.

- No measures are proposed at this time.

16. **Utilities**

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

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

- Water, Sewer, Electrical, and Communication will be needed for the proposed project. All needed utilities exist on/adjacent to the project site. These on-site utilities will be relocated/appropriately scaled to accommodate the proposed construction.

C. SIGNATURE

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

Signature: _____

Date Submitted: 6/20/22

SUPPLEMENTAL ENVIRONMENTAL CHECKLIST FOR NONPROJECT ACTIONS

(Do not use this sheet for project actions.)

When answering these questions, be aware of the extent of 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.

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 critical or 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 natural resource areas?

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

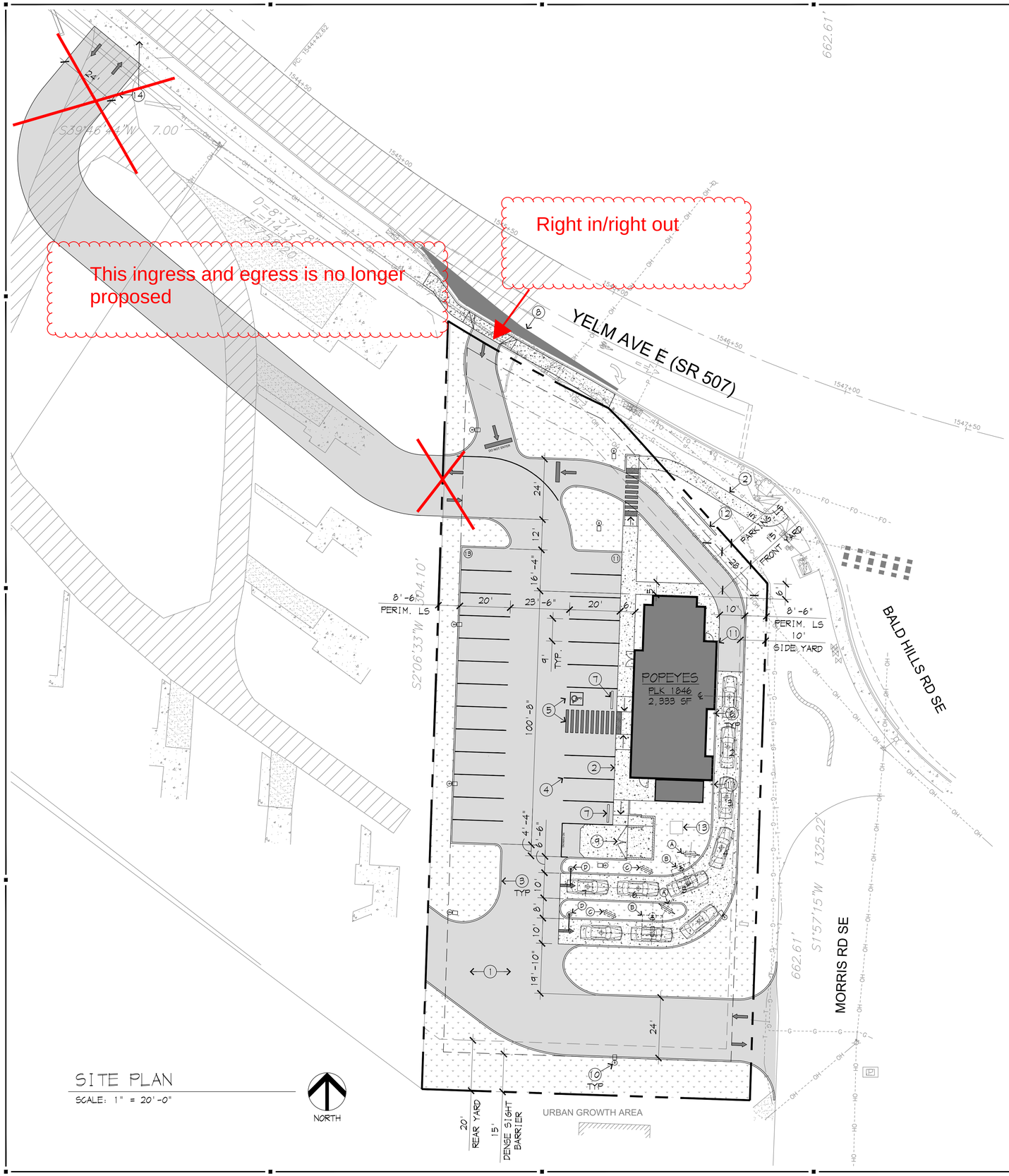
5. How would the proposal be likely to affect land and shoreline use, including whether it would allow or encourage land or shoreline uses incompatible with existing plans?

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.



SITE PLAN

SCALE: 1" = 20'-0"

NORTH

PROJECT CRITERIA

SCOPE OF WORK

CONSTRUCTION OF NEW 2,333 S.F. BUILDING AND SITE IMPROVEMENTS.

JURISDICTION: CITY OF YELM

TAX ACCOUNT NO.: 22730140400

LEGAL DESCRIPTION:
THAT PART OF THE SOUTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 30, TOWNSHIP 17 NORTH, RANGE 2 EAST, W.M.; COMMENCING 576.5 FEET NORHT OF THE QUARTER SECTION CORNERS BETWEEN SECTIONS 29 AND 30, THENCE WEST 150 FEET; THENCE NORTH 349.55 FEET; THENCE SOUTH 51°45' EAST 191 FEET TO LINE BETWEEN SECTIONS 29AND 30; THENCE SOUTH 231.3 FEET TO THE POINT OF BEGINNING, IN THURSTON COUNTY, WASHINGTON; EXCEPTING THEREFROM COUNTY ROADS ALONG THE NORTHERLY AND EASTERLY BOUNDARY; ALSO EXCEPT THOSE PORTIONS CONVEYED TO THE CITY OF YELM BY DEEDS RECORDED UNDER RECORDING NOS. 3418621, 3441760 AND 4083913.

CODES

2018 INTERNATIONAL BUILDING CODE (IBC)
2018 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
2018 INTERNATIONAL MECHANICAL CODE (IMC)
2018 INTERNATIONAL FIRE CODE (IFC)
2018 UNIFORM PLUMBING CODE (UPC)

BUILDING CRITERIA

ZONING:	C-1 COMMERCIAL
MAX. HEIGHT:	40'
OCCUPANCY:	A-2
CONSTRUCTION TYPE:	VB
FIRE SPRINKLERS:	NO
ALLOWABLE FIRE AREA:	5,000 S.F.

BUILDING AREAS (GROSS)

PLK 1846 BUILDING:	2,165 S.F.
WALK-IN BOX:	168 S.F.
TOTAL:	2,333 S.F.

OCCUPANT LOAD

DINING:	33 (495 S.F./15)
SALES:	31 (155 S.F./5)
KITCHEN/SERVICE:	6 (1,068 S.F./200)
OFFICE:	1 (35 S.F./100)
STORAGE:	1 (168 S.F./300)
TOTAL:	72

LOT COVERAGE
LOT AREA: 34,202 S.F. (0.79 AC)

PARKING CALCULATIONS

REQUIRED PARKING: 1 STALL PER 200 G.S.F.

TOTAL REQUIRED: 12 STALLS
TOTAL PROVIDED: 24 STALLS

LANDSCAPE CALCULATIONS

PARKING LOT LANDSCAPING: 24 S.F. PER PARKING STALL
PARKING AREA: 7,250 S.F.
TOTAL REQUIRED: 576 S.F.
TOTAL PROVIDED: 1,610 S.F.

LANDSCAPE BUFFERS:
FRONT PROP. LINE (NORTH) PARKING LOT LANDSCAPING PER 18.55.020.D.3.i.
SIDE PROP. LINE (EAST/WEST) PERIMETER LANDSCAPE PER 18.55.020.B.3.c.
REAR PROP. LINE (SOUTH) DENSE SIGHT BARRIER PER 18.55.020.A.3.c.

UTILITY DISTRICTS

POWER:	PUGET SOUND ENERGY
WATER:	CITY OF YELM
SEWER:	CITY OF YELM
TELEPHONE:	OWNER DETERMINED
GAS:	PUGET SOUND ENERGY

SEPARATE PERMITS

ELECTRICAL
IRRIGATION
SIGNS

NOTE: ALL SEPARATE SUBMITTALS SHALL BE REVIEWED AND APPROVED BY ARCHITECT PRIOR TO PERMIT SUBMISSION.

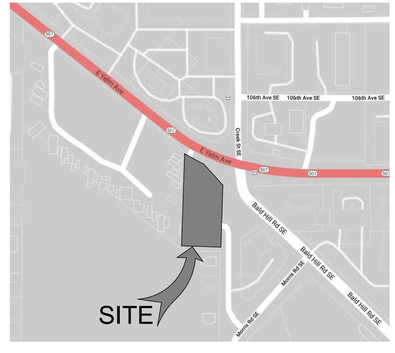
SITE PLAN NOTES (#)

1. SHADING DENOTES EXTENT OF ASPHALT PAVING. SEE CIVIL DRAWINGS FOR MORE INFORMATION.
2. CONCRETE SIDEWALK.
3. CONCRETE CURB.
4. PAINTED PARKING STRIPING. 4" WIDE LINES. LENGTH AND SPACING AS INDICATED ON PLAN. COLOR: TRAFFIC WHITE.
5. ACCESSIBLE PARKING STALL WITH PAINTED ACCESS AISLE & SIGN.
6. PIPE GUARDS PER DET. 1 DWG. SD3. PIPE GUARDS ADJACENT TO THE BUILDING PAINT COLOR PER POPEYES STANDARDS.
7. 7'-0" LONG CONCRETE WHEELSTOP. SET FACE OF WHEELSTOP 2'-0" FROM HEAD OF PARKING STALL.
8. REVISED RIGHT-IN ONLY AND FRONTAGE IMPROVEMENTS PER CIVIL DRAWINGS.
9. TRASH ENCLOSURE AND CONCRETE APRON. SEE DET. 5-7 DWG. SD3. PROVIDE 4" WIDE PAINT STRIPE AND THE WORDS "NO PARKING" IN 12" HIGH LETTERS AS SHOWN.
10. LIGHT POLE & BASE. SEE DET. 8 DWG. SD3.
11. TRANSITION FROM STANDARD CURB TO BARRIER CURB AND BACK TO STANDARD CURB ADJACENT TO BLDG. AT DRIVE-THRU WINDOWS. SEE DET. 2 DWG. SD3 FOR BARRIER CURB DESIGN.
12. 20'-0" LONG X 3'-0" TALL WALL FOR CORNER LOT ENHANCEMENT PER DET. 9 DWG. SD3.
13. NEW ELECTRICAL TRANSFORMER. COORDINATE LOCATION AND REQUIREMENTS WITH POWER UTILITY.
14. NEW ACCESS ROAD AT EXISTING DRIVENAY PER CIVIL DRAWINGS.

POPEYES SITE SIGNS

A. MENU BOARD (ILLUMINATED)
B. DRIVE-THRU CANOPY (ILLUMINATED)
C. PREVIEW MENU BOARD (ILLUMINATED)
D. DRIVE-THRU CLEARANCE BAR
E. "POPEYES" LOGO FREESTANDING POLE SIGN

NOTE: SEE DRAWING SD2 AND SD3 FOR GENERAL SIZE AND LAYOUT INFORMATION. COORDINATE WITH ELECTRICAL DRAWINGS.



VICINITY MAP

NO SCALE

NORTH

Popeyes
LOUISIANA KITCHEN, INC.
5505 BLUE LAGOON DRIVE
MIAMI, FL 33126

REGISTERED ARCHITECT
6803
ADAM B. CLARK
STATE OF WASHINGTON

PROJECT #20C-4234

2812 Colby Avenue
Everett WA 98201
(425) 252-2153 p
www.2812architecture.com

NEW PLK1846 - NOLA PROTOTYPE
POPEYES RESTAURANT
1405 YELM AVE EAST (SR 510)
YELM, WA 98597

LOUISIANA KITCHEN PLK DESIGN STANDARDS
DUAL-LINE PRODUCTION
STORE #13666

LOUISIANA KITCHEN 1972

POPEYES LOUISIANA KITCHEN

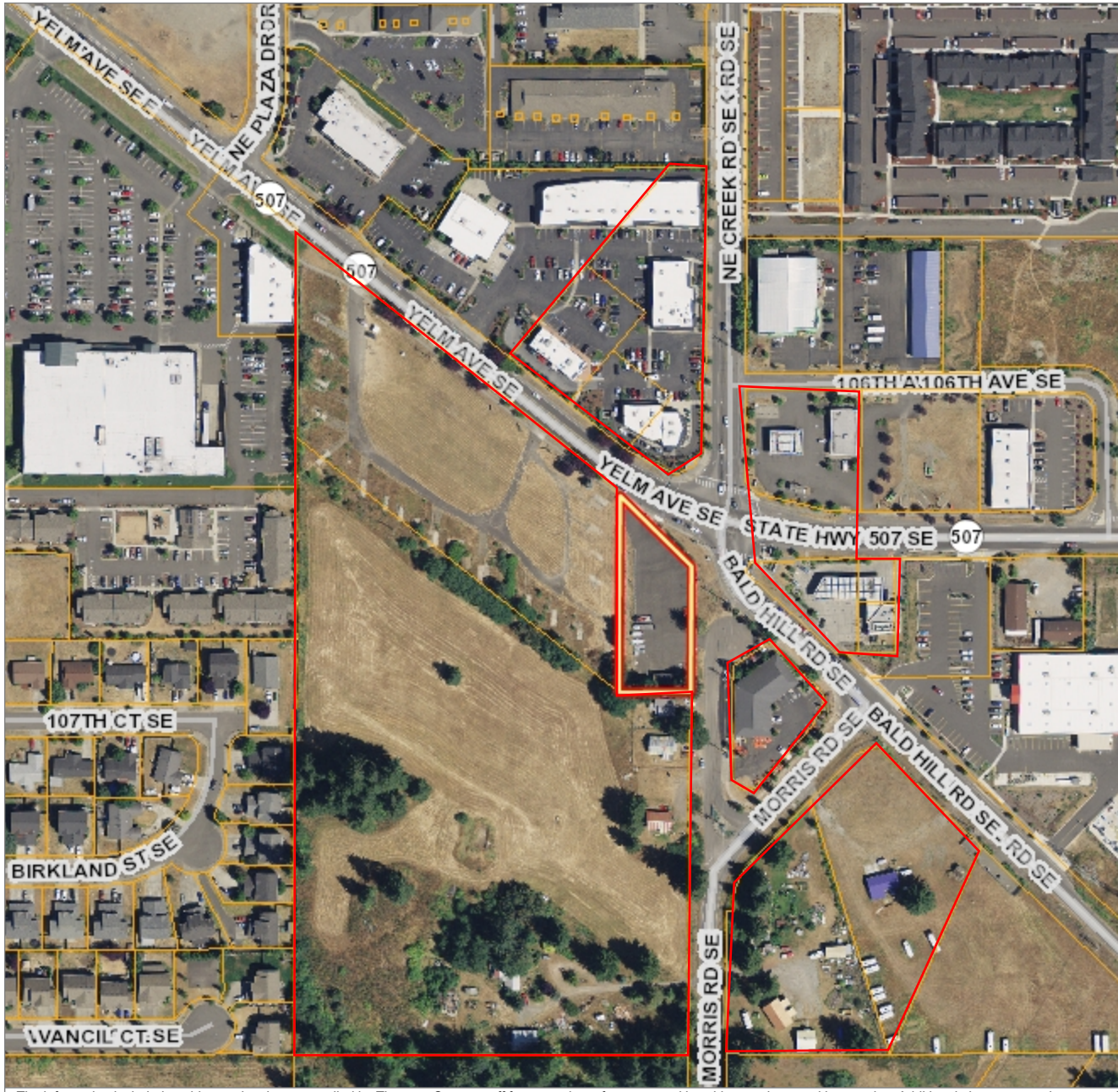
REVISIONS

ARCHITECTURAL SITE PLAN

SD1

DATE: 5/10/2022

CHECKED:



Vicinity Map

Legend

- Parcel Boundaries
- Roads - Major
  - Major Roads
  - Ramp
  - I 5; US 101
- Roads (Large Scale)
- Railroads
- County Border

Scale 1: 4,548

0 200 400

Feet

Map Created Using GeoData Public Website

Published: 12/3/2020

Note:

THURSTON COUNTY
WASHINGTON
SINCE 1852

Thurston County GeoData Center

Traffic Impact Analysis

Yelm Popeyes

Yelm, Washington

Prepared For:
Popeyes

Prepared By:
SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
360.352.1465

March 2023

SCJ ALLIANCE
CONSULTING SERVICES

Traffic Impact Analysis

Project Information

Project:	Yelm Popeyes
Prepared for:	Popeyes 2812 Colby Avenue Everett, WA 98201

Reviewing Agency

Jurisdiction:	City of Yelm

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 Eric Johnston, PE, Principal
Project Reference:	SCJ #1849.06 Path: N:\Projects\1849 2812 Architecture\1849.06 Yelm Popeyes\Phase 02 - Traffic Scoping Report\TIA\Report\Traffic Impact Analysis Yelm Popeyes 2023-0206.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

03/27/2023

Approved by Eric Johnston, PE, Principal

Table of Contents

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1 Introduction

1.1 Project Overview

Popeyes is proposing to construct a new Popeyes restaurant to be located at 1405 Yelm Avenue East in Yelm, Washington. The proposed restaurant will be approximatley 2,300 square feet in size. **Figure 1** illustrates the site vicinity and the transportation network serving the project area.

Figure 1. Site Vicinity Map

1.2 Study Context

A Traffic Scoping Analysis was prepared and submitted to the City of Yelm on December 14, 2020 which outlined the trip generation and distribution/assignment assumptions. Previous versions of the Traffic Impact Analysis have been submitted to the City in January 2021, April 2022, and November 2022. These previous reports have prompted lengthy discussions with City and WSDOT staff to determine the appropriate access to this property and the adjacent property to the west as well as potential off site mitigation measures. This report has been prepared to provide the necessary traffic analysis and project information for the City of Yelm, per the most recent comment responses, to use in reviewing the development proposal. The report describes the existing and forecasted operation of the following intersections:

- Yelm Ave/SR 507 at Creek Street/Bald Hill Road
- Morris Road at Bald Hill Road
- Morris Road at Morris Road Spur
- Site Driveway at Yelm Ave

Operational analysis has been prepared for existing 2021 PM peak hour conditions and forecasted 2023 PM peak hour conditions with and without completion of the development.

2 Project Description

2.1 Development Proposal

The proposed *Yelm Popeyes* project would construct a new approximate 2,300-square foot Popeyes restaurant on a largely vacant lot in Yelm. The site has an existing approximate 500-square foot structure that will be removed. The project is anticipated to open in 2023.

2.2 Site Access

The project site currently provides two access points, one on Yelm Avenue and one on Morris Road.

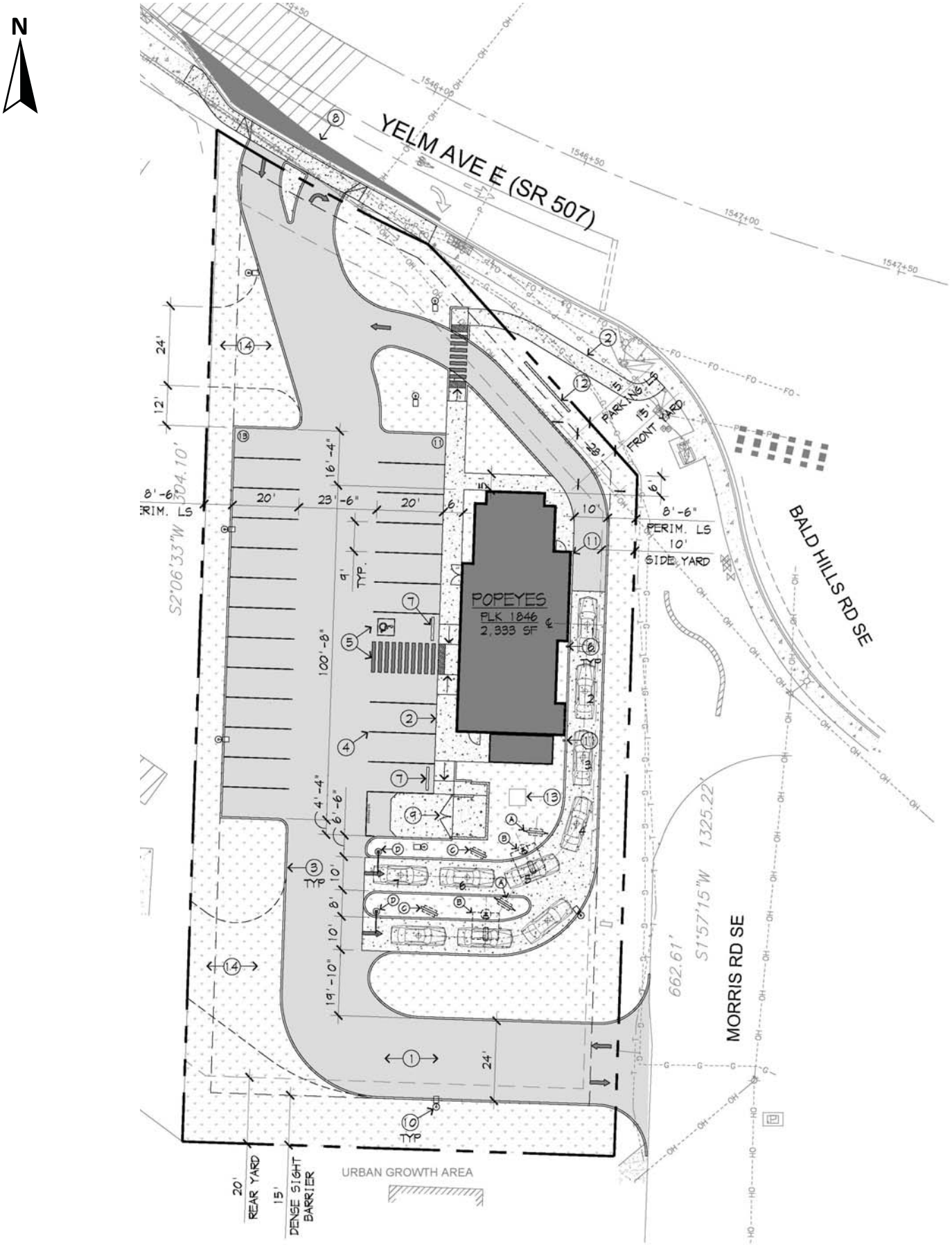
Morris Road Driveway

The current driveway on Morris Road is full access. The proposed project includes relocating this driveway just south of the existing location. The driveway will remain full access.

Yelm Avenue Driveway

The current driveway on Yelm Avenue is full access. This driveway is located approximately 80 feet west of the Yelm Avenue/Bald Hill Road intersection. Due to the close proximity to this intersection, this driveway will be limited to right-in right-out movements after completion of the proposed project.

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



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Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 2
Preliminary Site Plan

3 Existing Conditions

3.1 Area Land Uses

The *Yelm Popeyes* project will be located at 1405 Yelm Avenue East in Yelm, WA. The site has an existing approximate 500-square foot structure that will be removed. The adjacent land uses south of the site are primarily residential while the adjacent properties to the east, west, and north are primarily commercial.

3.2 Roadway Inventory

3.2.1 Yelm Avenue

Yelm Avenue is classified by the City of Yelm as urban arterial. In the project vicinity, Yelm Avenue is a three-lane roadway providing one travel lane in each direction with a two-way-left-turn-lane (TWLTL). In the project vicinity the roadway has sidewalks and bicycle lanes on both sides. Yelm Avenue has a posted speed limit of 35 mph.

3.2.2 Bald Hill Road

Bald Hill Road is classified by the City of Yelm as urban arterial. In the project vicinity Bald Hill Road is a two-lane roadway providing one travel lane in each direction and has a posted speed limit of 40 mph. The speed limit increases to 50 mph south of the project site.

3.2.3 Morris Road SE

Morris Road SE is classified by the City of Yelm as commercial collector. This roadway provides one travel lane in each direction with a speed limit of 50 mph.

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

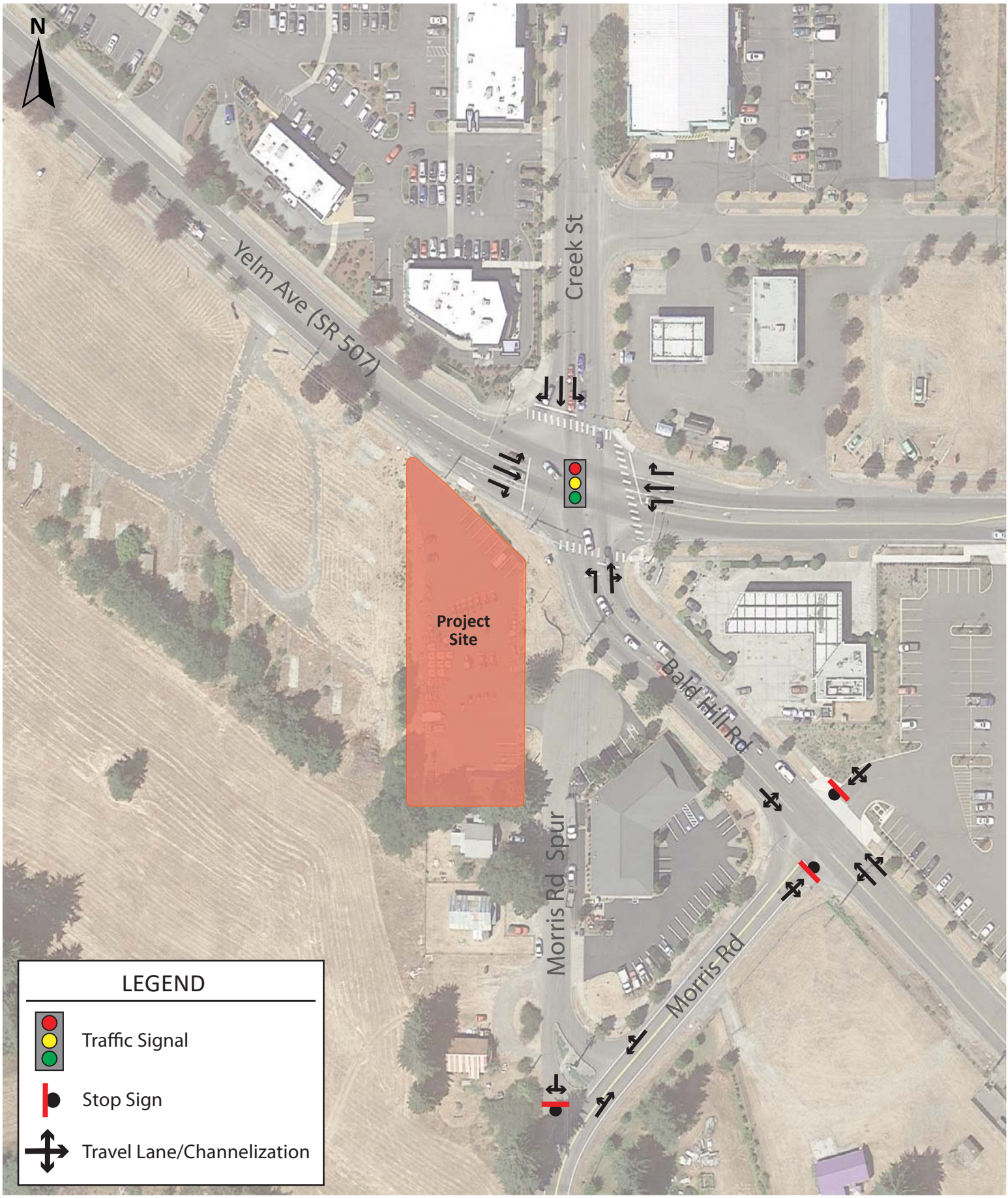
3.3 Traffic Volume Data

Traffic Count Consultants (TC2), a transportation data collection service, provided PM peak period turning movement counts at the Yelm Avenue/Bald Hill Road intersection and the Morris Road/Bald Hill Road intersection. The counts were conducted on October 15, 2019 between 4:00 pm and 6:00 pm for the evening peak period. Due to the COVID-19 pandemic, 2021 counts were not collected. Two years of growth was applied to the 2019 counts to represent 2021 volumes.

Turning movement counts were not provided for the intersection of Morris Road/Morris Road Spur. To estimate volumes at this location, a trip generation analysis was performed for the existing land uses on Morris Road. These volumes were added to the estimated through volumes on Morris Road that were calculated from the data collected at the adjacent intersection of Morris Road/Bald Hill Road.

An additional traffic volume count was collected at the Morris Road/Bald Hill Road intersection on January 18, 2023 to help perform an evaluation of potential intersection improvements. These counts are lower than the adjusted traffic volume counts described above. To provide a conservative analysis the higher volumes have been used in the baseline analysis.

The existing 2021 traffic volumes for the study intersections for the PM peak hour are presented in **Figure 4**. The turning movement count diagrams and daily count data are provided in **Appendix A.**



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Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 3
Existing Channelization and Intersection Control

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Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 4
Existing 2021 Traffic Volumes
PM Peak Hour

3.4 Crash History

The Washington Department of Transportation provides crash data for study area roadways. This data was collected over the five-year span between January 1, 2015 and December 31, 2019. A crash frequency rate per Millions of Entering Vehicles (MEV) was calculated for the study intersections based on the following formula:

$$\text{Crash Rate} = \frac{1{,}000{,}000 \times \text{Total Crashes}}{365 \times \text{Number of Years} \times \text{Average Daily Entering Traffic}}$$

The average daily traffic entering the study intersection was estimated by adding the entering PM peak hour turning movements and multiplying by a factor of 10. We have summarized the crash data for the study intersections in **Table 1**. The crash data received from WSDOT is provided in **Appendix C.**

Table 1. Existing Crash Severity by Study Intersection

Intersection	Total Daily Entering Traffic	Total Number of Reported Crashes	Number of Injury Crashes	Average crashes per Year	Crashes per MEV
Morris Rd/Bald Hill Rd	12,030	16	5	3.2	**0.73**
SR 507/Bald Hill Rd	24,680	31	8	6.4	**0.71**
SR 507/Site Driveway	15,850	0	0	0	**0.00**

None of the study area intersections presented a crash rate greater than 1.0 crashes per million entering vehicles and none of the 47 reported crashes were classified as a fatal or serious injury crash.

3.5 Transit and Non-Motorized Facilities

Intercity Transit currently provides transit service in the City of Yelm, via transit route 94, offering connections to Tumwater, Olympia, and Lacey. This route includes several stops along Yelm Avenue and currently offers one-hour headways from around 6:00 am to 8:30 pm. The closest transit stop is located just east of the project site along Yelm Avenue.

In the project vicinity, sidewalks and bicycle lanes are currently provided along both sides of Yelm Avenue. Sidewalks are also provided along developed sections of Bald Hill Road and Morris Road.

4 Project Traffic Characteristics

4.1 Site-Generated Traffic Volumes

The two 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. These are discussed in the following paragraphs.

Site-Generated Traffic Volumes

Vehicle trip generation was estimated using the trip generation rates contained in the 10th edition of the *Trip Generation Manual* by the Institute of Transportation Engineers (ITE). The land-use category "Fast-Food Restaurant with Drive-Through Window" (land-use code 934) with the variable 1,000-square feet (KSF) was determined to be the most applicable to this project.

Pass-By Trips

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 contained in the 3rd edition of the *Trip Generation Handbook* by ITE were used for the proposed Popeyes restaurant, with an AM Peak hour rate of 49percent and a 50percent rate for the PM peak hour. Given the small volume of traffic using the dead-end portion of Morris Road to which the site driveway connects, all of the pass-by traffic was assigned to the driveway on Yelm Avenue E. Given that this driveway does not allow left-turns to exit the site, and as a result of peak period congestion at the adjacent traffic signal, all of the pass-by trips were assigned to the eastbound travel direction. No pass-by trips were assumed for traffic traveling in the westbound direction.

