Fawcett Elementary School

Tacoma Public Schools

Conditional Use Permit (CUP) Narrative

August 16, 2021
AHBL Project No. 2200932.10

Overview

Tacoma Public Schools proposes to construct a new Fawcett Elementary School at 126 East 60th Street, Tacoma, Washington. The project consists of a new school building, parking lots, bus and parent drop-off and pick-up areas, outdoor landscape areas, and a play area, as well as utility and site improvements to support the program. The project site is located on Tax Parcel 0320214050 and is bounded by A Street to the west, East 60th Street to the north, East B Street to the west, and residential homes to the south, north, east, and west. The existing Fawcett Elementary School building and associated paved parking, drive lanes, play areas, and field currently occupy the parcel.

Construction of the new school will require reconstruction of sidewalk on the roads adjacent to the site. To comply with the Safe Routes to School Action Plan, sidewalk must be constructed along East B Street from the project site to the intersection of East B Street and East 62nd Street. Curb ramps must be constructed at the intersection of East B Street and East 60th Street, the intersection of East B Street and East 61st Street, and the intersection of East B Street and East 62nd Street.

The area of the parcel is 5.61 acres. A right-of-way dedication will be required to reconstruct the sidewalk along East B Street and to provide a 5-foot planter strip. The site includes 2.89 acres of impervious area and 2.72 acres of lawn or landscaped area in the existing condition, and 2.86 acres of impervious area and 2.75 acres of lawn or landscaped area in the proposed condition.

The site is mostly flat with some steeper slopes along the property lines. Most slopes on the site range from 1 to 5 percent. Because the site is generally higher in elevation than the adjacent streets, constructed slopes along the west, northeast, east, and south property lines range from 20 to 70 percent. The site is split between two basins. The west basin slopes west toward A Street and the east basin slopes east toward East B Street.

Based on geotechnical explorations at the site, existing soils generally consist of glacial till. Infiltration rates are generally low on such soils.

Site Demolition

The existing Fawcett Elementary School is proposed for demolition in its entirety. Site clearing and demolition include removal of the existing school building, play area, paving, existing vegetation, and utilities. Site clearing will consist of all 5.61 acres of the existing site. We understand that this project will require demolition of existing trees and utilities remaining that are located beyond the existing Fawcett Elementary School building, including roof drains, storm drainage piping, water services, sanitary sewer services, gas services, and electrical utilities.

Temporary Sedimentation and Erosion Control (TESC)

The project is required to have a Construction Stormwater National Pollutant Discharge Elimination System (NPDES) permit through the Washington Department of Ecology. A Stormwater Pollution Prevention Plan (SWPPP) and Temporary Erosion and Sedimentation Control (TESC) plan will be developed to meet the 13 Required Elements per the NPDES permit and the City of Tacoma *2021 Stormwater Management Manual (SWMM)*. The Contractor will mark the clearing limits with high visibility fencing. A stabilized construction entrance will be provided off East 60th Street. Stabilized construction roads and parking will also be provided on the site. Stormwater flow rates will be controlled through temporary sediment traps or ponds. Perimeter protection will be provided through silt fencing. Sediment controls may also include filtration or chemical treatments, if necessary. Temporary and permanent soil stabilization will occur through seeding/sodding, mulching, and plastic covering. Dust controls will include watering soils to prevent blowing of dust. Slopes will be protected through interceptor swales and check dams. Inlet protection will be provided to prevent discharge of sediment-laden stormwater offsite. All temporary proposed drainage channels will be stabilized and protected through outlet protection.

The Contractor will be responsible for controlling sources of pollution related to construction activities and materials. The Contractor will implement, inspect, and maintain all Best Management Practices (BMPs) on a regular basis. Inspection and maintenance records will be kept onsite. The Contractor will manage the project, including phasing of work to limit areas of disturbance, and maintain the SWPPP, which will be updated to reflect changing site conditions.

Site Access and Offsite Improvements

The new school will be accessed from two driveways located off East 60th Street and two driveways off East B Street. Parent and visitor parking will be provided north of the new building, accessed from East 60th Street. Teacher and bus parking will be provided east of the building, accessed from East B Street. The primary bus loading area is proposed east of the new building. Fire trucks and other emergency vehicles will use the proposed parking areas.

Construction of the new school will require reconstruction of sidewalk on the roads adjacent to the site. To comply with the Safe Routes to School Action Plan, sidewalk must be constructed along East B Street from the project site to the intersection of East B Street and East 62nd Street. Curb ramps must be constructed at the intersection of East B Street and East 60th Street, the intersection of East B Street and East 61st Street, and the intersection of East B Street and East 62nd Street.

Grading

Grading will be developed to best accommodate the programming needs of the school and to best balance earthwork materials within the project constraints. Earthwork will include approximately 16,000 cubic yards of cut and 50 cubic yards of fill. Cut will typically consist of undocumented fill and glacial till soils. Fill soils will be structural fill, either imported or from onsite materials. The locations for disposal and borrow will be coordinated at a later date by the Contractor.

The proposed building will have one finished floor elevation (FFE), currently proposed at 388.0. Grades around the building will slope away from the building. Drive aisles and parking lots will be sloped to drain and better match existing elevations.

Storm Drainage

The stormwater jurisdiction is City of Tacoma. Permanent stormwater controls will be provided based on the *SWMM*. The site will be divided into two Threshold Discharge Areas (TDA) to match existing drainage conditions. The site is located within the Foss Waterway watershed, as mapped by City of Tacoma.

The permanent Stormwater Control Plan will detain flows and release them from the site at a controlled rate. The project will include Onsite Stormwater Management, Flow Control, Water Quality Treatment, and Stormwater Conveyance. Onsite Stormwater Management requires compost-amending post construction soils.

The flow control requirement per the *SWMM* is to match existing flow durations for all flows from 50 percent of the 2-year flow to the 50-year flow. This project proposes storm bioretention cells to store runoff while control structures release it at a controlled rate. Low Impact Development (LID) requirements require the design to select LID BMPs from a menu of options, or to meet the existing flow durations for all flows from 8 percent of the 2-year flow to the 50-year flow.

The west basin will have a net decrease in impervious surface, so no flow control facilities are required to meet either the flow control or LID requirements. The west basin will discharge to the storm system within the intersection of A Street and East 60th Street.

The east basin will be served by a series of bioretention cells to meet both the flow control and LID requirements. The east basin will discharge to the storm system within the intersection of East B Street and East 60th Street.

The project is subject to basic water quality treatment. The building and paved play area are considered non-pollution generating and do not require treatment. The parking lots at the school will be treated by the bioretention cells in the east basin.

Stormwater conveyance will be through a series of pipes and precast concrete catch basins. Roof, plaza, and landscape drains will typically be 6 to 8 inches in diameter and conveyance pipes will typically be 12 inches in diameter. Onsite roof and conveyance drains will be Corrugated Polyethylene Pipe (CPEP). Foundation and wall drains will typically be 6-inch diameter perforated polyvinyl chloride (PVC) pipe. Conveyance in public roadways will be 12-inch CPEP.

Sanitary Sewer

The sewer jurisdiction is City of Tacoma. Sewer from the school will be directed to an existing sewer manhole located in the intersection of A Street and East 60th Street. There are no new sewer mains proposed on the public roads offsite.

The sanitary services for the school will exit the building from the north, east, and south sides, and will be routed to the existing manhole. Because food preparation is expected on the site, a grease interceptor is required. The proposed sanitary sewer system will consist of pipes, cleanouts, and precast concrete manholes. Pipes will be 6- to 8-inch PVC.

Domestic Water and Fire Service

The water jurisdiction is Tacoma Water. Existing water mains on A Street, East 60th Street, and East B Street will remain. Existing water mains on the site will be demolished. Water pressure and flow modeling have preliminarily been shown to be marginally inadequate to meet fire requirements. Per discussions with Tacoma Fire and Tacoma Water, additional analysis will likely be sufficient to show that fire flow requirements are met with existing infrastructure.

City of Tacoma requires hydrants within 375 feet of all points of the building. There are four existing hydrants around the site: one in the southwest quadrant of the intersection of A Street and East 60th Street, one midblock along East 60th Street, one in the northeast quadrant of the intersection of East B Street and East 60th Street, and one in the northeast quadrant of the intersection of East B Street and East 61st Street. These existing hydrants will be used to provide fire protection.

Fire sprinkler and domestic service will connect to the building mechanical/fire sprinkler room on the south side of the building. A double detector check valve assembly (DDCVA) will be located inside the building. The domestic service line will be 4-inch ductile iron pipe (DIP) and will connect to an existing 4-inch domestic meter at the northwest corner of the site on A Street. The fire service line will be 8-inch DIP and will connect to an existing 6-inch meter located near the west driveway from East 60th Street. The post indicator valve (PIV) will be located south of the fire service meter. The fire department connection (FDC) will be located at the southeast corner of the site. The irrigation meter will be located near the west driveway from East 60th Street.

Fire department access roadways will be provided with the parking lots adjacent to the building.

Paving and Surfacing Materials

Proposed site paving includes heavy-duty asphalt paving within all areas traversed by school buses and all areas designated as emergency vehicle routes. Standard-duty asphalt paving will be provided for vehicular areas subject to light use, including drive aisles of passenger vehicle parking lots. Heavy-duty concrete pavement is proposed within the service yard, driveway pans, and sidewalks subject to vehicular traffic. Frontage improvements are described above in the “Site Access and Offsite Improvements” section.

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Fawcett Elementary School
Property Name

DEMOLITION SUMMARY REPORT
for Tacoma Historic Preservation Office

126 East 60th Street
Tacoma, WA 98408
Property Address

Prepared July 2, 2021
by Artifacts Consulting, Inc.

Summary

There are two structures greater than 50 years of age on the Fawcett Elementary School site.

- The main school building was completed in 1950 and remains on its original site with multiple additions.
- One of the additions (south wing) was constructed in 1957. Subsequent additions are less than 50 years of age.

Despite the age of these two structures, neither are recommended as eligible for the Tacoma Heritage Register nor the National Register of Historic Places, due to issues of integrity as well as not meeting significance criteria. Previous documentation includes the 2009 Historic Survey for the Tacoma Public School District prepared by Caroline Swope, PhD. That inventory ranked twenty-five schools in Tacoma according to integrity and architectural significance. Fawcett Elementary was one of six schools ranked as low priority/non-eligible.

As of 2021, the school building is still in active use by the Tacoma School District as an elementary, although this is the last projected school year (2020-21) for active use. No significant events or persons have been found to be associated with the property.

Significance Statement

Designed by the Tacoma architecture firm of Heath, Gove and Bell in 1948-49, AV Fawcett Elementary was one of two new schools approved by the Tacoma School Board in the fall of 1947. E. Goettling & Son Contractors served as the builders. Construction began in 1949 and finished in 1950. Dedicated in the fall of 1950, the new school was named for former Tacoma mayor Angelo Vance Fawcett. Mr. Fawcett was the first mayor elected under the commissioner model of government here. He served several discontiguous terms of office between 1896 and 1925; he was also recalled at least once and had one win contested, given to a rival. A fiery and controversial political figure, Fawcett also served as a Pierce County Commissioner and a Washington State senator.

Shortly after opening, the new school was already too small. The population boom that followed World War II led to a sharp increase in the need for more public school capacity in the late 1940s and the 1950s. Designers and builders for the additions are not known. The 1957 addition (south wing) and the 1987 gym addition (northeast corner) utilize the same cladding as the original building but are simpler in form. The 1987 east wing is the most marked departure in terms of style, massing, and materials. Little remains of the original design by Heath, Gove and Bell. Subsequent additions and remodels have obscured and erased the historic character.

Physical Description

Site

Located at 126 East 60th Street in Tacoma, this school building is the main structure on the tax parcel (Pierce County parcel 0320214050). The school historically faced East 60th Street, separated only by a small, paved parking area, a curved drive, and a public sidewalk. A paved parking lot is situated east of the school; the 1987 east wing contains the current main entrance. A concrete walkway extends along the east facade and connects to the sidewalk along the north side (East 60th St.). Athletic fields are located west of the building, including a freestanding covered play structure (built 2001). There are a variety of playground structures such as swings to the east and west of the school. The site is surrounded and enclosed by metal chain-link fencing to the south, east and west. Trees of various species and sizes are dispersed across the site.

Exterior

Fawcett Elementary is mostly a single-story, Modern style school building. The partial basement of the original building is exposed as an extra floor along the west elevation. The original design featured an asymmetrical plan with a long west wing extending north-south and a shallow ell wrapping to the northeast (containing the Lunch Room). The construction of three major additions has created an irregular footprint. The original building forms the west and north sides; additions to the northeast (Gym), east (1987), and south (1957) have created an interior courtyard. Small hyphen connectors join the various wings; at least one of these is constructed of CMU block. The style and materials of the additions vary, but most of the complex features red brick veneer cladding.

A poured concrete foundation supports the original building, the 1957 wing, and the 1987 gym addition. The foundation of the 1987 east wing is unknown. The building has varied roof forms. A flat-on-hip roof form caps the original building and gym. The 1957 south wing has a shallow gable roof, and the 1987 east wing has a hip roof. Roofing material is asphalt-composition shingles for all visible areas. There are several extant triangular vents in the original building's roof.

Glass block windows, visible in a historic image of the northwest corner, have been removed. There is one wood framed, fixed multi-lite window extant, located in the west facade and illuminating the west (southwest) stairwell. The kitchen has several steel framed hopper windows which appear to date from before the 1987 remodel. All other windows have been replaced with anodized aluminum sashes.

The main entry is in the east facade, in the 1987 east wing. Historically, the north entry facing East 60th Street appears to have been the main entrance (commonly referred to now as the bus pickup area). This north entry is highlighted by decorative brickwork, cast stone rosette panels, a brick and concrete planter, and a semi-enclosed porch which serves as a weather protected area for students waiting for bus/ride pickups. All entrances exhibit a variety of door types and ages, none of them historic. Multiple exit doors provide egress, primarily in the east and west facades.

Interior
The interior of the school complex primarily contains classrooms along either side of corridors that extend lengthwise in the west, south, and east wings. The main office and administration spaces are in the east wing, near the main entrance. The lunch/multi-purpose room, kitchen, and gym comprise the north wing. A stage and mid-century wooden grill proscenium overlook the lunch/multi-purpose room from the west end. The kitchen is on the south side of the lunch/multi-purpose room, with a food service counter between the two spaces. The lunch/multi-purpose room and gym are both tall volume, windowless, and feature exposed wooden roof trusses and HVAC pipes.

The library, centered in the west side of the main floor of the original building (west wing), is a large space that has been highly altered. Library updates include aluminum replacement sashes, wall-to-wall carpeting, and added interior partitions for secondary support spaces.

Classrooms all match in terms of finishes and amenities. These include wall to wall carpeting and/or vinyl floor tiles, dropped acoustic ceilings, rubber baseboards, painted drywall, and non-historic dry erase boards. Historic cabinetry, doors, and windows have all been previously removed. Floor finishes in corridors, the lunchroom, gym, and restrooms are generally vinyl (and possibly vinyl asbestos) tiles. There is one restroom in the 1957 south wing that has original pink glazed ceramic wall tiles as well as ceramic floor tiles (see current pictures). Metal lockers line most of the main corridors and are of two types – either flush or projecting from the wall.

The west (or southwest) stairwell allows circulation between the basement and main floor of the original building. This stairwell features finished concrete steps and painted metal pipe railings. The north stairwell is a short flight of terrazzo steps with oak and metal railings that lead up to the main floor corridor from the north entry. All other stairwells are either less than 50 years old or have been rebuilt (such as the stairs wrapping the elevator, northeast end of west wing near the lunchroom).

The basement extends under only the west portion of the original building, and only the north half of the basement is finished space. The south end is unfinished storage space. The north end of the basement contains the boiler room and added classrooms with non-historic layout and finishes.