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

Table 2. PM Peak Hour Trip Generation Characteristics

Land Use	Time Period	Land Use Code (LUC)	Unit	Trip Rate	Pass-By %	Enter %	Exit %
Fast-Food Restaurant with Drive-Through Window	PM Peak Hour	934	1,000 sf	32.67	50%	52%	48%

The total trip generation expected from this project was calculated by applying the unit measure for the land use category to the appropriate trip generation rate. The PM peak hour trip generation calculations are shown in **Table 3.** The total pass-by trips for the site during the PM peak hour are expected to be 38 trips. This equates to 19 vehicles entering and then exiting the site in the hour. Based on the existing traffic volumes on Yelm Avenue in the eastbound direction, this amounts to approximately 2% of the total existing traffic volumes.

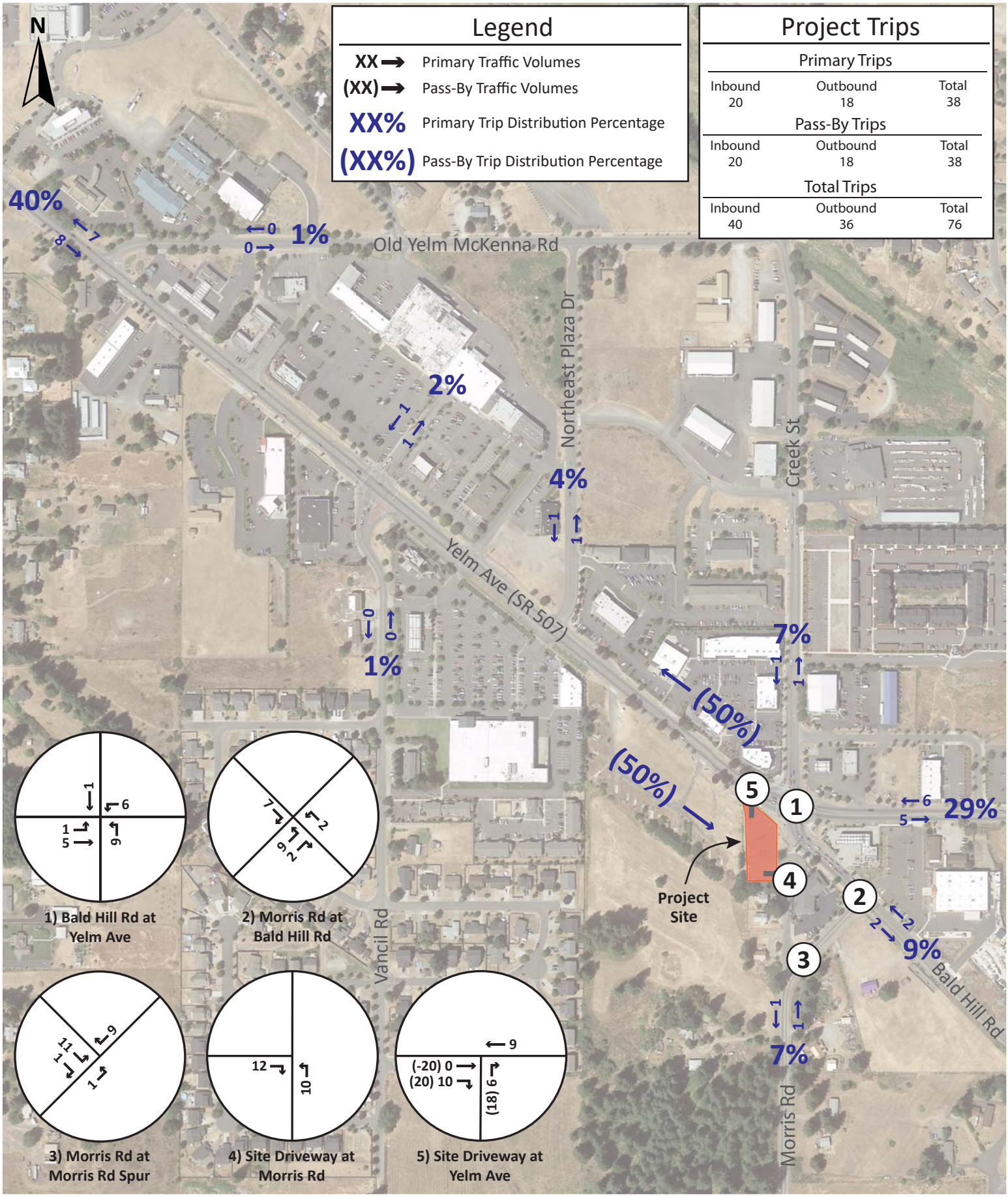
Table 3. PM Peak Hour Trip Generation Rates

Land Use	Size	Total Trips	Pass-By Trips	New-To-Network Trips		
				Enter %	Exit %	Total
Fast-Food Restaurant with Drive-Through Window	2.3	76	38	20	18	38

4.2 Site Traffic Distribution and Assignment

For this study, the regional distribution of traffic to and from the proposed project was estimated using the regional transportation model developed by the Thurston Regional Planning Council (TRPC) in cooperation with the local jurisdictions in Thurston County. The model uses the Emme/4 software package and has been calibrated to represent the existing vehicle travel patterns throughout the entire county.

Using the model, a Select Zone Analysis (SZA) was conducted for Transportation Analysis Zone (TAZ) #716, which represents the project site. The select zone analysis 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. The SZA graphically shows the percentage of vehicles currently using each of the available routes into and out of the area (Yelm Avenue and Bald Hill Road). From this information, regional distribution percentages were calculated for future traffic from the proposed *Yelm Popeyes* project. The regional traffic distribution percentages and site traffic distribution for the PM peak hour are shown on **Figure 5.**



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Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 5
Site-Generated PM Peak Hour Traffic Volumes

5 Future Traffic Conditions

5.1 Roadway Network Improvements

The City of Yelm *Six-Year Transportation Improvement Plan* (TIP) does not identify any projects within the vicinity of the proposed *Yelm Popeyes* project. However, through discussions with the city, they have identified the following projects located within the general study area:

- Y2C Bald Hill Road to SR 507/SR 510 Yelm Loop Intersection – Construct a new collector street between Bald Hill Road and the traffic signal at the SR 507/SR 510 Yelm Loop intersection. This project is included in the City of Yelm 2009 *Transportation Plan* as a component of the Y2 project, however, the city has identified this project as a short-term priority.
- Construct a roundabout at the intersection of Yelm Avenue/SR 507 and Bald Hill Road – Per recent WSDOT comments it is understood that WSDOT has secured funding for the construction of a roundabout at this location.
- Extension of the eastbound right-turn lane pocket at the intersection of Yelm Ave/SR 507 and Bald Hill Road.

The planned roundabout at SR 507/Bald Hill Road is not expected to be in operation before the proposed *Yelm Popeyes* project is complete and has not been included in the analysis.

The City of Yelm 2009 *Transportation Plan* identifies the following roadway improvements within the vicinity of the proposed *Yelm Popeyes* project:

- Y2 SR 507 Yelm Loop- Y2 is a new 2-lane State Route connecting the existing SR 507 on the east side of Yelm with SR 507 south of Yelm, creating an alternate route around the southeast quadrant of the city.
- Y3 SR 510 to SR 507 (SR 510 Yelm Loop)– Similar to the Y2 south Yelm Loop, the north loop provides a primary alternative for traffic traveling through and around the City Center near Canal Road. Construction of this facility would accommodate traffic associated with the industrial center, including truck traffic generated by this type of development. This project is currently in the design phase with an uncertain opening year.
- Y5D SR 507 between Creek Street/Bald Hill Road Intersection and the SR 510 Yelm Loop Intersections (Reconstruction) - Reconstruct to City standards an Urban Arterial with two drive lanes, bike lanes, planner strip with street trees and sidewalks, including the reconstruction of the Grove Road intersection and access control.
- Y9 Bald Hill Road (Reconstruction) – Bald Hill Road would be reconstructed to a 3-lane facility between the Western Chehalis Railroad and its intersection with Yelm Avenue (SR 507).

These projects are expected to provide a benefit to the study area, however none of these projects are expected to be constructed before the completion of the *Yelm Popeyes* project and were not accounted for in the intersection analysis. The extension of the eastbound right-turn lane pocket at the intersection of Yelm Ave/SR 507 and Bald Hill Road will be considered as the Yelm Popeyes completes site design.

5.2 Future Traffic Volumes

Traffic volume forecasts were prepared for PM peak hour conditions for the 2023 project opening year. The future traffic volume forecast includes non-specific background traffic growth, and estimated traffic generated by the proposed *Yelm Popeyes* project.

For the non-specific background traffic growth, a 4.0 percent annual growth rate (non-compounded) was assumed. This growth rate was taken from the Yelm High School Bypass Road project.

The projected 2023 traffic volumes without the *Yelm Popeyes* project are shown on **Figure 6.** The projected 2023 traffic volumes with the *Yelm Popeyes* project are shown on **Figure 7.**

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

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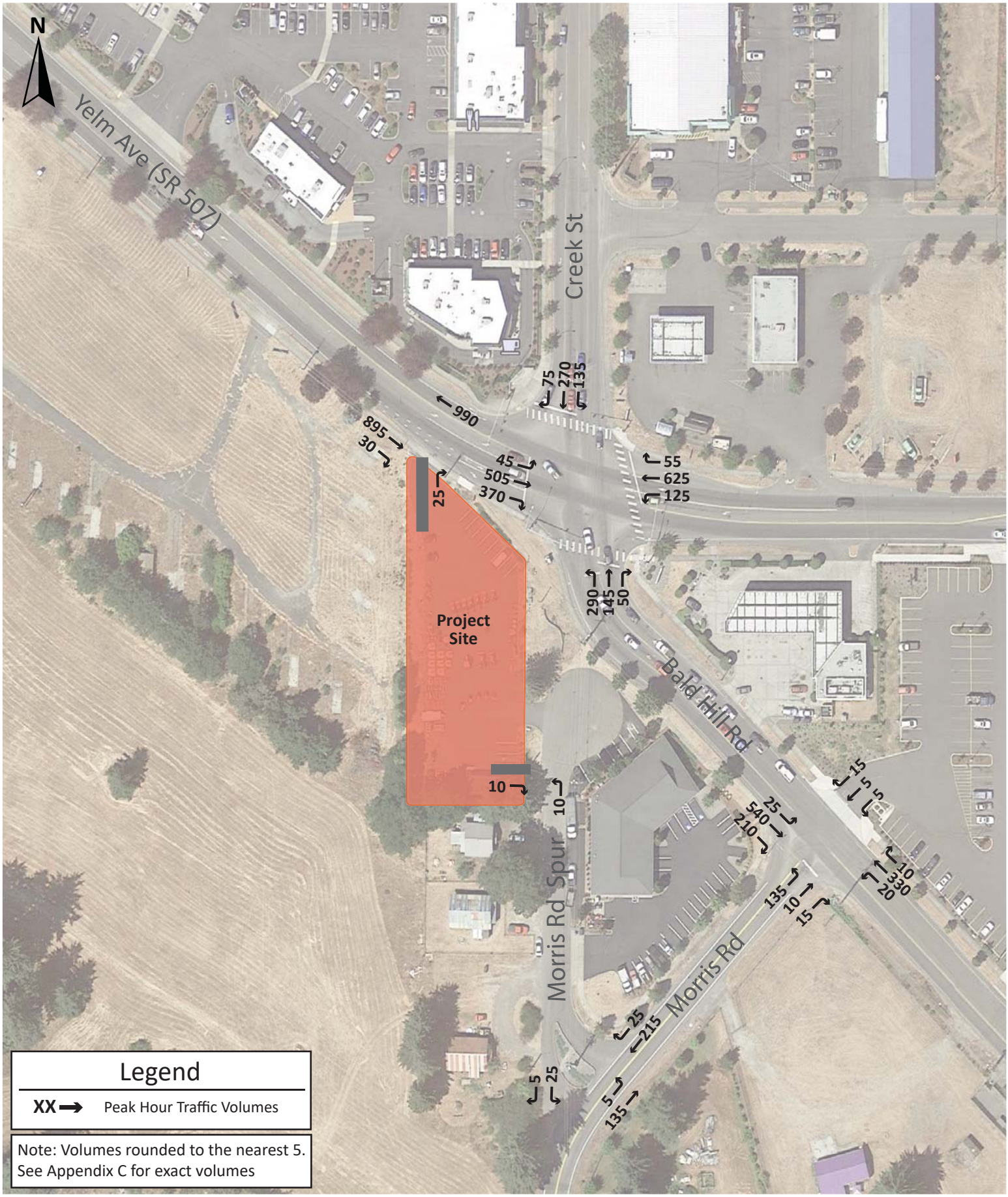
Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 6
Projected 2023 PM Peak Hour
Traffic Volumes Without Project



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Popeyes
Yelm, Washington
Traffic Impact Analysis

Figure 7
Projected 2023 PM Peak Hour
Traffic Volumes With Project

6 Traffic Operations Analysis

Traffic analyses were conducted to identify any deficiencies within the study area for the PM peak hour in the 2021 base year and the 2023 project opening year.

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). Operations analyses were completed for the base year and projected 2023 PM peak hour traffic volume scenarios for all study intersections. The PM peak hour is the highest traffic flow period during the day in this area. This time period is typically selected for analysis as it reflects the greatest impact of a project on the areas roadway system.

Intersection analysis was performed using Synchro version 11, with the HCM6 output of the Synchro software. The Synchro software packages implement the methodologies described in the current HCM.

City of Yelm identifies a Level of Service (LOS) D standard for all commercial and light industrial zones, which applies to all the study area intersections. For purposes of concurrency the city uses the average delay from all intersection approaches, for both signalized and unsignalized intersections.

6.1.1 Intersection Operations

For signalized 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) is typically used to represent the intersection level of service. As mentioned above, the City's concurrency standard is based on the average delay for all movements, but the worst movement delay for stop controlled has also been included in this report to provide a full assessment of each intersection. 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 summarizes the various levels of delay associated with varying LOS conditions.

Table 4. Level of Service Criteria for Intersections

Level of Service	Signalized 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 traffic saturation" which is experienced. This is typically presented as a "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 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 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 2021 traffic volumes
- Projected 2023 background traffic volumes without the *Yelm Popeyes* project
- Projected 2023 traffic volumes with the *Yelm Popeyes* project

The operational analysis results of the study intersections for the PM peak hour are provided in **Table 5**. The LOS analysis worksheets are included in **Appendix D**.

Table 5. PM Peak Hour Intersection Level of Service

	Intersection	Control Type	LOS Standard	Base Year 2021		2023 Without Project		2023 With Project	
				LOS (delay)	Worst V/C Ratio	LOS (delay)	Worst V/C Ratio	LOS (delay)	Worst V/C Ratio
1	Yelm Avenue/SR 507 at Creek Street/Bald Hill Road	Signal	D	D (42.4)	1.02	D (46.4)	1.10	D (47.2)	1.10
2	Morris Road at Bald Hill Road	TWSC[1]	D	E (48.8)	0.67	F (72.5)	0.81	F (85.7)	0.88
3	Morris Road at Morris Road	TWSC[1]	D	B (10.4)	0.02	B (10.7)	0.02	B (11.0)	0.05
5	Site Driveway at Yelm Avenue	TWSC[1]	D	N/A	N/A	N/A	N/A	C (18.2)	0.09

1-Two-Way-Stop-Control

6.3.1.1 Yelm Avenue/SR 507 at Creek Street/Bald Hill Road

This is a four-leg intersection under traffic signal control. During the PM peak hour this intersection currently operates at LOS D. For the 2023 horizon with and without the project, the intersection is projected to remain at LOS D. This intersection is expected to operate within the City's LOS standard.

6.3.1.2 Morris Road at Bald Hill Road

This is a four-way intersection under two-way stop control for the eastbound and westbound approaches. During the PM peak hour this intersection currently operates at LOS E for the eastbound approach. For the 2023 horizon year without the project, the intersection is projected to operate at LOS F with an average delay of 72.5 seconds. With the addition of project traffic, this intersection is expected to remain at LOS F with a delay of 97.6 seconds. The average delay for the intersection is LOS B, at 11.1 seconds. As such, this intersection operates within the City's concurrency standard. However, given the

LOS F condition for the Morris Road approach, the intersection has been evaluated for potential improvement options. This is discussed in more detail below.

6.3.1.3 Morris Road at Morris Road Spur

This is a tee intersection with stop control for the southbound approach. During the PM peak hour this intersection currently operates at LOS B and is projected to remain at LOS B for the 2023 horizon year with and without the project. This intersection is within the LOS standard.

6.3.1.4 Yelm Avenue at Full Access Site Driveway

This intersection would operate with stop-control for the northbound site driveway. The intersection is projected to operate at LOS C for the northbound approach.

6.4 Vehicle Queue Assessment

A high-level queue assessment was performed for the study area intersections. The existing traffic signal at Yelm Avenue/Bald Hill Road generates 95th percentile queues of several hundred feet on Yelm Avenue, which is consistent with the observed queues at this location. These queues are projected to increase as volumes increase and will easily extend beyond the proposed *Yelm Popeyes* driveway on Yelm Avenue. While this queue is likely to increase the delay experienced at the project site driveway, it is expected that the drivers on Yelm Avenue will provide gaps for vehicles to exit the site, which is fairly typical for driveways along congested corridors.

6.5 Morris Road at Bald Hill Road

As discussed above is Section 5, WSDOT has plans to fund and construct roundabout improvements at the intersection of Yelm Avenue (SR 507) and Bald Hill Road. Based on this planned improvement the City has identified roundabout control at Morris Road/Bald Hill Road as its preferred long-term improvement. An additional analysis was performed for each of these intersections assuming roundabout control in the 2023 study horizon with the proposed *Yelm Popeyes* project. These results are provided in **Table 6**. The assumed layout and analysis worksheets are included in **Appendix E**.

Table 6. Planned Roundabout Projected 2023 PM Peak Hour Intersection Level of Service

			Existing Control		Roundabout Control	
	Intersection	LOS Standard	LOS (delay)	Worst V/C Ratio	LOS (delay)	Worst V/C Ratio
1	Yelm Avenue/SR 507 at Creek Street/Bald Hill Road	D	D (47.2)	1.10	B (13.2)	0.88
2	Morris Road at Bald Hill Road	D	F (85.7)	0.88	A (5.9)	0.66

With roundabout control installed, each intersection is projected to improve with each operating at LOS B or better. These volumes include the proposed *Yelm Popeyes* project and also do not account for any traffic volume shifts as a result of the completion of the Yelm Bypass Loop.

7 Summary and Conclusions

Popeyes is proposing to construct a new Popeyes restaurant located in Yelm, Washington. The proposed project includes constructing a new approximate 2,300-square foot restaurant on vacant lot. The project also includes removing an approximate 500-square foot structure currently on the site.

Access to the project will be provided by two driveways, a right-in right-out driveway on Yelm Avenue at the existing driveway and the existing full-access driveway on Morris Road.

At full occupancy and operation, the project is estimated to generate approximately 76 trip ends during the PM peak hour. An evaluation of existing 2021 and project opening year (2023) conditions with and without project traffic was performed. All of the study intersections currently operate and are projected to operate within the City of Yelm level of service concurrency standard. However, the Morris Road/Bald Hill Road intersection is projected to operate at LOS F for the worst movement (eastbound left-turn) without and with the project. The City has identified roundabout control as its preferred improvement alternative, which would be coordinated with the planned roundabout improvements WSDOT has identified for the Yelm Avenue (SR 507)/Bald Hill Road intersection. With these improvements in place both intersections would operate at LOS B or better. The proposed *Yelm Popeyes* project will coordinate with City staff to determine an appropriate proportionate share towards the roundabout improvement at Morris Road and Bald Hill Road.

Appendix A

Traffic Volume Counts

Prepared for: **City of Yelm**

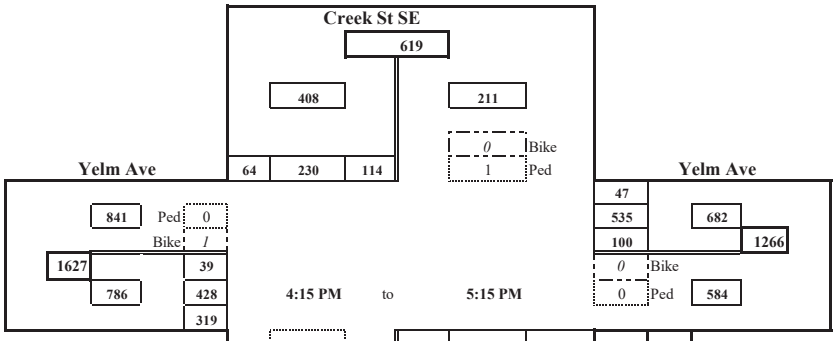
Traffic Count Consultants, Inc.

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

WBE/DBE

Intersection: Creek St SE/Bald Hill Rd SE & Yelm Ave
Location: Yelm, Washington
Date of Count: Tues 10/15/2019
Checked By: Jess

Time Interval	From North on (SB) Creek St SE				From South on (NB) Bald Hill Rd SE				From East on (WB) Yelm Ave				From West on (EB) Yelm Ave				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	22	52	24	7	57	37	11	1	21	119	8	5	17	104	62	534
4:30 P	0	31	48	11	3	50	24	11	3	21	143	12	5	10	105	77	543
4:45 P	1	22	47	29	0	65	35	14	2	29	134	10	1	11	103	65	564
5:00 P	0	24	59	9	1	69	31	4	3	22	144	10	2	9	115	82	578
5:15 P	0	37	76	15	0	58	35	13	2	28	114	15	0	9	105	95	600
5:30 P	1	23	57	16	0	68	23	7	2	30	132	5	4	3	100	65	529
5:45 P	1	23	51	16	1	43	19	12	2	19	129	11	1	10	122	84	539
6:00 P	0	17	47	16	0	57	20	9	4	20	147	8	1	11	102	61	515
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	5	199	437	136	12	467	224	81	19	190	1062	79	19	80	856	591	4402
Peak Hour: 4:15 PM to 5:15 PM																	
Total	1	114	230	64	4	242	125	42	10	100	535	47	8	39	428	319	2285
Approach		408				409				682				786			2285
%HV		0.2%				1.0%				1.5%				1.0%			1.0%
PHF		0.80				0.90				0.97				0.94			0.95



PEDs Across:	N	S	E	W	
INT 01		3	3		6
INT 02	1	1			2
INT 03					0
INT 04					0
INT 05					0
INT 06	2				2
INT 07	1				1
INT 08	2		1		3
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	6	4	4	0	**14**

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

2400 *1.0 PHF Peak Hour Volume*

		PHF	%HV
	EB	0.94	1.0%
Check	WB	0.97	1.5%
In: 2285	NB	0.90	1.0%
Out: 2285	SB	0.80	0.2%
	T Int.	0.95	1.0%

Conditions:

Special Notes

YLM19111TM_17p

Prepared for: **City of Yelm**

Traffic Count Consultants, Inc.

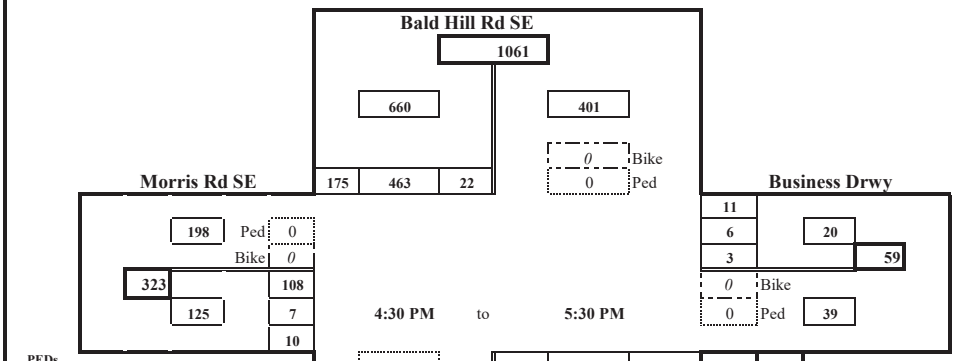
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Bald Hill Rd SE & Morris Rd SE **Date of Count:** Tues 10/15/2019

Location: Yelm, Washington **Checked By:** Jess

Time Interval	From North on (SB) Bald Hill Rd SE				From South on (NB) Bald Hill Rd SE				From East on (WB) Business Drwy				From West on (EB) Morris Rd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	2	85	40	5	3	74	1	0	1	1	1	2	30	3	3	244
4:30 P	1	4	100	43	3	5	59	2	0	0	0	0	1	26	0	4	243
4:45 P	0	8	90	40	0	3	76	2	0	1	3	2	0	31	1	4	261
5:00 P	0	5	140	40	1	6	69	0	0	1	0	1	0	30	0	3	295
5:15 P	1	3	125	60	0	3	68	6	0	0	1	3	0	31	4	3	307
5:30 P	0	6	108	35	0	5	69	2	0	1	2	5	0	16	2	0	251
5:45 P	0	9	109	34	0	2	59	2	0	1	0	2	0	20	1	2	241
6:00 P	0	3	93	34	0	2	54	4	0	2	0	4	0	23	0	2	221
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	3	40	850	326	9	29	528	19	0	7	7	18	3	207	11	21	2063
	Peak Hour: 4:30 PM to 5:30 PM																
Total	1	22	463	175	1	17	282	10	0	3	6	11	0	108	7	10	1114
Approach	660				309				20				125				1114
%HV	0.2%				0.3%				n/a				n/a				0.2%
PHF	0.88				0.95				0.63				0.82				0.91



1228 *1.0 PHF Peak Hour Volume*

		PHF	%HV
		EB	0.82	n/a
Check		WB	0.63	n/a
In:	1114	NB	0.95	0.3%
Out:	1114	SB	0.88	0.2%
		T Int.	0.91	0.2%

Conditions:

PEDs Across:

	N	S	E	W	
INT 01					0
INT 02					0
INT 03					0
INT 04					0
INT 05					0
INT 06	NO PEDS				0
INT 07					0
INT 08					0
INT 09					0
INT 10					0
INT 11					0
INT 12					0
	0	0	0	0	0

Special Notes

Bicycles From:

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

YLM19111TM_27p

Prepared for: **SCJ Alliance**

Traffic Count Consultants, Inc.

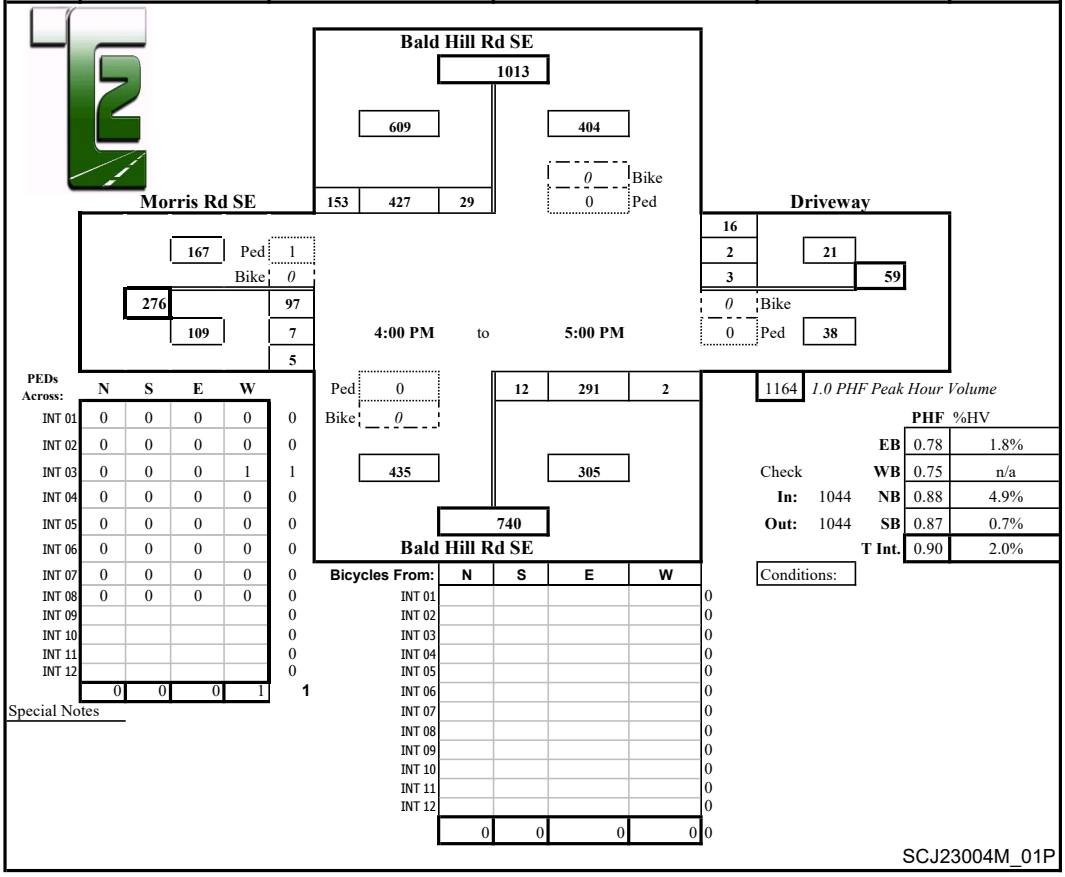
Phone: (253) 770-1407 FAX: (253) 770-1411 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: Bald Hill Rd SE & Morris Rd SE **Date of Count:** Wed 01/18/2023

Location: Yelm, Washington **Checked By:** Jen

Time Interval	From North on (SB) Bald Hill Rd SE				From South on (NB) Bald Hill Rd SE				From East on (WB) Driveway				From West on (EB) Morris Rd SE				Interval Total
Ending at	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	2	10	131	34	7	1	86	0	0	1	0	4	2	20	1	3	291
4:30 P	1	7	104	39	5	7	70	0	0	1	1	4	0	15	3	1	252
4:45 P	0	4	90	43	2	3	67	1	0	1	1	5	0	33	2	0	250
5:00 P	1	8	102	37	1	1	68	1	0	0	0	3	0	29	1	1	251
5:15 P	0	8	90	40	1	2	59	2	0	1	3	7	1	23	0	2	237
5:30 P	0	3	98	21	0	1	60	7	0	1	0	2	0	20	2	3	218
5:45 P	0	5	93	33	0	1	74	3	0	0	1	4	0	21	2	2	239
6:00 P	0	5	94	28	0	1	60	2	0	1	4	5	0	11	1	4	216
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Survey	4	50	802	275	16	17	544	16	0	6	10	34	3	172	12	16	1954
Peak Hour: 4:00 PM to 5:00 PM																	
Total	4	29	427	153	15	12	291	2	0	3	2	16	2	97	7	5	1044
Approach	609				305				21				109				1044
%HV	0.7%				4.9%				n/a				1.8%				2.0%
PHF	0.87				0.88				0.75				0.78				0.90



1164 *1.0 PHF Peak Hour Volume*

	PHF	%HV
EB	0.78	1.8%
WB	0.75	n/a
NB	0.88	4.9%
SB	0.87	0.7%
T Int.	0.90	2.0%

Check In: 1044 Out: 1044

Conditions:

PEDs Across:

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

Bicycles From:

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

Special Notes

SCJ23004M_01P

Appendix B

Traffic Volume Calculation Worksheets

SCJ ALLIANCE
CONSULTING SERVICES

Popeyes

PM Peak Hour Volumes

Growth Rate: 4.00%

Intersection	Movement		Existing 2019 Volumes	Existing Count Growth	Exisitng 2021 Volumes	Background 2023 Growth	Baseline 2023 Volumes	Primary Car Trips	Pass-By Car Trips	Site Generated Volumes	Projected 2023 Volumes
		L	39	3	**42**	3	**45**	1	0	**1**	**46**
	EB	T	428	34	**462**	37	**499**	5	0	**5**	**504**
		R	319	26	**345**	28	**372**	0	0	**0**	**372**
1		L	100	8	**108**	9	**117**	6	0	**6**	**123**
Yelm Ave/SR 507	WB	T	535	43	**578**	46	**624**	0	0	**0**	**624**
Creek St/Bald Hill Rd		R	47	4	**51**	4	**55**	0	0	**0**	**55**
		L	242	19	**261**	21	**282**	9	0	**9**	**291**
TMC Date: 10/15/2019	NB	T	125	10	**135**	11	**146**	0	0	**0**	**146**
		R	42	3	**45**	4	**49**	0	0	**0**	**49**
4:15 - 5:15 PM		L	114	9	**123**	10	**133**	0	0	**0**	**133**
PHF: 0.95	SB	T	230	18	**248**	20	**268**	1	0	**1**	**269**
		R	64	5	**69**	6	**75**	0	0	**0**	**75**
			2,285		2,468					**22**	**2,687**
		L	108	9	**117**	9	**126**	9	0	**9**	**135**
	EB	T	7	1	**8**	1	**8**	0	0	**0**	**8**
		R	10	1	**11**	1	**12**	2	0	**2**	**14**
2		L	3	0	**3**	0	**3**	0	0	**0**	**3**
Morris Rd	WB	T	6	0	**6**	1	**7**	0	0	**0**	**7**
Bald Hill Rd		R	11	1	**12**	1	**13**	0	0	**0**	**13**
		L	17	1	**18**	1	**20**	2	0	**2**	**22**
TMC Date: 10/15/2019	NB	T	282	23	**305**	24	**329**	0	0	**0**	**329**
		R	10	1	**11**	1	**12**	0	0	**0**	**12**
4:30 - 5:30 PM		L	22	2	**24**	2	**26**	0	0	**0**	**26**
PHF: 0.91	SB	T	463	37	**500**	40	**540**	0	0	**0**	**540**
		R	175	14	**189**	15	**204**	7	0	**7**	**211**
			1,114		1,203					**20**	**1,319**
		L	1	0	**1**	0	**1**	1	0	**1**	**2**
	EB	T	114	9	**123**	10	**133**	0	0	**0**	**133**
		R	0	0	**0**	0	**0**	0	0	**0**	**0**
3		L	0	0	**0**	0	**0**	0	0	**0**	**0**
Morris Rd	WB	T	185	15	**200**	16	**216**	0	0	**0**	**216**
Morris Rd		R	13	1	**14**	1	**15**	9	0	**9**	**24**
		L	0	0	**0**	0	**0**	0	0	**0**	**0**
	NB	T	0	0	**0**	0	**0**	0	0	**0**	**0**
		R	0	0	**0**	0	**0**	0	0	**0**	**0**
		L	11	1	**12**	1	**13**	11	0	**11**	**24**
	SB	T	0	0	**0**	0	**0**	0	0	**0**	**0**
		R	1	0	**1**	0	**1**	1	0	**1**	**2**
			325				**379**			**22**	**401**
		L	0	0	**0**	0	**0**	0	0	**0**	**0**
	EB	T	0	0	**849**	68	**917**	0	-20	**-20**	**897**
		R	0	0	**0**	0	**0**	10	20	**30**	**30**
5		L	0	0	**0**	0	**0**	0	0	**0**	**0**
Site Driveway	WB	T	0	0	**908**	73	**981**	9	0	**9**	**990**
Yelm Ave		R	0	0	**0**	0	**0**	0	0	**0**	**0**
		L	0	0	**0**	0	**0**	0	0	**0**	**0**
	NB	T	0	0	**0**	0	**0**	0	0	**0**	**0**
		R	0	0	**0**	0	**0**	6	18	**24**	**24**
		L	0	0	**0**	0	**0**	0	0	**0**	**0**
	SB	T	0	0	**0**	0	**0**	0	0	**0**	**0**
		R	0	0	**0**	0	**0**	0	0	**0**	**0**
			0		1,757		1,898			**43**	**1,941**

Appendix C
Crash Data

PRIMARY TRAFFICWAY	INTERSECTING TRAFFICWAY	DIST FROM REF POINT	MI or FT	COMP DIR FROM REF POINT	REFERENCE POINT NAME	MILEPOST	REPORT NUMBER	DATE	MOST SEVERE INJURY TYPE	# INJ	# NAJ	# FVH	# PED	# BIKE	VEHICLE 1 TYPE	VEHICLE 2 TYPE	JUNCTION RELATIONSHIP	FIRST COLLISION TYPE / OBJECT STRUCK	VEHICLE 1 ACTION	VEHICLE 2 ACTION	VEHICLE 1 COMPASS DIRECTION FROM	VEHICLE 1 COMPASS DIRECTION TO	VEHICLE 2 COMPASS DIRECTION FROM	VEHICLE 2 COMPASS DIRECTION TO
BALD HILL RD SE	MORRIS RD SE						E539725	05/02/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	West	North	North	South
BALD HILL RD SE	MORRIS RD SE						E581681	09/01/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	South	West	North	South
BALD HILL RD SE	MORRIS RD SE						E601492	10/24/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Overtaking and Passing	Making Left Turn	East	West	South	West
BALD HILL RD SE	MORRIS RD SE						E611431	11/22/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway within Major Intersection	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	West	North	East	West
BALD HILL RD SE	MORRIS RD SE						E620476	12/15/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	South	West	North	South
BALD HILL RD SE	MORRIS RD SE						E621331	12/12/2016	Possible Injury	2	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	South	Northwest	Northwest	Southeast
BALD HILL RD SE	MORRIS RD SE						E621451	12/16/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	South	West	East	West
BALD HILL RD SE	MORRIS RD SE						E716956	09/26/2017	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway within Major Intersection	Entering at angle	Going Straight Ahead	Going Straight Ahead	East	West	North	South
BALD HILL RD SE	MORRIS RD SE						E860624	11/14/2018	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	North	West	West	East
BALD HILL RD SE	MORRIS RD SE						E902922	03/15/2019	Possible Injury	1	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway within Major Intersection	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	North	East	South	North
BALD HILL RD SE	MORRIS RD SE						E911150	04/15/2019	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway within Major Intersection	Entering at angle	Going Straight Ahead	Going Straight Ahead	Northwest	Southeast	North	South
BALD HILL RD SE		304	F	SE	MORRIS RD SE		E427324	05/24/2015	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From opposite direction - all others	Other*	Going Straight Ahead	North	South	South	North
BALD HILL RD SE		103	F	NW	MORRIS RD SE		E448549	08/01/2015	Possible Injury	1	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	North	East	South	North
BALD HILL RD SE		231	F	SE	MORRIS RD SE		E466004	09/29/2015	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Driveway	From same direction - one left turn - one straight	Making Left Turn	North	South	North	East
BALD HILL RD SE		0.1	M	SE	MORRIS RD SE		E497112	12/19/2015	No Apparent Injury	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Roadway Ditch	Going Straight Ahead		Southeast	Northwest		
BALD HILL RD SE		118	F	NW	MORRIS RD SE		E530745	04/03/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	West	Northeast	East	West
BALD HILL RD SE		147	F	NW	MORRIS RD SE		E548614	05/28/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Making Left Turn	Going Straight Ahead	East	South	South	North
BALD HILL RD SE		129	F	NW	MORRIS RD SE		E568882	07/28/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	North	East	South	North
BALD HILL RD SE		0.13	M	SE	MORRIS RD SE		E653433	03/19/2017	No Apparent Injury	0	0	1	0	0	Pickup,Panel Truck or Vanette under 10,000 lb		Not at Intersection and Not Related	Roadway Ditch	Going Straight Ahead		Northwest	Southeast		
BALD HILL RD SE		129	F	NW	MORRIS RD SE		E674870	05/24/2017	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway within Major Intersection	Entering at angle	Making Right Turn	Going Straight Ahead	East	North	South	North
BALD HILL RD SE		200	F	SE	MORRIS RD SE		E694504	07/23/2017	No Apparent Injury	0	0	1	0	0	Passenger Car		Not at Intersection and Not Related	Roadway Ditch	Going Straight Ahead		North	South		
BALD HILL RD SE		137	F	NW	MORRIS RD SE		E712118	09/15/2017	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	Northwest	Northeast	Southeast	Northwest
BALD HILL RD SE		42	F	NW	MORRIS RD SE		E716957	09/28/2017	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	Not at Intersection and Not Related	From same direction - both going straight - both moving - rear-end	Going Straight Ahead	Slowing	North	South	North	South
BALD HILL RD SE		198	F	SE	MORRIS RD SE		E770071	02/16/2018	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	Driveway Related but Not at Driveway	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	South	North	South	North
BALD HILL RD SE		138	F	NW	MORRIS RD SE		E797341	05/13/2018	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	South	West	North	South
BALD HILL RD SE		134	F	NW	MORRIS RD SE		E799024	05/16/2018	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Driveway	Entering at angle	Making Left Turn	Going Straight Ahead	North	East	West	East
BALD HILL RD SE		0.24	M	SE	MORRIS RD SE		E806330	06/09/2018	Possible Injury	2	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	Not at Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	South	North	Vehicle Stopped	Vehicle Stopped
BALD HILL RD SE		137	F	NW	MORRIS RD SE		E835782	08/13/2018	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	West	North	East	West
BALD HILL RD SE		374	F	SE	MORRIS RD SE		E844343	09/23/2018	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway	From opposite direction - all others	Backing	Going Straight Ahead	Vehicle Backing	Vehicle Backing	South	North
BALD HILL RD SE		139	F	NW	MORRIS RD SE		E894165	02/16/2019	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	Entering at angle	Making Left Turn	Going Straight Ahead	Northeast	Southeast	Southeast	Northwest
BALD HILL RD SE		368	F	SE	MORRIS RD SE		E996692	12/21/2019	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	Northwest	Northeast	Southeast	Northwest
MORRIS RD SE	BALD HILL RD SE						E498410	12/24/2015	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	West	East	Vehicle Stopped	Vehicle Stopped
MORRIS RD SE	BALD HILL RD SE						E629277	01/06/2017	No Apparent Injury	0	0	1	0	0	Pickup,Panel Truck or Vanette under 10,000 lb		At Intersection and Related	Other Objects	Making Left Turn		South	West		
MORRIS RD SE	BALD HILL RD SE						E674871	05/23/2017	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	Entering at angle	Making Left Turn	Going Straight Ahead	South	West	South	North
MORRIS RD SE		88	F	SW	BALD HILL RD SE		E630813	01/10/2017	Possible Injury	1	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	Entering at angle	Making Right Turn	Slowing	Northeast	West	Southwest	Northeast
MORRIS RD SE		35	F	SW	BALD HILL RD SE		E674874	05/26/2017	Possible Injury	1	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.19	E697938	08/02/2017	Possible Injury	2	0	3	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.19	E844344	09/29/2018	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.22	E682808	06/18/2017	No Apparent Injury	0	0	2	0	0	Motorcycle	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.22	E746766	12/13/2017	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - sideswipe	Changing Lanes	Stopped at Signal or Stop Sign	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.22	E985498	11/21/2019	No Apparent Injury	0	0	3	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Starting in Traffic Lane	Stopped at Signal or Stop Sign	Vehicle Stopped	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E413111	04/02/2015	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - one right turn - one straight	Making Right Turn	Making Left Turn	South	East	South	West
S07						29.24	E437487	06/25/2015	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Not Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E486885	11/25/2015	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.24	E491882	12/10/2015	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E525004	03/10/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Starting in Traffic Lane	Stopped at Signal or Stop Sign	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E526206	03/13/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E528323	03/25/2016	Possible Injury	2	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Driveway within Major Intersection	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	North	East	South	North
S07						29.24	E535043	04/17/2016	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	North	South	Vehicle Stopped	Vehicle Stopped
S07						29.24	E576522	08/21/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Driveway within Major Intersection	From opposite direction - one left turn - one straight	Making Left Turn	Going Straight Ahead	North	East	South	North
S07						29.24	E578719	08/29/2016	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E586414	09/18/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Starting in Traffic Lane	Stopped for Traffic	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E586415	09/16/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	South	North	Vehicle Stopped	Vehicle Stopped
S07						29.24	E587981	09/23/2016	Possible Injury	1	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Starting in Traffic Lane	Stopped for Traffic	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E591261	10/01/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe	Changing Lanes	Stopped for Traffic	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E624879	12/26/2016	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - all others	Backing	Stopped at Signal or Stop Sign	Vehicle Stopped	Vehicle Backing	Vehicle Stopped	Vehicle Stopped
S07						29.24	E638652	02/04/2017	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	Entering at angle	Making Right Turn	Stopped at Signal or Stop Sign	West	South	Vehicle Stopped	Vehicle Stopped
S07						29.24	E665255	04/26/2017	No Apparent Injury	0	0	2	0	0	Truck Tractor & Semi-Trailer	Passenger Car	At Intersection and Related	From same direction - both going straight - one stopped - sideswipe	Making Left Turn	Stopped at Signal or Stop Sign	East	South	Vehicle Stopped	Vehicle Stopped
S07						29.24	E683003	06/19/2017	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	School Bus	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	North	South	Vehicle Stopped	Vehicle Stopped
S07						29.24	E737825	11/20/2017	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	From opposite direction - one left turn - one right turn	Making Left Turn	Making Right Turn	North	West	South	West
S07						29.24	E747792	12/15/2017	No Apparent Injury	0	0	2	0	0	Passenger Car	Passenger Car	At Intersection and Related	Entering at angle	Going Straight Ahead	Going Straight Ahead	East	West	South	North
S07						29.24	E752901	12/28/2017	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Passenger Car	At Intersection and Related	From same direction - both going straight - both moving - rear-end	Going Straight Ahead	Slowing	East	West	East	West
S07						29.24	E759859	01/17/2018	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	East	West	Vehicle Stopped	Vehicle Stopped
S07						29.24	E762375	01/11/2018	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	West	East	Vehicle Stopped	Vehicle Stopped
S07						29.24	E783262	03/28/2018	Possible Injury	1	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - all others	Backing	Stopped for Traffic	Vehicle Backing	Vehicle Backing	Vehicle Stopped	Vehicle Stopped
S07						29.24	E851164	10/20/2018	No Apparent Injury	0	0	2	0	0	Pickup,Panel Truck or Vanette under 10,000 lb	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From opposite direction - one left turn - one straight	Making Right Turn	Making Left Turn	West	South	East	South
S07						29.24	E891699	02/08/2019	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	At Intersection and Related	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped at Signal or Stop Sign	North	South	Vehicle Stopped	Vehicle Stopped
S07						29.27	E667692	05/04/2017	No Apparent Injury	0	0	2	0	0	Passenger Car	Pickup,Panel Truck or Vanette under 10,000 lb	Intersection Related but Not at Intersection	From same direction - both going straight - one stopped - rear-end	Going Straight Ahead	Stopped for Traffic	East	West	Vehicle Stopped	Vehicle Stopped

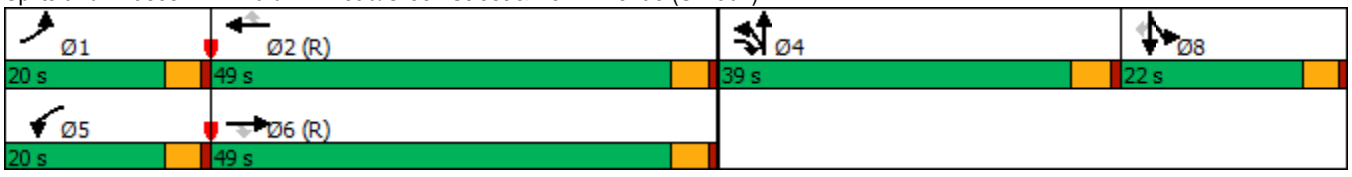
Appendix D

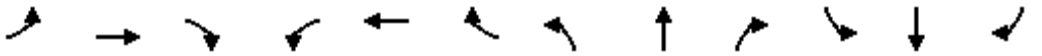
Operations Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	460	345	110	580	50	260	135	45	125	250	70
Future Volume (vph)	40	460	345	110	580	50	260	135	45	125	250	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	12	12	16	14	14	11	11	11
Storage Length (ft)	0		0	300		75	0		0	150		400
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			25	
Link Distance (ft)		166			1329			391			914	
Travel Time (s)		3.2			25.9			6.7			24.9	
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA		Split	NA	Perm
Protected Phases	1	6	4	5	2		4	4		8	8	
Permitted Phases			6		2	2						8
Detector Phase	1	6	4	5	2	2	4	4		8	8	8
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		6.0	6.0	6.0
Minimum Split (s)	10.5	31.6	37.9	10.5	37.6	37.6	37.9	37.9		10.5	10.5	10.5
Total Split (s)	20.0	49.0	39.0	20.0	49.0	49.0	39.0	39.0		22.0	22.0	22.0
Total Split (%)	15.4%	37.7%	30.0%	15.4%	37.7%	37.7%	30.0%	30.0%		16.9%	16.9%	16.9%
Yellow Time (s)	3.5	3.6	3.9	3.5	3.6	3.6	3.9	3.9		3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0
Lost Time Adjust (s)	-0.5	-0.6	-0.6	-0.5	-0.6	-0.6	-0.9	-0.9		-0.5	-0.5	0.0
Total Lost Time (s)	4.0	4.0	4.3	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes						
Recall Mode	None	C-Min	None	None	C-Min	C-Min	None	None		None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green, Master Intersection	
Natural Cycle: 110	
Control Type: Actuated-Coordinated	

Splits and Phases: 1: Bald Hill Road/Creek Street & Yelm Avenue (SR 507)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	460	345	110	580	50	260	135	45	125	250	70
Future Volume (veh/h)	40	460	345	110	580	50	260	135	45	125	250	70
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1945	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	42	484	363	116	611	53	274	142	47	132	263	76
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	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	71	892	1035	147	972	823	331	250	83	247	259	213
Arrive On Green	0.04	0.48	0.48	0.08	0.52	0.52	0.18	0.18	0.17	0.14	0.14	0.13
Sat Flow, veh/h	1781	1870	1583	1781	1870	1584	1853	1398	463	1781	1870	1579
Grp Volume(v), veh/h	42	484	363	116	611	53	274	0	189	132	263	76
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1781	1870	1584	1853	0	1860	1781	1870	1579
Q Serve(g_s), s	3.0	23.7	13.4	8.3	30.3	2.2	18.5	0.0	12.1	9.0	18.0	5.7
Cycle Q Clear(g_c), s	3.0	23.7	13.4	8.3	30.3	2.2	18.5	0.0	12.1	9.0	18.0	5.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.25	1.00		1.00
Lane Grp Cap(c), veh/h	71	892	1035	147	972	823	331	0	333	247	259	213
V/C Ratio(X)	0.59	0.54	0.35	0.79	0.63	0.06	0.83	0.00	0.57	0.54	1.02	0.36
Avail Cap(c_a), veh/h	219	892	1035	219	972	823	499	0	501	247	259	213
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.4	24.0	10.1	58.5	22.3	15.5	51.4	0.0	48.9	52.1	56.0	51.1
Incr Delay (d2), s/veh	5.7	2.4	0.9	8.7	3.1	0.2	5.9	0.0	1.1	1.8	60.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	10.9	7.7	4.1	13.7	0.8	9.0	0.0	5.6	4.2	12.9	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.1	26.3	11.1	67.2	25.3	15.7	57.3	0.0	50.0	53.9	116.0	51.9
LnGrp LOS	E	C	B	E	C	B	E	A	D	D	F	D
Approach Vol, veh/h		889			780			463			471	
Approach Delay, s/veh		22.0			30.9			54.3			88.2	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.2	71.6		27.2	14.7	66.0		22.0				
Change Period (Y+Rc), s	4.5	4.6		4.9	4.5	4.6		4.5				
Max Green Setting (Gmax), s	15.5	44.4		34.1	15.5	44.4		17.5				
Max Q Clear Time (g_c+I1), s	5.0	32.3		20.5	10.3	25.7		20.0				
Green Ext Time (p_c), s	0.0	4.2		1.6	0.1	4.9		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			42.4									
HCM 6th LOS			D									

Intersection	
Int Delay, s/veh	6.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	115	10	10	5	5	10	20	305	10	25	500	190
Future Vol, veh/h	115	10	10	5	5	10	20	305	10	25	500	190
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	126	11	11	5	5	11	22	335	11	27	549	209

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	924	1100	656	1106	1199	175	759	0	0	347	0	0
Stage 1	709	709	-	386	386	-	-	-	-	-	-	-
Stage 2	215	391	-	720	813	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.23	7.33	6.53	6.93	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	237	212	465	176	185	839	850	-	-	1210	-	-
Stage 1	424	436	-	610	609	-	-	-	-	-	-	-
Stage 2	768	606	-	418	391	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	215	197	464	155	171	837	849	-	-	1209	-	-
Mov Cap-2 Maneuver	215	197	-	155	171	-	-	-	-	-	-	-
Stage 1	410	418	-	590	589	-	-	-	-	-	-	-
Stage 2	726	586	-	381	375	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	48.8	19.4	0.6	0.3
HCM LOS	E	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	849	-	-	222	272	1209	-	-
HCM Lane V/C Ratio	0.026	-	-	0.668	0.081	0.023	-	-
HCM Control Delay (s)	9.4	0.1	-	48.8	19.4	8	0	-
HCM Lane LOS	A	A	-	E	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	4.2	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	10	5	5	125	200	15
Future Vol, veh/h	10	5	5	125	200	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
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	11	5	5	136	217	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	363	217	217	0	-	0
Stage 1	217	-	-	-	-	-
Stage 2	146	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	636	823	1353	-	-	0
Stage 1	819	-	-	-	-	0
Stage 2	881	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	633	823	1353	-	-	-
Mov Cap-2 Maneuver	633	-	-	-	-	-
Stage 1	816	-	-	-	-	-
Stage 2	881	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	10.4	0.3	0
HCM LOS	B		

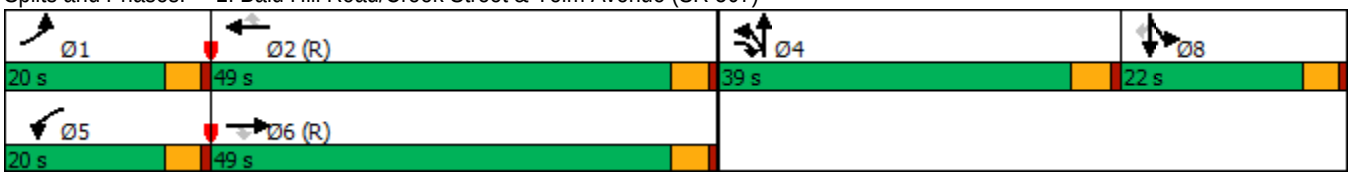
Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT
Capacity (veh/h)	1353	-	686	-
HCM Lane V/C Ratio	0.004	-	0.024	-
HCM Control Delay (s)	7.7	0	10.4	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

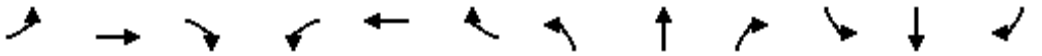
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	45	500	370	115	625	55	280	145	135	270	75
Future Volume (vph)	45	500	370	115	625	55	280	145	135	270	75
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	Split	NA	Perm
Protected Phases	1	6	4	5	2		4	4	8	8	
Permitted Phases			6		2	2					8
Detector Phase	1	6	4	5	2	2	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	10.5	31.6	37.9	10.5	37.6	37.6	37.9	37.9	10.5	10.5	10.5
Total Split (s)	20.0	49.0	39.0	20.0	49.0	49.0	39.0	39.0	22.0	22.0	22.0
Total Split (%)	15.4%	37.7%	30.0%	15.4%	37.7%	37.7%	30.0%	30.0%	16.9%	16.9%	16.9%
Maximum Green (s)	15.5	44.4	34.1	15.5	44.4	44.4	34.1	34.1	17.5	17.5	17.5
Yellow Time (s)	3.5	3.6	3.9	3.5	3.6	3.6	3.9	3.9	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-0.5	-0.6	-0.6	-0.5	-0.6	-0.6	-0.9	-0.9	-0.5	-0.5	0.0
Total Lost Time (s)	4.0	4.0	4.3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes					
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	None	C-Min	None	None	C-Min	C-Min	None	None	None	None	None
Walk Time (s)		6.0	6.0		6.0	6.0	6.0	6.0			
Flash Dont Walk (s)		21.0	27.0		27.0	27.0	27.0	27.0			
Pedestrian Calls (#/hr)		0	0		0	0	0	0			

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green, Master Intersection
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 1: Bald Hill Road/Creek Street & Yelm Avenue (SR 507)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	500	370	115	625	55	280	145	50	135	270	75
Future Volume (veh/h)	45	500	370	115	625	55	280	145	50	135	270	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1945	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	47	526	389	121	658	58	295	153	53	142	284	79
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	866	1030	152	948	803	352	262	91	247	259	213
Arrive On Green	0.04	0.46	0.46	0.09	0.51	0.51	0.19	0.19	0.18	0.14	0.14	0.13
Sat Flow, veh/h	1781	1870	1583	1781	1870	1583	1853	1380	478	1781	1870	1579
Grp Volume(v), veh/h	47	526	389	121	658	58	295	0	206	142	284	79
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1781	1870	1583	1853	0	1858	1781	1870	1579
Q Serve(g_s), s	3.4	27.3	14.8	8.7	34.8	2.4	19.9	0.0	13.1	9.7	18.0	5.9
Cycle Q Clear(g_c), s	3.4	27.3	14.8	8.7	34.8	2.4	19.9	0.0	13.1	9.7	18.0	5.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	74	866	1030	152	948	803	352	0	353	247	259	213
V/C Ratio(X)	0.64	0.61	0.38	0.79	0.69	0.07	0.84	0.00	0.58	0.58	1.10	0.37
Avail Cap(c_a), veh/h	219	866	1030	219	948	803	499	0	500	247	259	213
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.3	26.1	10.5	58.3	24.4	16.4	50.7	0.0	48.1	52.4	56.0	51.2
Incr Delay (d2), s/veh	6.5	3.2	1.1	10.2	4.2	0.2	7.5	0.0	1.1	2.8	84.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	12.7	8.7	4.3	16.0	0.9	9.8	0.0	6.1	4.6	14.6	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.9	29.3	11.6	68.5	28.6	16.6	58.2	0.0	49.2	55.2	140.2	52.0
LnGrp LOS	E	C	B	E	C	B	E	A	D	E	F	D
Approach Vol, veh/h		962			837			501			505	
Approach Delay, s/veh		24.0			33.5			54.5			102.5	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.4	69.9		28.7	15.1	64.2		22.0				
Change Period (Y+Rc), s	4.5	4.6		4.9	4.5	4.6		4.5				
Max Green Setting (Gmax), s	15.5	44.4		34.1	15.5	44.4		17.5				
Max Q Clear Time (g_c+I1), s	5.4	36.8		21.9	10.7	29.3		20.0				
Green Ext Time (p_c), s	0.0	3.3		1.7	0.1	4.9		0.0				

Intersection Summary												
HCM 6th Ctrl Delay			46.4									
HCM 6th LOS			D									

Intersection	
Int Delay, s/veh	8.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	125	10	10	5	5	15	20	330	10	25	540	205
Future Vol, veh/h	125	10	10	5	5	15	20	330	10	25	540	205
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	137	11	11	5	5	16	22	363	11	27	593	225

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	990	1180	708	1186	1287	189	819	0	0	375	0	0
Stage 1	761	761	-	414	414	-	-	-	-	-	-	-
Stage 2	229	419	-	772	873	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.23	7.33	6.53	6.93	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	213	190	434	154	164	821	807	-	-	1182	-	-
Stage 1	397	413	-	587	592	-	-	-	-	-	-	-
Stage 2	754	589	-	391	367	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	191	175	433	134	151	819	806	-	-	1181	-	-
Mov Cap-2 Maneuver	191	175	-	134	151	-	-	-	-	-	-	-
Stage 1	383	394	-	566	571	-	-	-	-	-	-	-
Stage 2	706	568	-	354	350	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	72.5	19.1	0.6	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	806	-	-	197	282	1181	-	-
HCM Lane V/C Ratio	0.027	-	-	0.809	0.097	0.023	-	-
HCM Control Delay (s)	9.6	0.1	-	72.5	19.1	8.1	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	5.7	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	0.7

Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	15	5	5	135	215	15
Future Vol, veh/h	15	5	5	135	215	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
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	16	5	5	147	234	16

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	391	234	234	0	-	0
Stage 1	234	-	-	-	-	-
Stage 2	157	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	613	805	1333	-	-	0
Stage 1	805	-	-	-	-	0
Stage 2	871	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	611	805	1333	-	-	-
Mov Cap-2 Maneuver	611	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	871	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	10.7	0.3	0
HCM LOS	B		

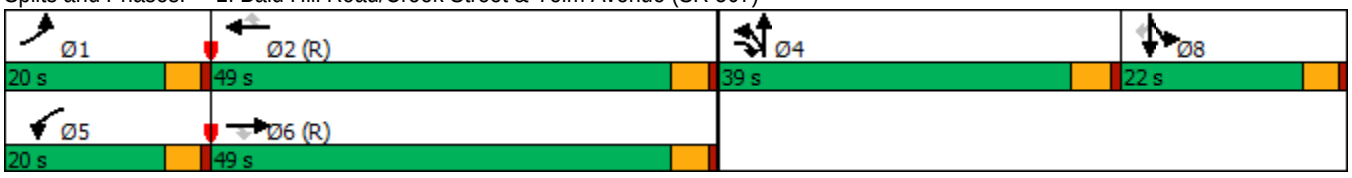
Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT
Capacity (veh/h)	1333	-	650	-
HCM Lane V/C Ratio	0.004	-	0.033	-
HCM Control Delay (s)	7.7	0	10.7	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0.1	-

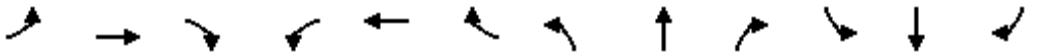
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations											
Traffic Volume (vph)	45	505	370	125	625	55	290	145	135	270	75
Future Volume (vph)	45	505	370	125	625	55	290	145	135	270	75
Turn Type	Prot	NA	pm+ov	Prot	NA	Perm	Split	NA	Split	NA	Perm
Protected Phases	1	6	4	5	2		4	4	8	8	
Permitted Phases			6		2	2					8
Detector Phase	1	6	4	5	2	2	4	4	8	8	8
Switch Phase											
Minimum Initial (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Minimum Split (s)	10.5	31.6	37.9	10.5	37.6	37.6	37.9	37.9	10.5	10.5	10.5
Total Split (s)	20.0	49.0	39.0	20.0	49.0	49.0	39.0	39.0	22.0	22.0	22.0
Total Split (%)	15.4%	37.7%	30.0%	15.4%	37.7%	37.7%	30.0%	30.0%	16.9%	16.9%	16.9%
Maximum Green (s)	15.5	44.4	34.1	15.5	44.4	44.4	34.1	34.1	17.5	17.5	17.5
Yellow Time (s)	3.5	3.6	3.9	3.5	3.6	3.6	3.9	3.9	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	-0.5	-0.6	-0.6	-0.5	-0.6	-0.6	-0.9	-0.9	-0.5	-0.5	0.0
Total Lost Time (s)	4.0	4.0	4.3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.5
Lead/Lag	Lead	Lag		Lead	Lag	Lag					
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes					
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Minimum Gap (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Time To Reduce (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Recall Mode	None	C-Min	None	None	C-Min	C-Min	None	None	None	None	None
Walk Time (s)		6.0	6.0		6.0	6.0	6.0	6.0			
Flash Dont Walk (s)		21.0	27.0		27.0	27.0	27.0	27.0			
Pedestrian Calls (#/hr)		0	0		0	0	0	0			

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green, Master Intersection
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 1: Bald Hill Road/Creek Street & Yelm Avenue (SR 507)





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	505	370	125	625	55	290	145	50	135	270	75
Future Volume (veh/h)	45	505	370	125	625	55	290	145	50	135	270	75
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1945	1945	1945	1870	1870	1870
Adj Flow Rate, veh/h	47	532	389	132	658	58	305	153	53	142	284	79
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, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	74	844	1020	164	938	794	362	269	93	247	259	213
Arrive On Green	0.04	0.45	0.45	0.09	0.50	0.50	0.20	0.20	0.19	0.14	0.14	0.13
Sat Flow, veh/h	1781	1870	1583	1781	1870	1583	1853	1380	478	1781	1870	1579
Grp Volume(v), veh/h	47	532	389	132	658	58	305	0	206	142	284	79
Grp Sat Flow(s),veh/h/ln	1781	1870	1583	1781	1870	1583	1853	0	1858	1781	1870	1579
Q Serve(g_s), s	3.4	28.3	15.1	9.4	35.2	2.5	20.6	0.0	13.1	9.7	18.0	5.9
Cycle Q Clear(g_c), s	3.4	28.3	15.1	9.4	35.2	2.5	20.6	0.0	13.1	9.7	18.0	5.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	74	844	1020	164	938	794	362	0	363	247	259	213
V/C Ratio(X)	0.64	0.63	0.38	0.81	0.70	0.07	0.84	0.00	0.57	0.58	1.10	0.37
Avail Cap(c_a), veh/h	219	844	1020	219	938	794	499	0	500	247	259	213
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	61.3	27.3	10.9	57.9	24.9	16.8	50.4	0.0	47.5	52.4	56.0	51.2
Incr Delay (d2), s/veh	6.5	3.6	1.1	13.2	4.4	0.2	8.3	0.0	1.0	2.8	84.2	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	13.3	8.9	4.8	16.2	0.9	10.2	0.0	6.1	4.6	14.6	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	67.9	30.9	12.0	71.1	29.3	16.9	58.7	0.0	48.5	55.2	140.2	52.0
LnGrp LOS	E	C	B	E	C	B	E	A	D	E	F	D
Approach Vol, veh/h		968			848			511			505	
Approach Delay, s/veh		25.1			34.9			54.6			102.5	
Approach LOS		C			C			D			F	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	9.4	69.2		29.4	15.9	62.7		22.0				
Change Period (Y+Rc), s	4.5	4.6		4.9	4.5	4.6		4.5				
Max Green Setting (Gmax), s	15.5	44.4		34.1	15.5	44.4		17.5				
Max Q Clear Time (g_c+I1), s	5.4	37.2		22.6	11.4	30.3		20.0				
Green Ext Time (p_c), s	0.0	3.2		1.7	0.1	4.8		0.0				