Alterations
The school has a low degree of integrity. There are three major additions (1957 south wing, 1987 east wing, 1987 gym) plus one minor expansion (1979/80, kitchen addition). Original cladding appears moderately intact, although inappropriate caulking has been used to repair grout in various places. Windows have been extensively altered, with most windows being contemporary metal framed, double-paned replacements. There are added interior and exterior panels obscuring select windows (see west facade). The floor plan has been extensively altered with the multiple additions and interior remodel in 1987. Interior finishes have been highly altered. Most doors, both interior and exterior, have been replaced with contemporary metal types; glazing size, if present, varies by location. Exterior transom and sidelight windows have all been replaced with contemporary metal framing and insulated glass.

1957 Addition, consisting of classroom wing to the south. Rectangular footprint. Building permit D9435, dated 5/20/1957. Note: Original inspection report lists “poor work” under framing; final inspection approval dated 9/12/1957.
1967 Foundation for a portable classroom added to site. Permit E26467, dated 7/21/1967. (Status of this foundation is unknown, if it was ever completed; not evident on site in 2021.)
1973 Reroofing, completed by F. E. Yost Co., Inc. Permit E-45435, dated 8/30/1973.
1980 Small addition constructed (school kitchen extended to the south). Building permit 800673, dated 2/14/1980.
1986 Sprinkler fire suppression system installed. Permit 860880, dated 3/18/1986.
1987 Certificate of Occupancy issued by City of Tacoma for Fawcett Elementary new construction and remodel of existing build-

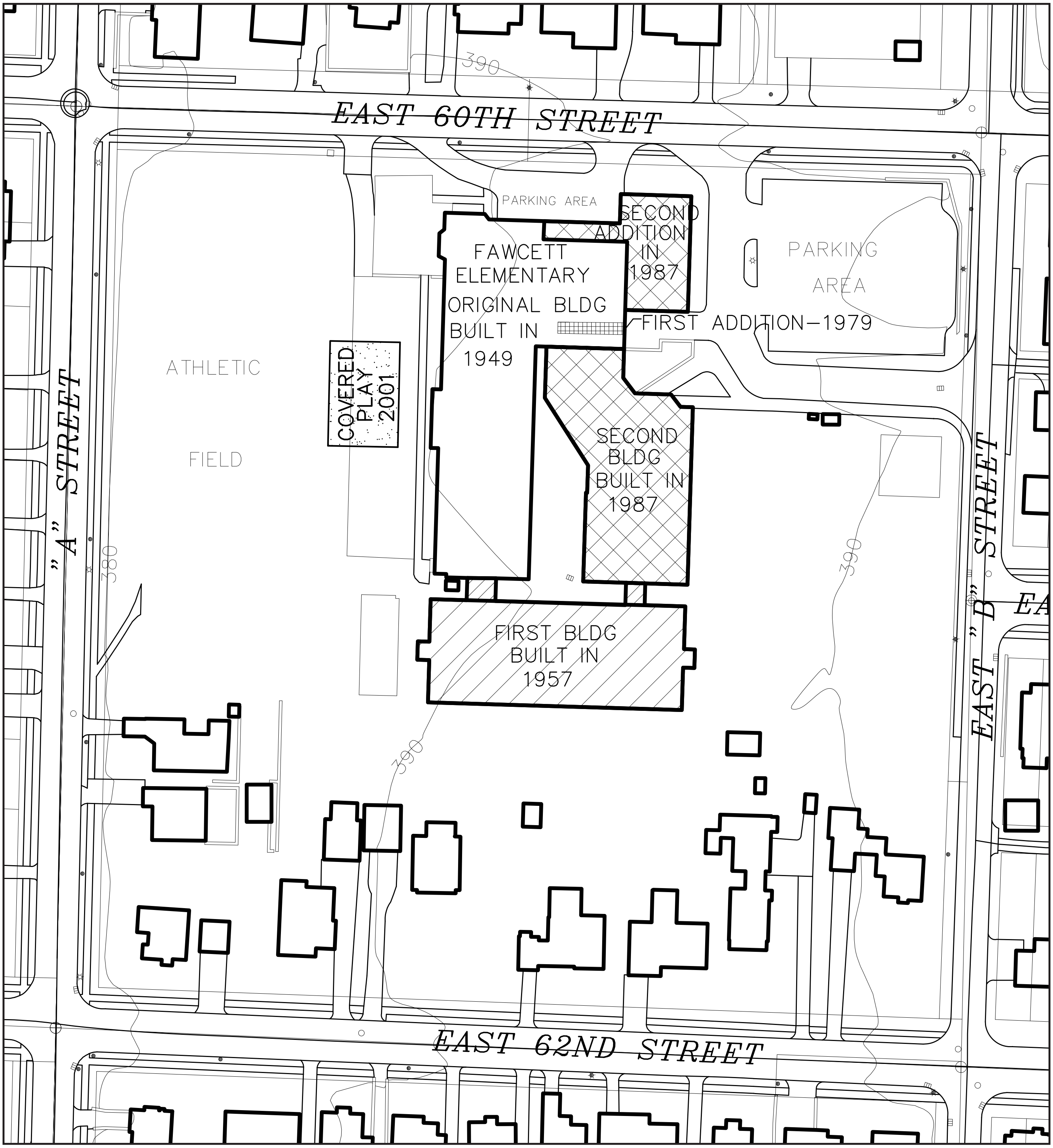
ing. Permit 853902. COI dated 10/16/1987. Original permit dated 11/5/1985, value of $2.3 million.
1994 Strip, reroof Fawcett Elementary Building B. Permit 942851, dated 8/22/1994.
2001 Outdoor covered play area shelter erected. Certificate of Occupancy issued November 2001. Building permit 2001-01179.

Bibliography

Tacoma News Tribune. 10/10/1947 p.1 Board OKs two new schools.
-----. 10/15/1947 p.5 Site of New Elementary School (aerial il).
-----. 10/15/1948 p.24 New School Plans Near.
-----. 6/24/1949 p.1 Contracts Awarded for Fawcett School Building.
-----. 3/19/1950 p.A4 Nearing Completion (il).
-----. 8/16/1950 p.21 Serves New District (il).
-----. 10/22/1950 p.A15 Fawcett School's Dedication Near (il).
-----. 9/23/1951 p.A8 New Schools Already Need More Rooms (aerial il).
Tacoma Public Library. Northwest Room Image Archive and Biographical Index.
City of Tacoma. Permit records.

Fawcett Elementary School
Property Name

126 East 60th Street
Tacoma, WA 98408
Property Address



Site plan showing dates of construction for the original building [sic, 1950] and subsequent additions. Fenceline along south edge of parcel not shown. Surrounding buildings are primarily residences. Source: BLRB Architects.

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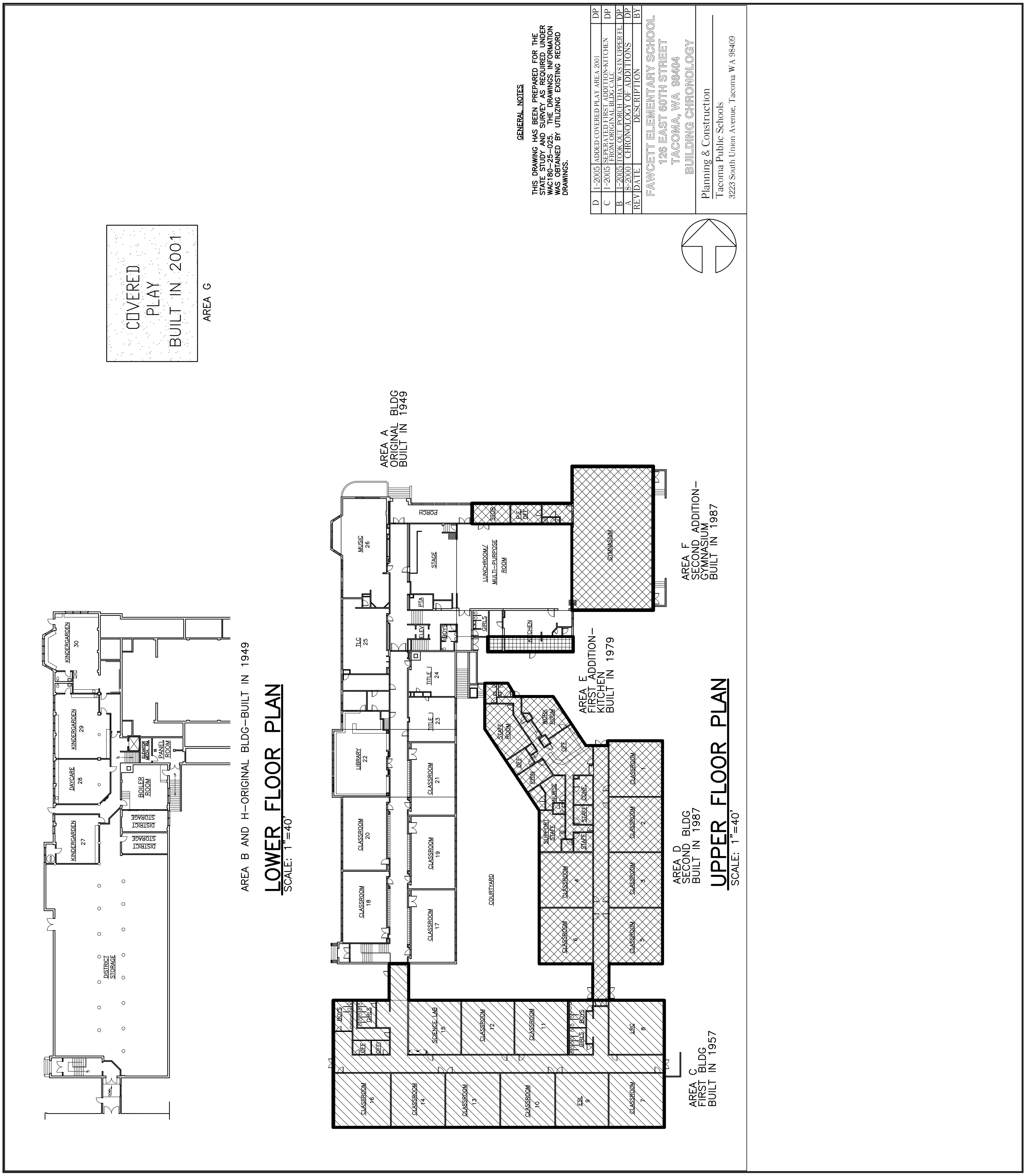


Floor plan, as-built and current to 2021. Source: Tacoma School District via BLRB Architects.

CP1. West facade and athletic field. Covered play structure (center). 1957 addition/south wing partially visible (far right).

CP2. SW corner of original building.

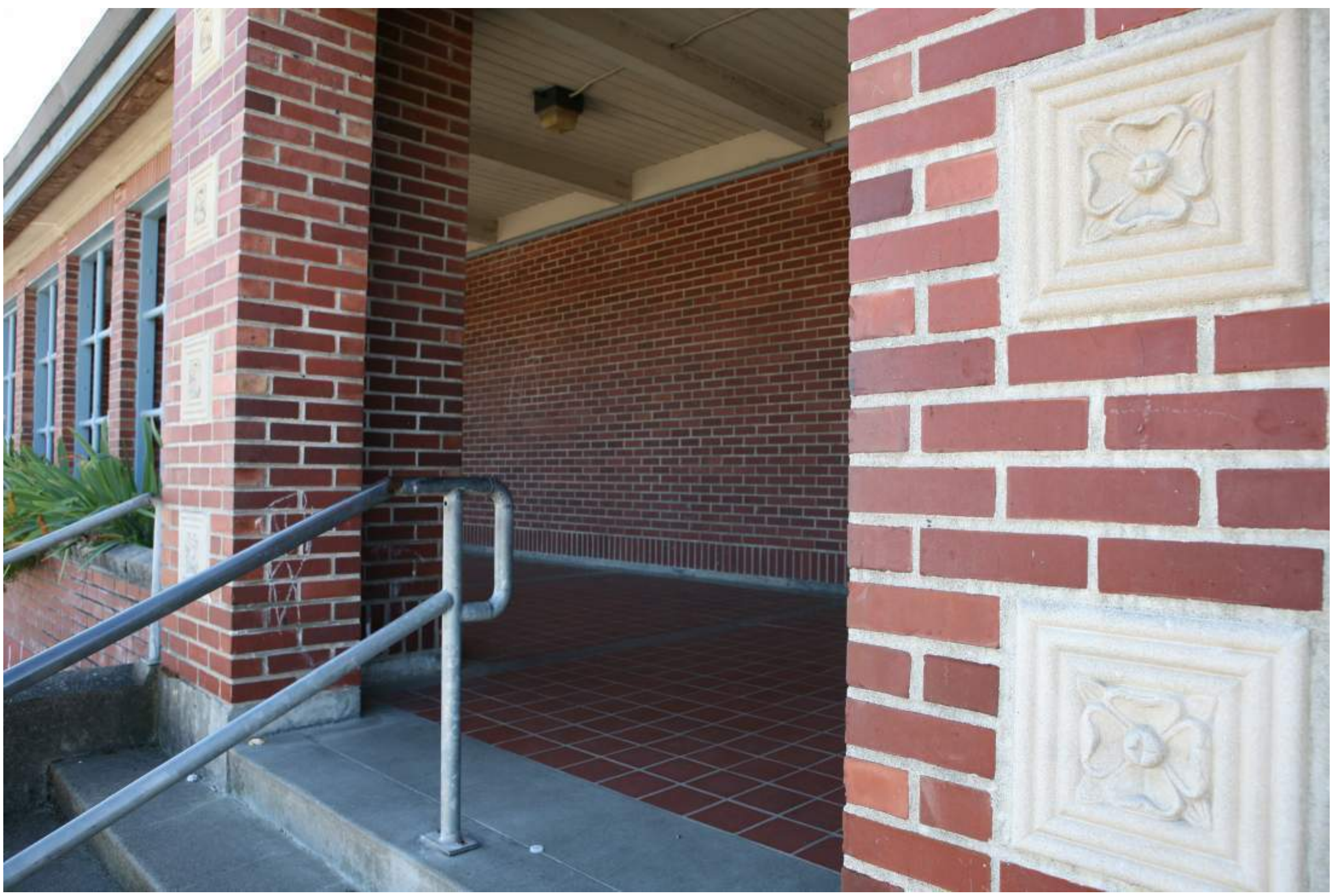
CP3. NW corner of 1957 addition (south wing).

CP4. Original building, west facade detail. Looking NE. Library is at 2nd floor of projecting bay.

CP5. NW corner. Original building, with 1987 gym addition (far left).

CP6. Detail, NW corner. Entry to basement of original building, north end of west facade.

CP7. North facade (original building). Covered bus pickup (center/right). Looking south from East 60th St.



CP8. Detail, north facade and covered bus pickup area. Looking SE.

CP9. North bus pickup area, looking west. North entrance (left), accesses main floor of original building.

CP10. North bus pickup area, looking east. Exit doors from auditorium, near stage.

Current Photographs
All photos taken 6/23/2021
by Susan Johnson, Artifacts Consulting

CP11. NE corner. 1987 gym addition (center). Paved parking lot to left (not shown).

CP12. East facade, partial. Gym addition and east wing, both added 1987.