Intersection Summary			
HCM 6th Ctrl Delay		47.2	
HCM 6th LOS		D	

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	135	10	15	5	5	15	20	330	10	25	540	210
Future Vol, veh/h	135	10	15	5	5	15	20	330	10	25	540	210
Conflicting Peds, #/hr	1	0	1	1	0	1	1	0	1	1	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	148	11	16	5	5	16	22	363	11	27	593	231

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	993	1183	711	1191	1293	189	825	0	0	375	0	0
Stage 1	764	764	-	414	414	-	-	-	-	-	-	-
Stage 2	229	419	-	777	879	-	-	-	-	-	-	-
Critical Hdwy	7.33	6.53	6.23	7.33	6.53	6.93	4.13	-	-	4.13	-	-
Critical Hdwy Stg 1	6.13	5.53	-	6.53	5.53	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.53	5.53	-	6.13	5.53	-	-	-	-	-	-	-
Follow-up Hdwy	3.519	4.019	3.319	3.519	4.019	3.319	2.219	-	-	2.219	-	-
Pot Cap-1 Maneuver	212	189	432	153	162	821	803	-	-	1182	-	-
Stage 1	395	412	-	587	592	-	-	-	-	-	-	-
Stage 2	754	589	-	389	364	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	190	174	431	132	149	819	802	-	-	1181	-	-
Mov Cap-2 Maneuver	190	174	-	132	149	-	-	-	-	-	-	-
Stage 1	381	393	-	566	571	-	-	-	-	-	-	-
Stage 2	705	568	-	347	348	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	85.7	19.3	0.7	0.3
HCM LOS	F	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	802	-	-	199	279	1181	-	-
HCM Lane V/C Ratio	0.027	-	-	0.884	0.098	0.023	-	-
HCM Control Delay (s)	9.6	0.2	-	85.7	19.3	8.1	0	-
HCM Lane LOS	A	A	-	F	C	A	A	-
HCM 95th %tile Q(veh)	0.1	-	-	6.8	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	1

Movement	SBL	SBR	NEL	NET	SWT	SWR
Lane Configurations						
Traffic Vol, veh/h	25	5	5	135	215	25
Future Vol, veh/h	25	5	5	135	215	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	Free
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	27	5	5	147	234	27

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	391	234	234	0	-	0
Stage 1	234	-	-	-	-	-
Stage 2	157	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	613	805	1333	-	-	0
Stage 1	805	-	-	-	-	0
Stage 2	871	-	-	-	-	0
Platoon blocked, %				-	-	
Mov Cap-1 Maneuver	611	805	1333	-	-	-
Mov Cap-2 Maneuver	611	-	-	-	-	-
Stage 1	802	-	-	-	-	-
Stage 2	871	-	-	-	-	-

Approach	SB	NE	SW
HCM Control Delay, s	11	0.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NEL	NET	SBLn1	SWT
Capacity (veh/h)	1333	-	637	-
HCM Lane V/C Ratio	0.004	-	0.051	-
HCM Control Delay (s)	7.7	0	11	-
HCM Lane LOS	A	A	B	-
HCM 95th %tile Q(veh)	0	-	0.2	-

Intersection	
Int Delay, s/veh	0.2

Movement	SET	SER	NWL	NWT	NEL	NER
Lane Configurations						
Traffic Vol, veh/h	895	30	0	990	0	25
Future Vol, veh/h	895	30	0	990	0	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	973	33	0	1076	0	27

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	990
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	-	0	299
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	299
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0	18.2
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NWT	SET	SER
Capacity (veh/h)	299	-	-	-
HCM Lane V/C Ratio	0.091	-	-	-
HCM Control Delay (s)	18.2	-	-	-
HCM Lane LOS	C	-	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-

Appendix E

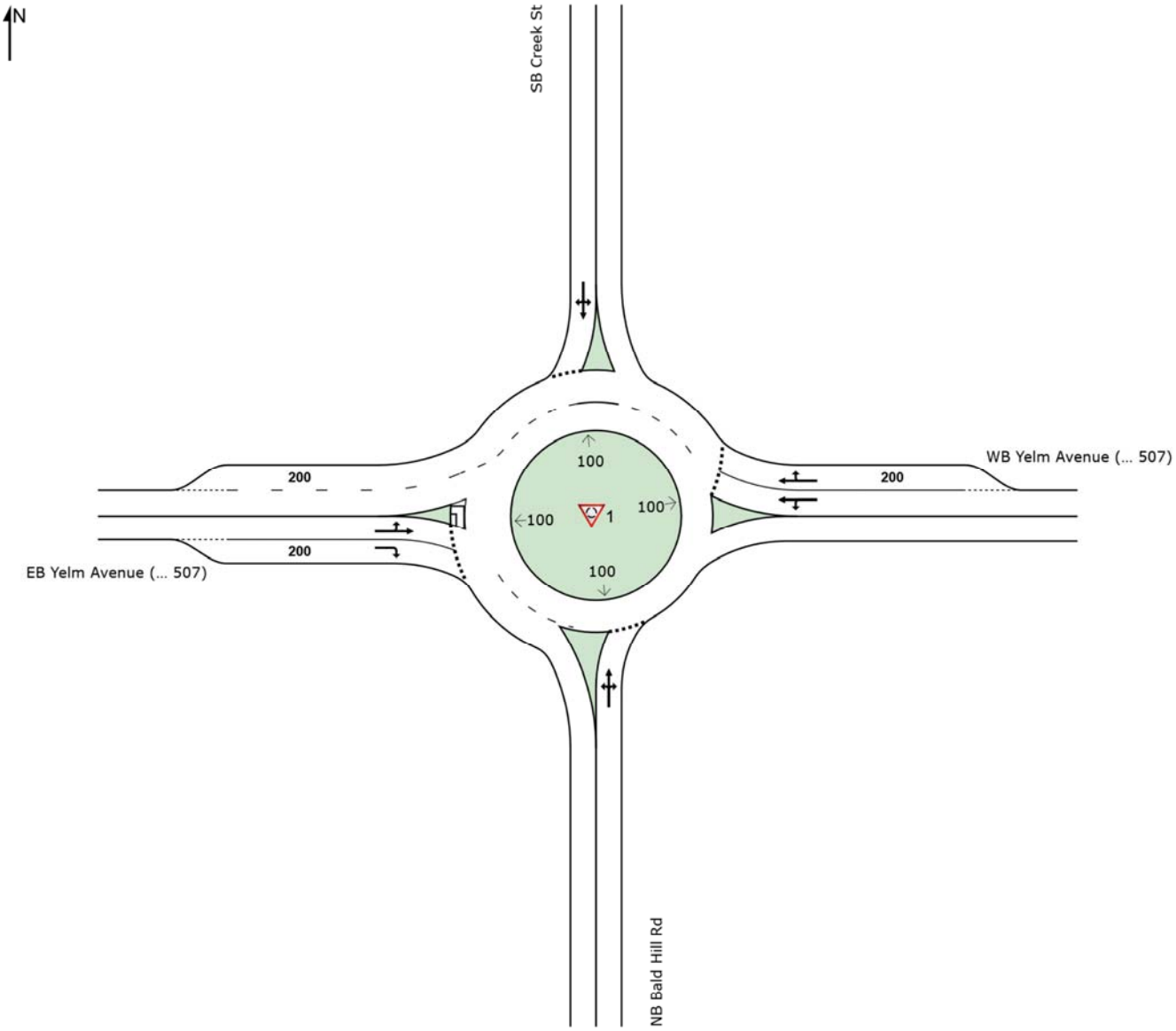
Roundabout Analysis Worksheets

SITE LAYOUT

Site: 1 [SR 507-Bald Hill - 2 WB thru (Site Folder: General)]

Projected 2023 with Project
PM Peak Hour
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 1 [SR 507-Bald Hill - 2 WB thru (Site Folder: General)]

Projected 2023 with Project
PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
South: NB Bald Hill Rd														
3	L2	290	2.0	305	2.0	0.704	20.2	LOS C	8.1	207.0	0.98	1.14	1.38	31.2
8	T1	145	2.0	153	2.0	0.704	14.1	LOS B	8.1	207.0	0.98	1.14	1.38	31.1
18	R2	50	2.0	53	2.0	0.704	14.2	LOS B	8.1	207.0	0.98	1.14	1.38	30.4
Approach		485	2.0	511	2.0	0.704	17.8	LOS B	8.1	207.0	0.98	1.14	1.38	31.1
East: WB Yelm Avenue (SR 507)														
1	L2	125	2.0	132	2.0	0.584	13.3	LOS B	5.7	145.1	0.84	0.79	0.92	34.6
6	T1	625	2.0	658	2.0	0.584	8.1	LOS A	5.7	145.1	0.80	0.76	0.87	34.8
16	R2	55	2.0	58	2.0	0.284	7.1	LOS A	1.8	45.0	0.70	0.69	0.70	34.4
Approach		805	2.0	847	2.0	0.584	8.8	LOS A	5.7	145.1	0.80	0.76	0.86	34.7
North: SB Creek St														
7	L2	135	2.0	142	2.0	0.882	29.0	LOS C	10.6	269.0	0.98	1.33	1.99	28.4
4	T1	270	2.0	284	2.0	0.882	23.2	LOS C	10.6	269.0	0.98	1.33	1.99	28.3
14	R2	75	2.0	79	2.0	0.882	25.8	LOS C	10.6	269.0	0.98	1.33	1.99	27.6
Approach		480	2.0	505	2.0	0.882	25.2	LOS C	10.6	269.0	0.98	1.33	1.99	28.2
West: EB Yelm Avenue (SR 507)														
5	L2	45	2.0	47	2.0	0.565	14.0	LOS B	5.5	139.8	0.86	0.83	0.96	35.0
2	T1	505	2.0	532	2.0	0.565	7.9	LOS A	5.5	139.8	0.86	0.83	0.96	35.0
12	R2	370	2.0	389	2.0	0.480	8.4	LOS A	3.8	96.3	0.82	0.85	0.87	34.2
Approach		920	2.0	968	2.0	0.565	8.4	LOS A	5.5	139.8	0.84	0.84	0.92	34.7
All Vehicles		2690	2.0	2832	2.0	0.882	13.2	LOS B	10.6	269.0	0.88	0.96	1.18	32.7

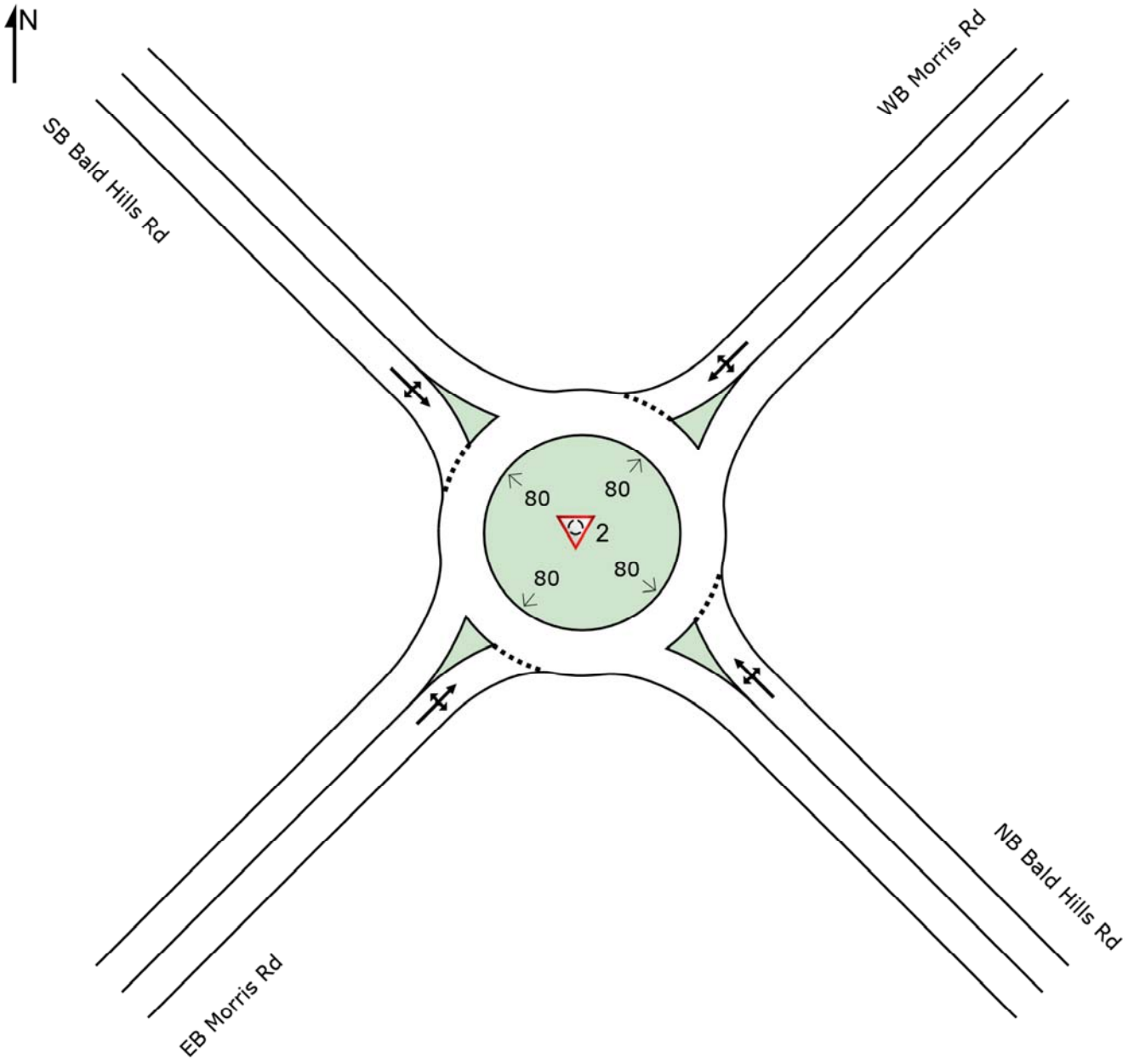
Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will 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.

SITE LAYOUT

Site: 2 [Morris Rd-Bald Hill (Site Folder: General)]

Projected 2023 with Project
PM Peak Hour
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 2 [Morris Rd-Bald Hill (Site Folder: General)]

Projected 2023 with Project
PM Peak Hour
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] ft	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed mph
SouthEast: NB Bald Hills Rd														
3x	L2	20	2.0	22	2.0	0.351	10.5	LOS B	2.2	55.2	0.44	0.53	0.44	35.8
8x	T1	330	2.0	363	2.0	0.351	5.3	LOS A	2.2	55.2	0.44	0.53	0.44	35.9
18x	R2	10	2.0	11	2.0	0.351	5.2	LOS A	2.2	55.2	0.44	0.53	0.44	34.9
Approach		360	2.0	396	2.0	0.351	5.6	LOS A	2.2	55.2	0.44	0.53	0.44	35.9
NorthEast: WB Morris Rd														
1x	L2	5	2.0	5	2.0	0.031	11.8	LOS B	0.2	3.9	0.55	0.62	0.55	35.4
6x	T1	5	2.0	5	2.0	0.031	6.6	LOS A	0.2	3.9	0.55	0.62	0.55	35.4
16x	R2	15	2.0	16	2.0	0.031	6.5	LOS A	0.2	3.9	0.55	0.62	0.55	34.5
Approach		25	2.0	27	2.0	0.031	7.6	LOS A	0.2	3.9	0.55	0.62	0.55	34.9
NorthWest: SB Bald Hills Rd														
7x	L2	25	2.0	27	2.0	0.659	9.8	LOS A	6.9	174.0	0.28	0.43	0.28	36.5
4x	T1	540	2.0	593	2.0	0.659	4.6	LOS A	6.9	174.0	0.28	0.43	0.28	36.5
14x	R2	210	2.0	231	2.0	0.659	4.5	LOS A	6.9	174.0	0.28	0.43	0.28	35.5
Approach		775	2.0	852	2.0	0.659	4.7	LOS A	6.9	174.0	0.28	0.43	0.28	36.3
SouthWest: EB Morris Rd														
5x	L2	135	2.0	148	2.0	0.214	13.0	LOS B	1.2	30.3	0.65	0.79	0.65	33.2
2x	T1	10	2.0	11	2.0	0.214	7.7	LOS A	1.2	30.3	0.65	0.79	0.65	33.3
12x	R2	15	2.0	16	2.0	0.214	7.6	LOS A	1.2	30.3	0.65	0.79	0.65	32.5
Approach		160	2.0	176	2.0	0.214	12.1	LOS B	1.2	30.3	0.65	0.79	0.65	33.2
All Vehicles		1320	2.0	1451	2.0	0.659	5.9	LOS A	6.9	174.0	0.38	0.50	0.38	35.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Signalised Intersections.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
Intersection and Approach LOS values are based on average delay for all movements (v/c not used).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: HCM Queue Formula.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Stormwater Site Plan

Yelm Popeyes
Yelm, WA

Prepared For:
2812 Architecture
2812 Colby Ave.
Everett, WA 98201

Prepared By:
SCJ Alliance
8730 Tallon Lane NE, Suite 200
Lacey, WA 98516
360-352-1465

June 2022

SCJ ALLIANCE
CONSULTING SERVICES

Stormwater Site Plan

Project Information

Project:	**Popeyes**
Prepared for:	**2812 Architecture** 2812 Colby Ave. Everett, WA 98201 Contact Name: Adam Clark Contact Phone: 425-252-2153

Reviewing Agency

Jurisdiction:	City of Yelm

Project Representative

Prepared by:	**SCJ Alliance** 8730 Tallon Lane NE, Suite 200 Lacey, WA 98516 360.352.1465 scjalliance.com
Contact:	Whitney Holm, PE
Project Reference:	SCJ #1849.06 Path: N:\Projects\1849 2812 Architecture\1849.06 Yelm Popeyes\Phase 03 - Construction Documents\Design\Storm\Stormwater Site Plan\2020-xxxx Stormwater Site Plan.docx

PROJECT ENGINEER'S CERTIFICATION

I hereby certify that this Stormwater Site Plan for the Yelm Popeyes project has been prepared by me or under my supervision and meets the minimum standards of the City of Yelm and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities designed by me.

6-6-2022

Prepared by: Ronald Boursaw, PE Date
Ronald.Boursaw@scjalliance.com
(360) 352-1465

6-6-2022

Approved by: Whitney Holm, PE Date
Whitney.Holm@scjalliance.com
(360) 352-1465

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1. PROJECT OVERVIEW

The following report was prepared for the Popeyes project in Yelm, WA. This report was prepared to comply with the minimum technical standards and requirements that are set forth in the *2014 Department of Ecology Stormwater Management Manual for Western Washington (SWMMWW).*

Project Proponent:	Popeyes
Parcel Numbers:	22730140400
Total Parcel Area:	0.97 Acres
Current Zoning:	C-1: Commercial
Required Permits:	Grading, Utility, Paving, Building, etc.
Site Address:	1405 Yelm Ave E
Section, Township, Range:	Section 30, Township 17 N, Range 2 E

The proposed Popeyes site is located on one parcel that contains a total of 0.97 acres. The project is located on the south west corner of Yelm Ave. E and Bald Hills Road SE in Yelm, WA. The proposed construction includes a Popeyes drive-thru fast-food restaurant as well as associated parking lot, utilities, and stormwater improvements disturbing approximately 0.97 acres. As well as an offsite access road to provide access to the site off of Yelm Ave E. Specifically, the proposed site improvements/construction activities for this project include the following:

- Site preparation, grading, and erosion control activities
- Construction of Popeyes restaurant and drive-thru
- Construction of parking lot
- Construction/installation of on-site water quality and flow control facilities
- Extension of available utilities (i.e., water, sewer, etc.)
- Offsite access road through neighboring parcel to the west

A site vicinity map of the proposed project location is enclosed herein as **Appendix 1**. A worksheet for determining the number of Minimum Requirements for this project per the SWMMWW has been prepared and enclosed herein as **Appendix 2**. The proposed project is substantially developed and will be considered a redevelopment project that triggers all of the minimum requirements.

1.1 SUMMARY OF COMPLIANCE ON-SITE

The stormwater design complies with the 9 minimum requirements as follows:

Minimum Requirement #1 – Preparation of Stormwater Site Plans – The Stormwater Site Plan is prepared per the 2014 SWMMWW.

Minimum Requirement #2 – Construction Stormwater Pollution Prevention – A pollution prevention is included herein as **Appendix 7**. Further, an erosion control plan is included as part of the engineering construction plan set in **Appendix 4**.

Minimum Requirement #3 – Source Control of Pollution – BMPs listed below are the minimum required for the site, additional BMPs not listed here may need to be implemented the meet the minimum requirements discussed in the 2014 SWMMWW.

- S411 BMPs for Landscaping and Lawn/Vegetation Management
- S417 BMPs for Maintenance of Stormwater Drainage and Treatment Systems
- S421 BMPs for Parking and Storage of Vehicles and Equipment
- S426 BMPs for Spills of Oil and Hazardous Substances

Minimum Requirement #4 – Preservation of Natural Drainage Systems and Outfalls – Currently, stormwater runoff within the parcel sheet flows to the west into a biofiltration system that appears to provide treatment and flow control for the on-site improvements. After construction, this system will be removed and replaced with a mechanical basic treatment system and an underground infiltration gallery.

Minimum Requirement #5 – On-site Stormwater Management – In accordance with Minimum Requirement #7, this project is not flow control exempt. Using Table I-2.5.1: On-Site Stormwater Management Requirements for Project Triggering Minimum Requirements #1-9, the proposed project is a redevelopment located in the UGA on a parcel smaller than 5 acres, therefore the project shall employ the On-Site Stormwater Management BMPs in accordance with the Low Impact Performance Standard or List #2. The project will demonstrate compliance with List #2, see below.

Lawn and Landscaped Areas:

- Per the 2014 SWMMWW manual, BMP T5.13: Post Construction Soil Quality and Depth will be utilized to the maximum extent practicable. See landscape plans for details.

Roofs:

- Full Dispersion (BMP T5.30) or Downspout Full Infiltration Systems (BMP T5.10A): Full dispersion is not feasible for this project site. Full dispersion requires that the site protects at least 65% of the site in a forest or native condition. For this reason alone this BMP is not feasible. In addition, the existing topography and adjacent existing development areas combined with the site plan does not allow for the required native flow paths at the appropriate slopes (less than 15% away from the target surfaces). Full Infiltration Systems are feasible for the project site and will be used for the proposed roof areas. Stormwater runoff from the proposed roof will be collected and tightlined directly to the underground rock gallery.

Other Hard Surfaces:

- Full Dispersion (BMP T5.30): Full dispersion is not feasible for this project site for the reasons mentioned above.
- Permeable Pavement (BMP T5.15): Based on the use of the site and the location of the parcel, basic treatment is required for the stormwater runoff prior to infiltration. A permeable pavement system would not allow for the stormwater runoff to be treated prior to infiltration into the soils.
- Bioretention (BMP T7.30): Bioretention is also is not feasible for this project. Due to the proposed site plan and the adjacent development areas, there is not space for an above ground stormwater facility.
- Sheet Flow Dispersion (BMP T5.12) or Concentrated Flow Dispersion (BMP T5.11): Sheet flow dispersion and concentrated flow dispersion are both not feasible for this project. The locations of the existing roadways and developments do not allow for the required native flow paths for the stormwater runoff coming off of the target surfaces. Additionally, the requirements that need to be met for Minimum

Requirement #6 require that the stormwater runoff be collected and treated prior to infiltration into the soils, this would not be possible prior to dispersion.

- Stormwater runoff from the proposed improvements will be collected, treated and infiltrated on-site in an underground rock gallery.

Minimum Requirement #6 – Runoff Treatment – The proposed project will construct over 5,000 S.F. of pollution-generating impervious surface, therefore a stormwater treatment facility is required. The project is not considered a high use site or a commercial/industrial project, therefore only basic treatment is required.

Minimum Requirement #7 – Flow Control – The proposed project will construct over 10,000 S.F. of effective impervious surfaces and will not be discharging into flow control exempt waters per Appendix I-E of the SWMMWW, Flow Control-Exempt Surface Waters. Therefore, flow control is required for this project. The proposed project is considered one drainage basin. Stormwater runoff from the proposed improvements will be collected, treated, and infiltrated in an underground rock gallery located on-site.

Minimum Requirement #8 – Wetlands Protection – There are no wetlands on the project site nor does the project site does currently discharge into a wetland.

Minimum Requirement #9 – Operation and Maintenance – An operations and maintenance manual is included and attached herein as **Appendix 6**.

2. EXISTING CONDITIONS SUMMARY

2.1 EXISTING ON-SITE CONDITIONS

The subject site is +/- 0.97 acres in size. Topography within the property generally flat throughout the site and slopes from east to west at slopes between 0-4%. The site appears to have been cleared and developed with a parking lot sometime between 1990 and 2019

See the figures below.

Figure 1: Existing Conditions (1990)

Figure 2: Existing Conditions (2019)

2.1.1 Flood Hazard Zone

Flood Zones: The project parcel is located with Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 53067C0362E. According to the map, the project site is located within Zone X which is determined to be an area of minimal flood hazard. See **Appendix 8** for the FIRM Map that reflects the previous conditions.

2.1.2 On-Site Soils Information

A geotechnical investigation was conducted by GeoEngineers in September, 2015 for the Yelm Development adjacent to the proposed project. Ten test pits were conducted to depths of approximately 10 to 16 feet bgs. The soils generally encountered were a weathered outwash, an upper outwash, and a lower outwash. The upper outwash was present within all test pit locations except in TP-7 where the lower outwash was overlain by the weathered outwash. Grass or sod and significant organics were typically present within the top 3 to 6 inches of the explorations. The weathered outwash generally was in a loose to medium dense condition and consists of silty sand with gravel, gravel with silt and sand and occasional organic material. The upper outwash generally was in a medium dense condition and consists of one or more layers of gravel with sand and occasional cobbles, (up to 1 foot in diameter), silty sand, and sand with silt. The lower outwash generally is in a medium dense to dense condition and consists of gravel with sand and occasional cobbles up to and potentially greater than 1 foot in diameter. All the explorations terminated in the lower outwash. The majority of the site was determined to have an infiltration rate of 20 inches per hour. No groundwater was encountered in the test pits and a review of the monitoring wells in the area indicated that the static groundwater is encountered at depths between 26 feet and 59 feet. See **Appendix 5** for the geotechnical report.

3. OFFSITE ANALYSIS REPORT

3.1 QUALITATIVE UPSTREAM ANALYSIS

Due to the adjacent roadways and existing development, there are no upstream areas with stormwater run-on onto the parcel.

3.2 QUALITATIVE DOWNSTREAM ANALYSIS

All of the stormwater runoff generated by the disturbed developed area of the parcel will be collected, treated, and infiltrated on-site. The site currently infiltrates the stormwater runoff on-site and will not change the downstream runoff flows. Therefore, there are no anticipated adverse affects to the downstream systems.

4. PERMANENT STORMWATER CONTROL PLAN

4.1 SUMMARY SECTION

The proposed project follows the development requirements stated in the 2014 SWMMWW. Following Figure 2.4.1 (See **Appendix 2**), this project classifies as a new development that triggers all of the minimum requirements. The site does not have 35% or more of existing impervious coverage, and the project will add more than 5,000 S.F. of new impervious surfaces. See **Appendix 4** for the proposed stormwater facility locations and details. Table 1:

Land Type Designations Existing vs. Proposed below illustrates the existing and proposed impervious and pervious areas of the disturbed areas (See **Appendix 3** for the basin map).

LAND TYPE DESIGNATIONS	AREA (ACRES)	% OF TOTAL AREA
Existing Areas	**0.97**	**100**
Impervious	0.50	51.55
Pervious	0.47	48.45
Proposed Areas	**0.97**	**100**
Roof	0.05	5.15
Asphalt	0.36	37.11
Sidewalk	0.08	8.25
Landscape	0.48	49.49
Offsite Area	**0.14**	**100**
Asphalt	0.14	100

Table 1: Land Type Designations Existing vs. Proposed

4.1.1 Performance Standards and Goals

Following Figure 2.4.1 – Flow Chart for Determining Requirements for New Development, the project site is considered a redevelopment. Following Figure 2.4.2 – Flow Chart for Determining Requirements for Redevelopment, the project triggers the use of Minimum Requirements #1-9. All of the stormwater runoff from the disturbed area of the project parcel will be collected, treated, and infiltrated on-site. Basic treatment will be provided for all of the pollution-generating impervious surfaces through the use of Contech Stormfilters.

Off-site runoff from the access road will sheetflow off the roadway surface and infiltrate. A future development is planned for that parcel and will address the stormwater during that design process.

4.1.2 Flow Control System

Flow control is required for the proposed development and will be provided through an underground rock gallery. The 2012 Western Washington Hydrology Model (WWHM) was used to size the flow control facility so that it meets Minimum Requirement #7. All of the stormwater runoff on-site will be collected, treated, and infiltrated on-site. According to WWHM, the 0.97-acre site requires a rock gallery with 660 s.f. and 4 feet of total depth storage depth and 1 foot of freeboard. The facility was design with 20 inches per hour and is lined with filter fabric. The drainage plan with the detention and conveyance layouts has been included as **Appendix 4**. See **Appendix 9** for the WWHM report.

4.1.3 Water Quality System

Basic treatment will be provided for the proposed development through the use of Contech Stormfilters. The Stormfilters will precede the detention system and therefore are required to treat the flow rate at or below which 91% of the runoff volume, as estimated by WWHM. At this stage in design, it is assumed that the stormwater runoff from the sidewalk areas will flow across the asphalt parking areas, and therefore were included in the treatment facility sizing. The Contech system is equipped with an internal bypass and therefore can be sized using the off-line water quality flow rates. Each 18" Tall Phosphosorb cartridge can treat up to 12.53 gpm per cartridge and the required treatment flow rate is 0.0431 cfs (16.11 gpm). Therefore, 2 cartridges are required to provide the

appropriate treatment. The drainage plan with the locations of the treatment facilities has been included as **Appendix 4**. See **Appendix 9** for the WWHM report.

4.1.4 Conveyance System Analysis and Design

All stormwater conveyance systems has been sized to convey the 24-hour 25-year storm within the pipe. All proposed stormwater pipes are a minimum of 12" at a minimum slope of 0.50%.

5. CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN (C-SWPPP)

A SWPPP will be prepared and attached herein as **Appendix 7** at the time of the civil permit submittal.

6. SPECIAL REPORTS AND STUDIES

See **Appendix 5** for the geotechnical report. No other special reports or studies were required for this project.

7. OTHER PERMITS

Utility, paving, building, and grading permits may need to be secured prior to beginning construction activities.

8. OPERATION AND MAINTENANCE MANUAL

The owner of the Popeyes will be responsible in maintaining all stormwater facilities on-site. An operation and maintenance manual will be completed and included herein as **Appendix 6** at the time of the civil permit submittal.