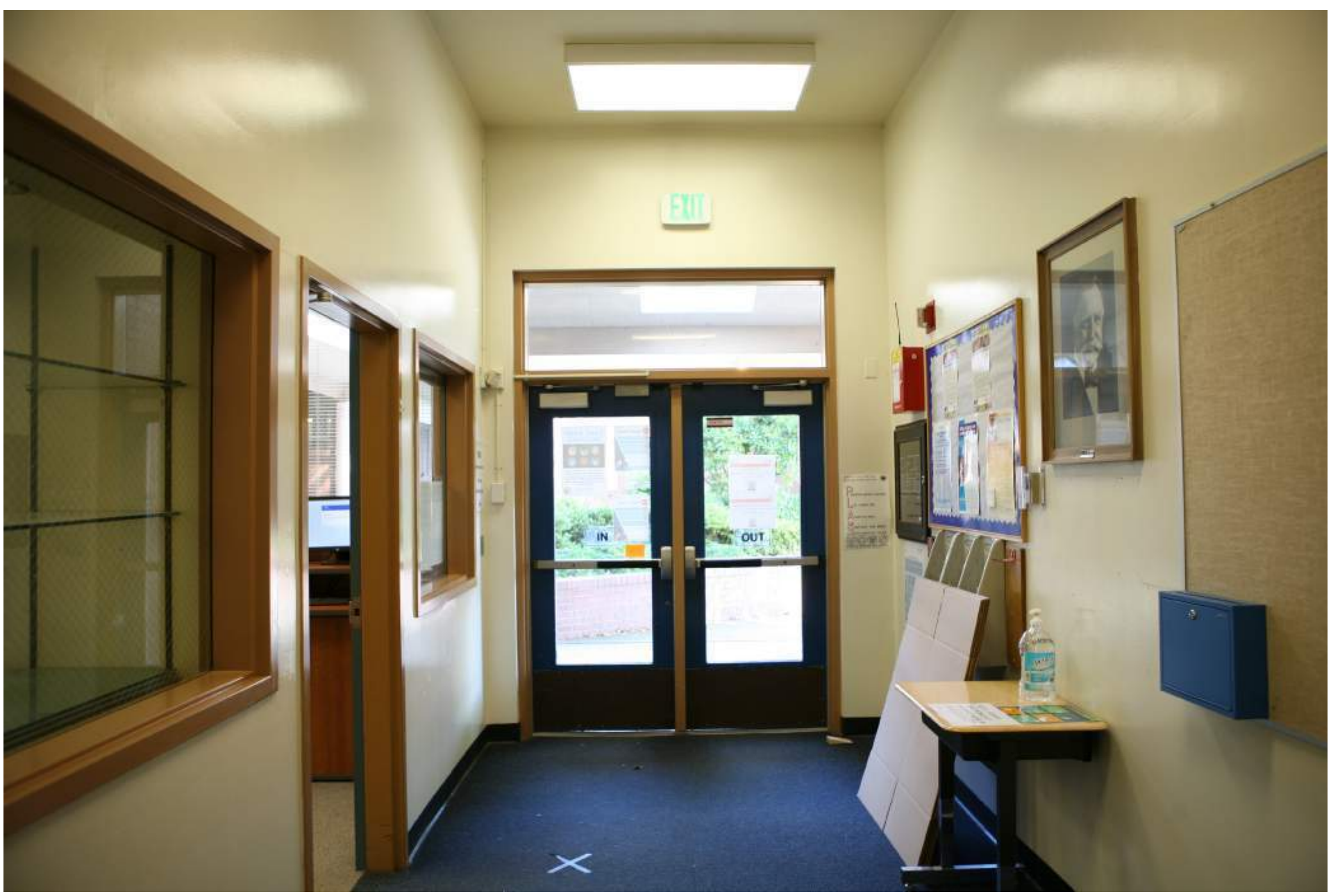
CP13. Site, SE corner. Looking NW. 1957 south wing (left), 1987 east wing (center) and gym (right).

CP14. NE corner of 1957 wing, showing hyphen connection to 1987 east wing. Looking west.

CP15. East facade, partial, of original building. Courtyard at center of complex, looking NW.

CP16. Courtyard at center of complex, looking east. 1987 east wing (left) & hyphen (center), 1957 south wing (right).

CP17. Detail, school signage. Located on east facade of 1987 east wing.



CP18. Main entry and admin/office (left). 1987 east wing, looking north.

CP19. 1987 east wing, main corridor looking south. School office at right.

CP20. Typical classroom in 1987 east wing (Room 1). Looking NW.

CP21. 1957 south wing, main corridor looking east.

CP22. 1957 south wing, typical classroom. Room 14, looking SW.

CP23. Basement of original building. Looking south along main corridor and into Room 29. Typical finishes.

CP24. Stairwell, between basement and main floor, original building, near NE end of main corridor. Looking SW.

CP25. Original building, main floor. Looking south from north end of main corridor.

CP26. Music Room, NW corner of original building (Rm 26) main floor. Looking north.

CP27. Library, original building main floor. Looking north.

CP28. Lunch/Multi-purpose Room. Looking west towards stage. Original building, main floor level.

CP29. Detail, stage at west end of Lunch/Multi-purpose Rm. Looking SW.

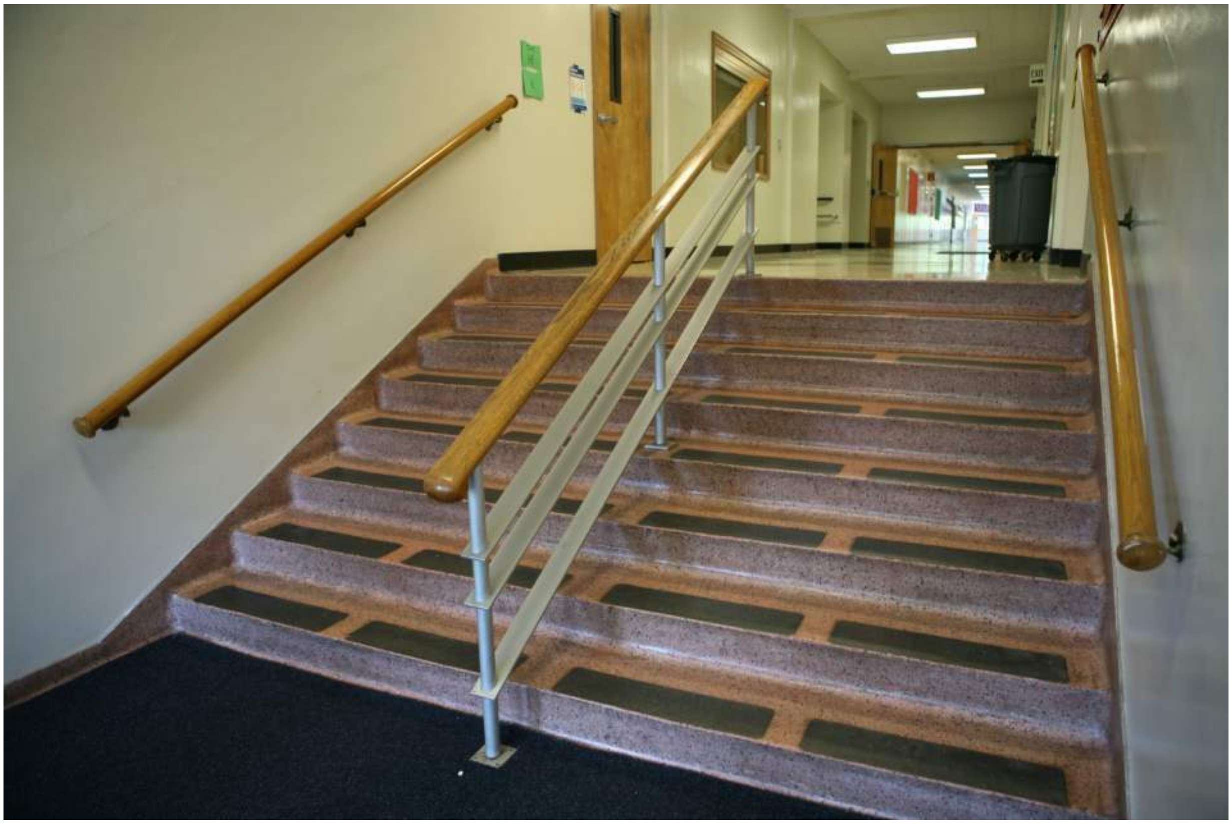
CP30. Detail, roof truss & proscenium over stage at west end of Lunch/Multi-purpose Rm. Looking SW.

CP31. Kitchen, south side of Lunch/Multi-purpose Rm. Looking south.

CP32. Kitchen, south side of Lunch/Multi-purpose Rm. Looking east.

CP33. Lunch/Multi-purpose Room, looking east into gym. Kitchen partially visible, far right.

CP34. Gymnasium (1987 addition), SE corner looking NW.



CP35. North entryway, steps up into main corridor, original building. Looking south.

CP36. North entry, multi-lite transom over exterior doors. Non-original materials. (see CP9 for doorway)

CP37. West stairwell, at south end of corridor in original building. Main floor, looking down/west.

CP38. Restroom entry/vestibule along corridor, west end of 1957 addition/south wing. Note metal handwashing fixture.

CP39. Restroom (see CP38) interior.

CP40. Connecting corridor between original building basement level and 1957 south wing, looking south.

CP41. Lockers, typical. Original building, main floor corridor.

CP42. Ceramic tile mosaic by artist Gordon Bryan, 1990. WA State Arts Commission Art in Public Places, in partnership with Tacoma School District. WSAC1989.069.000. Located in secondary/added corridor south of Lunch Rm.

HP1. 1950 image, showing NW corner; compare to current photo (CP) 5. Source: Tacoma Public Library, Northwest Room Image Archive, image A62833-1, taken by Richards Studio.

HP2. 1950 image of Fawcett Elementary (exact location unknown). Source: Tacoma Public Library, Northwest Room Image Archive, image D62376-6, taken by Richards Studio..

ORION Environmental Services, Inc.
34004 9th Avenue South A5 – Federal Way, Washington 98003
Telephone (253) 952-6717; email nmiles@oriones.net

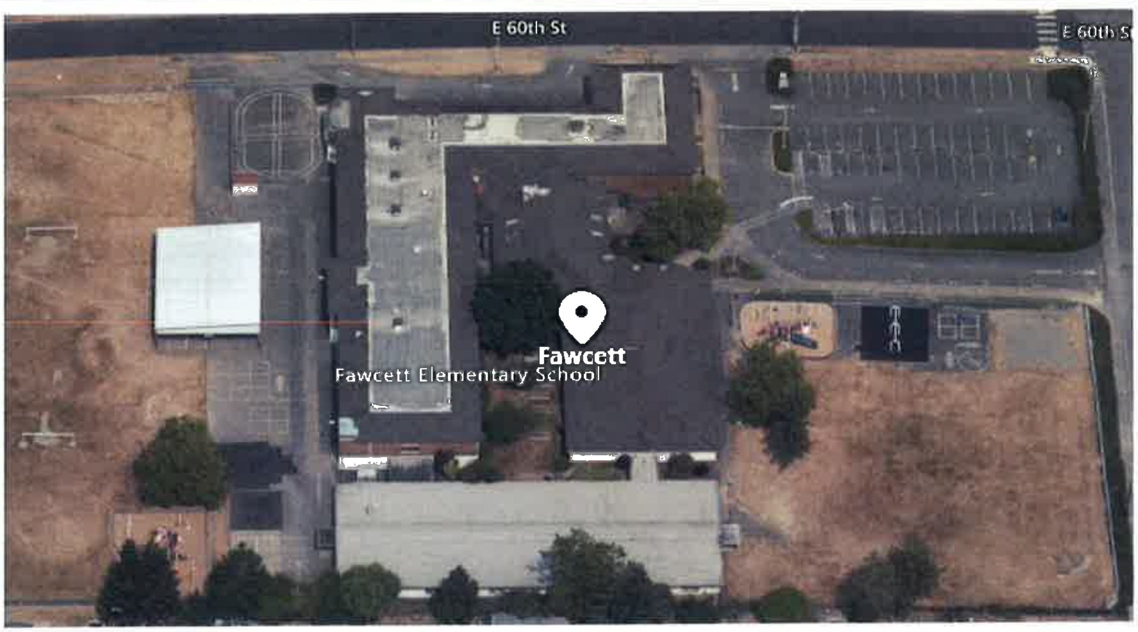
Submitted to:
Gret Stidham
Tacoma Public Schools Planning & Construction
3223 South Union Avenue
Tacoma, WA 98409

Environmental Compliance & Consulting
WBE W2F5522217

Hazardous Materials Survey Report

A.V. Fawcett Elementary School Demolition

120 60th Street
Tacoma, Washington 98404



ORION Environmental Services

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WBE W2F5522217

USFCR 2018-2019 Verified Vendor

From the Desk of Nelson Miles
34004 9th Avenue South A5
Federal Way, Washington 98003
Telephone (253) 952-6717
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Hazardous Material Survey Report

ORION Project 021-0180

JULY 23, 2021

Greg Stidham, Capital Projects
Tacoma Public Schools
Planning and Construction
3223 South Union Avenue
Tacoma, Washington 98409

RE: A.V. Fawcett Elementary School Demolition
120 60th Street
Tacoma, Washington 98404

Dear Mr. Stidham,

The purpose of this report is to present the results of a hazardous material survey performed on July 12 through 14, 2021 at the subject location referenced above. This survey was conducted in general accordance with the terms of the agreement between ORION Environmental and V Environmental of Idaho (owner's representative) authorizing us to perform this service. We understand that this survey was requested for future demolition of the building. State laws require hazards be identified before structures or components are impacted as part of renovation or demolition activities.

The survey was designed to identify asbestos containing materials (ACM), lead-containing paint (LCP), Polychlorinated Biphenyls (PCBS) and Mercury (Hg)-containing components. This survey was conducted by Industrial Hygienists with appropriate accreditations and experiences.

Professionally Yours,

ORION Environmental Services, Inc.

Chris Grysho, Industrial Hygienist
Certified AHERA Building Inspector
July 23, 2020

Dennis Rauschenberg
Certified AHERA Building Inspector
July 23, 2021

Evan Cooke, IH Technician
Certified AHERA Building Inspector
July 31, 2020

CONTENTS

EXECUTIVE SUMMARY

The purpose of this hazardous materials survey is to support the proposed demolition of A.V. Fawcett Elementary School located at 126 East 60th Street in Tacoma, Washington 98404. The survey was performed on July 12 through July 14, 2021. Our scope of services included collection and analysis of suspected asbestos-containing materials (ACM) and suspected lead-containing paint, and identification, by visual inspection of polychlorinated biphenyl (PCB)-containing fluorescent light ballasts (FLBs), and mercury (Hg)-containing light tubes or thermostat/switches.

Upon completion of the survey and sample analyses, the following information are our findings:

- Asbestos-containing materials (ACM) was identified in 9" x 9" vinyl tiles (for an estimated quantity of 2,620 square feet in on the walls in classrooms and a storage location. Pipe insulation in association with all classrooms under sinks were identified for an estimated quantity of 370 linear feet visible and concealed.
- Lead-containing paint (main theme colors) – were noted in measurable concentrations on a majority of the building components throughout the building. All painted component is to be treated as lead containing.
- PCB-containing ballasts – No PCB containing ballasts were identified.
- Potential Mercury (Hg)-containing light tubes – Approximately 1,950 fluorescent light tubes found throughout the building.
- Hg switches/thermostats – None

Inaccessible locations included sealed interstitial spaces that is presumed to contain asbestos pipe insulation.

This summary is intended for introductory purposes only. We recommend a thorough reading of the complete report.

1.0 INTRODUCTION

ORION Environmental Services, Inc. (OES) was hired by Tacoma Public Schools (TPS) to conduct a hazardous material survey regarding materials and components that may be impacted during demolition. The purpose of this survey is to support the proposed demolition of the building by evaluating the presence of hazardous materials at the subject location, and to provide this evaluation to the school district. OES' assessment was conducted on July 12 through July 14, 2021 and was performed in accordance with federal, state and local regulatory requirements. The assessment was conducted by Evan Cooke, Chris Grysho and Dennis Rauschenberg of OES and their accreditations can be found as an attachment to this report.

1.1 Building Information

A.V. Fawcett Elementary a brick and masonry-constructed, single-story with lower-level commercial building built in 1950 which approximately 55,000 square feet will be impacted during demolition of the building. The building was used as a public school by Tacoma Public Schools (TPS) and is now permanently closed. No know renovations were identified at the time this report was written. Interior wall systems are comprised primarily of wallboard with skim coat texture in some locations. Flooring consists of vinyl flooring and concrete. Heating is by force air HVAC with piping covered with fiberglass and air-o-cell, and PVC fittings and hard fittings. Lighting includes incandescent and fluorescent fixtures. The roof is constructed of built-up with fiberglass insulation and composition three-tab shingles.