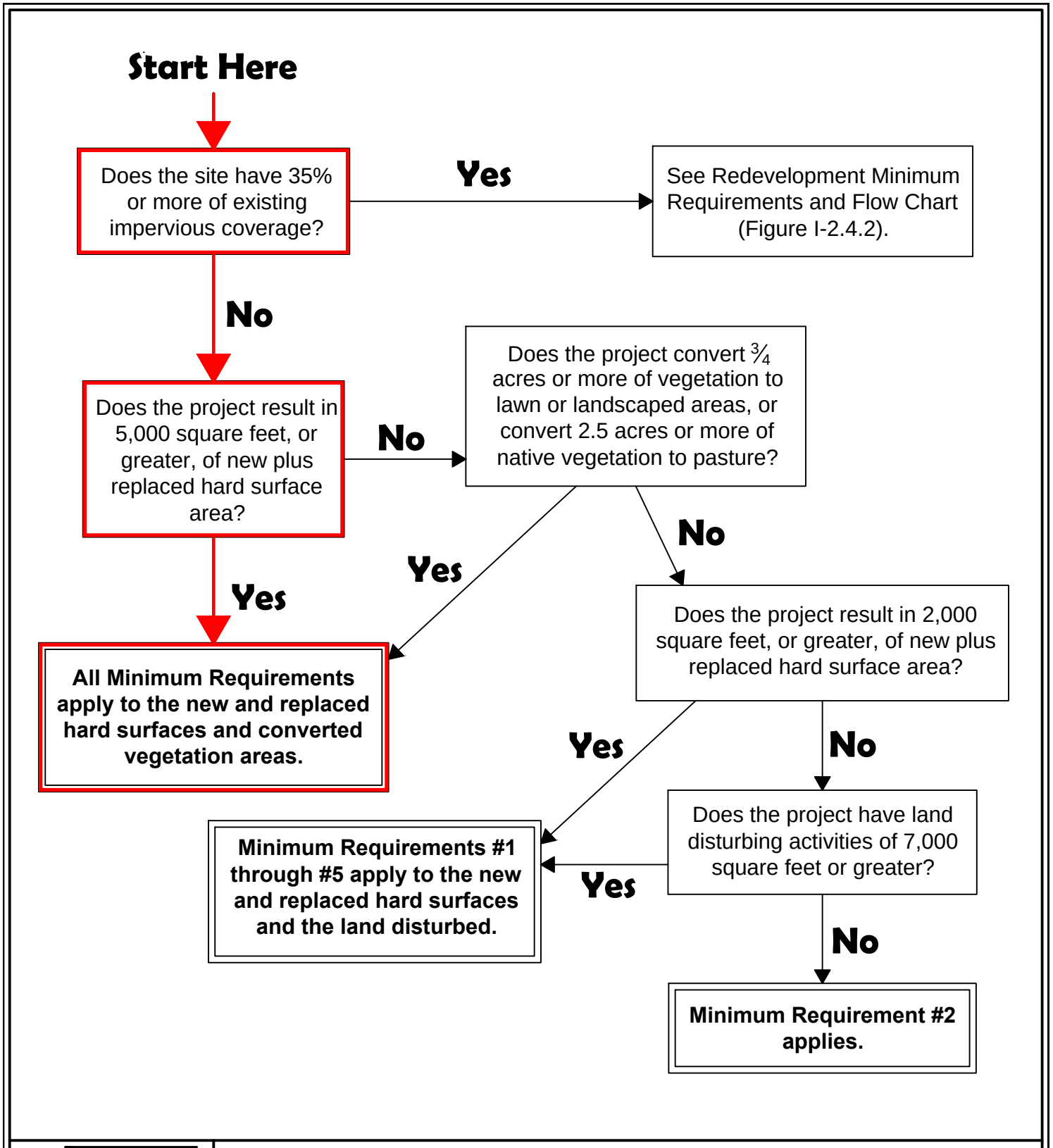
END OF STORMWATER SITE PLAN

APPENDIX 1
SITE VICINITY MAP

SCJ ALLIANCE
CONSULTING SERVICES

APPENDIX 2

DETERMINATION OF MINIMUM REQUIREMENTS WORKSHEET



DEPARTMENT OF ECOLOGY
State of Washington

Figure I-2.4.1
Flow Chart for Determining Requirements for New Development

Revised June 2015

APPENDIX 3
BASIN MAP EXHIBITS

EXISTING BASIN AREAS:

BASIN 1:

IMPERVIOUS AREAS:	0.50 ACRES
PERVIOUS AREAS:	0.47 ACRES

BASIN 2:

IMPERVIOUS AREA:	0.06 ACRES
PERVIOUS AREAS:	0.08 ACRES
TOTAL:	1.11 ACRES

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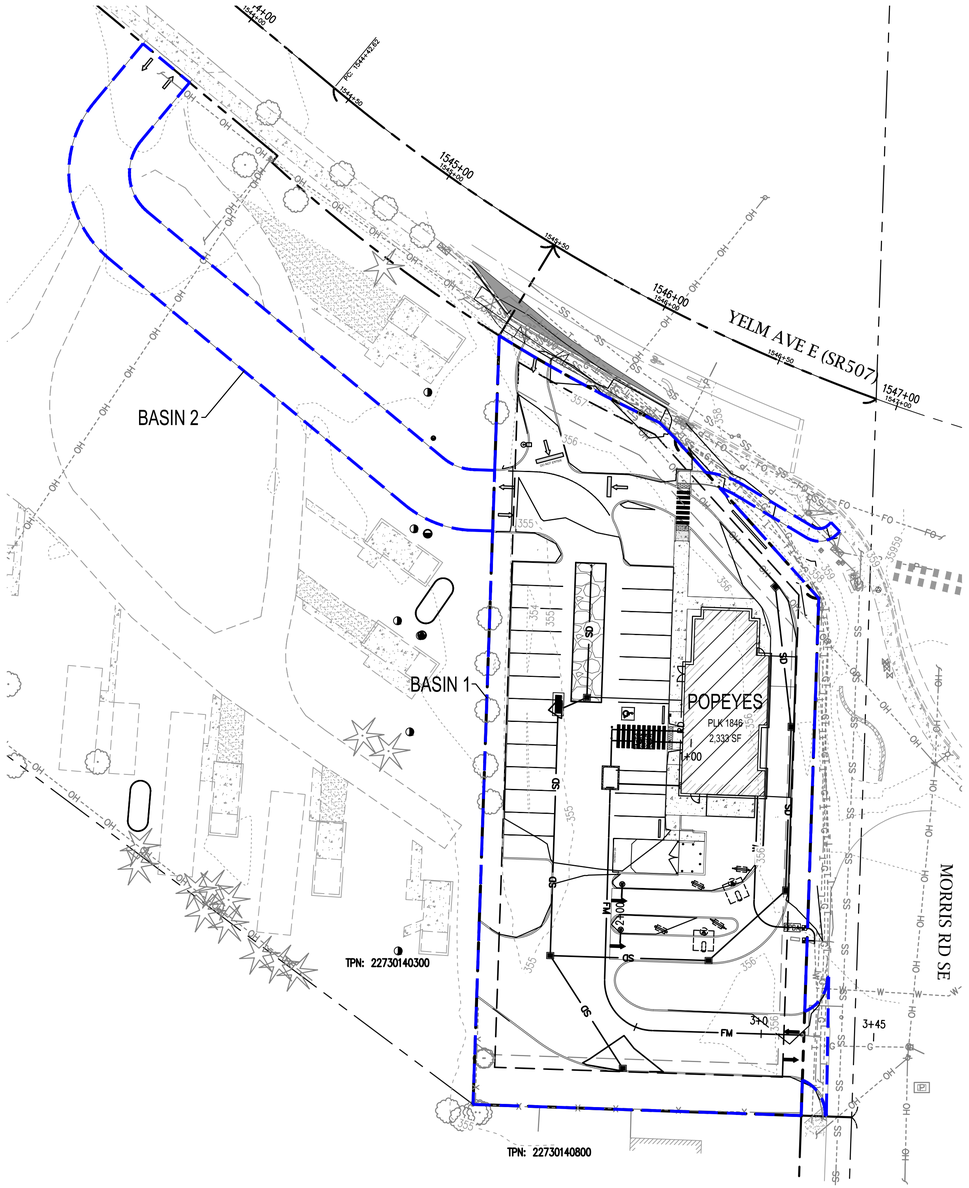
HORIZONTAL SCALE:	1"=30'
DATE:	DECEMBER, 2020
JOB No.:	1849.06
DRAWING FILE No.:	1849.06 Ex. Conditions Map.dwg

EXISTING CONDITIONS MAP
POPEYES, YELM, WASHINGTON

EXHIBIT No: **EX-02**

SHEET No: **2**



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0 20 40

SCALE IN FEET

PROPOSED BASIN AREAS:

BASIN 1:	
ASPHALT AREA:	0.36 ACRES
CONCRETE AREA:	0.08 ACRES
ROOF AREA:	0.05 ACRES
PERVIOUS AREAS:	0.48 ACRES
BASIN 2:	
ASPHALT AREA:	0.14 ACRES
TOTAL:	1.11 ACRES

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JOB No.:	1849.06
DRAWING FILE No.:	1849.06 Pr. Conditions Map.dwg

PROPOSED CONDITIONS MAP
POPEYES, YELM, WASHINGTON

EXHIBIT No: **EX-02**

SHEET No: **2**

APPENDIX 4
CONSTRUCTION PLANS

APPENDIX 5
GEOTECHNICAL REPORT

Geotechnical Engineering Services Report

Yelm Development
Yelm, Washington

for
D&B Retail Development

September 14, 2015

GeoEngineers
Earth Science + Technology

Geotechnical Engineering Services Report

Yelm Development
Yelm, Washington

for
D&B Retail Development

September 14, 2015

GeoEngineers

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Geotechnical Engineering Services Report

Yelm Development
Yelm, Washington

File No. 22013-001-00

September 14, 2015

Prepared for:

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Attention: Dale Pinney

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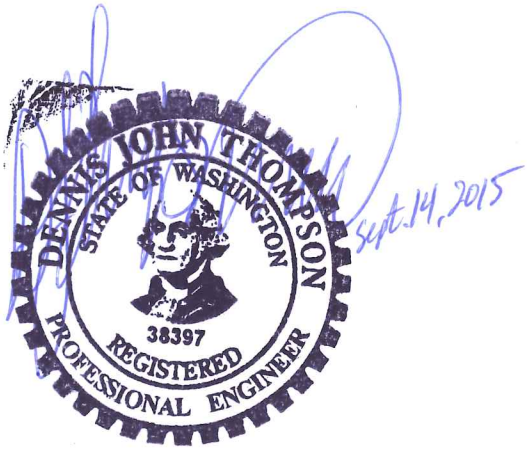
Senior Geotechnical Engineer



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INTRODUCTION AND PROJECT UNDERSTANDING

GeoEngineers is pleased to present this geotechnical report to support development and construction of the proposed Yelm Development project located at 1301 Yelm Avenue East in Yelm, Washington as shown in Figure 1. Our understanding of this project is based on our discussions with you and/or members of your design team, including Larson and Associates (project civil engineers), and review of conceptual plans provided.

Based on review of aerial photographs and on-site observations, the parcel is generally flat, removed of trees and is surfaced with grass vegetation. Abandoned single family homes surround the property in the south, east and west. The property is irregular in shape; the overall size is on the order of 3.7 acres. The property is divided into three lots as shown on our Site Plan, Figure 2.

We understand that three retail buildings and a surrounding parking lot area are proposed for and will cover the majority of the site. The proposed structures will consist of single-story retail shopping and restaurant type buildings. The exterior walls and interior columns will be supported by conventional spread footings.

Stormwater for each retail building and the parking lot area will be handled by underground infiltration trenches that will generally be located in the southwest portion of the parcel behind the proposed developments. We understand that the stormwater infiltration trenches within Lots 1 and 3 will be located at depths of approximately 5 to 7 feet below ground surface (bgs) and at a depths of approximately 9 to 10 feet bgs within Lot 2. The Washington State Department of Ecology (Ecology) 2012 Stormwater Management Manual for Western Washington (SWMMWW) Volume III will be used as a guideline for stormwater design, including stormwater infiltration. Additional improvements include asphalt concrete parking and installation of underground utilities.

SCOPE OF SERVICES

The purpose of our services was to evaluate soil and groundwater conditions as a basis for developing recommendations to support the proposed site improvements and to determine infiltration characteristics of the underlying soil. Our specific scope of services for this study includes:

1. Reviewing existing in-house information on subsurface conditions.
2. Visiting the site, marking out, identifying potential test pit locations and coordinating clearance of existing utilities.
3. Exploring subsurface conditions at the site by conducting 10 test pit explorations. The test pits were located around the proposed structures and within proposed infiltration areas (note that the SWMMWW requires a minimum of two test pits per infiltration facility or trench). Eight test pits were excavated to depths of approximately 10 to 12-feet and two test pits were excavated to depths of approximately 15 to 16 feet.
4. Performing laboratory tests consisting of eight grain-size analyses on selected soil samples obtained from the test pits.
5. Providing a discussion of the surface and subsurface conditions encountered.

6. Providing an estimate of infiltration rate(s) of soil collected in the explorations. Our estimate(s) are based on the laboratory grain-size analysis and requirements presented in the 2012 SWMMWW.
7. Providing geotechnical seismic design information in accordance with International Building Code (IBC) criteria and discussing our opinion on the potential for liquefaction.
8. Providing recommendations for design of shallow foundations including recommendations for foundation design, including bearing surface preparation, removal of uncontrolled fill, soft, organic or otherwise unsuitable material, backfill compaction and drainage recommendations. We include recommendations for allowable bearing capacity, estimates of settlement, and lateral resistance.
9. Providing recommendations for conventional below-grade building walls and retaining wall structures, including allowable soil bearing pressures, settlement (total and differential) estimates, lateral earth pressures (seismic, active and passive) and coefficient of friction for evaluating sliding resistance. We also discuss backfill material and compaction requirements and drainage recommendations.
10. Providing recommendations for support of on-grade floor slabs, including modulus of subgrade reaction, capillary break, vapor retarder and underslab drainage, as appropriate.
11. Providing a recommended asphalt concrete pavement (ACP) section based on our experience and typical practice in this area.
12. Providing recommendations for site preparation and earthwork. We discuss clearing and stripping, temporary and permanent cut slopes, suitability of on-site soils for use as structural fill, specifications for imported soil for use as structural fill, wet weather considerations for earthwork and fill placement and compaction requirements.
13. Providing recommendations for site drainage and control of groundwater that may be encountered.
14. Preparing a geotechnical report commensurate with the scope described above. Our report presents our findings and recommendations and including summary logs of the explorations and a plan view showing the exploration locations.

SITE CONDITIONS

Published Literature

Based on review of geologic maps in our files, Vashon recessional outwash sand and gravel is the dominant, near-surface, geologic material mapped in the immediate project area. This material is commonly known as Steilacoom gravel. Vashon recessional outwash was deposited by melt water streams in front of the most recent glacier during its retreat from the Puget Sound region approximately 10,000 to 15,000 years ago. These deposits generally consist of permeable sand, or sand and gravel. Cobbles and boulders can also be encountered in this deposit, depending on the depositional history. Glacial till and/or advance outwash is commonly encountered at depth below the recessional outwash.

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey of Pierce County Area, Washington, maps the project area as Spanaway gravelly sandy loam, 0 to 3 percent slopes (110). This soil unit is described as being formed in glacial outwash. It is further described as generally having positive soil characteristics for small commercial buildings. These characteristics include but are not limited to being somewhat excessively drained, little erosion hazard, and low resistance to compaction. However, this soil unit is described as being “very limited” in regards to shallow excavations (i.e., trenches

or holes excavated to a maximum depth of 5 to 6 feet below ground surface) and will potentially require "major soil reclamation, special design, or expensive installation procedures". We interpret part of this statement to refer to the potential for excessive caving of sidewalls that may occur during excavation below grade and accompanying shoring, trench boxes, or similar soil support options.

Surface Conditions

The project area is located west of the intersection of East Yelm Avenue, Bald Hill Road SE, and Creek Street SE in Yelm, Washington. The project area is irregular in shape and is flat or slightly sloping down to the northwest. A paved road loops around the interior of the site giving access to residences that bordered the western, southern and eastern perimeter of the site. The residences are abandoned and some of the structures that are visible from aerial photographs have been removed. A gas line was noted to exist between the access road and the front of the abandoned residences. Vegetation in the majority of the property is low growing grasses. Trees of various sizes exist along the perimeter of the property. We did not observe standing water or indications of wet surface conditions during our time on site.

Subsurface Explorations

Our understanding of subsurface conditions at the project site is based on conditions disclosed in 10 test pits excavated at the approximate locations shown in Figure 2. Details of the exploratory program, laboratory testing program and test pit logs completed for this study are presented in Appendix A.

Subsurface Conditions

General

We categorized soil layers encountered in our explorations into the following units in the order in which they are generally encountered: a weathered outwash, an upper outwash, and a lower outwash. The upper outwash was present within all test pit locations except in TP-7 where the lower outwash was overlain by the weathered outwash. Grass or sod and significant organics are typically present within the top 3 to 6 inches of the explorations. The weathered outwash generally is in a loose to medium dense condition and consists of silty sand with gravel, gravel with silt and sand and occasional organic material. The upper outwash generally is in a medium dense condition and consists of one or more layers of gravel with sand and occasional cobbles (up to 1 foot in diameter), silty sand, and sand with silt. The lower outwash generally is in a medium dense to dense condition and consists of gravel with sand and occasional cobbles up to and potentially greater than 1 foot in diameter. All the explorations terminated in the lower outwash.

Soil Conditions

We observed approximately 3 inches of sod at the surface in all of the explorations with the exception of test pits TP-2, TP-3 and TP-4. TP-2 surface soils consisted of a 3-inch layer of gravel base rock that is present along the shoulder of the existing northwestern access road. Weathered outwash was observed at the ground surface of test pit locations TP-3 and TP-4.

In TP-1 through TP-4 and TP-8 the weathered outwash is present from the below the ground surface, sod, or gravel base and extends approximately to depths of 2 to 3.5 feet bgs. The weathered outwash overlies the upper outwash. The upper outwash extends approximately to depths of 6 to 7 feet bgs. We did not observe the upper outwash in TP-7, only the lower outwash unit. The lower outwash extends to the full depths explored in the test pit explorations.

In TP-5, TP-6, TP-9 and TP-10 the weathered outwash extends approximately to depths of 2 and 3 feet bgs. The weathered outwash overlies the upper outwash and extends approximately to depths of 7 and 8 feet. The lower outwash extends to the bottom of the test pit explorations.

Groundwater Condition

No groundwater seepage was observed during our explorations. Ecology's reports for monitoring wells completed in the project vicinity were reviewed and indicated static groundwater is encountered at depths between 26 feet and 59 feet bgs at the well locations. Based on our observations, and review of Ecology's reports for monitoring wells combined with the relatively flat topography of the surrounding area, static groundwater elevation is expected to be well below the depths of the test pit explorations completed for this project. Groundwater conditions should be expected to vary as a result of season, precipitation and other factors. Depending on the time of year, it is possible that some groundwater seepage may be encountered below or within the weathered outwash.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on the results of our study, it is our opinion that the site is generally suitable for the proposed development with regard to geotechnical considerations. A summary of the primary geotechnical considerations for the proposed development is provided below, and is followed by our detailed recommendations.

- Granular soils were generally encountered; however, we did observe that some of the near-surface site soil has a higher fines (silt and clay-sized particles passing the U.S. Standard No. 200 sieve) content. Soil with a higher fines content is more sensitive to small changes in moisture content and may be difficult, if not impossible, to work and compact during wet weather conditions. This material can also be susceptible to disturbance from construction traffic when wet, or if earthwork is performed during wet weather.
- The proposed structures may be satisfactorily supported on continuous and isolated shallow foundations supported on the well compacted weathered outwash or the medium dense or dense native soils or on structural fill that extends to these soils.
- Floor slabs may be supported on well compacted weathered outwash or the underlying outwash soils.
- The glacial outwash deposits can contain cobbles and boulders. The contractor should be prepared for this possibility.
- On-site stormwater infiltration appears feasible based on the subsurface conditions observed. Greater infiltration rates will likely be obtained at depth. We provide preliminary infiltration rate recommendations below.

Stormwater Infiltration

General

Soil consisting of the lower outwash material is typically encountered below Elevation 344.5 feet to 342 feet in the explorations completed in the project area. In general, it is our opinion that the natural soils encountered in the lower outwash within our explorations should have adequate permeability to infiltrate

stormwater from the site. We did not encounter groundwater seepage, staining or other indications of seasonal shallow groundwater in the explorations.

Soil Infiltration Rates

Stormwater infiltration rates for the site soils were established based on the 2012 Ecology SWMMWW Volume III in conjunction with the sieve analysis results presented in Appendix A, Figures A-12 and A-13.

TABLE 1. SOIL INFILTRATION RATES[1]

Test Pit No.	Soil Sample No.	Soil Sample Elevation (feet)	Percent Fines[2]	D10 Size (mm)[3]	USCS[4] Soil Classification	Recommended Long-term Design Infiltration Rate[5] (Inches per Hour)
1	1	345.5	12.5	N/D	SM	2[(6)]
1	2	341	2	0.8	GP	20[(7)]
2	3	337.5	2	0.52	GW	20[(7)]
3	2	339.5	1	10.7	GW	20[(7)]
4	3	336.5	1	0.79	GP	20[(7)]
5	2	345.5	13.4	N/D	SM	2[(6)]
5	3	342	2	0.87	GP	20[(7)]
6	2	342	2.3	0.68	GP	20[(7)]

Notes:

[1] For selected soil samples.

[2] Fines = Silt and clay-sized particles passing U.S. No. 200 (0.75 mm) sieve.

[3] Based on ASTM C 136 Soil Gradation Test.

[4] Unified Soil Classification System (USCS).

[5] Based on grain-size analysis and the procedures outlined in the 2012 Ecology SWMMWW Volume III Table 3.8.

[6] Design infiltration rate determined using USDA soil texture method provided in the 2005 Department of Ecology Stormwater Management Manual.

[7] Calculated infiltration rates were greater than presented and were limited to 20 inches per hour.

We completed explorations within the areas of the infiltration trench locations indicated on the plans provided by Larson and Associates, Inc. We expect that the relatively clean gravel soils encountered in the test pits should have adequate permeability and storage capacity to infiltrate stormwater. We recommend that a long-term design infiltration rate of 20 inches per hour be used for sizing facilities located within the lower outwash below approximate Elevations 344.5 feet to 342 feet. The value(s) presented above are for the specific samples tested and are an estimate of subsurface infiltration properties at various depths. We recommend that the project plans include provisions for GeoEngineers to observe subsurface conditions during construction to check that the preliminary infiltration rate(s)and soil conditions used for design are appropriate for the conditions encountered. Site- and location- specific testing may also be required by local jurisdictions.

Stormwater should be treated in accordance with current regulations prior to infiltration. To help reduce clogging of infiltration facilities, we recommend they be protected during construction with siltation control facilities such as temporary settling basins, silt fences and hay bales. Suspended solids can clog the soil and reduce the infiltration rate. Periodic sweeping of paved areas, during and following construction, will

help extend the life of the infiltration facilities. Equipment should not be permitted in the infiltration areas after they are excavated to grade because of the potential for compaction of the subgrade that could reduce the infiltration rate of the soil.

Site Development and Earthwork

General

We anticipate that site development and earthwork will include clearing and stripping of surface vegetation, constructing foundations and then placing and compacting fill and backfill materials. We expect that the majority of site grading can be accomplished with conventional earthmoving equipment. The following sections provide recommendations for stripping, excavation, erosion control, subgrade development, fill materials, fill placement and compaction.

Clearing and Stripping

Based on our observations at the site, we estimate that the depth of stripping could be on the order of 3 inches to 1 foot. For estimating purposes we suggest a depth of stripping of 6 inches. Greater stripping depths may be required to remove localized zones of loose or organic-rich soil. In addition, demolition around existing structures may cause localized disturbance and require greater stripping depths. The primary root systems of shrubs should be completely removed. Stripped material should be transported off site for disposal or processed and used as fill in landscaping areas.

We did encounter cobbles/boulders during our subsurface investigation, confirming our experience that cobbles/boulders can be present in the glacial deposits in the area. Accordingly, the contractor should be prepared to remove cobbles/boulders, if encountered during grading or utility excavations. Boulders may be removed from the site or buried in landscape areas. Voids caused by boulder removal should be backfilled with structural fill.

Temporary Excavations, Support and Dewatering

Excavations deeper than 4 feet should be shored or laid back at a stable slope if workers are required to enter. Shoring and temporary slope inclinations must conform to the provisions of Title 296 Washington Administrative Code (WAC), Part N, "Excavation, Trenching and Shoring." Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under Washington Industrial Safety and Health Act (WISHA). The contract documents should specify that the contractor is responsible for selecting excavation and dewatering methods, monitoring the excavations for safety and providing shoring, as required, to protect personnel and structures. We provide additional recommendations in regard to temporary and permanent shoring below.

In general, temporary cut slopes should be inclined no steeper than about 1-1/2H:1V (horizontal:vertical). This guideline assumes that all surface loads are kept at a minimum distance of at least one-half the depth of the cut away from the top of the slope and that seepage is not present on the slope face. Flatter cut slopes will be necessary where seepage occurs or if surcharge loads are anticipated. We observed caving in our explorations; therefore, some sloughing and raveling of cut slopes should be expected. Temporary covering with heavy plastic sheeting should be used to protect these slopes during periods of wet weather.

Based on our explorations, we do not expect groundwater to be a major factor during shallow excavations and earthwork. However, some perched groundwater could occur in the near-surface soil depending on the

time of year of construction. We anticipate that groundwater handling needs will typically be lower during the late summer and early fall months. We anticipate that shallow perched groundwater can typically be handled adequately with sumps, pumps, and/or diversion ditches, as necessary. Ultimately, we recommend that the contractor performing the work be made responsible for controlling and collecting groundwater encountered.

Permanent Cut and Fill Slopes

Based on site grades and the proposed construction, we anticipate that only minor cutting and filling will be required for this project. However, if permanent slopes are necessary, we recommend they be constructed at a maximum inclination of 2H:1V. Where 2H:1V permanent slopes are not feasible, protective facings and/or retaining structures should be considered.

To achieve uniform compaction, we recommend that fill slopes be overbuilt slightly and subsequently cut back to expose well-compacted fill. Fill placement on slopes steeper than 5H:1V should be benched into the slope face and include keyways. The configuration of the bench and keyway depends on the equipment being used. Bench excavations should be level and extend into the slope face. We recommend that a vertical cut of about 3 feet be maintained for benched excavations. Keyways should be about 1-1/2 times the width of the equipment used for grading or compaction.

Exposed areas should be re-vegetated as soon as practical to reduce the surface erosion and sloughing. Temporary protection should be used until permanent protection is established.

Surface Drainage

Surface water from roofs, driveways and landscape areas should be collected and controlled. Curbs or other appropriate measures such as sloping pavements, sidewalks and landscape areas should be used to direct surface flow away from the buildings, erosion sensitive areas and from behind retaining structures. Roof and catchment drains should not be connected to wall or foundation drains.

Erosion and Sedimentation Control

Potential sources or causes of erosion and sedimentation can be influenced by construction methods, slope length and gradient, amount of soil exposed and/or disturbed, soil type, construction sequencing and weather. Implementing an erosion and sedimentation control plan will reduce the project impact on erosion-prone areas. The plan should be designed in accordance with applicable city, county and/or state standards. The plan should incorporate basic planning principles, including:

- Scheduling grading and construction to reduce soil exposure.
- Re-vegetating or mulching denuded areas.
- Directing runoff away from denuded areas.
- Reducing the length and steepness of slopes with exposed soils.
- Decreasing runoff velocities.
- Preparing drainage ways and outlets to handle concentrated or increased runoff.
- Confining sediment to the project site.

- Inspecting and maintaining control measures frequently.

Some sloughing and raveling of exposed or disturbed soil on slopes should be expected. We recommend that disturbed soil be restored promptly so that surface runoff does not become channeled.

Temporary erosion protection should be used and maintained in areas with exposed or disturbed soils to help reduce erosion and reduce transport of sediment to adjacent areas and receiving waters. Permanent erosion protection should be provided by paving, structure construction or landscape planting.

Until the permanent erosion protection is established and the site is stabilized, site monitoring may be required by qualified personnel to evaluate the effectiveness of the erosion control measures and to repair and/or modify them as appropriate. Provision for modifications to the erosion control system based on monitoring observations should be included in the erosion and sedimentation control plan.

Subgrade Preparation and Evaluation

Subgrade areas should be thoroughly compacted with heavy, smooth-drum vibratory equipment to a uniformly dense and unyielding condition prior to placement of structural fill or structural elements. We recommend that prepared subgrades be observed by a member of our firm, who will evaluate the suitability of the subgrade and identify any areas of yielding, which are indicative of soft or loose soil. The exposed subgrade soil should be proof-rolled with heavy rubber-tired equipment or probed with a 1/2-inch-diameter steel rod, as appropriate depending on prevailing conditions. If soft or otherwise unsuitable areas revealed during probing or proof-rolling cannot be compacted to a stable and uniformly firm condition, we recommend that: 1) the subgrade soils be scarified (e.g., with a ripper or a farmer's disc), aerated and recompacted; or 2) the unsuitable soils be removed and replaced with structural fill, as needed.

Subgrade Protection and Wet Weather Considerations

The wet weather season generally begins in October and continues through May in western Washington; however, periods of wet weather can occur during any month of the year. In our opinion, site grading and fill placement could be considered during wet weather, but it should be noted that some of the soils encountered in our explorations contain a significant amount of fines and will be susceptible to disturbance during extended periods of wet weather. Soil with high fines content is very sensitive to small changes in moisture and is susceptible to disturbance from construction traffic when wet or if earthwork is performed during wet weather. If wet weather earthwork is unavoidable, we recommend that the following steps be taken.

- The ground surface in and around the work area should be sloped so that surface water is directed away from the work area. The ground surface should be graded so that areas of ponded water do not develop. Measures should be taken by the contractor to prevent surface water from collecting in excavations and trenches. Measures should be implemented to remove surface water from the work area.
- Earthwork activities should not take place during periods of heavy precipitation.
- Slopes with exposed soils should be covered with plastic sheeting.
- The contractor should take necessary measures to prevent on-site soils and other soils to be used as fill from becoming wet or unstable. These measures may include the use of plastic sheeting, sumps with pumps and grading. The site soils should not be left uncompacted and exposed to moisture.

Sealing the surficial soils by rolling with a smooth-drum roller prior to periods of precipitation will help reduce the extent to which these soils become wet or unstable.

- Construction traffic should be restricted to specific areas of the site, preferably areas that are surfaced with working pad materials not susceptible to wet weather disturbance.
- Construction activities should be scheduled so that the length of time that soils are left exposed to moisture is reduced to the extent practical.
- Protective surfacing such as placing asphalt-treated base (ATB) or haul roads made of quarry spalls or a layer of free-draining material such as well graded pit-run sand and gravel may be necessary to protect completed areas. Typically, minimum gravel thicknesses on the order of 24 inches are necessary to provide adequate subgrade protection.
- During periods of wet weather, concrete should be placed as soon as practical after preparation of the footing excavations. Foundation bearing surfaces should not be exposed to standing water. Should water infiltrate and pool in the excavation, it should be removed before placing structural fill or reinforcing steel. Subgrade protection for foundations consisting of a lean concrete mat should be considered if footing excavations are exposed to extended wet weather conditions.

Fill Materials

General

Material used for structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. As the amount of fines increases, soil becomes increasingly more sensitive to small changes in moisture content. We recommend that structural fill and trench backfill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the Washington State Department of Transportation (WSDOT) Standard Specifications. If construction is performed during wet weather, we recommend using select granular fill as described below. If prolonged dry weather prevails during the earthwork phase of construction, a somewhat higher fines content may be acceptable.

Select Granular Fill

We recommend select granular fill for construction during wet weather conditions, consist of well-graded sand and gravel or crushed rock with a maximum particle size of 6 inches and less than 5 percent fines by weight based on the minus 3/4-inch fraction. Organic matter, debris or other deleterious material should not be present. In our opinion, material conforming to WSDOT Specification 9-03.9 (Aggregates for Ballast and Crushed Surfacing), 9-03.10 (Aggregate for Gravel Base), or 9-03.14 (Borrow) is suitable for use as import fill material during wet weather with the exception that the fines content should be less than 5 percent based on the minus 3/4-inch fraction. In addition, some larger particle sizes are acceptable, as described above.

On-Site Soil

During dry weather and periods of light rain fall any non-organic on-site soil may be considered for use as fill provided it meets the criteria described above and can be compacted as recommended. When the fines content in the soil exceeds about 5 percent, the soil becomes more sensitive to moisture. Portions of the on-site soil contain enough fines to be moisture sensitive and may not be suitable for use as fill during extended periods of wet weather and/or if exposed to wet conditions. Even when properly compacted, this

material can be easily disturbed and will soften when exposed to moisture. Based on our subsurface explorations, on-site material in the top approximate 6 feet will typically not be suitable for use as drainage material, for use behind retaining walls, or as a capillary break material. Use of on-site soils for drainage material should be evaluated on a case-by-case basis, and approved by the engineer.

Fill Placement and Compaction

General

To obtain proper compaction, fill soil should be compacted near optimum moisture content and in uniform horizontal lifts. Lift thickness and compaction procedures will depend on the moisture content and gradation characteristics of the soil and the type of equipment used. The maximum allowable moisture content varies with the soil gradation and should be evaluated during construction. Silty soil and other fine granular soil may be difficult or impossible to compact during persistent wet conditions. Generally, 12-inch loose lifts are appropriate for steel-drum vibratory roller compaction equipment. Compaction should be achieved by mechanical means. During fill and backfill placement, sufficient testing of in-place density should be conducted to check that adequate compaction is being achieved.

Area Fills and Bases

Fill placed to raise site grades and materials under pavements should be placed on subgrades prepared as previously recommended. In general, area fills and bases should be compacted to at least 95 percent of the maximum dry density (MDD) determined by ASTM International (ASTM) Test Method D 1557 (modified Proctor).

Trench Backfill

For utility excavations, we recommend that the initial lift of fill over the pipe be thick enough to reduce the potential for damage during compaction but generally should not be greater than about 18 inches. In addition, rock fragments greater than about 1 inch in maximum dimension should be excluded from this lift.

In paved and structural areas, trench backfill should be uniformly compacted in horizontal lifts to at least 95 percent of the MDD in the upper 2 feet below subgrade. Fill placed below a depth of 2 feet from subgrade in paved areas must be compacted to at least 90 percent of the MDD. In nonstructural areas, trench backfill should be compacted to a firm condition that will support construction equipment, as necessary.

Seismic Design Considerations

General

The site is located within the Puget Sound region, which is seismically active. Seismicity in this region is attributed primarily to the interaction between the Pacific, Juan de Fuca, and North American plates. The Juan de Fuca plate is subducting beneath the North American plate. It is thought that the resulting deformation and breakup of the Juan de Fuca plate might account for the deep focus earthquakes in the region. Hundreds of earthquakes have been recorded in the Puget Sound area. In recent history, four of these earthquakes were large events: 1) in 1946, a Richter magnitude 7.2 earthquake occurred in the Vancouver Island, British Columbia area; 2) in 1949, a Richter magnitude 7.1 earthquake occurred in the Olympia area; 3) in 1965, a Richter magnitude 6.5 earthquake occurred between Seattle and Tacoma; and 4) on February 28, 2001, a magnitude 6.8 earthquake occurred at Nisqually near Olympia.

Research is currently underway regarding historical large magnitude subduction-related earthquake activity along the Washington and Oregon coasts. Geologists are reporting evidence that suggests several large magnitude earthquakes (Richter magnitude 8 to 9) have occurred in the last 1,500 years, the most recent of which occurred about 300 years ago. No earthquakes of this magnitude have been documented during the recorded history of the Pacific Northwest. Local design practice in Puget Sound assumes that the magnitude felt from such an earthquake is about the same as from the existing design earthquake because of the distance.

Seismic Design Criteria

Seismic design may be performed using the equivalent static force procedure outlined in the 2012 IBC using the design parameters provided below.

TABLE 2. SEISMIC DESIGN PARAMETERS

2012 IBC
Spectral Response Accel. at Short Periods (SS) = 1.244
Spectral Response Accel. at 1 Second Periods (S1) = 0.495
Site Class = C
Site Coefficient (FA) = 1.0
Site Coefficient (FV) = 1.51

Liquefaction Potential

Liquefaction refers to a condition where vibration or shaking of the ground, usually from earthquake forces, results in development of excess pore pressures in loose, saturated soils and subsequent loss of strength in the deposit of soil so affected. In general, soils that are susceptible to liquefaction include loose to medium dense "clean" to silty sands that are below the water table. In our opinion, the potential for liquefaction at this site is low.

Shallow Foundations

Foundation Support

Proposed structures can be satisfactorily founded on continuous wall or isolated column footings supported on densely compacted weathered outwash or undisturbed native soils below the weathered outwash, or on structural fill placed over these materials. If the bearing surface is loose or disturbed it must be compacted to a dense, unyielding condition or the loose soil removed and replaced with compacted structural fill. As noted above, the weathered outwash material contains fine-grained material and will be susceptible to disturbance if wet or compacted during periods of rain. This should be considered during site development and depending on the time of year. The weathered outwash material must be thoroughly compacted to a uniformly dense and unyielding condition prior to construction of foundations.

The exterior footings should be established at least 18 inches below the lowest adjacent grade. The recommended minimum footing depth is greater than the anticipated frost depth. Interior footings can be founded a minimum of 12 inches below the top of the floor slab. Isolated column and continuous wall footings should have minimum widths of 24 and 18 inches, respectively.

Bearing Capacity

We recommend that footings founded as recommended be proportioned using an allowable soil bearing pressure of 4,000 pounds per square foot (psf). The allowable soil bearing pressure may be increased to 6,000 psf for footings greater than 4 feet in width. The bearing pressures apply to the total of dead and long-term live loads and may be increased by one-third when considering total loads, including earthquake or wind loads. These are net bearing pressures. The weight of the footing and overlying backfill can be ignored in calculating footing sizes.

Foundation Drains

In general, it is our opinion that foundation drains are not necessary for this project as we have considered some water near the base of the footing in the foundation design recommendations presented. However, due to the fine-grained nature of the weathered outwash, some foundation excavations may experience seepage, depending on the time of year of excavation. In addition, some areas may exhibit wet conditions near the surface depending on how foundations are backfilled, the design of the final grade surrounding the building and other improvements such as irrigation. The use of foundation drains should be determined on a case-by-case basis and consider items such as soil conditions exposed during construction, the presence of seepage or evidence of seepage during excavation, surrounding irrigation lines, direction of the surface water flow surrounding the structure(s), and maintenance programs in place. In some instances, the backfill area around foundations is converted to landscape areas and it is common for surface water to accumulate in these areas, which may require maintenance.

Footing Bearing Surface Preparation

Footing excavations should be performed using a smooth-edged bucket to limit bearing surface disturbance. The foundation bearing surface should be recompacted as necessary to a dense, non-yielding condition. Loose or disturbed materials present at the base of footing excavations should be removed or compacted. Foundation bearing surfaces should not be exposed to standing water. Should water infiltrate and pool in the excavation, it should be removed before placing structural fill or reinforcing steel.

If foundation bearing surfaces will be exposed to wet weather and/or construction traffic, we recommend that they be protected using a crushed rock or lean-mix concrete. Typically, 8 to 12 inches of crushed rock or 4 inches of lean-mix concrete is adequate for protection.

We recommend that a member from our firm observe foundation excavations before placing reinforcing steel in order to confirm that adequate bearing surfaces have been prepared or provide recommendations for removal of unsuitable soil. Unsuitable bearing materials should be recompacted or removed and replaced with compacted structural fill as recommended by the geotechnical engineer.

Foundation Settlement

We estimate that settlement of footings designed and constructed as recommended will be less than 1 inch, for an assumed loading condition of up to 200 kips per column and 6 kips per lineal foot for continuous footings. Differential settlements between comparably loaded isolated column footings or along 50 feet of continuous footing should be less than 1/2 inch. Settlement is expected to occur rapidly as loads are applied. Settlements could be larger than estimated if footings are placed on loose or disturbed soil. We should be contacted if foundation loads are anticipated to be greater than described above.

Lateral Resistance

The ability of the soil to resist lateral loads is a function of frictional resistance, which can develop on the base of footings and slabs and the passive resistance, which can develop on the face of below-grade elements of the structure as these elements tend to move into the soil. For footings and floor slabs founded in accordance with the recommendations presented above, the allowable frictional resistance may be computed using a coefficient of friction of 0.40 applied to vertical dead-load forces. The allowable passive resistance on the face of footings, grade beams or other embedded foundation elements may be computed using an equivalent fluid density of 300 pounds per cubic foot (pcf) for undisturbed on-site soils or structural fill extending out from the face of the foundation element a distance at least equal to two and one-half times the depth of the element.

The passive earth pressure and friction components may be combined provided that the passive component does not exceed two-thirds of the total. The passive earth pressure value is based on the assumptions that the adjacent grade is level and that groundwater remains below the base of the footing throughout the year. The top foot of soil should be neglected when calculating passive lateral earth pressures unless the foundation area is covered with pavement or slab-on-grade. The lateral resistance values include a safety factor of approximately 1.5.

Conventional Subgrade and Retaining Walls

Drainage

Positive drainage is imperative behind any retaining structure. This can be accomplished by providing a zone of free-draining material behind the wall with perforated pipes to collect seepage water. The drainage material should consist of coarse sand and gravel containing less than 5 percent fines based on the fraction of material passing the 3/4-inch sieve. The wall drainage zone should extend horizontally at least 18 inches from the back of the wall.

Perforated smooth-walled rigid PVC pipe having a minimum diameter of 4 inches should be placed at the bottom of the drainage zone along the entire length of the wall, with the pipe invert at or below the elevation of the base of the wall footing. The drainpipes should discharge to a tightline leading to an appropriate collection and disposal system. An adequate number of cleanouts should be incorporated into the design of the drains in order to provide access for regular maintenance. In general, roof downspouts, perimeter drains or other types of drainage systems should not be connected to retaining wall drain systems.

Design Parameters

The pressures presented assume that backfill placed within 2 feet of the wall is compacted by hand-operated equipment to a density of 90 percent of the MDD and that wall drainage measures are included as previously recommended. For walls constructed as described above, we recommend using an active lateral earth pressure corresponding to an equivalent fluid density of 35 pcf for the level backfill condition. For walls with backfill sloping upward behind the wall at 2H:1V, an equivalent fluid density of 55 pcf should be used. This assumes that the tops of the walls are not structurally restrained and are free to rotate. For the at-rest condition (walls restrained from movement at the top) an equivalent fluid density of 50 pcf should be used for design. For seismic conditions, we recommend a uniform lateral pressure of 8H (where H is the height of the wall) psf be added to these lateral pressures. Note that if the retaining system is designed as a braced system but is expected to yield a small amount during a seismic event, an active earth pressure condition may be assumed and combined with the uniform seismic surcharge pressure.

The recommended pressures do not include the effects of surcharges from surface loads. If vehicles will be operated within one-half the height of the wall, a traffic surcharge should be added to the wall pressure. The traffic surcharge can be approximated by the equivalent weight of an additional 2 feet of backfill behind the wall. Additional surcharge loading conditions should also be considered on a case-by-case basis.

Retaining wall foundations may be designed using the allowable soil bearing values and lateral resistance values presented above in the "Shallow Foundations" section of this report provided that bearing surfaces are prepared as recommended. We estimate settlement of retaining structures will be similar to the values previously presented for building foundations.

Building Pads and Floor Slabs

A modulus of subgrade reaction of 350 pounds per cubic inch (pci) can be used for designing the building floor slab provided that the subgrade consists of dense native soil or structural fill and has been prepared in accordance with the "Site Development and Earthwork" section of this report. Settlement for floor slabs designed and constructed as recommended are estimated to be less than 3/4 inch for a floor load of 250 psf. We estimate that differential settlement of floor slabs will be 1/2 inch or less over a span of 50 feet providing that the fill below the slab is compacted as specified. The subgrade soils are non-expansive, so heave is not anticipated beneath the floor slab.

We recommend that on-grade slabs be underlain by a minimum 6-inch-thick capillary break layer to reduce the potential for moisture migration into the slab. The capillary break material should consist of a well-graded sand and gravel or crushed rock with a maximum particle size of 3/4 inch and less than 5 percent fines. The material should be placed as recommended in the "Fill Placement and Compaction" section of this report. If dry slabs are required (e.g., where adhesives are used to anchor carpet or tile to the slab), a waterproof liner may be placed as a vapor barrier below the slab.

Pavement Recommendations

Asphaltic Concrete Pavement

Pavement subgrades and fill should be prepared and placed as previously described. The crushed rock base course should be moisture conditioned near the optimum moisture content and compacted to at least 95 percent of the MDD determined in accordance with ASTM D 1557 test procedures. An appropriate number of in-place density tests should be conducted on the compacted base course to check that adequate compaction has been obtained. Crushed rock base course should conform to applicable sections of 4-04 and 9-03.9(3) of the WSDOT Standards.

For this project, we based the recommended pavement sections described below on an assumed in-situ California Bearing Ratio (CBR) between 20 and 25. The heavy-duty pavement section thickness is based on a traffic loading of about 1,000,000, 18-kip equivalent single-axle loads (ESALs); we used a design life of 10 years. The standard-duty section is appropriate for areas that will not be exposed to heavy truck loads. Hot mix asphalt (HMA) should conform to applicable sections of 5-04, 9-02 and 9-03 of the WSDOT Standards. The recommended pavement sections assume that final improvements surrounding the pavement will be designed and constructed such that stormwater or excess irrigation water from landscape areas does not infiltrate below the pavement section into the crushed base.

STANDARD-DUTY ASPHALTIC CONCRETE PAVEMENT

- 2 inches of hot mix asphalt.
- 4 inches of crushed surfacing base course and/or top course compacted as recommended.
- 12 inches compacted depth of granular native subgrades and/or imported structural fill compacted to 95 percent MDD (ASTM D 1557) and in a firm and unyielding condition.

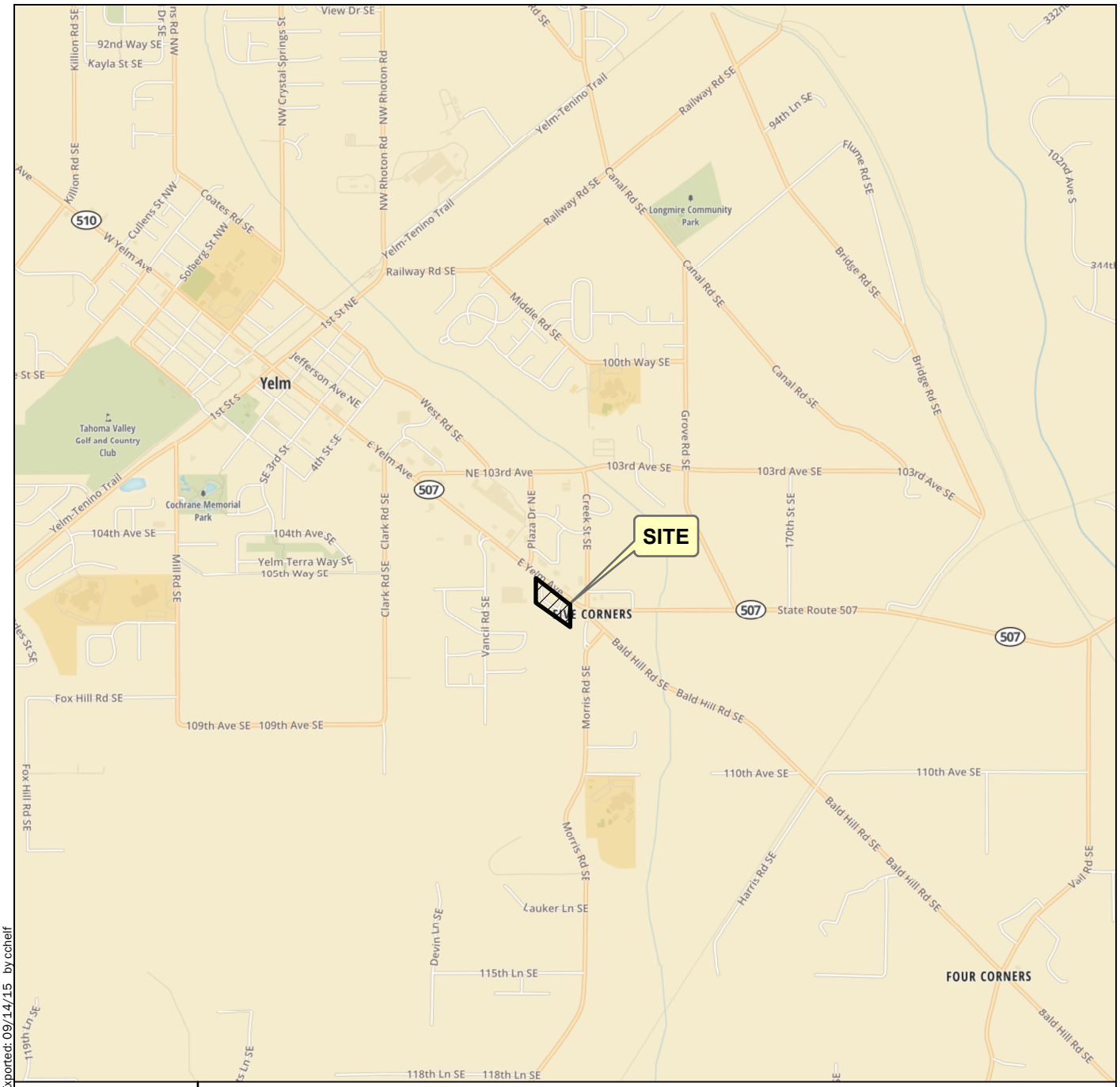
HEAVY-DUTY ASPHALTIC CONCRETE PAVEMENT

- 3 inches of hot mix asphalt.
- 6 inches of crushed surfacing base course and/or top course compacted as recommended.
- 12 inches compacted depth of granular native subgrades and/or imported structural fill compacted to 95 percent MDD (ASTM D 1557) and in a firm and unyielding condition.

LIMITATIONS

We have prepared this report for the exclusive use by D&B Retail Development and their authorized agents for the Yelm Development project located at 1301 Yelm Avenue East in Yelm, Washington, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix B titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.



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Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapbox Open Street Map, 2015

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Yelm Development
Yelm, Washington

GeoEngineers

Figure 1

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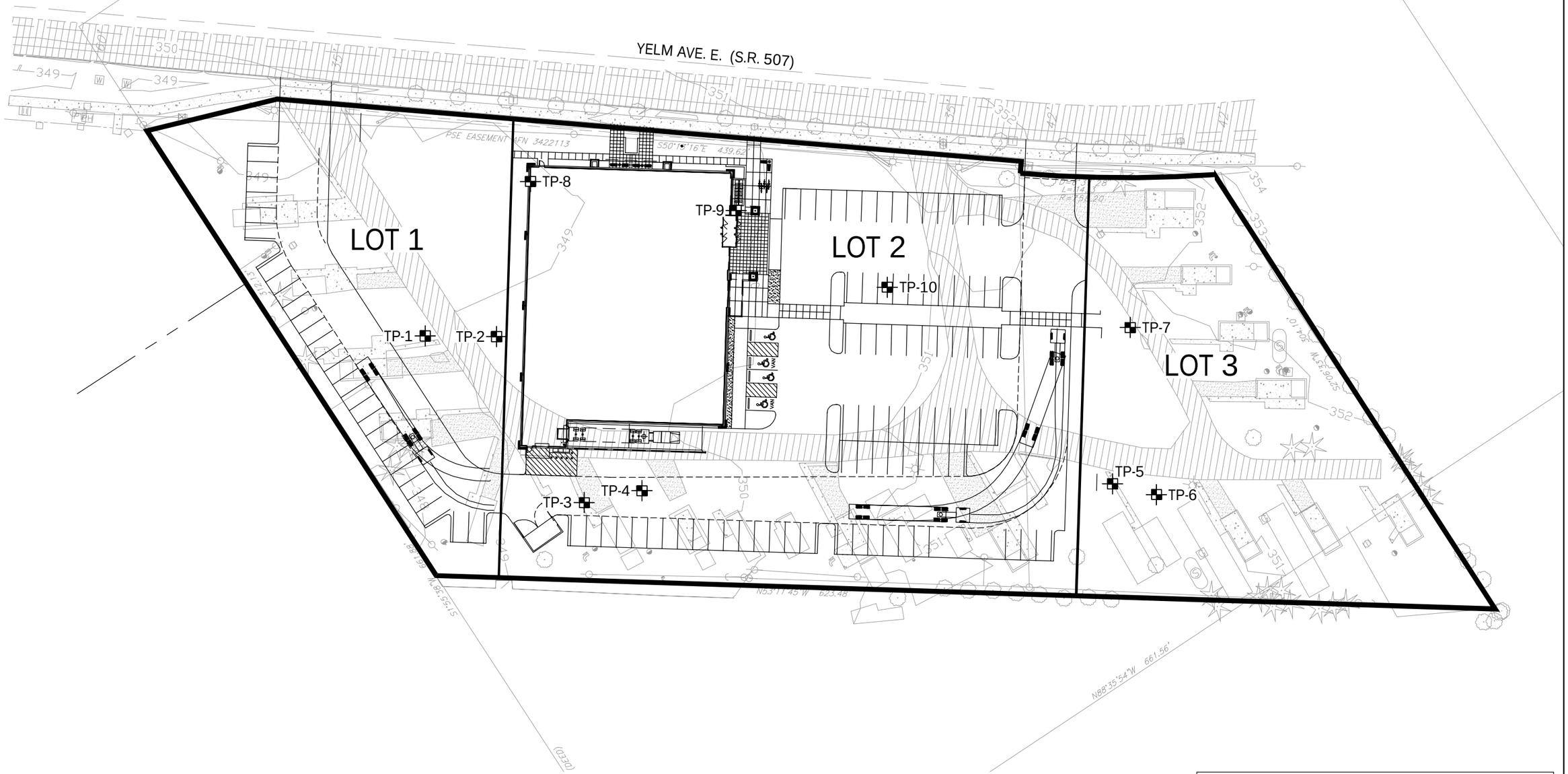

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Data Source: Base survey drawing provided by Larson and Associates. Proposed features provided by architect firm.

Vertical Datum: Thurston County Datum (NGVD 29).

Projection: NAD83 Washington State Planes, South Zone, US Foot.

Legend

TP-1 Test pit number and approximate location

60 0 60

Feet

Site Plan

Yelm Development
Yelm, Washington

GeoEngineers

Figure 2

APPENDIX A
Field Explorations and Laboratory Testing

APPENDIX A
FIELD EXPLORATIONS AND LABORATORY TESTING

Subsurface Explorations

Soil and groundwater conditions at the proposed development site were explored by excavating 10 test pits on August 14, 2015. Subsurface exploratory services were subcontracted to GeoEngineers, Inc. Eight of the test pit explorations extended to depths between 10 and 12 feet below surrounding site grades. The remaining test pit explorations extended to depths between 15 and 16 feet below surrounding site grades.

The locations of the test pits were determined by pacing and visual triangulation from existing site features such as roadways and property corners. The elevations presented on the test pit logs are based on a site plan obtained from Larson and Associates Land Surveyors and Engineers Inc. The locations and elevations of the explorations should be considered approximate. Locations of the explorations are provided on the Site Plan, Figure 2.

Our field representative obtained samples, classified the soils, maintained a detailed log of each exploration and observed groundwater conditions where applicable. The samples were retained in sealed plastic bags to prevent moisture loss. The soils were classified visually in general accordance with the system described in Figure A-1, which includes a key to the exploration logs. Summary logs of the explorations are included as Figures A-2 through A-11. The densities noted on the test pit exploration logs are based on the difficulty of excavation, observations of caving and our experience and judgment.

Laboratory Testing

Soil samples obtained from the test pits were transported to our laboratory and examined to confirm or modify field classifications, as well as to evaluate engineering properties of the soil. Representative samples were selected for laboratory testing. Laboratory testing included moisture content determination conducted in general accordance with ASTM International (ASTM) D 2216 and grain-size analyses conducted in general accordance with ASTM C 136. The sample test depths and moisture content test results are shown on the exploration logs. Sieve analysis results are presented in Figures A-12 and A-13.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

- **2.4-inch I.D. split barrel**
- **Standard Penetration Test (SPT)**
- **Shelby tube**
- **Piston**
- **Direct-Push**
- **Bulk or grab**
- **Continuous Coring**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 12.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
348	0				TS		Grass and topsoil		
	1				SM		Brown silty sand with gravel (loose to medium dense, dry to moist)		
347	2								
346	3								
345	4	X	1 SA		SM		Yellowish-brown silty fine to medium sand with occasional gravel (medium dense, moist)	9	%F=13
344	5								
343	6								
342	7				GP		Gray fine to coarse gravel with sand occasional cobbles and trace silt (dense, moist)		
341	8	X	2 SA					4	%F=2
									Cobble/boulders; up to 1 foot in diameter observed
340	9								
339	10						Increased sand content		
338	11								
337	12	X	3				Test pit completed at 12 feet No groundwater seepage observed Moderate caving observed at 3.5 to 6 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-1

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-2
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 12.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
348	1				GW		Gravel, base rock		
					SM		Brown silty fine sand with gravel (medium dense, moist)		
347	2								
346	3				SP-SM		Yellow-brown fine to medium sand with silt, occasional gravel (medium dense, moist)		
345	4	X	1						
344	5								
343	6								
342	7				GW		Yellow-gray fine to coarse gravel with occasional cobbles and sand and trace silt (medium dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
341	8								
340	9	X	2						
339	10						Grades to with sand and medium dense to dense		
338	11								
337	12	X	3 SA					4	%F=2

Test pit completed at 12 feet
No groundwater seepage observed
Moderate caving observed at 0 to 7 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-2

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-3
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 16.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
349	0				SM		Brown silty fine sand with gravel (loose, dry to moist)		
348	1								
347	2								
346	3				SP-SM		Yellow-brown fine to medium sand with silt, occasional gravel (medium dense, moist)		
345	4	X	1						
344	5								
343	6								
342	7				GW		Gray medium to coarse gravel with sand and occasional cobbles and trace silt (medium dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
341	8								
340	9								
339	10	X	2 SA					2	%F=1
338	11								
337	12								
336	13								
335	14								
334	15								
	16	X	3				Test pit completed at 16 feet No groundwater seepage observed Moderate caving observed at 0 to 6 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-3

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-4
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 15.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
349	0				SM		Brown silty fine sand with gravel (loose, dry)		
348	1								
	2				SP-SM		Yellow-brown fine to medium sand with silt and occasional gravel (medium dense, moist)		
347	3	X	1						
346	4								
345	5								
344	6				GP		Gray fine to coarse gravel with sand and occasional cobbles and silt (medium dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
343	7								
342	8	X	2						
341	9								
340	10								
339	11						Grades to with sand and dense		
338	12								
337	13	X	3 SA					3	%F=1
336	14								
335	15								
334							Test pit completed at 15.5 feet No groundwater seepage observed Moderate caving observed at 0 to 6 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-4

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-5
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 12.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
351	0				TS		Grass and topsoil		
					GP-GM		Brown fine to coarse gravel with sand and silt and occasional cobbles and organic matter (roots) (loose to medium dense, dry)		
350	1								
	2								
349					GP		Yellow-brown fine to coarse gravel with sand, occasional cobbles, trace silt (medium dense to dense, moist)		
348	3	X	1						
	4								
347	5								
346					SM		Yellow silty fine sand (medium dense, moist)		
345	6	X	2 SA					6	%F=13
	7								
344					GP		Brown-gray fine to coarse gravel with sand and occasional cobbles and trace silt (medium dense to dense, dry to moist)		Cobble/boulders; up to 1 foot in diameter observed
343	8								
	9								
342		X	3 SA					3	%F=2
341	10								
	11						Grades to moist		
340	12	X	4						

Test pit completed at 12 feet
No groundwater seepage observed
Moderate caving observed at 2.5 to 12 feet bgs

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Tacoma: Date:9/15/15 Path:P:\22\22013001\GINT\22013001 00.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_GEOTEC

Log of Test Pit TP-5

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-6
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 11.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
351	0				TS		Grass and topsoil		
					GP-GM		Brown fine to coarse gravel with silt and sand and occasional cobbles and organic matter (roots) (medium dense, dry)		
350	1								
	2				GP		Yellow-brown fine to coarse gravel with sand, occasional cobbles and trace silt (medium dense, dry)		
349									
348	3								
	4	☒	1						
347									
346	5								
	6				SM		Yellow-brown silty fine sand (medium dense, dry)		
345									
344	7				GP		Gray-brown fine to coarse gravel with sand and occasional cobbles and trace silt (medium dense to dense, dry to moist)		Cobble/boulders; up to 1 foot in diameter observed
	8								
343									
342	9								
	10	☒	2 SA					3	%F=2
341	11						Test pit completed at 11 feet No groundwater seepage observed Minor caving observed at 1 to 11 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-6

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-7
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 10.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
351	0				TS		Grass and topsoil		
					GP-GM		Brown fine to coarse gravel with silt, sand and occasional organic matter (roots) (medium dense, dry)		
350	1				GP		Brown-gray fine to coarse gravel with sand and occasional cobbles and trace silt (medium dense to dense, moist)		
349	2								Cobble/boulders; up to 1 foot in diameter observed
348	3								
	4	X	1						
347	5								
346	6								
345	7								
344	8								
343	9						Sand becomes medium to coarse		
342	10	X	2						
							Test pit completed at 10 feet No groundwater seepage observed Minor caving observed at 3 to 10 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-7

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-8
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 11.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
348	1				TS		Topsoil and grass		
					GM		Brown silty fine to medium gravel with sand and occasional organic matter (roots) (medium dense, dry)		
347	2								
346	3				SP-SM		Yellow-brown fine to medium sand with silt and occasional gravel and trace cobbles (medium dense, moist)		
345	4	X	1						
344	5								
343	6								
342	7				GP		Yellow-brown fine to coarse gravel with sand and trace silt (medium dense to dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
341	8								
340	9	X	2						
339	10								
338	11								

Test pit completed at 11.5 feet
No groundwater seepage observed
Moderate caving observed at 3.5 to 11.5 feet

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-8

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-9
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 12.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
349	1				TS		Topsoil and grass		
					GM		Brown silty fine to coarse gravel with sand and occasional organic matter (roots) (medium dense, dry)		
348	2								
347	3	X	1		GP		Yellow-brown fine to coarse gravel with sand (medium dense to dense, moist)		
346	4	X	2		SP-SM		Yellow-gray fine to medium sand with silt and occasional gravel (medium dense, dry to moist)		
345	5								
344	6								
343	7								
342	8				GP		Gray fine to coarse gravel with sand and occasional cobbles and trace silt (medium dense to dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
341	9								
340	10								
339	11								
338	12	X	3				Test pit completed at 12 feet No groundwater seepage observed Minor to moderate caving observed at 4 to 12 feet		

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-9

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-10
Sheet 1 of 1

Date Excavated: 8/14/2015 Logged By: BK

Equipment: Komatsu PC120 Total Depth (ft) 11.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Moisture Content, %	REMARKS
350	0				TS		Grass and topsoil		
	1				GM		Brown silty fine to coarse gravel with sand and occasional organic matter (roots) (medium dense, dry)		
349	2				GP		Gray-brown fine to coarse gravel with sand and occasional cobbles (medium dense, dry to moist)		
348	3								
347	4	X	1						
346	5				SP-SM		Yellow-brown fine sand with silt (medium dense, moist)		
345	6								
344	7	X	2						
343	8				GP		Gray fine to coarse gravel with sand and occasional cobbles and trace silt (dense, moist)		Cobble/boulders; up to 1 foot in diameter observed
342	9								
341	10	X	3						
340	11								

Test pit completed at 11 feet
No groundwater seepage observed
Minor to moderate caving observed at 4.5 to 11 feet