1.2 OES Scope of Services

a. Collection samples of suspected ACM and suspected LCP;

b. Analysis of those samples at a laboratory selected by ORION;

c. Identification, by visual inspection, of PCB-containing FLBs, and Hg-containing light tubes or thermostats; and

d. Preparation of this report.

Our scope of services did not include:

a. Disassembly of electrical panels or other machinery;

b. Investigation of hazardous materials other than ACM, LCP, PCB-containing FLBs, and Hg-containing light tubes or thermostats; or

c. Investigation of non-building materials.

Within the scope of services

- The asbestos survey was conducted in general accordance with the, "Good Faith" asbestos survey requirements in the Washington Administrative Code (WAC) 296-62-07721 (Communication of Hazards to Employees) as required by Washington State Department of Occupational Safety Health (DOSH) and regionally by the Northwest Clean Air Agency (NWCAA) for buildings or building sections that are to be renovated and/or demolished.

- The lead survey was conducted in general accordance with WAC 296-155-17605 regarding the identification of lead as it applies to all construction work where an employee may occupationally-exposed during construction activities.

- The visual examination of PCB-containing FLB and Hg-containing light tubes was conducted to identify potential hazards regulated by Washington State Department of Ecology (DOE) WAC 173-303 and Washington State Department of Occupational Safety and Health (DOSH) WAC 296-841.

1.3 Limitation of the Assessment

This targeted assessment was limited to building components that would be impacted regarding renovation and demolition activities. The conclusions within this report are professional opinions based solely upon visual site observations and interpretations of analytical data as described in this report. Typical construction techniques can render portions of the building inaccessible. As a result, additional ACBM may be present in inaccessible areas (e.g., ground or components beneath the concrete slab).

Suspect ACM, LCP and other hazardous materials within inaccessible areas should be presumed until characterized.

The opinions presented herein apply to the site conditions existing at the time of the investigation and interpretation of current regulation pertaining to asbestos and lead. Opinions and recommendations provided herein may not apply to future conditions that may exist at the site. Regulatory requirement in effect at the time of the work should be verified prior to any work that impacts hazardous materials. This report represents the finding of this survey only and is not intended to establish scope or contractual terms to hazardous material abatement.

2.0 ASBESTOS SURVEY METHODOLOGY

This section describes the sampling methodology. Supporting documentation provided within the survey reports incudes materials summary tables, photographs, laboratory analytical repots, chain of custody forms, etc.

2.1 Survey Methodology

A "walk-through" inspection of accessible areas was conducted to identify suspect ACBM and PACM. The asbestos survey was performed by AHERA-certified building inspectors in accordance with a sampling protocol appropriate for the demolition of the garage. The inspectors' AHERA certifications are provided in the Appendices. The sampling protocol was modeled after 40 CFR 763.86 and DOSH regulation (WAC 296.62.07721). The approximate quantity of materials was obtained from field measurements.

2.2 Sampling and Sample Documentation

Suspect ACBM was grouped into homogeneous sampling areas and categorized as TSI, surfacing material, or miscellaneous material. The sampling plan included, at a minimum, the collection and analysis of samples as follows:

Thermal System Insulation

- In a distributive manner, a minimum of three samples of each homogeneous area that was not PACM
- At least one bulk sample from each homogeneous area of patched TSI if the patch was less than 6 square feet.

Surfacing Material

- In a distributive manner, a minimum of three samples collected from each homogeneous area that was less than 1,000 square feet
- A minimum of five samples collected from each homogeneous area that was greater than 1,000 square feet but less than or equal to 5,000 square feet.

- A minimum of seven samples collected from each homogeneous area that was greater than 5,000 square feet.

Miscellaneous Material

- In a distributive manner as deemed sufficient by the AHERA Building Inspector. At least one sample was collected of each suspect miscellaneous material not PACM.

Non-Suspect Materials

According to 40 CFR 763-86(4), sampling of the following materials are not required where the accredited inspector has deemed the materials to be fiberglass, foam glass, rubber or other recognized non-ACBM.

Samples were collected by carefully removing small portions of the suspect material with a sharp knife or other hand tool suitable to the materials being sampled. Each sample was placed in a labeled plastic container immediately after collection. Sample containers were then placed in a large re-sealable plastic bag for transportation to the laboratory. The sampling instrument was wiped with a clean moist cloth to decontaminate the tool and minimize the potential release of asbestos fibers or contamination of the subsequent samples. Data pertinent to each sample (e.g., date, sample number, material description, and material category) was recorded on a field data sheet.

2.3 Laboratory Analysis

Asbestos bulk samples and chain-of-custody submittal sheets were analyzed in-house. As specified in 40 CFR Chapter I (1-1-87 edition) Part 763, Subpart F, Appendix A, each sample was analyzed using PLM/dispersion staining techniques, in accordance with EPA Method 600/R-93/116). The detection limit for this type of analysis is approximately one percent (by volume). Materials containing more than one percent asbestos are considered to ACBM.

3.0 LEAD PAINT SURVEY METHODOLOGY

3.1 General

The survey was conducted using a NITON XLp300A X-ray fluorescence (XRF) instrument. The purpose of the assessment was to identify the presence of lead in the paint for components being impacted or to identify painted surfaces that may be impacted as a result of renovation, demolition, upgrades and repairs. Testing was performed on representative main-theme painted components with the intent of ascertaining the presence of lead-based paint above specified regulatory action levels of any measurable concentration. If lead-based paint was found, the survey would identify architectural components and their respective lead concentrations as positive or negative.

3.2 How the Instrument Works

The XRF directs high-energy X-rays into a surface. These high-energy rays strike atoms in the surface, causing electrons to be ejected from their orbits. Characteristic X-ray energy is emitted when another electron fills the void in the shell. The emitted energy is detected by the XRF instrument and converted to a quantitative measure. For the lead atom, characteristic frequencies are emitted from the K-and L-shells, its two innermost electron orbits. Energy emitted from these shells (energy bands) are referred to as K X-rays and L X-rays respectively. The length of each test can vary based on the strength of the radioactive source.

Testing was performed by state-accredited lead paint inspectors and lead paint risk assessor who are trained and licensed in the use of the NITON XRF. At no time were the instrument used while non-trained personnel were in the area. This includes testing wall where individual may be on the opposite side.

3.3 Calibration

Calibration is performed both directly on bare substrates and on National Institute of Standards and Technology (NIST) standard reference material (SRM) films placed over the bare areas. The NIST SRM used during calibration has a lead level of 1.02 mg/cm^2. The measurements taken on the NIST SRM film (with the 1.02 mg/cm^2 lead level) placed over the bare areas were obtained to examine the performance of the instrument.

4.0 REGULATORY OVERVIEW

4.1 Asbestos

The NESHAP regulation for asbestos regulates asbestos fiber emissions and asbestos waste disposal practices. It requires the identification of existing asbestos-containing building materials (ACBM) according to friability prior to demolition or renovation activity. Friable is a material containing more than 1% asbestos that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure.

The NESHAP regulation classifies ACBM as either regulated asbestos-containing material (RACM), Category I non-friable ACBM or Category II non-friable ACBM. RACM includes all friable ACBM, along with Category I non-friable ACBM that has become friable or will be or has been subjected to sanding, grinding, cutting or abrading, and Category II non-friable ACBM that has a high probability of becoming or has become crumbled, pulverized, or reduced to power in the course of renovation or demolition activity. Category I non-friable ACBM are exclusively asbestos-containing packings, gaskets, resilient floor coverings, floor covering mastics and asphalt roofing products that contain more than 1% asbestos. Category II non-friable ACBM are all other non-friable materials other than Category I non-friable ACBM that contain more than 1% asbestos. RACM must be removed prior to renovation or demolition activities.

Washington Administrative Code (WAC) 173-400-075 adopts the federal NESHAP rule by reference. In the State of Washington, authority to administer NESHAP requirements is delegated to the regional air pollution authorities (e.g., the local Clean Air Agency or the Washington State Department of Ecology. In Pierce County, the NESHAP requirements are administered by the Puget Sound Clean Air Agency (PSCAA). PSCAA must be notified at least 10 working days prior to demolition of any structure with a projected roof greater than 120 square feet, regardless of whether any asbestos was identified. Notification is not required for renovation projects, unless the project involves the disturbance of friable asbestos containing materials. The owner or operator must also provide Washington State Department of Occupational Safety and Health (DOSH) with written notification at least 10 working days prior to the commencement of asbestos removal projects involving at least 10 linear feet or 48 square feet or RACM. Removal of RACM must be conducted by a State of Washington-certified asbestos abatement contractor.

In the State of Washington, worker exposures to asbestos are governed by Labor and Industries; (L&I's) DOSH. The administrative rule WAC 296-62-07705 requires that employee exposure to airborne asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeters of air (0.1 f/cc) as an eight hour time weighted average. State of Washington Occupational Safety and Health rules also classify construction and maintenance activities which could disturb ACBM, and specify work practices and precautions which employers must follow when their employees engage in each class of regulated work.

4.2 Lead

Lead was commonly used in most products until 1978, when it was banned from residential paints at concentrations greater than 600 parts per million (PPM); however, commercial applications with lead were still utilized and are still available. Lead is poisonous to the human body and presents a potential health hazard during any kind of disturbance (such as maintenance, including grinding, welding and cutting) and if improperly disposed, where lead can enter drinking water supplies.

EPA and Washington State defines lead-based paint as a concentration of 1.0 milligrams per square centimeters squared (mg/cm^2) or greater by X-ray fluorescence (XRF) or 0.5 percent by weight or greater by total lead analysis (equivalent to 5,000 ppm). This EPA action level triggers requirements for protection of the environment, maintenance workers, and building occupants. It also triggers training and certification requirements for inspectors, project designers, contractors, supervisors and workers. The training requirements apply to certain residential structures and/or child occupied facilities, which this building fits well into the description of consideration.

The Occupational Safety and Health Administration (OSHA) and Washington State Department of Occupational Safety and Health (DOSH) worker protection regulations has not defined a minimum concentration for regulating lead and has clarified that lead at any detectable concentration shall be considered regulated (29 CFR 1926.62; WAC 296-62-176). OSHA and DOSH applies to all construction work and to general industry where an employee may be occupationally exposed to lead. Construction work is defined as work for construction, alteration and/or repair, including painting and decorating. It includes but is not limited to the following:

- Demolition or salvage of structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- Installation of products containing lead
- Lead contamination/emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and
- Maintenance operations associated with the construction activities described in this paragraph.

As defined by OSHA, any detectable concentration of lead creates the requirement for implementing worker, and in some cases, environmental protection. The current OSHA standard (29 CFR 1926.62) and DOSH (WAC) 296-155 for standards, when the PEL is exceeded, the hierarchy of controls requires employers to institute feasible engineering and work practice controls as the primary means to reduce and maintain employee exposures to levels at or below the PEL.

When all feasible engineering and work practice controls have been implemented but have proven inadequate to meet the PEL, employers must nonetheless implement these controls and must supplement them with appropriate respiratory protection. The employer also must ensure that employees wear the respiratory protection provided when it is required

As referenced in OSHA's Technical Manual – Controlling Lead Exposures in the Construction Industry: Engineering and Work Practice Controls; Appendix V: 3-1 provides a construction task table and their presumed 8-hour TWA exposure levels:

> 50 to 500 $\mu g/m^3$	**> 500 $\mu g/m^3$ to 2,500 $\mu g/m^3$**	**> 2,500 $\mu g/m^3$**
Manual demolition	Using lead-containing mortar	Abrasive blasting
Dry manual scraping	Lead burning	Welding
Dry manual sanding	Rivet busting	Torch cutting
Heat gun use	Power tool cleaning without dust collection systems	Torch burning
Power tool cleaning w/ dust collection systems	Cleanup dry expendable abrasive blasting jobs	
Spray painting with lead paint	Abrasive blasting enclosure movement and removal	

The current lead standard for construction is unique in that it groups tasks presumed to create employee exposures above the PEL of 50 µg/m^3 as an 8-hour TWA. Until the employer performs an employee exposure assessment and determines actual employee exposure, the employer must assume that employees performing one of these tasks are exposed to the levels of lead indicated for that task as referenced above. For all three groups of tasks, employers are required to provide respiratory protection appropriate to the task's presumed exposure level, protective work clothing and equipment, change areas, hand-washing facilities, training, and initial medical surveillance as prescribed by paragraph (d)(2)(v) of the standard. The only difference in the provisions applying to these groups is in the degree of respiratory protection required

4.3 PCB

Washington state Department of Ecology (DOE) references that concentrations of PCBs greater then 50 mg/Kg in solids or liquids is considered contaminated to be contaminated, which special procedures handling and disposal will be required. Department of Occupational Safety and Health (DOSH) has established worker protection guidelines for the disturbance of PCB containing compounds materials when:

1) Leaching PCBS to the surface and skin contacts occur;

2) Causing PCB contamination of the air, including dust, above the permissible exposure level of 0.5 mg/m^3; or

3) Pentrated by water.

When removing PCBs, skin contact must be avoided. As with other hazardous substances, a heirarchy of control measures must be considered for the handling of PCBs with include:

1. Isolation to control the emission of PCBs or PCB dusts;

2. Engineering controls to minimize the direct handling of compouns and to minimize generating any airborne dusts;

3. Adoption of safe work practices; and

4. Where other effective means for control listed above are not practicable, suitable personal protectie equipment is to be used.

The demolition process may give rise to two types of exposure – that from the PCB compounds itself and that from the dust. Prior to demolition, any regulated PCB containing compound in the structure must be removed in accordance with state regulations. Bulk removal is required (see PCB light ballasts below). As with any demolition process, dust will be generated and may constitute a hazard depending on how it will be impacted, which appropriate dust control must be implemented (see Butimen expansion joint below).

The screening for ballasts was performed in accordance with EPA 909B-00-002 entitled "Removing PCBs from Light Fixtures". No samples were collected as part of this work.

4.4 Fluorescent Light Bulbs

Fluorescent light bulbs are present throughout the building and may be mercury vapor containing, which can be classified as universal waste. Universal wastes are a subset of hazardous wastes that are ubiquitous throughout commercial and industrial buildings. In accordance with EPA requirements, identified universal wastes must either be recycled where appropriate or disposed of as universal waste.

5.0 LIMITATIONS

This hazardous material survey was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the professions currently practicing under similar conditions in the same locale. The results, conclusions and recommendations expressed in this report are based on the conditions observed during our assessment of the work area being impacted. The information contained in this report is relevant to the date on which this assessment was performed, and should not be relied upon to represent conditions at a later date. This report has been prepared on behalf of and exclusively for the use by TPS for specific application to their project as discussed. This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. ORION does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied is made.

6.0 CONCLUSIONS AND RECOMENDATIONS

- Materials being impacted that were not identified in the reports must be presumed as asbestos or lead containing until subsequent sampling can be conducted by an accredited professional.
- Fluorescent light fixtures within the building (if not certified as non-mercury containing) must be recycled in accordance with Washington State Department of Ecology Regulations.
- All asbestos containing materials and lead containing paint (identified in this report or presumed) must be handled in according with State, Local Air Agency and Federal regulations.

ATTACHMENT 1
Asbestos Findings and Recommendations

SUSPECT MATERIAL TABLE

A total of ninety-six (96) samples consisting of various suspect materials were processed. **Results are listed in the table below with an explanation of components containing asbestos.** Components sampled are listed in the following table. Laboratory analytical reports and sample location maps are included in this attachment

SUSPECT MATERIAL	HOMOGENEOUS IDENTIFICATION	SAMPLE NO.	DESCRIPTION	RESULTS
Wall Systems	WB 1	01, 10, 33, 58, 74, 75, 76, 83, 94, 106	Wallboard and Taping Mud found throughout building	No Asbestos
	SM 1	28, 29, 34-38, 84, 85, 86, 96, 97	White Plaster found throughout building	No Asbestos
	SM 2	31, 39-44, 95	Wall texture found throughout building	No Asbestos
Mastic	MA 1	02, 27, 46	Yellow Mastic associated with carpeting throughout building.	No Asbestos
	MA 2	04	Brown Mastic associated with cove base throughout	No Asbestos
	MA 3	05, 17	Dark and Tan Cabinet Mastic	No Asbestos
	MA 4	12	Gold Mastic associated with wall paneling throughout	No Asbestos
	MA 5	20, 24, 61	Dark Mastic associated with wall paneling throughout	No Asbestos
	MA 6	26, 54	Dark Brown Mastic associated with cove base throughout	No Asbestos
Vinyl Flooring	FT 1	03, 23	24" x 24" Vinyl Tile w/Dark Mastic in hallways and throughout	No Asbestos
	FT 2	07, 93	12" x 12" White Vinyl Tile w/Dark Mastic in classroom & throughout	No Asbestos
	FT 3	09	Gray Viny Tile Sheets w/white mastic found throughout	No Asbestos
	FT 4	13, 16	9" x 9" Tan Vinyl Tile w/Dark Mastic on walls/floor in classrooms	3% Chrysotile
	FT 5	15	12" x 12" Gray Vinyl Tile with Gold Mastic found throughout	No Asbestos

SUSPECT MATERIAL	HOMOGENEOUS IDENTIFICATION	SAMPLE NO.	DESCRIPTION	RESULTS
Vinyl Flooring	FT 6	21	9" x 9" Red Vinyl Tile w/Dark Mastic in Lower-Level Supply Room	2% Chrysotile
	FT 7	22	12" x 12" Vinyl Tile w/Dark Mastic in lower-level Supply Closet	No Asbestos
	FT 8	45	12" x 12" Pink Vinyl Tile w/Dark Mastic Throughout	No Asbestos
	FT 9	55	12" x 12" Blue Vinyl Tile w/Dark Mastic found throughout	No Asbestos
	VS 1	11	Blue Vinyl Sheeting in Girls and Boys Bathrooms	No Asbestos
	VS 2	56	Yellow Vinyl Sheeting w/yellow mastic throughout	No Asbestos
	VS 3	57	Vinyl Sheeting w/Gray Felt Backing & Dark Mastic throughout	No Asbestos
	VS 4	60	Pebble Pattern Vinyl Sheeting w/Gray Felt Backing throughout	No Asbestos
	VS 5	79	Gray Pebble Patter Vinyl Sheeting w/Gray Felt Backing throughout	No Asbestos
	VS 6	72	Gray Sheet Vinyl over VS 4	No Asbestos
Ceiling Tiles	CT 1	08	2' x 4' Ceiling Tile throughout	No Asbestos
	CT 2	14	2' x 4' Ceiling Tile w/multiple-hole and Dark Mastic throughout	No Asbestos
	CT 3	49	1' x 1' Ceiling Tile w/Brown Glue Dot and Dark Mastic throughout	No Asbestos
	CT 4	50	1' x 1' Ceiling Tile w/rough surface and Brown Glue Dots	No Asbestos
	CT 5	59	1'x 1' Ceiling Tile w/Dark Brown Glue Dot	No Asbestos
	CT 6	71, 81	White Acoustic Ceiling Tile with Brown Glue Dot	No Asbestos
Sink Coating	SU 1	18, 30	Dark Sink Undercoat throughout	No Asbestos
Miscellaneous	MISC 1	32	Message Board in Halls	No Asbestos
	MISC 2	52	Terrazzo Flooring; Pink Pebble Pattern	No Asbestos
	MISC 3	63	Roofing Patch Tar (around lead vents)	No Asbestos
	MISC 4	64	Tar Roofing Patch	No Asbestos

SUSPECT MATERIAL	HOMOGENEOUS IDENTIFICATION	SAMPLE NO.	DESCRIPTION	RESULTS
Miscellaneous	MISC 5	69	Window Putty	No Asbestos
	MISC 6	73	Exterior Brick and Mortar	No Asbestos
	MISC 7	80, 87-92	Fire Door Insulation	No Asbestos
Ceramic Tile	CTS 1	25	Ceramic Tile Set associated with walls in bathrooms	No Asbestos
	CTS 2	25	Ceramic Tile Set associated with floors in bathrooms	No Asbestos
	CTS 3	51	Ceramic Tile Set associates with walls and floors	No Asbestos
	CTS 4	82	Gray Ceramic Tile Mortar	No Asbestos
Roofing	RM 1	62	Asphalt Roofing Material on wood	No Asbestos
	RM 2	64, 65	Asphalt Roofing Material on insulation	No Asbestos
	RM 3	66	Asphalt Roofing Material on insulation over wood	No Asbestos
	RM 4	68	Asphalt Roofing Material	No Asbestos
	RM 5	77	White Asphalt Flashing	No Asbestos
	RM 6	78	3-Tab Shingle w/Black Felt	No Asbestos
Pipe Insulation	TSI 1	59, 60	Air-O-Cell pipe insulation behind sinks in class rooms	40% Chrysotile

WB – Wallboard
CT – Ceiling Tiles
SU – Sink Undercoating
MISC – Miscellaneous
SM – Surfacing Material
MA – Mastic
FT – Floor Tile

VS – Vinyl Sheeting
CTS – Ceramic Tile Set with Grout
RM – Roofing Material
TSI 1 – Thermal System Insulation
Chrysotile – A type of Asbestos
00% - Quantity of Asbestos in a Material.

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WBE W2F9219763

Polarized Light Microscopy Test Report
EPA Method 600/R-98/116

Client: Tacoma School District #10
Address: 3223 South Union Ave., Tacoma, WA 98409
Attention: Greg Stidham
Project Name: Fawcett Elementary Demolition
Project Number: O21-0180

Rpt. Date: 7/22/2021

Invoice: 21167064
Date Rcvd: 7/15/2021

Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
1a	20210715-13	Joint Compound		ND		cellulose
1b		Wall Board		ND		cellulose
2	20210715-14	Yellow Mastic		ND		man-made fibers
3a	20210715-15	2x2 Vinyl Tile	crush	ND		
3b		Dark mastic		ND		
4	20210715-16	Brown Cove base mastic		ND		
5	20210715-17	Dark tan cabinet and mastic		ND		
6	20210715-18	Sink undercoat		ND		cellulose
7a	20210715-19	12x12 Vinyl Tile		ND		
7b		Dark mastic		ND		
8	20210715-20	2x4 ceiling tile		ND		cellulose
9a	20210715-21	Vinyl Tile Sheet		ND		
9b		White mastic		ND		
10a	20210715-22	Wall Board		ND		cellulose
10b		Taping mud		ND		cellulose
11	20210715-23	Blue vinyl sheeting		ND		cellulose
12	20210715-24	Gold wall panel mastic		ND		
13a	20210715-25	Tan 9x9	crush	ND		

Polarized Light Microscopy Test Report (cont.)

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Project Number: O21-0180

Rpt. Date: 7/22/2021
Page: 2 of 8
Invoice: 21167064
Date Rcvd: 7/15/2021

Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
13b		Dark mastic		ND		
14	20210715-26	2x4 multiple hole with dark mastic		ND		cellulose
15a	20210715-27	12x12 Vinyl Tile	crush	ND		
15b		Gold mastic		ND		
16a	20210715-28	Tan 9x9	crush	3		Chrysotile
16b		Dark mastic		ND		
17	20210715-29	Dark and tan cove base mastic		ND		cellulose
18a	20210715-30	Wall ceramic	crush	ND		
18b		Tile set	crush	ND		
19a	20210715-31	Floor ceramic tile set	crush	ND		
19b		Grout	crush	ND		
20	20210715-32	Dark wall panel mastic		ND		
21a	20210715-33	Red 9x9 Vinyl Tile		2	Chrysotile	cellulose
21b		Dark mastic		ND		
22a	20210715-34	12x12 Vinyl Tile		ND		
22b		Dark mastic		ND		
23a	20210715-35	2x4 ceiling tile	crush	ND		
23b		Dark mastic		ND		
24	20210715-36	Dark wall panel mastic		ND		cellulose
25a	20210715-37	Ceramic tile set	crush	ND		

Polarized Light Microscopy Test Report (cont.)

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Rpt. Date: 7/22/2021

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Date Rcvd: 7/15/2021

Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
25b		Grout	crush	ND		
26	20210715-38	Brown Cove base mastic		ND		
27	20210715-39	Yellow carpet mastic		ND		man-made fibers
28	20210715-40	White plaster	crush	ND		
29	20210715-41	White plaster	crush	ND		
30	20210715-42	Dark sink undercoat		ND		cellulose
31	20210715-43	Texture		ND		cellulose
32	20210715-44	Message Brown		ND		cellulose
33a	20210715-45	Wall Board		ND		cellulose
33b		Taping area		ND		cellulose
34	20210715-46	White plaster		ND		cellulose
35	20210715-47	White plaster		ND		
36	20210715-48	White plaster		ND		
37	20210715-49	White plaster		ND		
38	20210715-50	White plaster		ND		
39	20210715-51	Texture		ND		cellulose
40	20210715-52	Texture		ND		cellulose
41	20210715-53	Texture		ND		
42	20210715-54	Texture		ND		cellulose
43	20210715-55	Texture		ND		cellulose

Polarized Light Microscopy Test Report (cont.)

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Attention: Greg Stidham
Project Name: Fawcett Elementary Demolition
Project Number: O21-0180

Invoice: 21167064
Date Rcvd: 7/15/2021

Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
44	20210715-56	Texture		ND		cellulose
45a	20210715-57	Pink 12x12 Vinyl Tile	crush	ND		
45b		Dark mastic		ND		
46	20210715-58	Yellow carpet mastic		ND		man-made fibers
47	20210715-59	Air cell pipe insulation		40	Chrysotile	cellulose
48	20210715-60	Air cell pipe insulation		40	Chrysotile	cellulose
49a	20210715-61	1x1 multi holed with glue		ND		cellulose
49b		Dot-Dark mastic		ND		cellulose
50a	20210715-62	1x1 texture Ceiling tile		ND		cellulose
50b		Brown mastic		ND		cellulose
51a	20210715-63	Wall ceramic	crush	ND		
51b		Tile set		ND		
51c		Grout	crush	ND		
52	20210715-64	Tirazzo: Pink with pebble pattern	crush	ND		
53a	20210715-65	1A textured		ND		cellulose
53b		Brown mastic glue dot		ND		cellulose
54a	20210715-66	Cove base		ND		
54b		Dark brown mastic		ND		cellulose
55a	20210715-67	12x12 Vinyl Tile	crush	ND		cellulose
55b		Blue with black mastic		ND		

Polarized Light Microscopy Test Report (cont.)

Client: Tacoma School District #10
Address: 3223 South Union Ave., Tacoma, WA 98409
Attention: Greg Stidham
Project Name: Fawcett Elementary Demolition
Project Number: O21-0180

Rpt. Date: 7/22/2021

Invoice: 21167064
Date Rcvd: 7/15/2021

Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
56a	20210715-68	Vinyl sheeting		ND		man-made fibers
56b		Yellow glue		ND		
57	20210715-69	Vinyl sheeting with gray felt backing		ND		cellulose
58a	20210715-70	Joint Compound		ND		cellulose
58b	20210715-	Wall Board		ND		cellulose
59a	20210715-71	1x1 ceiling tile		ND		cellulose
59b	20210715-	Dark brown glue dot		ND		cellulose
60	20210715-72	Vinyl sheeting. Gray felt backing		ND		cellulose
61	20210715-73	Wall panel with dark mastic		ND		cellulose
62a	20210715-74	Built up roofing		ND		fiberglass/ cellulose
62b		Built up roofing		ND		fiberglass/ cellulose
62c		Felt		ND		fiberglass
63	20210715-75	Vent patch		ND		cellulose
64a	20210715-76	Built up roofing		ND		fiberglass/ cellulose
64b		Built up roofing		ND		fiberglass/ cellulose
64c		Insulation		ND		man-made fibers
64d		Felt		ND		fiberglass
65a	20210715-77	Built up roofing		ND		fiberglass/ cellulose
65b		Built up roofing		ND		fiberglass/ cellulose
65c		Felt		ND		fiberglass/ cellulose

Polarized Light Microscopy Test Report (cont.)

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Rpt. Date: 7/22/2021

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Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
65d		Insulation		ND		man-made fibers
65e		Felt		ND		fiberglass
66a	20210715-78	Rolled roofing		ND		fiberglass/ cellulose
66b		Felt		ND		fiberglass
66c		Insulation		ND		cellulose
67	20210715-79	Vent patch		ND		cellulose
68a	20210715-80	Built up roofing		ND		fiberglass/ cellulose
68b		Built up roofing		ND		fiberglass/ cellulose
69	20210715-81	Window Putty	crush	ND		cellulose
70a	20210715-82	Gray pebble pattern vinyl		ND		cellulose
70b		Black mastic sheeting/ Gray felt back		ND		cellulose
71	20210715-83	White acoustic tile w/ brown glue dot		ND		cellulose
71		White acoustic tile w/ brown glue dot	crush	ND		cellulose
72	20210715-84	Gray SV over pebble pattern SV; Gray felt backing		ND		cellulose
73a	20210715-85	Exterior red brick	crush	ND		
73b		Mortar	crush	ND		
74a	20210715-86	Joint Compound		ND		cellulose
74b		Wall Board		ND		cellulose
75a	20210715-87	Joint Compound		ND		cellulose
75b		Wall Board		ND		cellulose

Polarized Light Microscopy Test Report (cont.)

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Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
76	20210715-88	Joint Compound		ND		cellulose
76		Wall Board		ND		cellulose
77	20210715-89	Asphalt flashing white		ND		cellulose
78a	20210715-90	3 tab shingle red/black		ND		fiberglass/cellulose
78b		Felt		ND		cellulose
79	20210715-91	Gray pebble vinyl sheeting; Gray felt backing		ND		cellulose
80	20210715-92	Fire door insulation		ND		cellulose
81a	20210715-93	Acoustic tile with brown glue dot		ND		cellulose
81b		Acoustic tile with brown glue dot		ND		
82	20210715-94	Ceramic tile (gray)	crush	ND		
83a	20210715-95	Joint Compound		ND		cellulose
83b		Wall Board		ND		cellulose
84	20210715-96	Plaster inlay windows (exterior)	crush	ND		
85	20210715-97	Plaster inlay windows (exterior)	crush	ND		
86	20210715-98	Plaster inlay windows (exterior)	crush	ND		
87	20210715-99	Fire door insulation		ND		
88	20210715-100	Fire door insulation		ND		
89	20210715-101	Fire door insulation		ND		
90	20210715-102	Fire door insulation		ND		
91	20210715-103	Fire door insulation		ND		

Polarized Light Microscopy Test Report (cont.)

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Address: 3223 South Union Ave., Tacoma, WA 98409
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Rpt. Date: 7/22/2021

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Client Sample ID	Orion Sample ID	Material Description	Sample Treatment	% Asbestos Containing Material	Asbestos Type	Other Fibers
92	20210715 -104	Fire door insulation		ND		
93a	20210715 -105	12x12 Vinyl Tile	crush	ND		
93b		Dark Mastic		ND		
94a	20210715 -106	Joint Compound		ND		cellulose
94b		Wall Board		ND		cellulose
95	20210715 -107	Texture		ND		cellulose
96	20210715 -108	Plaster	crush	ND		
97	20210715 -109	Plaster	crush	ND		

Dup: Laboratory QA/QC Duplicate; M; Mastic [(a), (b), (c), etc.]: Sample layers numbered from front to back.
Comments: For layered samples, each component has been analyzed separately. ND means non-detect for asbestos fibers by EPA Method 600/R-98/116.Disclaimers: PLM has been known to miss asbestos in a small percentage of samples that contain asbestos. Thus, these laboratory results represent due diligence, however negative or <1 % PLM results can not be guaranteed. Per EPA guidelines samples will be archived for 30 days then will be disposed of. This report may only be reproduced in full with written approval of ORION Environmental Services.