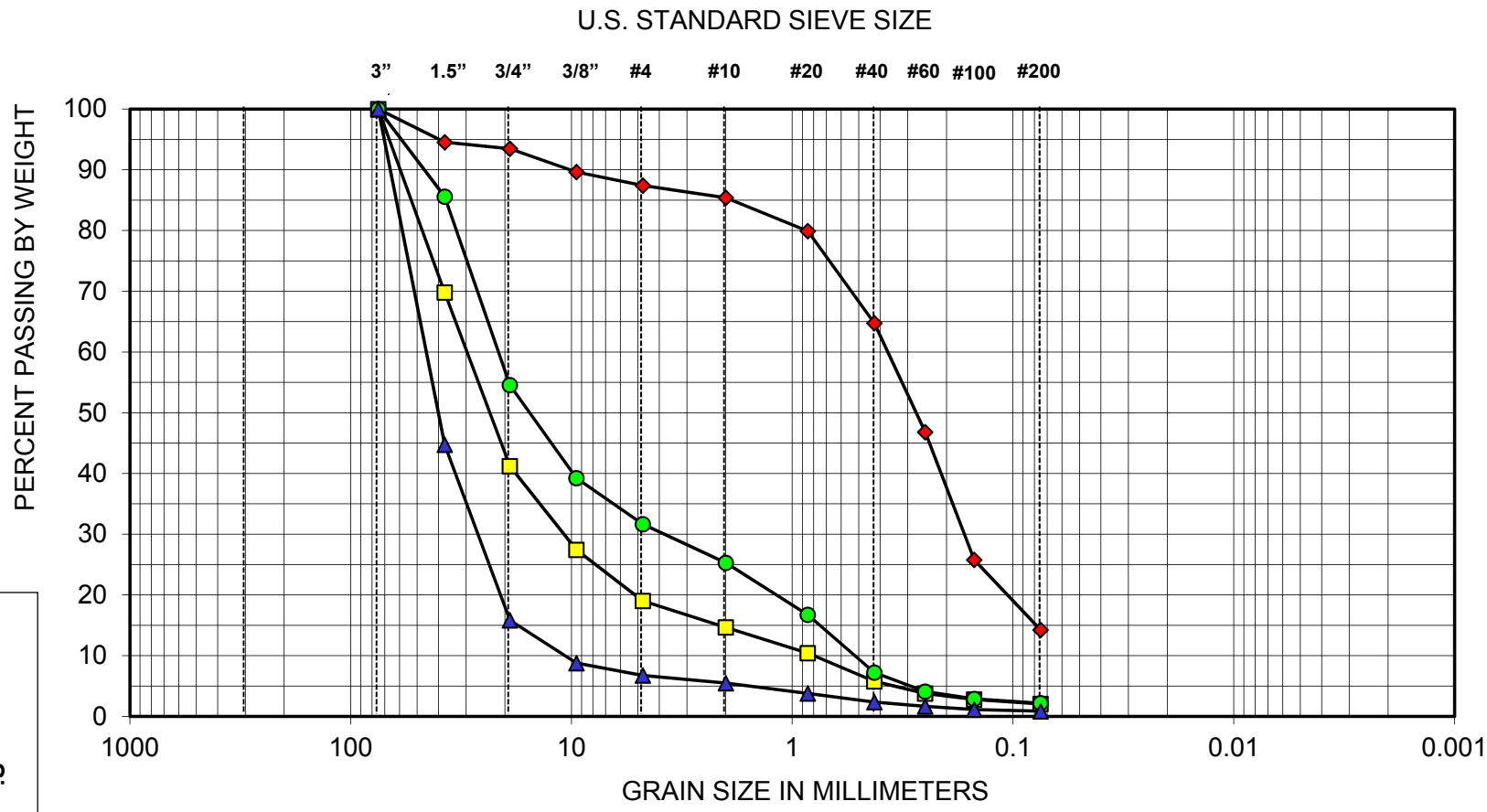
Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Log of Test Pit TP-10

GeoEngineers

Project: Yelm Development
Project Location: Yelm, Washington
Project Number: 22013-001-00

Figure A-11
Sheet 1 of 1



BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	EXPLORATION NUMBER	DEPTH (ft)	LABORATORY SOIL CLASSIFICATION
◆	TP-1	3.5	Silty sand (SM)
□	TP-1	8	Poorly graded gravel with sand (GP)
○	TP-2	11.5	Well-graded gravel with sand (GW)
△	TP-3	10	Well-graded gravel (GW)

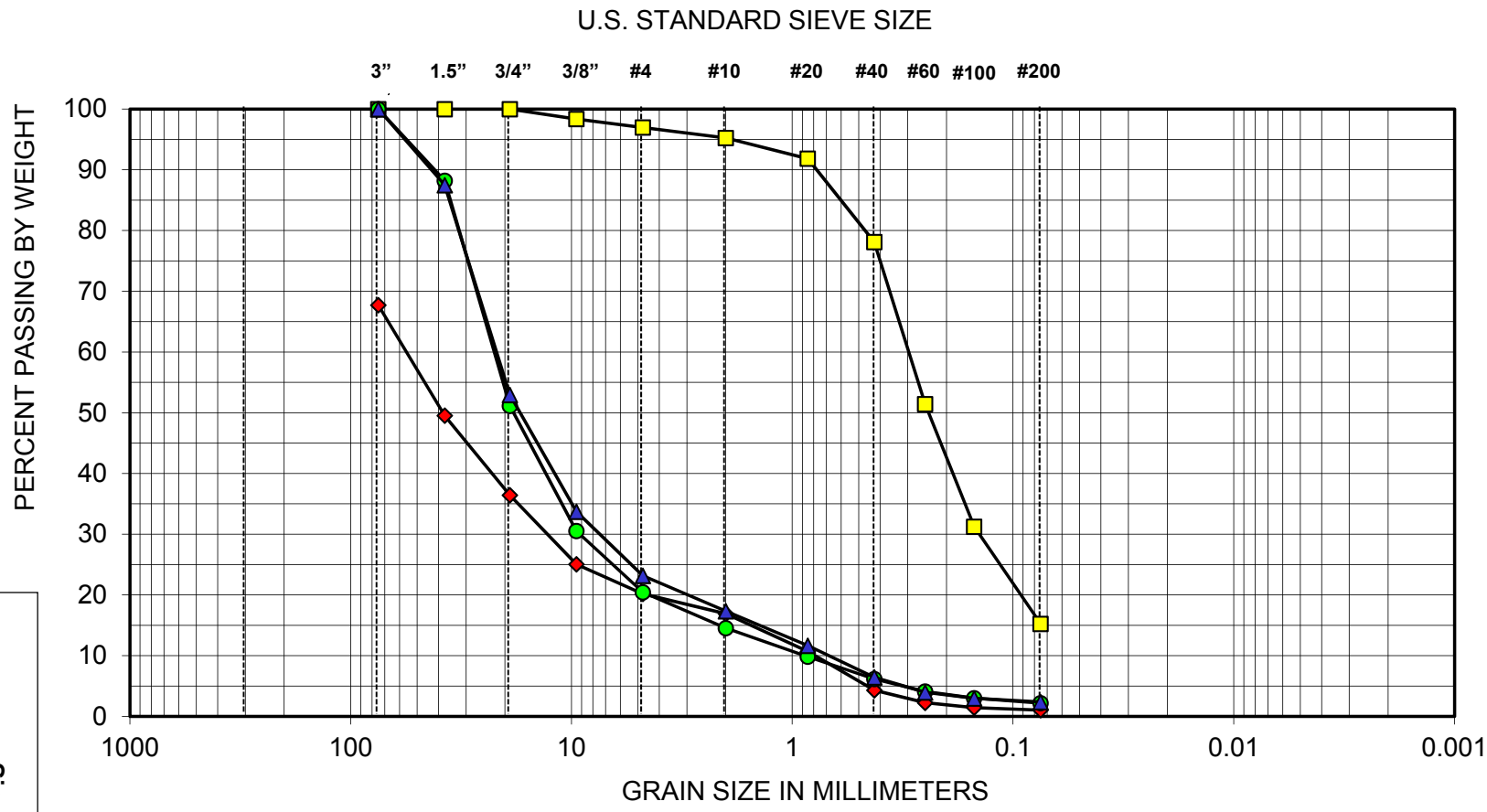
The grain size analysis results were obtained in general accordance with ASTM D 6913.

GeoEngineers

Yelm Development
Yelm, Washington

Sieve Analysis Results

Figure A-12



BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	EXPLORATION NUMBER	DEPTH (ft)	SOIL CLASSIFICATION
◆	TP-4	13	Poorly graded gravel with sand (GP)
□	TP-5	6	Silty sand (SM)
○	TP-5	9.5	Poorly graded gravel with sand (GP)
△	TP-6	9.5	Poorly graded gravel with sand (GP)

The grain size analysis results were obtained in general accordance with ASTM D 6913.

GEOENGINEERS

Figure A-13

Yelm Development
Yelm, Washington

Sieve Analysis Results

APPENDIX B
Report Limitations and Guidelines for Use

APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use by D&B Retail Development and their authorized agents. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, a geotechnical or geologic study conducted for a civil engineer or architect may not fulfill the needs of a construction contractor or even another civil engineer or architect that are involved in the same project. Because each geotechnical or geologic study is unique, each geotechnical engineering or geologic report is unique, prepared solely for the specific client and project site. Our report is prepared for the exclusive use of our Client. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions. Within the limitations of scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted geotechnical practices in this area at the time this report was prepared. This report should not be applied for any purpose or project except the one originally contemplated.

A Geotechnical Engineering or Geologic Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Yelm Development project located at 1301 Yelm Avenue East in Yelm, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

For example, changes that can affect the applicability of this report include those that affect:

- the function of the proposed structure;
- elevation, configuration, location, orientation or weight of the proposed structure;
- composition of the design team; or

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

- project ownership.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Subsurface Conditions Can Change

This geotechnical or geologic report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying a report to determine if it remains applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Geotechnical and Geologic Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Geotechnical Engineering Report Recommendations Are Not Final

Do not over-rely on the preliminary construction recommendations included in this report. These recommendations are not final, because they were developed principally from GeoEngineers' professional judgment and opinion. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for this report's recommendations if we do not perform construction observation.

Sufficient monitoring, testing and consultation by GeoEngineers should be provided during construction to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes should the conditions revealed during the work differ from those anticipated, and to evaluate whether or not earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective method of managing the risks associated with unanticipated conditions.

A Geotechnical Engineering or Geologic Report Could be Subject to Misinterpretation

Misinterpretation of this report by other design team members can result in costly problems. You could lower that risk by having GeoEngineers confer with appropriate members of the design team after submitting the report. Also retain GeoEngineers to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering or geologic report. Reduce that risk by having GeoEngineers participate in pre-bid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Exploration Logs

Geotechnical engineers and geologists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Give Contractors a Complete Report and Guidance

Some owners and design professionals believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering or geologic report, but preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer. A pre-bid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might an owner be in a position to give contractors the best information available, while requiring them to at least share the financial responsibilities stemming from unanticipated conditions. Further, a contingency for unanticipated conditions should be included in your project budget and schedule.

Contractors are Responsible for Site Safety on their Own Construction Projects

Our geotechnical recommendations are not intended to direct the contractor’s procedures, methods, schedule or management of the work site. The contractor is solely responsible for job site safety and for managing construction operations to minimize risks to on-site personnel and to adjacent properties.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering or geology) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Environmental Reports Should not be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or

recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

APPENDIX 6

OPERATIONS AND MAINTENANCE MANUAL

APPENDIX 7

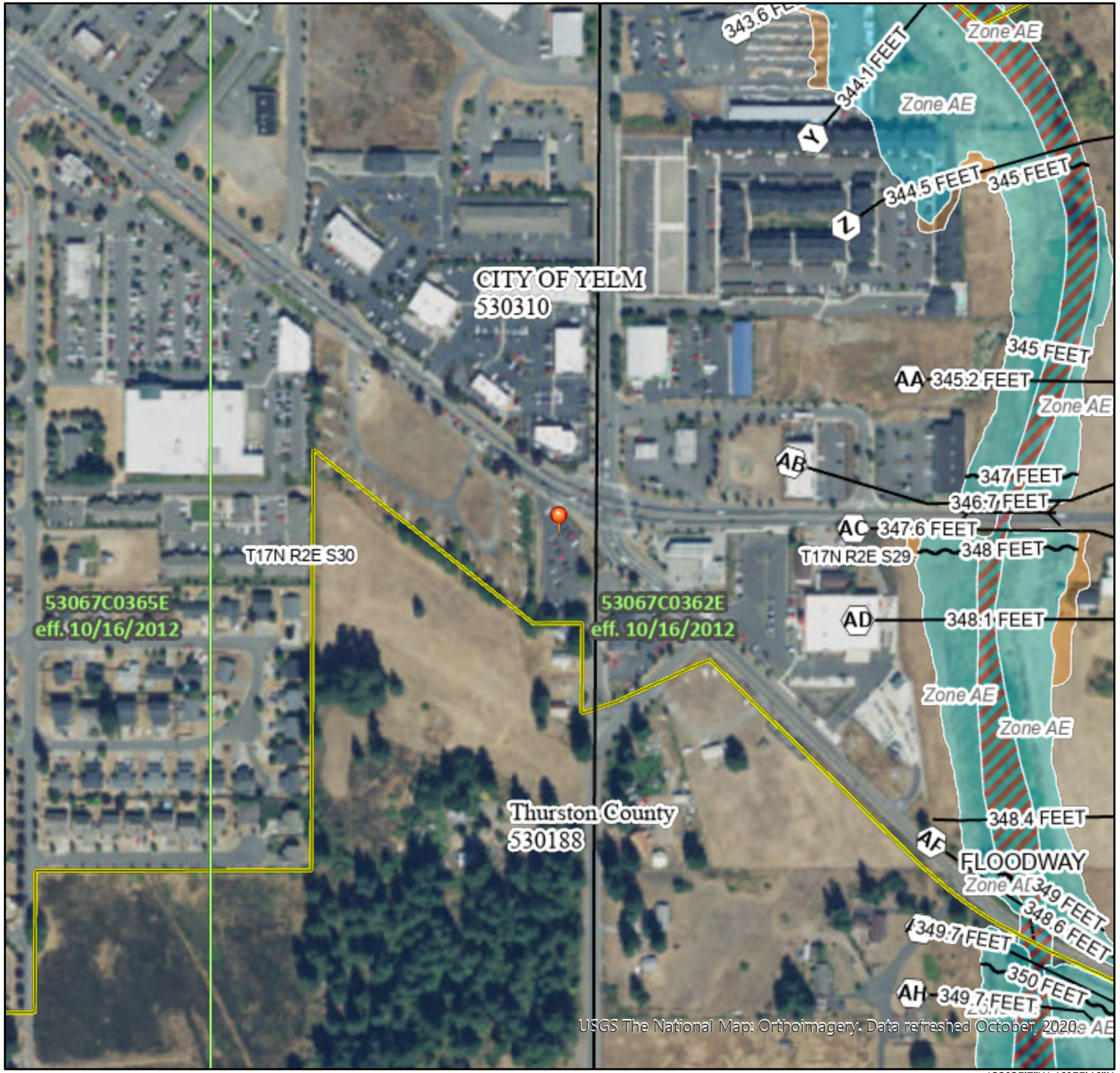
CONSTRUCTION STORMWATER POLLUTION PREVENTION PLAN

APPENDIX 8
FEMA FLOOD INSURANCE MAP

National Flood Hazard Layer FIRMette

FEMA

122°35'44"W 46°56'11"N



122°35'7"W 46°55'46"N

Feet

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

1:6,000

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/10/2020 at 4:32 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

APPENDIX 9
DESIGN CALCULATIONS AND COMPUTATIONS

WWHM2012

PROJECT REPORT

INFILTRATION

SYSTEM

General Model Information

Project Name:	1849.06 Yelm Popeyes Detention
Site Name:	
Site Address:	
City:	
Report Date:	5/31/2022
Gage:	Lake Lawrence
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.857
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	0.97
Pervious Total	0.97

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.97

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Lawn, Flat	0.48
Pervious Total	0.48

Impervious Land Use	acre
ROOF TOPS FLAT	0.05
SIDEWALKS FLAT	0.08
PARKING FLAT	0.36
Impervious Total	0.49
Basin Total	0.97

Element Flows To:

Surface	Interflow	Groundwater
Gravel Trench Bed 1	Gravel Trench Bed 1	

Routing Elements

Predeveloped Routing

Mitigated Routing

Gravel Trench Bed 1

Bottom Length:	55.00 ft.
Bottom Width:	12.00 ft.
Trench bottom slope 1:	0 To 1
Trench Left side slope 0:	0 To 1
Trench right side slope 2:	0 To 1
Material thickness of first layer:	4
Pour Space of material for first layer:	0.33
Material thickness of second layer:	0
Pour Space of material for second layer:	0
Material thickness of third layer:	0
Pour Space of material for third layer:	0
Infiltration On	
Infiltration rate:	20
Infiltration safety factor:	1
Total Volume Infiltrated (ac-ft.):	85.997
Total Volume Through Riser (ac-ft.):	0
Total Volume Through Facility (ac-ft.):	85.997
Percent Infiltrated:	100
Total Precip Applied to Facility:	0
Total Evap From Facility:	0
Discharge Structure	
Riser Height:	4 ft.
Riser Diameter:	18 in.
Element Flows To:	
Outlet 1	Outlet 2

Gravel Trench Bed Hydraulic Table

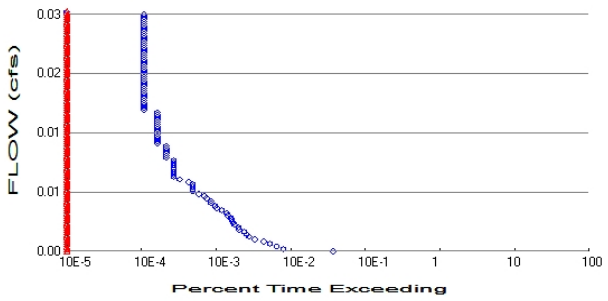
Stage(feet)	Area(ac.)	Volume(ac-ft.)	Discharge(cfs)	Infilt(cfs)
0.0000	0.015	0.000	0.000	0.000
0.0556	0.015	0.000	0.000	0.305
0.1111	0.015	0.000	0.000	0.305
0.1667	0.015	0.000	0.000	0.305
0.2222	0.015	0.001	0.000	0.305
0.2778	0.015	0.001	0.000	0.305
0.3333	0.015	0.001	0.000	0.305
0.3889	0.015	0.001	0.000	0.305
0.4444	0.015	0.002	0.000	0.305
0.5000	0.015	0.002	0.000	0.305
0.5556	0.015	0.002	0.000	0.305
0.6111	0.015	0.003	0.000	0.305
0.6667	0.015	0.003	0.000	0.305
0.7222	0.015	0.003	0.000	0.305
0.7778	0.015	0.003	0.000	0.305
0.8333	0.015	0.004	0.000	0.305
0.8889	0.015	0.004	0.000	0.305
0.9444	0.015	0.004	0.000	0.305
1.0000	0.015	0.005	0.000	0.305
1.0556	0.015	0.005	0.000	0.305
1.1111	0.015	0.005	0.000	0.305
1.1667	0.015	0.005	0.000	0.305
1.2222	0.015	0.006	0.000	0.305
1.2778	0.015	0.006	0.000	0.305

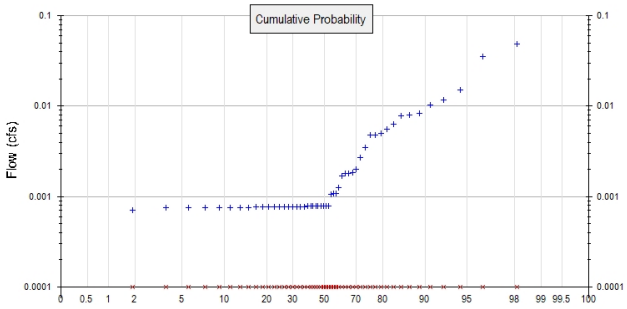
1.3333	0.015	0.006	0.000	0.305
1.3889	0.015	0.006	0.000	0.305
1.4444	0.015	0.007	0.000	0.305
1.5000	0.015	0.007	0.000	0.305
1.5556	0.015	0.007	0.000	0.305
1.6111	0.015	0.008	0.000	0.305
1.6667	0.015	0.008	0.000	0.305
1.7222	0.015	0.008	0.000	0.305
1.7778	0.015	0.008	0.000	0.305
1.8333	0.015	0.009	0.000	0.305
1.8889	0.015	0.009	0.000	0.305
1.9444	0.015	0.009	0.000	0.305
2.0000	0.015	0.010	0.000	0.305
2.0556	0.015	0.010	0.000	0.305
2.1111	0.015	0.010	0.000	0.305
2.1667	0.015	0.010	0.000	0.305
2.2222	0.015	0.011	0.000	0.305
2.2778	0.015	0.011	0.000	0.305
2.3333	0.015	0.011	0.000	0.305
2.3889	0.015	0.011	0.000	0.305
2.4444	0.015	0.012	0.000	0.305
2.5000	0.015	0.012	0.000	0.305
2.5556	0.015	0.012	0.000	0.305
2.6111	0.015	0.013	0.000	0.305
2.6667	0.015	0.013	0.000	0.305
2.7222	0.015	0.013	0.000	0.305
2.7778	0.015	0.013	0.000	0.305
2.8333	0.015	0.014	0.000	0.305
2.8889	0.015	0.014	0.000	0.305
2.9444	0.015	0.014	0.000	0.305
3.0000	0.015	0.015	0.000	0.305
3.0556	0.015	0.015	0.000	0.305
3.1111	0.015	0.015	0.000	0.305
3.1667	0.015	0.015	0.000	0.305
3.2222	0.015	0.016	0.000	0.305
3.2778	0.015	0.016	0.000	0.305
3.3333	0.015	0.016	0.000	0.305
3.3889	0.015	0.016	0.000	0.305
3.4444	0.015	0.017	0.000	0.305
3.5000	0.015	0.017	0.000	0.305
3.5556	0.015	0.017	0.000	0.305
3.6111	0.015	0.018	0.000	0.305
3.6667	0.015	0.018	0.000	0.305
3.7222	0.015	0.018	0.000	0.305
3.7778	0.015	0.018	0.000	0.305
3.8333	0.015	0.019	0.000	0.305
3.8889	0.015	0.019	0.000	0.305
3.9444	0.015	0.019	0.000	0.305
4.0000	0.015	0.020	0.000	0.305
4.0556	0.015	0.020	0.208	0.305
4.1111	0.015	0.021	0.587	0.305
4.1667	0.015	0.022	1.074	0.305
4.2222	0.015	0.023	1.636	0.305
4.2778	0.015	0.024	2.248	0.305
4.3333	0.015	0.025	2.882	0.305
4.3889	0.015	0.025	3.509	0.305
4.4444	0.015	0.026	4.103	0.305
4.5000	0.015	0.027	4.639	0.305

4.5556	0.015	0.028	5.097	0.305
4.6111	0.015	0.029	5.468	0.305
4.6667	0.015	0.030	5.754	0.305
4.7222	0.015	0.030	5.974	0.305
4.7778	0.015	0.031	6.249	0.305
4.8333	0.015	0.032	6.469	0.305
4.8889	0.015	0.033	6.681	0.305
4.9444	0.015	0.034	6.887	0.305
5.0000	0.015	0.035	7.086	0.305

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.97
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0.48
Total Impervious Area: 0.49

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.001471
5 year	0.004083
10 year	0.007527
25 year	0.015372
50 year	0.02524
100 year	0.040374

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0
5 year	0
10 year	0
25 year	0
50 year	0
100 year	0

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.005	0.000
1957	0.001	0.000
1958	0.001	0.000
1959	0.001	0.000
1960	0.001	0.000
1961	0.003	0.000
1962	0.001	0.000
1963	0.001	0.000
1964	0.001	0.000
1965	0.001	0.000

1966	0.001	0.000
1967	0.001	0.000
1968	0.001	0.000
1969	0.001	0.000
1970	0.001	0.000
1971	0.006	0.000
1972	0.010	0.000
1973	0.001	0.000
1974	0.003	0.000
1975	0.001	0.000
1976	0.001	0.000
1977	0.001	0.000
1978	0.001	0.000
1979	0.001	0.000
1980	0.001	0.000
1981	0.002	0.000
1982	0.002	0.000
1983	0.001	0.000
1984	0.001	0.000
1985	0.001	0.000
1986	0.002	0.000
1987	0.002	0.000
1988	0.001	0.000
1989	0.001	0.000
1990	0.006	0.000
1991	0.008	0.000
1992	0.001	0.000
1993	0.001	0.000
1994	0.001	0.000
1995	0.005	0.000
1996	0.012	0.000
1997	0.008	0.000
1998	0.002	0.000
1999	0.001	0.000
2000	0.001	0.000
2001	0.001	0.000
2002	0.005	0.000
2003	0.001	0.000
2004	0.049	0.000
2005	0.008	0.000
2006	0.035	0.000
2007	0.015	0.000
2008	0.001	0.000

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0491	0.0000
2	0.0353	0.0000
3	0.0152	0.0000
4	0.0117	0.0000
5	0.0103	0.0000
6	0.0084	0.0000
7	0.0079	0.0000
8	0.0077	0.0000
9	0.0063	0.0000
10	0.0055	0.0000
11	0.0050	0.0000

12	0.0048	0.0000
13	0.0048	0.0000
14	0.0035	0.0000
15	0.0027	0.0000
16	0.0020	0.0000
17	0.0018	0.0000
18	0.0018	0.0000
19	0.0018	0.0000
20	0.0017	0.0000
21	0.0013	0.0000
22	0.0011	0.0000
23	0.0011	0.0000
24	0.0011	0.0000
25	0.0008	0.0000
26	0.0008	0.0000
27	0.0008	0.0000
28	0.0008	0.0000
29	0.0008	0.0000
30	0.0008	0.0000
31	0.0008	0.0000
32	0.0008	0.0000
33	0.0008	0.0000
34	0.0008	0.0000
35	0.0008	0.0000
36	0.0008	0.0000
37	0.0008	0.0000
38	0.0008	0.0000
39	0.0008	0.0000
40	0.0008	0.0000
41	0.0008	0.0000
42	0.0008	0.0000
43	0.0008	0.0000
44	0.0008	0.0000
45	0.0008	0.0000
46	0.0008	0.0000
47	0.0008	0.0000
48	0.0008	0.0000
49	0.0008	0.0000
50	0.0007	0.0000
51	0.0007	0.0000
52	0.0007	0.0000
53	0.0007	0.0000

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.0007	690	0	0	Pass
0.0010	148	0	0	Pass
0.0012	120	0	0	Pass
0.0015	98	0	0	Pass
0.0017	80	0	0	Pass
0.0020	61	0	0	Pass
0.0022	51	0	0	Pass
0.0025	48	0	0	Pass
0.0027	44	0	0	Pass
0.0030	38	0	0	Pass
0.0032	37	0	0	Pass
0.0035	33	0	0	Pass
0.0037	32	0	0	Pass
0.0040	30	0	0	Pass
0.0042	29	0	0	Pass
0.0044	27	0	0	Pass
0.0047	26	0	0	Pass
0.0049	22	0	0	Pass
0.0052	19	0	0	Pass
0.0054	18	0	0	Pass
0.0057	16	0	0	Pass
0.0059	16	0	0	Pass
0.0062	14	0	0	Pass
0.0064	13	0	0	Pass
0.0067	11	0	0	Pass
0.0069	9	0	0	Pass
0.0072	9	0	0	Pass
0.0074	9	0	0	Pass
0.0077	9	0	0	Pass
0.0079	8	0	0	Pass
0.0082	6	0	0	Pass
0.0084	5	0	0	Pass
0.0087	5	0	0	Pass
0.0089	5	0	0	Pass
0.0092	5	0	0	Pass
0.0094	5	0	0	Pass
0.0096	5	0	0	Pass
0.0099	5	0	0	Pass
0.0101	5	0	0	Pass
0.0104	4	0	0	Pass
0.0106	4	0	0	Pass
0.0109	4	0	0	Pass
0.0111	4	0	0	Pass
0.0114	4	0	0	Pass
0.0116	4	0	0	Pass
0.0119	3	0	0	Pass
0.0121	3	0	0	Pass
0.0124	3	0	0	Pass
0.0126	3	0	0	Pass
0.0129	3	0	0	Pass
0.0131	3	0	0	Pass
0.0134	3	0	0	Pass
0.0136	3	0	0	Pass

0.0139	3	0	0	Pass
0.0141	3	0	0	Pass
0.0143	3	0	0	Pass
0.0146	3	0	0	Pass
0.0148	3	0	0	Pass
0.0151	3	0	0	Pass
0.0153	2	0	0	Pass
0.0156	2	0	0	Pass
0.0158	2	0	0	Pass
0.0161	2	0	0	Pass
0.0163	2	0	0	Pass
0.0166	2	0	0	Pass
0.0168	2	0	0	Pass
0.0171	2	0	0	Pass
0.0173	2	0	0	Pass
0.0176	2	0	0	Pass
0.0178	2	0	0	Pass
0.0181	2	0	0	Pass
0.0183	2	0	0	Pass
0.0186	2	0	0	Pass
0.0188	2	0	0	Pass
0.0191	2	0	0	Pass
0.0193	2	0	0	Pass
0.0195	2	0	0	Pass
0.0198	2	0	0	Pass
0.0200	2	0	0	Pass
0.0203	2	0	0	Pass
0.0205	2	0	0	Pass
0.0208	2	0	0	Pass
0.0210	2	0	0	Pass
0.0213	2	0	0	Pass
0.0215	2	0	0	Pass
0.0218	2	0	0	Pass
0.0220	2	0	0	Pass
0.0223	2	0	0	Pass
0.0225	2	0	0	Pass
0.0228	2	0	0	Pass
0.0230	2	0	0	Pass
0.0233	2	0	0	Pass
0.0235	2	0	0	Pass
0.0238	2	0	0	Pass
0.0240	2	0	0	Pass
0.0242	2	0	0	Pass
0.0245	2	0	0	Pass
0.0247	2	0	0	Pass
0.0250	2	0	0	Pass
0.0252	2	0	0	Pass

Water Quality

Water Quality BMP Flow and Volume for POC #1

On-line facility volume:	0 acre-feet
On-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.
Off-line facility target flow:	0 cfs.
Adjusted for 15 min:	0 cfs.

LID Report

LID Technique	Used for Treatment ?	Total Volume Needs Treatment (ac-ft)	Volume Through Facility (ac-ft)	Infiltration Volume (ac-ft)	Cumulative Volume Infiltration Credit	Percent Volume Infiltrated	Water Quality	Percent Water Quality Treated	Comment
Gravel Trench Bed 1 POC	☐	78.26			☐	100.00			
Total Volume Infiltrated		78.26	0.00	0.00		100.00	0.00	0%	No Treat. Credit
Compliance with LID Standard 8% of 2-yr to 50% of 2-yr									Duration Analysis Result = Passed

Model Default Modifications

Total of 0 changes have been made.