Analyzed By (Print)	Date	Reviewed By (Print)	Date
Dennis Rauschenberg	7/22/2021	Donna McNeal	7/22/2021
Analyzed By (Signature)	Time	Reviewed By (Signature)	Time

Vinyl Flooring - Floor Tile 4 (FT 4)
Samples No. 13 and 14

This non-friable vinyl tile can be found on the walls in a majority of the classrooms 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 (walls are painted) and on the floor in room ESL 9. On the wall, material is adhered to a wallboard or plaster substrate and in room ESL 9, it is adhered to a concrete substrate in front of the sink. The vinyl tile contained 3% Chrysotile while no asbestos was found in the mastic. Although sample number 13 was found non-detect, it was homogenized with sample number 16 which was found asbestos containing. Estimated quantity is 2,500 square feet.

Vinyl Flooring - Floor Tile 6 (FT 6)
Sample No. 21

This non-friable vinyl tile can be found in the southwest end of the building in a supply room of the hallway between the girl's and boy's bathroom with an estimated quantity of 120 square feet. Vinyl tile contained 2% Chrysotile fibers and is adhered to a wood substrate. The mastic associated with the tile did not contain asbestos.

Pipe Insulation – TSI 1
Sample No. 59 and 60

This friable pipe insulation (air-o-cell) is found in association with classroom sinks and other locations throughout the building. Material may be exposed or may be underneath a wood door found under the sink. The material is in poor condition with debris found underneath the piping. Material contained 40% Chrysotile fibers. Material from the base may extend up to 3 feet behind the wall and cabinetry. It is assumed that the material may also extend approximately up to 1 foot below the base as a penetration. Estimated quantity for this material is 120 linear feet visible. We also estimate 250 linear feet may be concealed. NOTE: Materials stored in the cabinets may be contaminated with this insulation.

Mastic 1 (MA1) Yellow Carpet Mastic
Sample No. 02, 27 and 46
NO ASBESTOS

Mastic 2 (MA 2) Brown Cove Base Mastic
Sample No. 04
NO ASBESTOS

Mastic 3 (MA 3) Dark and Tan Cabinet Mastic
Sample No. 05, 17
NO ASBESTOS

Mastic 4 (MA 4) Gold Wall Panel Mastic
Sample No. 12
NO ASBESTOS

Mastic 5 (MA 5) Dark Mastic Associated Wall Paneling
Sample No. 20, 24 and 61
NO ASBESTOS

Mastic 6 (MA 6) Dark Mastic Associated Wall Paneling
Sample No. 26 and 54
NO ASBESTOS

Floor Tile 1 (FT1) 24" x 24" Vinyl Tile w/Dark Mastic
Sample No. 03 and 23
NO ASBESTOS

Floor Tile 2 (FT 2) 12" x 12" White Vinyl Tile w/Dark Mastic
Sample No. 07 and 93
NO ASBESTOS

Floor Tile 3 (FT 3) Gray Vinyl Sheeting Sheets w/White Mastic

Sample No. 09

NO ASBESTOS

Floor Tile 5 (FT 5) 12" x 12" Gray Vinyl Tile w/Gold Mastic

Sample No. 15

NO ASBESTOS

Floor Tile 7 (FT 7) 12" x 12" Vinyl Tile w/Dark Mastic
Sample No. 22
NO ASBESTOS

Floor Tile 9 (FT 9) 12" x 12" Blue Vinyl Tile w/Dark Mastic
Sample No. 55
NO ASBESTOS

Vinyl Sheeting 1 (VS 1) Blue Vinyl Sheeting
Sample No. 11
NO ASBESTOS

Vinyl Sheeting 2 (VS 2) Blue Vinyl Sheeting
Sample No. 56
NO ASBESTOS

Vinyl Sheeting 3 (VS 3) Vinyl Sheeting with Gray Felt Backing
Sample No. 57
NO ASBESTOS

Vinyl Sheeting 4 (VS 4) Vinyl Sheeting with Gray Felt Backing
Sample No. 60
NO ASBESTOS

Vinyl Sheeting 5 (VS 5) Gray Pebble Pattern Vinyl Sheeting w/Gray Felt Backing
Sample No. 79
NO ASBESTOS

Vinyl Sheeting 6 (VS 6) Pebble Pattern Vinyl Sheeting with Gray Felt Backing
Sample No. 72
NO ASBESTOS

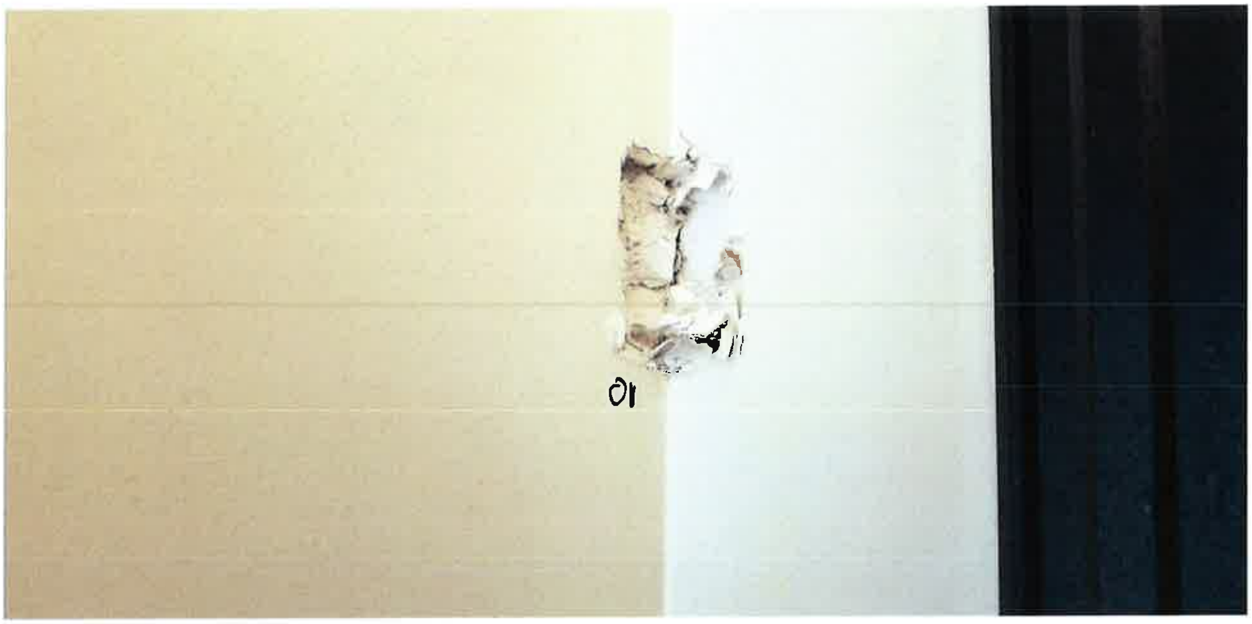
Ceramic Tile Set 1 (CTS 1) Associated with Bathroom Walls
Sample No. 18
NO ASBESTOS

Ceramic Tile Set 2 (CTS 2) Associated with Bathroom Floors
Sample No. 18
NO ASBESTOS

Ceramic Tile Set 3 (CTS 3) Red Ceramic Tile Mortar
Sample No. 51
NO ASBESTOS

Ceramic Tile Set 4 (CTS 4) Gray Ceramic Tile Mortar
Sample No. 82
NO ASBESTOS

Wallboard Wall Systems (WB1)
Sample No. 01, 10, 33, 58, 74, 75, 76, 94 and 106
NO ASBESTOS



Plaster (SM 1) White
Sample No. 28, 29, 34, 35, 36, 37, 38, 84, 85, 86, 96 and 97
NO ASBESTOS

Texture (SM 2) White Orange Peal
Sample No. 31, 39, 40,41, 42, 43, 44 and 95
NO ASBESTOS

Ceiling Tile 2 (CT 1) 2' x 4' Multiple Hole with Dark Felt/Mastic

Sample No. 14

NO ASBESTOS

Ceiling Tile 4 (CT 4) 1' x 1' Rough Appearance with Brown Glue Dot

Sample No. 50

NO ASBESTOS

Ceiling Tile 5 (CT 5) 1' x 1' Worm Patter with Dark Brown Glue Dot
Sample No. 50
NO ASBESTOS

Ceiling Tile 6 (CT 6) White Acoustic Multiple Hole with Brown Glue Dot
Sample No. 71 and 81
NO ASBESTOS

Sink Undercoat 1 (SU1) Dark Coating
Sample No. 30
NO ASBESTOS

Roofing Material 1 (RM 1) Asphalt Roofing Material
Sample No. 62
NO ASBESTOS

Roofing Material 2 (RM 2) Asphalt Roofing Material
Sample No. 64, 65
NO ASBESTOS

Roofing Material 3 (RM 3) Asphalt Roofing Material
Sample No. 66
NO ASBESTOS

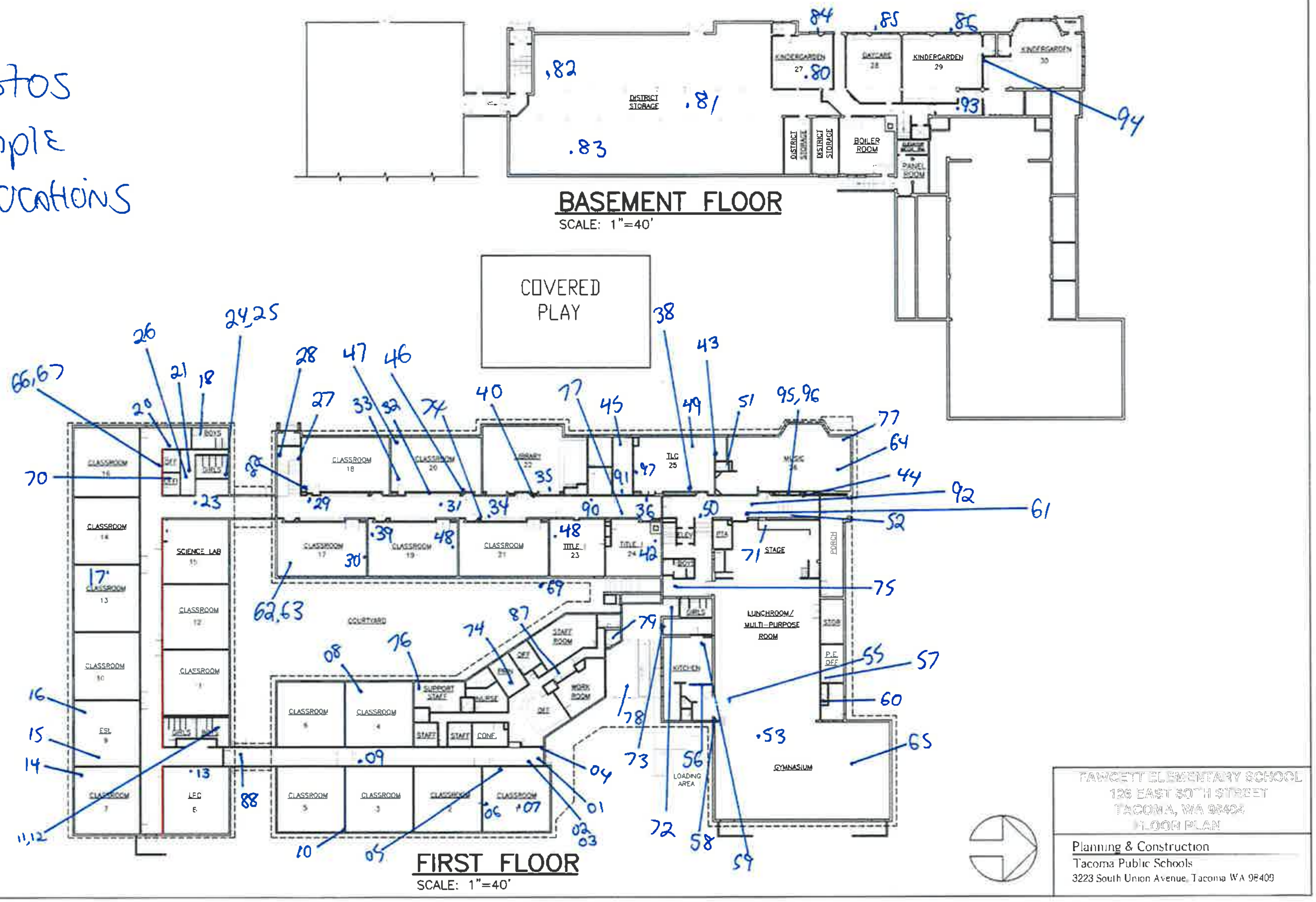
Miscellaneous 1 – MISC 1 Message Board
Sample No. 32
NO ASBESTOS

Miscellaneous 2 – MISC 2 Terrazzo Flooring
Sample No. 52
NO ASBESTOS

Miscellaneous 3 – MISC 3 Roof Tar Patch Around Lead Pipes
Sample No. 63
NO ASBESTOS

Miscellaneous 6 – MISC 6 Brick and Mortar
Sample No. 73
NO ASBESTOS

Asbestos Sample Locations



AHERA

BUILDING INSPECTOR CERTIFICATE

This is to certify that

Christopher Grysho

has attended and satisfactorily completed all requirements to maintain accreditation as an AHERA Building Inspector in accordance with the Toxic Substance Control Act Title (Section 206) and 40 CFR 763.

Accreditation No. BI-NES-11-12-2020-4

Course Date: November 10th-12th, 2020
Valid through: November 10th-12th, 2021

Jamie Switras

NOW Environmental Services, Inc.
34004 – 9th Avenue South, Suite # 12
Federal Way, Washington 98003
(253) 927-5233

AHERA

BUILDING INSPECTOR CERTIFICATE

This is to certify that

Evan Cooke

has attended and satisfactorily completed all requirements to maintain accreditation as an AHERA Building Inspector in accordance with the Toxic Substance Control Act Title (Section 206) and 40 CFR 763.

Accreditation No. BI-NES-051321-09
Course Date: May11th-13, 2021
Valid through: May 13th, 2022

Jamie Switras

NOW Environmental Services, Inc.
34004 – 9th Avenue South, Suite # 12
Federal Way, Washington 98003
(253) 927-5233

ATTACHMENT 2
Lead Paint Findings and Recommendations

Component Table
Sample Location Drawing
Performance Characterization Sheet (PCS)

Recommendation Summary: **ALL** painted components are to be considered lead containing. Washington Administrative Code (WAC) 296-155-176 Lead in Construction are applicable and will regulated all contractors impacting painted component at the school.

A.V. Fawcett Elementary School Demolition

Lead in Construction Assessment Report

Testing Performed July 14, 2021

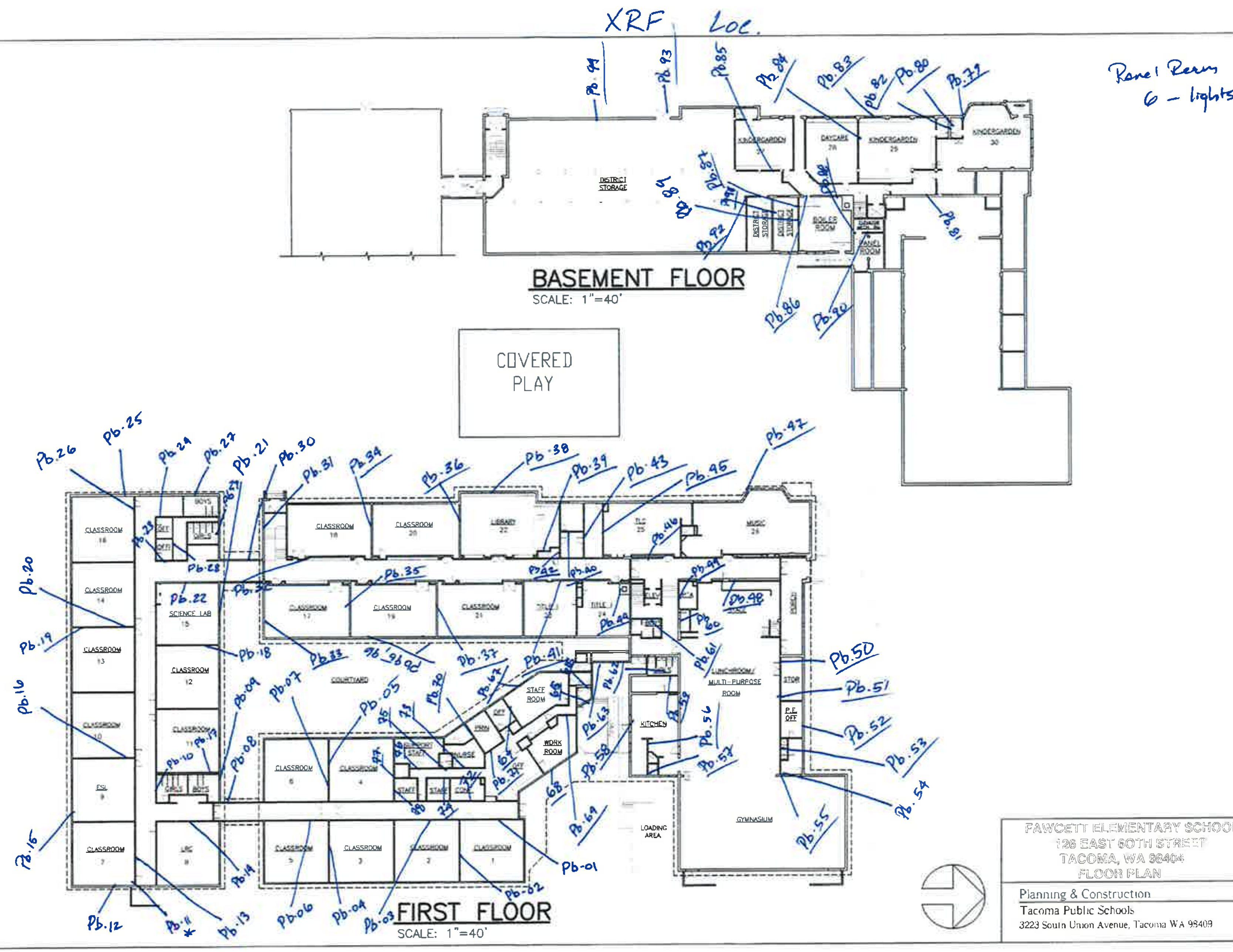
Room	Index	Side	Component	Substrate	Color	Calibration	Result	PbC
	910				White	NIST 2570	Pass	0.0
	911				White	NIST 2570	Pass	0.0
	912				White	NIST 2570	Pass	0.0
	913				Red	NIST 2573	Pass	1.0
	914				Red	NIST 2573	Pass	1.0
	915				Red	NIST 2573	Pass	1.0
Room	**PB No.**	**Side**	**Component**	**Substrate**	**Color**	**Condition**	**PbC**	**DOSH**
Main Hall Way	1		Wall	Wallboard	White	Good	0.0	Negative
Class Room 1	2		Wall	Wallboard	White	Good	0.0	Negative
Class Room 2	3		Wall	Wallboard	White	Good	0.0	Negative
Class Room 3	4		Wall	Wallboard	White	Good	0.0	Negative
Class Room 4	5		Wall	Wallboard	White	Good	0.0	Negative
Class Room 5	6		Wall	Wallboard	White	Good	0.0	Negative
Class Room 6	7		Wall	Wallboard	White	Good	0.0	Negative
Exterior Door	8		Door	Metal	Blue	Good	0.0	Negative
Boys Bathroom	9		Wall	Wallboard	White	Good	0.0	Negative
Girls Bathroom	10		Wall	Wallboard	White	Good	0.0	Negative
Class Room 7	11		Wall	Plaster	White	Good	0.1	Positive
Class Room 7	12		Wall	Cinderblock	White	Good	0.15	Positive
West Hall	13		Wall	Wallboard	White	Good	0.1	Positive
LRC 8	14		Wall	Wallboard	White	Good	0.50	Positive
ESL 9	15		Wall	Wallboard	White	Good	0.0	Negative
Class Room 10	16		Wall	Wallboard	White	Good	0.1	Positive
Class Room 11	17		Wall	Wallboard	White	Good	0.0	Negative
Class Room 12	18		Wall	Wallboard	White	Good	0.0	Negative
Class Room 13	19		Wall	Wallboard	White	Good	0.1	Negative
Class Room 14	20		Wall	Wallboard	White	Good	0.2	Positive
Class Room 15	21		Wall	Brick		Good	0.21	Positive
Class Room 15	22		Wall	Wallboard	White	Good	0.2	Positive
Office 1	23		Wall	Wallboard	White	Good	0.9	Positive
Office 1	24		Wall	Wallboard	White	Good	0.6	Positive

Report Date: July 23, 2021

Room	Index	Side	Component	Substrate	Color	Condition	PbC	DOSH
Class Room 16	25		Wall	Wallboard	White	Good	0.13	Positive
Class Room 17	26		Wall	Wallboard	White	Good	0.0	Negative
Boys Room	27		Wall	Wallboard	White	Good	0.0	Negative
Utilty Closet	28		Wall	Wallboard	White	Good	0.5	Positive
Girls Room	29		Wall	Wallboard	White	Good	0.5	Positive
Exit Door	30		Door	Metal	Blue	Good	0.0	Negative
Stairwell	31		Wall	Wallboard	White	Good	0.0	Negative
Hallway 3	32		Wall	Plaster	White	Good	0.15	Positive
Room 17	33		Wall	Wallboard	White	Good	0.0	Negative
Class Room 18	34		Wall	Wallboard	White	Good	0.0	Negative
Class Room 19	35		Wall	Wallboard	White	Good	0.0	Negative
Class Room 20	36		Wall	Wallboard	White	Good	0.0	Negative
Class Room 21	37		Wall	Wallboard	White	Good	0.0	Negative
Library	38		Wall	Wallboard	White	Good	0.1	Positive
Library	39		Wall	Wallboard	White	Good	0.0	Negative
Library	40		Wall	Wallboard	White	Good	0.0	Negative
Title 1	41		Wall	Wallboard	White	Good	0.0	Negative
Roof Access Room	42		Wall	Wallboard	White	Poor	0.0	Negative
Adjacent Room	43		Wall	Wallboard	White	Good	0.27	Positive
Title 1 #24	44		Wall	Wallboard	White	Good	0.0	Negative
TLC	45		Wall	Wallboard	White	Good	0.0	Negative
Hallway N	46		Wall	Wallboard	White	Good	0.0	Negative
Music Room	47		Wall	Wallboard	White	Good	0.05	Positive
Stage	48		Wall	Wallboard	White	Good	0.0	Negative
PTA	49		Wall	Wallboard	White	Good	0.0	Negative
Lunchroom	50		Wall	Wallboard	White	Good	0.0	Negative
Storage Room	51		Wall	Wallboard	White	Good	0.0	Negative
PE Office	52		Wall	Wallboard	White	Good	0.0	Negative
Bathroom	53		Wall	Wallboard	White	Good	0.0	Negative
PE Office	54		Wall	Wallboard	White	Good	0.0	Negative
Gymnasium	55		Wall	Wallboard	White	Good	0.0	Negative
Kitchen	56		Wall	Plaster	White	Good	0.1	Positive
Kitchen Bathroom	57		Wall	Wallboard	White	Good	0.0	Negative
Kitchen	58		Wall	Wallboard	White	Good	0.0	Negative
Kitchen	59		Wall	Wallboard	White	Good	0.0	Negative
Mop Closet	60		Wall	Wallboard	White	Good	0.0	Negative

Room	Index	Side	Component	Substrate	Color	Condition	PbC	DOSH
Boys Room	61		Wall	Wallboard	White	Good	0.0	Negative
Girls Room	62		Wall	Wallboard	White	Good	0.0	Negative
Foyer Outside	63		Wall	Wallboard	White	Good	0.0	Negative
Hallway E	64		Wall	Wallboard	White	Good	0.0	Negative
Bathroom 1	65		Wall	Wallboard	White	Good	0.0	Negative
Bathroom 2	66		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	67		Wall	Wallboard	White	Good	0.0	Negative
Work Room	68		Wall	Wallboard	White	Good	0.0	Negative
Associate Principal	69		Wall	Wallboard	White	Good	0.0	Negative
Principal Office	70		Wall	Wallboard	White	Good	0.0	Negative
Main Office	71		Wall	Wallboard	White	Good	0.0	Negative
Conference Room	72		Wall	Wallboard	White	Good	0.0	Negative
Nurse	73		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	74		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	75		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	76		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	77		Wall	Wallboard	White	Good	0.0	Negative
Staff Room	78		Wall	Wallboard	White	Good	0.0	Negative
Kinder #30	79		Wall	Concrete	White	Good	0.0	Negative
Kinder #30	80		Wall	Wallboard	White	Good	0.0	Negative
Basement Hallway	81		Wall	Concrete	White	Good	0.0	Negative
Kinder #29	82		Wall	Wallboard	White	Good	0.0	Negative
Kinder #29	83		Wall	Concrete	White	Good	0.0	Negative
Daycare #28	84		Wall	Wallboard	White	Good	0.0	Negative
Kinder #27	85		Wall	Wallboard	White	Good	0.0	Negative
Boiler Room	86		Door	Metal	White	Good	0.12	Positive
Boiler Room	87		Wall	Brick	White	Good	0.0	Negative
Boiler Room	88		Wall	Concrete	White	Good	0.0	Negative
Panel Room	89		Wall	Wallboard	White	Good	0.0	Negative
District Storage	90		Wall	Wallboard	White	Good	0.0	Negative
District Storage	91		Wall	Wallboard	White	Good	0.0	Negative
District Storage	92		Door	Wood	Blue	Good	0.0	Negative
District Storage	93		Door	Metal	White	Good	0.0	Negative
Exterior Roof	94		Trim	Wood	White	Fair	2	Positive
Exterior Roof	95		Trim	Wood	Blue	Fair	2	Positive

Report Date: July 23, 2021



FAWCETT ELEMENTARY SCHOOL
126 EAST 60TH STREET
TACOMA, WA 98404
FLOOR PLAN

Planning & Construction
Tacoma Public Schools
3223 South Union Avenue, Tacoma WA 98409

Performance Characteristic Sheet

EFFECTIVE DATE: **September 24, 2004** **EDITION NO.: 1**

MANUFACTURER AND MODEL:

Make: *Niton LLC*

Tested Model: *XLp 300*

Source: ^{109}Cd

Note: This PCS is also applicable to the equivalent model variations indicated below, for the Lead-in-Paint K+L variable reading time mode, in the XLi and XLp series:

XLi 300A, XLi 301A, XLi 302A and XLi 303A.

XLp 300A, XLp 301A, XLp 302A and XLp 303A.

XLi 700A, XLi 701A, XLi 702A and XLi 703A.

XLp 700A, XLp 701A, XLp 702A, and XLp 703A.

Note: The XLi and XLp versions refer to the shape of the handle part of the instrument. The differences in the model numbers reflect other modes available, in addition to Lead-in-Paint modes. The manufacturer states that specifications for these instruments are identical for the source, detector, and detector electronics relative to the Lead-in-Paint mode.

FIELD OPERATION GUIDANCE

OPERATING PARAMETERS:

Lead-in-Paint K+L variable reading time mode.

XRF CALIBRATION CHECK LIMITS:

0.8 to 1.2 mg/cm^2 (inclusive)

The calibration of the XRF instrument should be checked using the paint film nearest 1.0 mg/cm^2 in the NIST Standard Reference Material (SRM) used (e.g., for NIST SRM 2579, use the 1.02 mg/cm^2 film).

If readings are outside the acceptable calibration check range, follow the manufacturer's instructions to bring the instruments into control before XRF testing proceeds.

SUBSTRATE CORRECTION:

For XRF results using Lead-in-Paint K+L variable reading time mode, substrate correction is <u>not</u> needed for:

Brick, Concrete, Drywall, Metal, Plaster, and Wood

INCONCLUSIVE RANGE OR THRESHOLD:

K+L MODE READING DESCRIPTION	SUBSTRATE	THRESHOLD (mg/cm^2)
Results not corrected for substrate bias on any substrate	Brick	1.0
	Concrete	1.0
	Drywall	1.0
	Metal	1.0
	Plaster	1.0
	Wood	1.0

BACKGROUND INFORMATION

EVALUATION DATA SOURCE AND DATE:

This sheet is supplemental information to be used in conjunction with Chapter 7 of the HUD *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing* ("HUD Guidelines"). Performance parameters shown on this sheet are calculated from the EPA/HUD evaluation using archived building components. Testing was conducted in August 2004 on 133 testing combinations. The instruments that were used to perform the testing had new sources; one instrument's was installed in November 2003 with 40 mCi initial strength, and the other's was installed June 2004 with 40 mCi initial strength.

OPERATING PARAMETERS:

Performance parameters shown in this sheet are applicable only when properly operating the instrument using the manufacturer's instructions and procedures described in Chapter 7 of the HUD Guidelines.

SUBSTRATE CORRECTION VALUE COMPUTATION:

Substrate correction is not needed for brick, concrete, drywall, metal, plaster or wood when using Lead-in-Paint K+L variable reading time mode, the normal operating mode for these instruments. If substrate correction is desired, refer to Chapter 7 of the HUD Guidelines for guidance on correcting XRF results for substrate bias.

EVALUATING THE QUALITY OF XRF TESTING:

Randomly select ten testing combinations for retesting from each house or from two randomly selected units in multifamily housing. Use the K+L variable time mode readings.

Conduct XRF retesting at the ten testing combinations selected for retesting.

Determine if the XRF testing in the units or house passed or failed the test by applying the steps below.

> Compute the Retest Tolerance Limit by the following steps:
>
> > Determine XRF results for the original and retest XRF readings. Do not correct the original or retest results for substrate bias. In single-family housing a result is defined as the average of three readings. In multifamily housing, a result is a single reading. Therefore, there will be ten original and ten retest XRF results for each house or for the two selected units.
> >
> > > Calculate the average of the original XRF result and retest XRF result for each testing combination.
> > >
> > > Square the average for each testing combination.
> > >
> > > Add the ten squared averages together. Call this quantity C.
> > >
> > > Multiply the number C by 0.0072. Call this quantity D.
> > >
> > > Add the number 0.032 to D. Call this quantity E.
> > >
> > > Take the square root of E. Call this quantity F.
>
> Multiply F by 1.645. The result is the Retest Tolerance Limit.
>
> Compute the average of all ten original XRF results.
>
> Compute the average of all ten re-test XRF results.
>
> Find the absolute difference of the two averages.

If the difference is less than the Retest Tolerance Limit, the inspection has passed the retest. If the difference of the overall averages equals or exceeds the Retest Tolerance Limit, this procedure should be repeated with ten new testing combinations. If the difference of the overall averages is equal to or greater than the Retest Tolerance Limit a second time, then the inspection should be considered deficient.

Use of this procedure is estimated to produce a spurious result approximately 1% of the time. That is, results of this procedure will call for further examination when no examination is warranted in approximately 1 out of 100 dwelling units tested.

TESTING TIMES:

For the Lead-in-Paint K+L variable reading time mode, the instrument continues to read until it is moved away from the testing surface, terminated by the user, or the instrument software indicates the reading is complete. The following table provides testing time information for this testing mode. The times have been adjusted for source decay, normalized to the initial source strengths as noted above. Source strength and type of substrate will affect actual testing times. At the time of testing, the instruments had source strengths of 26.6 and 36.6 mCi.