PERLND Changes

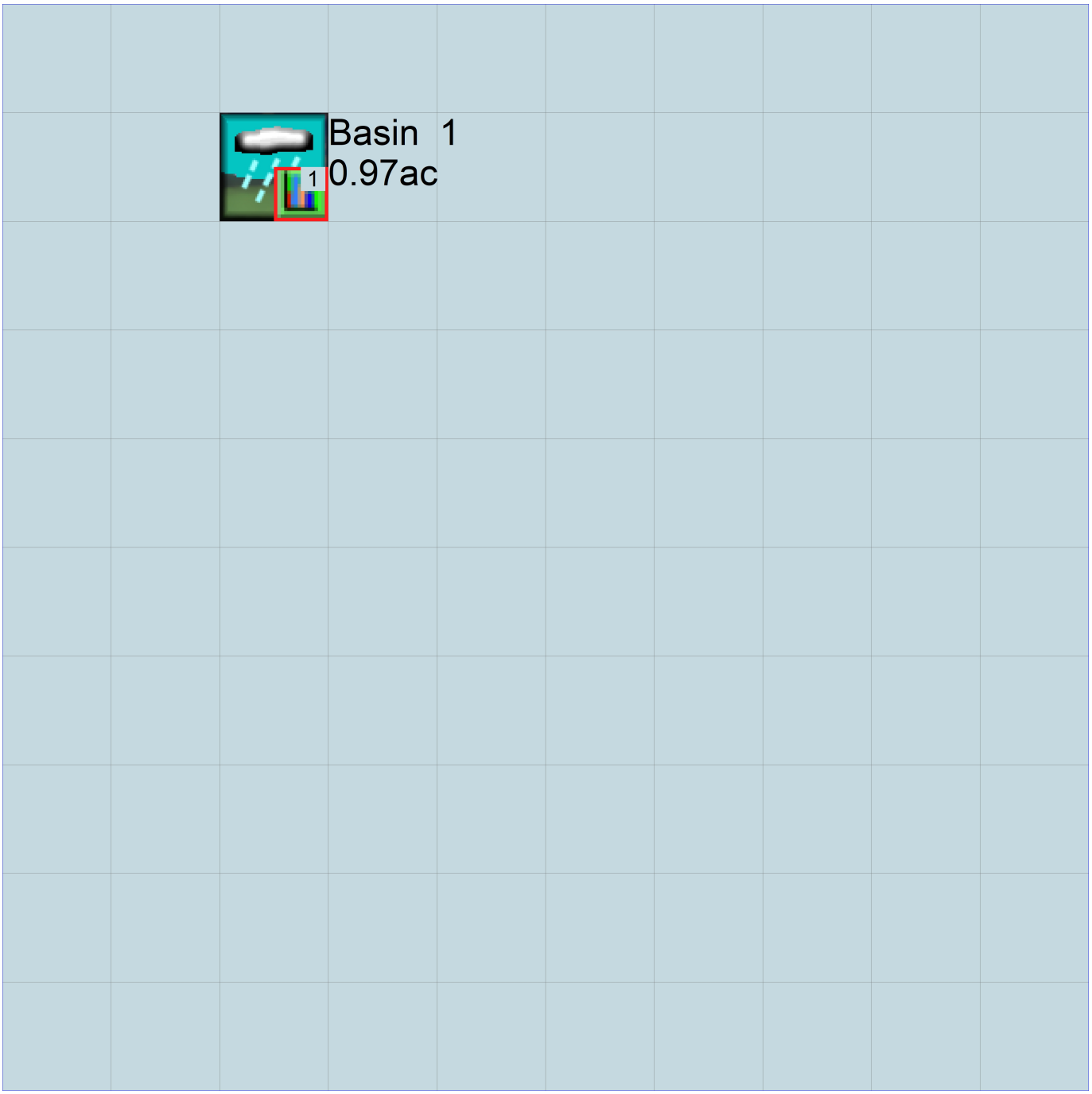
No PERLND changes have been made.

IMPLND Changes

No IMPLND changes have been made.

Appendix

Predeveloped Schematic



Mitigated Schematic

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WWHM2012

PROJECT REPORT

TREATMENT

SIZING

General Model Information

Project Name:	1849.06 Yelm Popeyes Treatmnet
Site Name:	
Site Address:	
City:	
Report Date:	5/31/2022
Gage:	Lake Lawrence
Data Start:	1955/10/01
Data End:	2008/09/30
Timestep:	15 Minute
Precip Scale:	0.857
Version Date:	2019/09/13
Version:	4.2.17

POC Thresholds

Low Flow Threshold for POC1:	50 Percent of the 2 Year
High Flow Threshold for POC1:	50 Year

Landuse Basin Data

Predeveloped Land Use

Basin 1

Bypass:	No
GroundWater:	No

Pervious Land Use	acre
A B, Forest, Flat	0.44
Pervious Total	0.44

Impervious Land Use	acre
Impervious Total	0
Basin Total	0.44

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

Basin 1

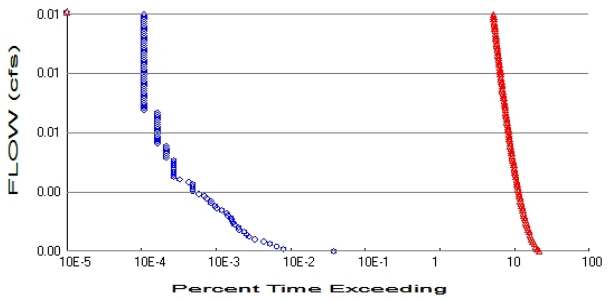
Bypass:	No
GroundWater:	No
Pervious Land Use	acre
Pervious Total	0
Impervious Land Use	acre
SIDEWALKS FLAT	0.08
PARKING FLAT	0.36
Impervious Total	0.44
Basin Total	0.44

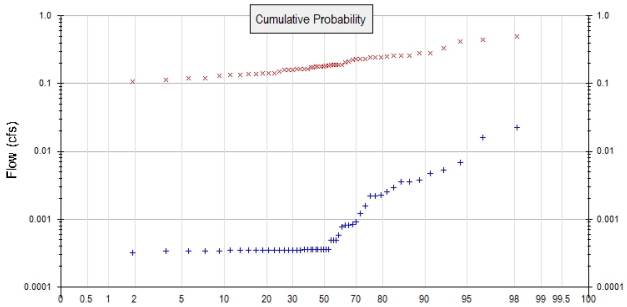
Element Flows To:

Surface	Interflow	Groundwater

Analysis Results

POC 1





\+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 0.44
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 0
Total Impervious Area: 0.44

Flow Frequency Method: Log Pearson Type III 17B

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	0.000667
5 year	0.001852
10 year	0.003415
25 year	0.006973
50 year	0.011449
100 year	0.018314

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.183483
5 year	0.249277
10 year	0.297542
25 year	0.364096
50 year	0.417863
100 year	0.475345

Annual Peaks

Annual Peaks for Predeveloped and Mitigated. POC #1

Year	**Predeveloped**	**Mitigated**
1956	0.002	0.143
1957	0.000	0.258
1958	0.000	0.186
1959	0.000	0.175
1960	0.000	0.253
1961	0.002	0.129
1962	0.000	0.141
1963	0.000	0.246
1964	0.000	0.178
1965	0.000	0.181

1966	0.000	0.152
1967	0.001	0.172
1968	0.000	0.114
1969	0.000	0.119
1970	0.000	0.141
1971	0.003	0.133
1972	0.005	0.165
1973	0.000	0.137
1974	0.001	0.277
1975	0.000	0.187
1976	0.000	0.160
1977	0.000	0.231
1978	0.000	0.187
1979	0.000	0.246
1980	0.000	0.139
1981	0.001	0.225
1982	0.001	0.188
1983	0.000	0.329
1984	0.000	0.177
1985	0.000	0.166
1986	0.001	0.230
1987	0.001	0.164
1988	0.000	0.096
1989	0.000	0.122
1990	0.003	0.444
1991	0.004	0.228
1992	0.000	0.180
1993	0.000	0.107
1994	0.000	0.160
1995	0.002	0.244
1996	0.005	0.213
1997	0.004	0.189
1998	0.001	0.283
1999	0.000	0.160
2000	0.000	0.184
2001	0.000	0.166
2002	0.002	0.187
2003	0.000	0.132
2004	0.022	0.419
2005	0.004	0.490
2006	0.016	0.255
2007	0.007	0.206
2008	0.000	0.257

Ranked Annual Peaks

Ranked Annual Peaks for Predeveloped and Mitigated. POC #1

Rank	**Predeveloped**	**Mitigated**
1	0.0223	0.4897
2	0.0160	0.4442
3	0.0069	0.4195
4	0.0053	0.3293
5	0.0047	0.2832
6	0.0038	0.2774
7	0.0036	0.2580
8	0.0035	0.2568
9	0.0029	0.2547
10	0.0025	0.2528
11	0.0023	0.2458

12	0.0022	0.2456
13	0.0022	0.2441
14	0.0016	0.2312
15	0.0012	0.2300
16	0.0009	0.2284
17	0.0008	0.2253
18	0.0008	0.2135
19	0.0008	0.2060
20	0.0008	0.1892
21	0.0006	0.1876
22	0.0005	0.1874
23	0.0005	0.1873
24	0.0005	0.1869
25	0.0004	0.1856
26	0.0004	0.1844
27	0.0004	0.1806
28	0.0004	0.1802
29	0.0004	0.1776
30	0.0004	0.1767
31	0.0004	0.1750
32	0.0004	0.1721
33	0.0004	0.1659
34	0.0004	0.1657
35	0.0004	0.1647
36	0.0004	0.1640
37	0.0004	0.1604
38	0.0004	0.1601
39	0.0003	0.1597
40	0.0003	0.1522
41	0.0003	0.1427
42	0.0003	0.1411
43	0.0003	0.1408
44	0.0003	0.1393
45	0.0003	0.1372
46	0.0003	0.1325
47	0.0003	0.1325
48	0.0003	0.1295
49	0.0003	0.1215
50	0.0003	0.1191
51	0.0003	0.1135
52	0.0003	0.1075
53	0.0003	0.0959

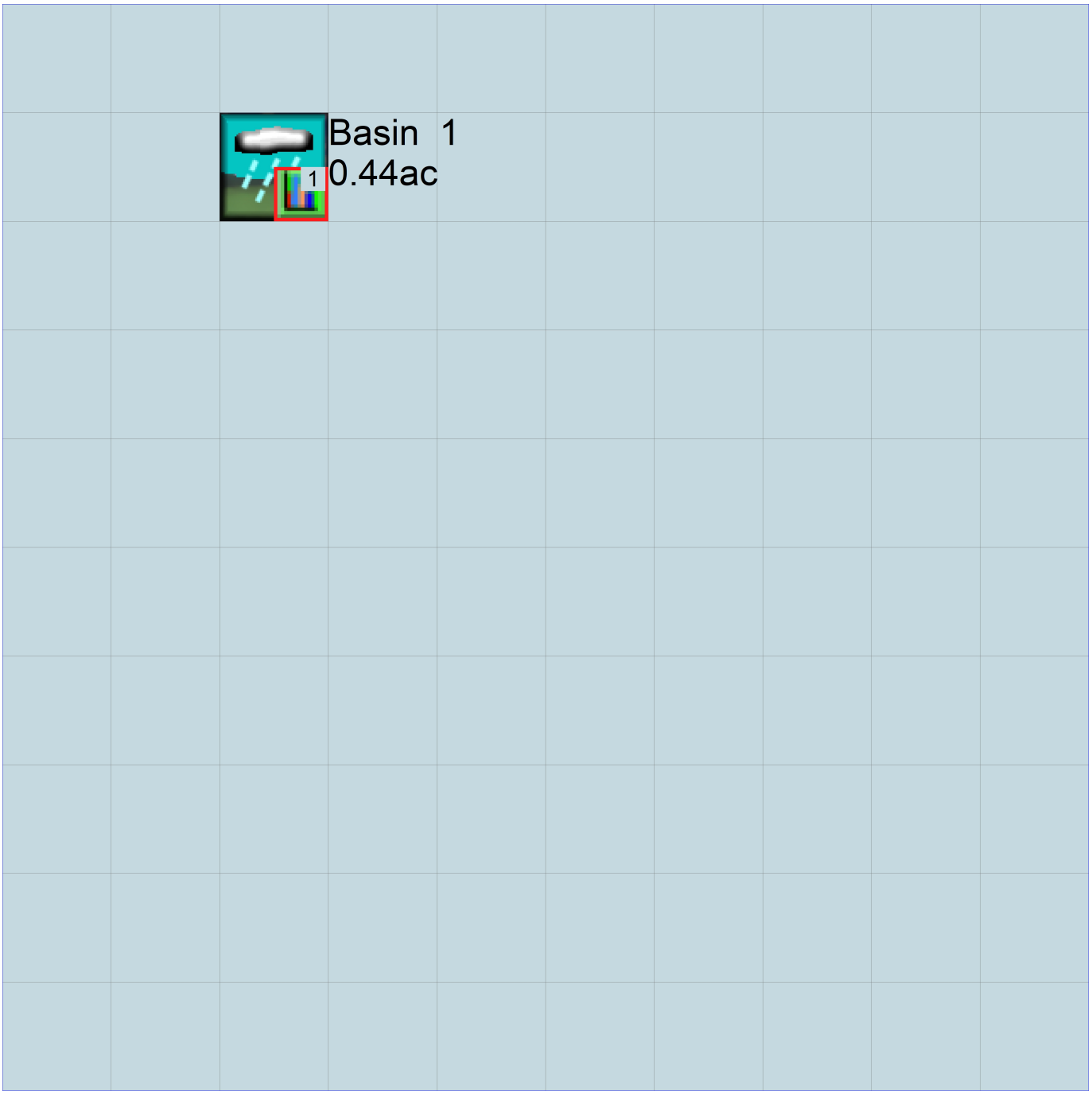
Water Quality

Water Quality BMP Flow and Volume for POC #1

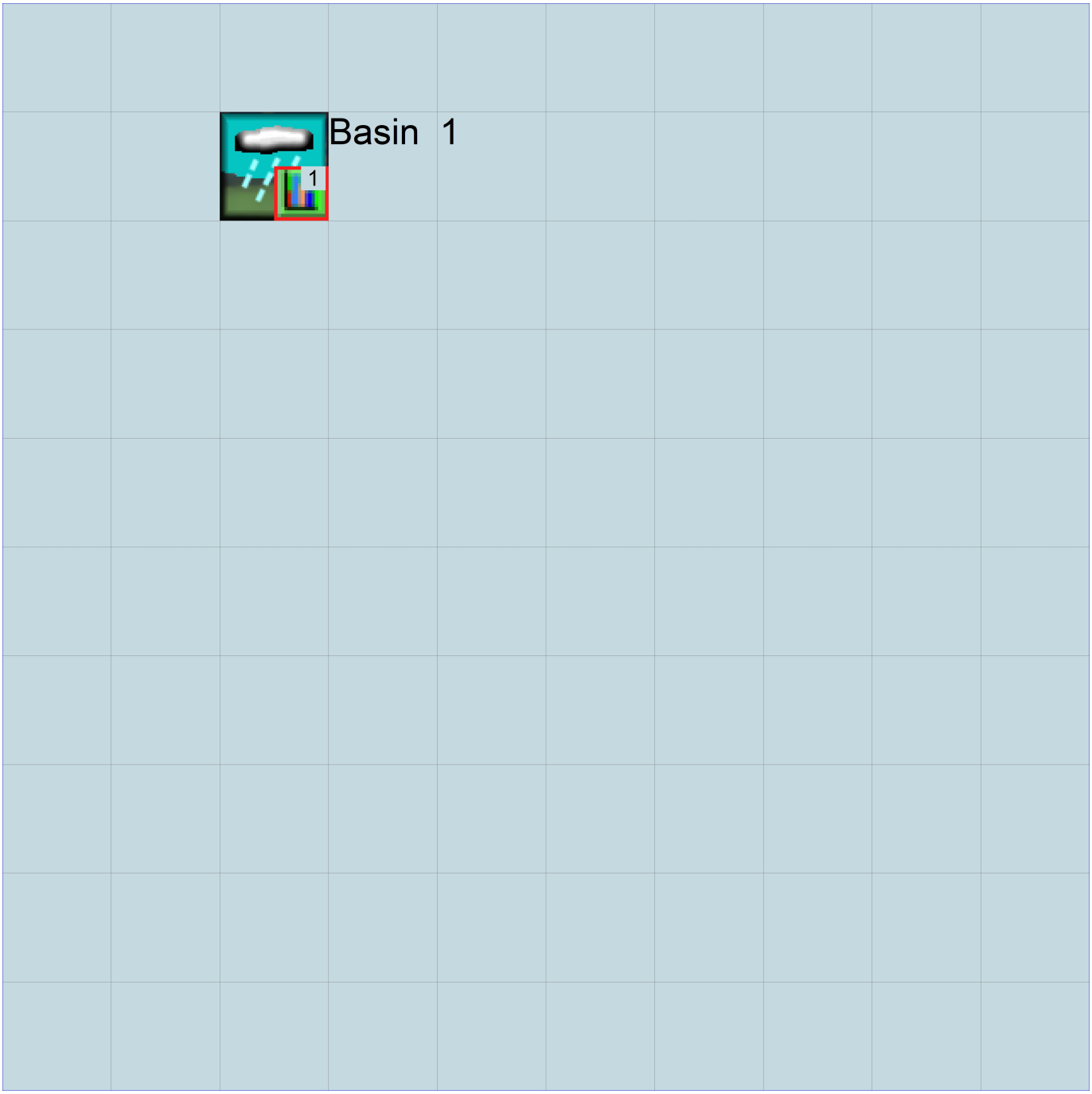
On-line facility volume:	0.0639 acre-feet
On-line facility target flow:	0.0761 cfs.
Adjusted for 15 min:	0.0761 cfs.
Off-line facility target flow:	0.0431 cfs.
Adjusted for 15 min:	0.0431 cfs.

Appendix

Predeveloped Schematic



Mitigated Schematic



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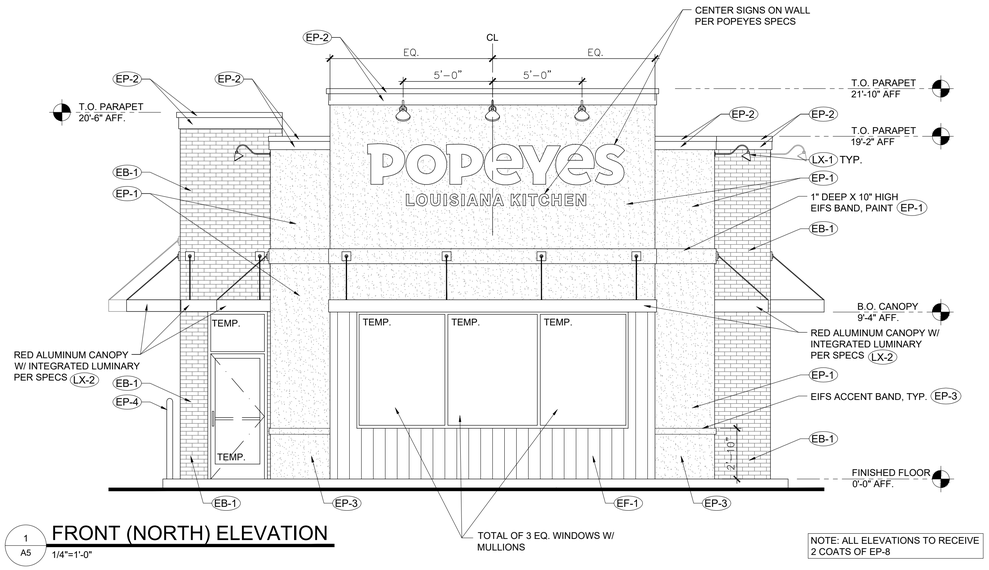
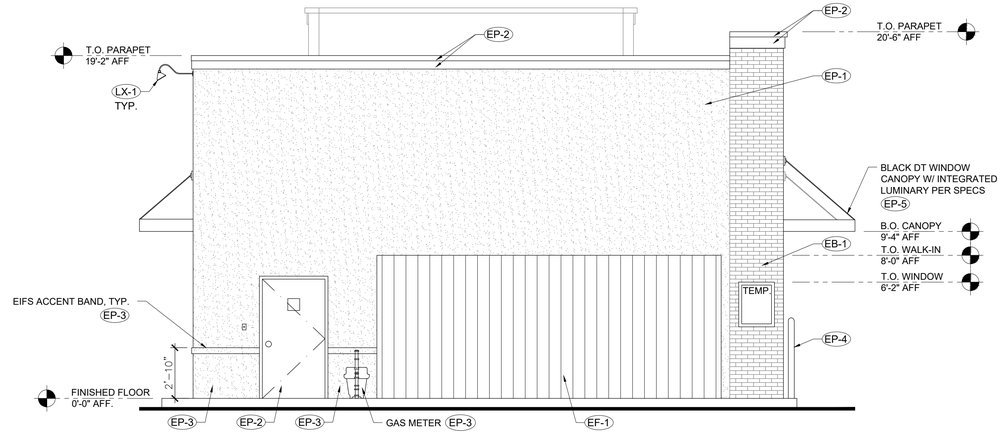


1 A5 FRONT (NORTH) ELEVATION

1/4"=1'-0"

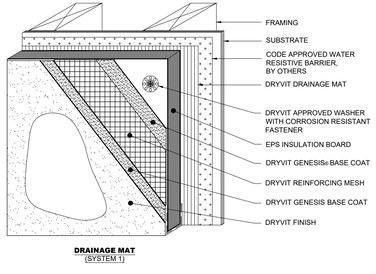
NOTE: ALL ELEVATIONS TO RECEIVE 2 COATS OF EP-8



2 A5 REAR (SOUTH) ELEVATION

1/4"=1'-0"

OUTSULATION LCMD SYSTEM 1 BY DRYVIT



3 A5.0 TYP. EIFS DETAIL

NTS

SIGN MANUFACTURERS

A. AAA
CONTACT: LINDSEY OLIVER; PHONE (337) 233-5686X3012
LINDSEY@AAASIGNS.COM

B. ALLEN INDUSTRIES
CONTACT: DAVID SIMMONS; PHONE: (336) 615-8731;
DAVID.SIMMONS@ALLENINDUSTRIES.COM

C. ENTERA
CONTACT: JASON BRAGG; PHONE: (850) 392-0801;
JASON.BRAGG@ENTERABRANDING.COM

D. LOREN SIGNS
CONTACT: DAVE PALMGREN; PHONE: (562) 309-5660;
DAVE.P@LORENSIGNS.COM
WARRANTY CONTACT:
DAN LORENZON; (562) 946-7545; DAN.L@LORENSIGNS.COM

E. SIGN RESOURCE
CONTACT: JEFF OGLE; PHONE: (323) 319-1635/CELL (865) 771-5676
JOGLE@SIGNRESOURCE.COM

FINISH NOTES	
THE FOLLOWING COMPONENTS CAN BE PURCHASED FROM THE APPROVED SIGN VENDORS:	
*	STANDING SEAM ROOF
*	RAILING
*	CLEARANCE BAR
*	MENU CANOPY
*	GUARD RAIL
*	CANOPIES
*	SHUTTERS
*	DUMPSTER GATES
*	INTERIOR LADDER

POPeyes
LOUISIANA KITCHEN
5505 BLUE LAGOON DRIVE
MIAMI, FL 33126

PROJECT #20C-4218

2812 Colby Avenue
Everett WA 98201
(425) 252-2153 p
www.2812architecture.com

NEW PLK1846 - NOLA PROTOTYPE
POPEYES RESTAURANT

1405 YELM AVE EAST
YELM, WA 98597

LOUISIANA KITCHEN PLK DESIGN STANDARDS
DUAL-LINE PRODUCTION

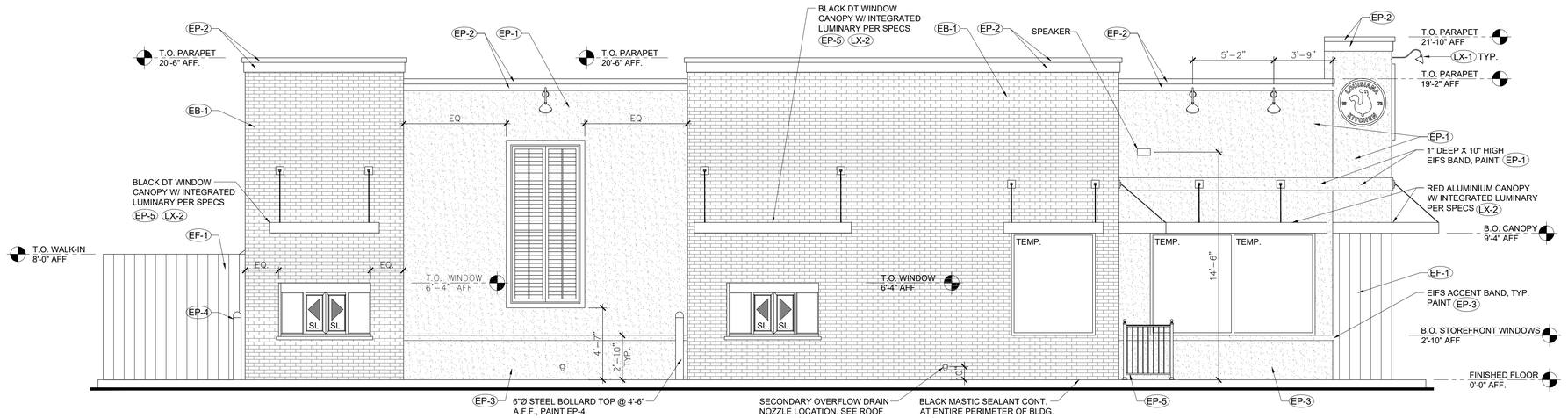
REVISIONS

EXTERIOR ELEVATIONS

A5

DATE: 12/04/20

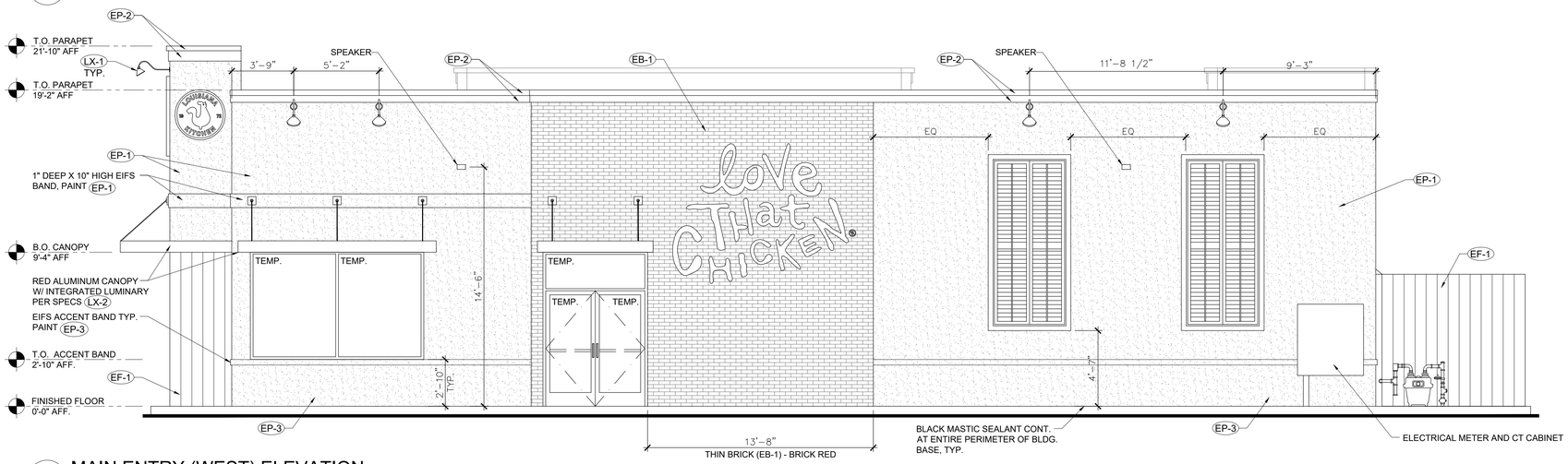
CHECKED:



1 A6 — 1/4"=1'-0"

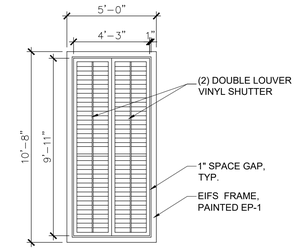
DRIVE THRU (EAST) ELEVATION

NOTE: ALL ELEVATIONS TO RECEIVE 2 COATS OF EP-8



2 A6 — 1/4"=1'-0"

MAIN ENTRY (WEST) ELEVATION



3 A6 — 1/4"=1'-0"

LARGE SHUTTER DIM

DRIVE-THRU SPECIFICATIONS

DRIVE THRU WINDOW - QUIKSERV
MODEL # BP-7241E - STANDARD INSTALLATION
MODEL # BP-7241E-IP - HIGH WIND ZONE AS DETERMINED BY THE LOCAL BUILDING CODE

GENERAL NOTES:
ACTUAL DIMENSIONS: 72" (W) x 27" (H)
ROUGH OPENING 72 1/2" (W) x 41 1/2" (H)

1) EYE SET TO BE MOUNTED DIRECTLY BELOW THE SERVICE OPENING. BAR TO BE MOUNTED ON THE WALL.
2) ANCHOR SCREWS TO BE SUPPLIED BY THE CONTRACTOR.
3) JUNCTION BOX TO BE SUPPLIED BY CONTRACTOR.

INSTALLATION:
1) QUIKSERV WINDOWS MUST BE INSTALLED LEVEL AND SQUARE TO WORK PROPERLY.
2) ANCHOR ACCORDING TO THE LOCAL BUILDING CODE ANCHOR SCHEDULE.
3) 115V/15 AMP. DEDICATED CIRCUIT FEATURE.
4) RECOMMENDED HEIGHT FROM FLOOR TO SERVCE OPENING TO BE 36". (CHECK FOR ANY LOCAL CODES OR CITY CODES)
5) SILICONE ALL EXTERIOR AND INTERIOR JOINTS.
6) ALL OTHER TYPES OF ANCHORING TO BE APPROVED BY CERTIFIED ENGINEER.

SHUTTER MANUFACTURER

SHUTTER CONTRACTOR
MODEL L-2 VINYL; PHONE: 1-800-734-8368
WWW.SHUTTERCONTRACTOR.COM

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DUAL-LINE PRODUCTION

REVISIONS

EXTERIOR ELEVATIONS

A6

DATE: 12/04/20

CHECKED:

POPEYES LOUISIANA KITCHEN - EXTERIOR

EXTERIOR MATERIALS & FINISH SCHEDULE (not all specs are used on every project)

05/06/20

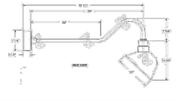
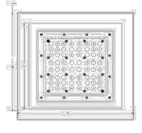
CODE	MATERIAL	LOCATION	MANUFACTURER	DESCRIPTION			ADDITIONAL INFORMATION
				PRODUCT	COLOR	DIMENSION	
EP-1	EXTERIOR PAINT	MAIN WALL SURFACE ABOVE WAINSCOT ACCENT TRIM	BENJAMIN MOORE	**PRIMER:** **PAINT:**	"WHITE" OC-125 Moonlight White		Contact: RODGER LIPPMAN, ARCHITECTURAL ACCOUNT EXECUTIVE phone: (800) 344-0400 Ext 5240 email: rodger.lippman@benjaminmoore.com
EP-2	EXTERIOR PAINT	PARAPET TRIM		**PRIMER:** **PAINT:**	"BLACK" 2120-20 Black Iron		
EP-3	EXTERIOR PAINT	WAINSCOT ACCENT TRIM AND BELOW		**PAINT:**	"GRAY" HC-170 Stonington Grey		
EP-4	EXTERIOR PAINT	BOLLARDS, PYLON POLE AND DIRECTIONAL SIGN POLES		**PRIMER:** **PAINT:**	"RED" 2086-10 Exotic Red		
EP-5	METAL/PAINT	DRIVE THRU WINDOW CANOPY		**PRIMER:** Pro Industrial Pro-Cryl Primer B66-310 **PAINT:** Pro Industrial High Performance Acrylic B66-660 Eggshell	FACTORY FINISH BLACK		
EP-7	EXTERIOR PAINT	DUMSPTER WALLS	BENJAMIN MOORE	**PAINT:**	"GRAY" HC-170 Stonington Grey		
EP-7	EXTERIOR PAINT	DUMSPTER GATES		**PRIMER:** Pro Industrial Pro-Cryl Primer B66-310 **PAINT:** Pro Industrial High Performance Acrylic B66-600 Gloss	FACTORY FINISH BLACK		
EP-8	EXTERIOR PAINT	ALL EXTERIOR WALLS		**PAINT:** Aliphatic Acrylic Urethane Clear Gloss	ANTI-GRAFFITI PAINT M74-00 / M75 2 COATS ON FULL FAÇADE SURFACE		
EF-1	WOODEN SIDING PANEL	EXTERIOR WALLS	NICHIHA	**VINTAGE WOOD**	CEDAR		Matt Stephenson (o) 770-805-9466 mstephenson@nichiha.com

POPEYES LOUISIANA KITCHEN - LIGHTING

INTERIOR AND EXTERIOR FIXTURE SCHEDULE (not all specs are used on every project)

5/6/2020

EXTERIOR FIXTURES

TYPE		LOCATION	MANUFACTURER	CATALOG NUMBER	COLOR TEMP	WATTAGE	ADDITIONAL INFORMATION
LX-1		EXTERIOR WALL	HERMITAGE	MODEL: H-HLPP82A3Y044L FINISH: CUSTOM COLOR ORANGE 4000 LUMENS	LED2, 3500K	38W	
LX-2		FLAT CANOPY	HERMITAGE	MODEL: E-CONOLIGHT #E-CP2L04CS 36 LED MODULES/ 4100 LUMENS	COOL WHITE 5000K	42W LED	

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A6.1

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