Testing Times Using K+L Reading Mode (Seconds)						
	All Data			Median for laboratory-measured lead levels (mg/cm^2)		
Substrate	25th Percentile	Median	75th Percentile	Pb < 0.25	0.25 ≤ Pb<1.0	1.0 ≤ Pb
Wood Drywall	4	11	19	11	15	11
Metal	4	12	18	9	12	14
Brick Concrete Plaster	8	16	22	15	18	16

CLASSIFICATION RESULTS:

XRF results are classified as positive if they are greater than or equal to the threshold, and negative if they are less than the threshold.

DOCUMENTATION:

A document titled *Methodology for XRF Performance Characteristic Sheets* provides an explanation of the statistical methodology used to construct the data in the sheets, and provides empirical results from using the recommended inconclusive ranges or thresholds for specific XRF instruments. For a copy of this document call the National Lead Information Center Clearinghouse at 1-800-424-LEAD.

This XRF Performance Characteristic Sheet was developed by the Midwest Research Institute (MRI) and QuanTech, Inc., under a contract between MRI and the XRF manufacturer. HUD has determined that the information provided here is acceptable when used as guidance in conjunction with Chapter 7, Lead-Based Paint Inspection, of HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.

ATTACHMENT 3
PCB and Fluorescent Fixtures Findings and Recommendations

ATTACHMENT 3
PCB and Fluorescent Fixtures Findings and Recommendations

Fluorescent Light Ballasts

Fluorescent light ballasts were randomly examined throughout the buildings The ballasts of these fixtures we identified were either electronic or ballasts were marked as "No PCB"

Ballast marked as "Electronic"

Fluorescent Light Tubes

Unless identified as "Truefit LED Tube, or otherwise noted, we estimated 1,950 fluorescent bulbs as potentially being mercury containing

Geotechnical Engineering Services Report

Fawcett Elementary School
Tacoma, Washington

for
BLRB Architects

August 3, 2021

GeoEngineers
Earth Science + Technology

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GeoEngineers

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Geotechnical Engineering Services Report

Fawcett Elementary School
Tacoma, Washington

File No. 0522-034-00

August 3, 2021

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GEOENGINEERS

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APPENDICES

1.0 INTRODUCTION AND PROJECT UNDERSTANDING

This report provides a summary of subsurface conditions and geotechnical recommendations for design and construction of the Fawcett Elementary School Replacement Project. The project site is located at 126 East 60th Street in Tacoma, Washington. A Vicinity Map is provided as Figure 1. Our understanding of the project is based on our communications with the project team (Hensel Phelps, BLRB, AHBL) and information provided including a Conceptual Site Plan dated May 26, 2021.

We understand that the existing elementary school is to be demolished and replaced with a new school building. The new school building will be two stories tall and have an "L" shape. The existing school building is constructed into the site topography with the lower level of the building being below grade and daylighting on the west side of the site. We understand that the site will be regraded so that the new building has a consistent ground floor elevation with frontages to the East 60th Street and East B Street sides of the site. We understand that grades along the western third of the site where the existing playfield is located will remain unchanged. Other site improvements include frontage improvements, new utility installation, new parking lots, bus loops and student drop off areas, a new playground and site landscaping. A rain garden or bioswale is also being considered in the northeast corner of the site. We understand that seismic design at the site will be completed in accordance with the 2018 International Building Code (IBC). Stormwater facilities will be designed in accordance with the 2021 City of Tacoma Stormwater Management Manual (SWMM).

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of our services is to complete subsurface explorations at the site as a basis for providing geotechnical design and construction recommendations for the project. Our services have been provided in accordance with our signed agreement executed on May 21, 2021. Our specific scope of services is summarized in our proposal dated May 11, 2021.

3.0 SOIL AND GROUNDWATER CONDITIONS

3.1. Literature Review

Based on review of the *Geologic Map of the Tacoma 1:100,000 Quadrangle* (2015), the project site is underlain by Vashon Glacial Till (Qgt) deposits. Glacial till soils are typically comprised of a mixture of sand gravel and cobbles in a silty matrix. Glacial till deposits can also contain boulders. Glacial till deposits were deposited below the base of advancing and retreating glaciers and are highly over-consolidated. Glacial till deposits are typically dense to very dense; however, the upper few feet of the deposit can be weathered and relatively less dense than the underlying intact glacial till. Glacial till typically is defined as an NRCS Hydraulic Group C or D soil.

We reviewed the *Hydrogeologic Framework, Groundwater Movement, and Water Budget in the Chambers-Clover Creek Watershed and Vicinity Report* (U.S. Geological Survey Report 2012-5055). According to the report, which provides a summary of average aquifer elevations in the Tacoma area, static groundwater depths at the site are expected to be more than about 150 feet below existing site grades.

3.2. Subsurface Explorations

GeoEngineers explored subsurface conditions at the site by advancing four borings and six test pits. The Site Plan, Figure 2, shows the approximate locations of the explorations. Summary explorations logs and the results of laboratory testing completed on select soil samples are provided in Appendix A. Borings were extended as deep as 25.5 feet below ground surface (bgs). Test pits were extended as deep as 8.5 feet bgs. Additional details regarding our subsurface exploration and laboratory testing program are provided in Appendix A.

3.3. Soil and Groundwater Conditions

The site is surfaced with sod, gravel and pavements. Borings B-1, B-2 and B-4 were advanced within areas paved with asphalt concrete. Measured asphalt thicknesses were between 2 and 5 inches. Boring B-3 and Test Pits TP-1 through TP-5 were advanced in sod field areas. Sod thicknesses typically ranged between 4 and 6 inches. TP-6 was advanced within a landscaping area where the root zone of vegetation was observed within the upper 2 to 4 inches.

Below the surfacing, we encountered three soil units in our explorations; fill (or reworked native soils), weathered glacial till and intact glacial till. Encountered fill generally consisted of loose to medium dense silty sand with variable gravel content and occasional cobbles and stiff to very stiff sandy silt with gravel. The fill deposit ranged between 0.5 and 5 feet thick. Trace organic material including small diameter roots were encountered in the fill.

Underlying the fill, we encountered either weathered glacial till or intact glacial till. The weathered glacial till, where present, was typically on the order of 1 to 4 feet thick and comprised of medium dense to dense silty sand with variable gravel content. Intact glacial till soils generally consisted of very dense silty sand with gravel. All of our explorations were terminated within the intact glacial till deposits. The top of the intact very dense glacial till layer typically ranged between 3 and 7.5 feet bgs.

We did not encounter what we interpret to be the regional groundwater table in our explorations. We expect that the regional groundwater is located more than 150 feet bgs below the glacial till deposit in deeper underlying layers of outwash soils or older glacial deposits. We observed what we interpret to be slow to moderate perched groundwater seepage in TP-3 around 3 feet bgs. The perched groundwater appeared to enter the excavation from a relatively clean sand layer. This layer was not observed in other explorations at the site. We expect that areas of perched groundwater will be seasonal, isolated and discontinuous across the site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1. Primary Geotechnical Considerations

Based on our understanding of the project, the explorations performed for this study and our experience, it is our opinion that the proposed improvements can be designed and constructed generally as envisioned with regards to geotechnical considerations. A summary of key geotechnical considerations for the project is provided below and is followed by our detailed recommendations.

- We did not identify potentially liquefiable soils in our explorations and in our opinion the risk of liquefaction occurring at this site is low.

- Most of the soils observed in our borings contain a significant percentage of fines and could be difficult or impossible to work with when wet or become easily disturbed if exposed to wet weather. Depending on the intended use of the material and the prevailing conditions, it may be difficult to re-use these soils as structural fill.
- In our opinion, proposed structures at the site can be satisfactorily supported using shallow foundations provided that the foundation bearing surfaces are prepared as recommended.
- In our opinion, the infiltration potential of the site soils is very low. Additional field testing will be necessary to establish a design infiltration rate for stormwater infiltration facilities.

4.2. Seismic Design Considerations

4.2.1. Seismic Design Parameters

We understand that seismic design will be performed in accordance with 2018 IBC Standards. The following parameters provided in Table 1 should be used for design.

TABLE 1. SEISMIC DESIGN PARAMETERS

2018 IBC Seismic Design Parameters	
Spectral Response Acceleration at Short Periods (S_S)	1.331g
Spectral Response Acceleration at 1-Second Periods (S_1)	0.46g
Site Class	C
Site Modified Peak Ground Acceleration (PGA)	0.6g
Design Spectral Response Acceleration at Short Periods (SD_S)	1.065g
Design Spectral Response Acceleration at 1-Second Periods (SD_1)	0.46g

4.2.2. Liquefaction

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

We reviewed the *Liquefaction Susceptibility Map of Pierce County, Washington* (Palmer et al. 2004). According to the map, the potential for liquefaction at this site is very low. Based on the soil conditions observed in our explorations and our interpretation of the regional geology and groundwater table, it is also our opinion the potential for liquefaction at this site is low.

4.2.3. Lateral Spreading Potential

Lateral spreading related to seismic activity typically involves lateral displacement of large, surficial blocks of non-liquefied soil when a layer of underlying soil loses strength during seismic shaking. Lateral spreading usually develops in areas where sloping ground or large grade changes (including retaining walls) are present. Based on our understanding of the liquefaction risk at the site and the proposed improvements it is our opinion that the risk of lateral spreading is very low.

4.2.4. Surface Rupture Potential

According to the Washington State Department of Natural Resources (DNR) Interactive Natural Hazards Map, the project site is in the vicinity of the Tacoma Fault zone. However, because bedrock in this area is covered by hundreds of feet of glacial soils, it is unlikely that movement of the fault would result in significant surface rupture at the ground surface. In our opinion the risk for surface fault rupture occurring at this site is low.

4.3. Site Development and Earthwork

We anticipate that site development and earthwork will include demolition of existing features, excavating for the below-grade portion of the building, shallow foundations, utilities and other improvements, establishing subgrades for structures and hardscaping, and placing and compacting fill and backfill materials. We expect that site grading and earthwork can be accomplished with conventional earthmoving equipment. The following sections provide specific recommendations for site development and earthwork.

4.3.1. Clearing, Stripping and Demolition

Clearing and stripping depths will likely be on the order of 2 to 6 inches in areas currently surfaced with sod or other landscaping. Greater stripping depths could be required within structural areas or areas of unsuitable soils, if observed during construction. Stripped grass and sod material must not be re-used as fill.

Coarse gravel and cobbles were observed in our explorations at the site. In our experience boulders can also be present in the glacial till soils present at the site. Accordingly, the contractor should be prepared to remove boulders and cobbles, if encountered during grading or excavation. Boulders may be removed from the site or used in landscape areas. Voids caused by boulder removal should be backfilled with structural fill.

We recommend that existing pavements and hardscaping be completely removed from areas that will be developed. During removal of these features, disturbance of surficial soils may occur, especially if left exposed to wet conditions. Disturbed soils may require additional remediation during construction and grading. If utilities exist beneath planned structures, they should be removed and backfilled or abandoned in place.

At this time, we recommend that foundations, basement walls and basement floor slabs associated with demolished structures be completely removed from within the footprint of the proposed structure. Outside of the proposed building footprint, it may be acceptable to leave some existing basement slabs and foundation elements in place provided these features are located on the order of 4 feet below proposed finished grade. If basement slabs are left in place, the slab should be broken into pieces, punched with holes or have cores drilled through it to prevent water from pooling on top of the slab. Ultimately, we recommend that leaving existing structural elements in place below new site features be considered on a case-by-case basis. We can help with this review if it is determined that structures are expected to remain in place.

We also discuss the use of recycled fill materials further in this report. It may be possible to use some of the demolished material from the structure as fill.

4.3.2. Erosion and Sedimentation Control

Erosion and sedimentation rates and quantities 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 exposed soils;
- 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. Provisions for modifications to the erosion control system based on monitoring observations should be included in the Erosion and Sedimentation Control Plan.

4.3.3. Temporary Excavation

Excavations deeper than 4 feet must 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.

In general, temporary cut slopes at this site should be inclined no steeper than about 1½H to 1V (horizontal to 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. Temporary covering with heavy plastic sheeting should be used to protect slopes during periods of wet weather. Steeper slopes, up to about 1H to 1V can be considered within intact glacial till deposits. If 1H to 1V slopes will be excavated, we should be allowed to observe the stability of the cut and confirm that soil conditions are appropriate for the slope inclination.

4.3.4. Permanent Slopes

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 about 5H:1V should be benched into the slope face. The configuration of benches depends on the equipment being used. Bench excavations should be level and extend into the slope face.

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.

4.3.5. Groundwater Handling Considerations

Based on our understanding of the proposed site improvements, we do not anticipate that the regional groundwater table will be encountered in excavations at the site.

We encountered what we interpret to be perched groundwater around 3 feet bgs during excavation of TP-3. Perched groundwater was not observed in other explorations at the site, and we expect that the perched groundwater observed in TP-3 is likely isolated to the immediate area around the test pit. Regardless, we recommend that the contractor performing the work be prepared to encounter perched groundwater seepage in excavations at the site. The interface between the fill material and native soils and contacts between relatively more permeable and relatively less permeable materials are likely locations for accumulation of perched groundwater. Groundwater seepage handling needs will typically be lower during the late summer and early fall months. We anticipate that shallow perched groundwater, if encountered, can 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.

4.3.6. Surface Drainage

Surface water from roofs, pavements 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 buildings, erosion sensitive areas and from behind retaining structures. Roof and catchment drains should not be connected to wall or foundation drains.

4.3.7. Subgrade Preparation

Subgrades that will support slab-on-grade floors, pavements, and other site features bearing on final grade should be thoroughly compacted to a uniformly firm and unyielding condition on completion of stripping/excavation and before placing structural fill. We recommend that subgrades for structures, pavements and other bearing surfaces be evaluated, as appropriate, to identify areas of yielding or soft soil. Probing with a steel probe rod or proof-rolling with a heavy piece of wheeled construction equipment are appropriate methods of evaluation.

If soft or otherwise unsuitable subgrade areas are revealed during evaluation that cannot be compacted to a stable and uniformly firm condition, we recommend that: (1) the unsuitable soils be scarified (e.g., with a ripper or farmer's disc), aerated and recompacted, if practical; or (2) the unsuitable soils be removed and replaced with compacted structural fill, as needed.

4.3.8. 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. The soils encountered in our explorations contain a significant amount of fines. 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 and controlling surface water with ditches, sumps with pumps and by grading. The site soils should not be left uncompacted and exposed to moisture. Sealing the exposed 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.
- 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. If water pools in the base of the excavation, it should be removed before placing structural fill or reinforcing steel.
- If footing excavations are exposed to extended wet weather conditions, a lean concrete mat or a layer of clean crushed rock can be considered for foundation bearing surface protection.

4.4. Fill Materials

4.4.1. Structural Fill

The workability of material for use as structural fill will depend on the gradation and moisture content of the soil. We recommend that washed crushed rock or select granular fill, as described below, be used for structural fill during the rainy season. If prolonged dry weather prevails during the earthwork phase of construction, materials with a somewhat higher fines content may be acceptable. Weather, material use, schedule, duration exposed, and site conditions should be considered when determining the type of import fill materials purchased and brought to the site for use as structural fill.

Material used for structural fill should be free of debris, organic contaminants and rock fragments larger than 6 inches. For most applications, we recommend that structural fill 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.

4.4.2. Select Granular Fill/Wet Weather Fill

Select granular fill should 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 ¾-inch fraction. Organic matter, debris or other deleterious material should not be present. In our opinion, material with gradation characteristics similar to WSDOT Specification 9-03.9 (Aggregates for Ballast and Crushed Surfacing), "Gravel Backfill for Walls" as described in Section 9-03.12(2) of the WSDOT Standard Specifications, or 9-03.14 (Borrow) is suitable for use as select granular fill, provided that the fines content is less than 5 percent (based on the minus ¾-inch fraction) and the maximum particle size is 6 inches.

4.4.3. Pipe Bedding

Trench backfill for the bedding and pipe zone should consist of well-graded granular material similar to "gravel backfill for pipe zone bedding" described in Section 9-03.12(3) of the WSDOT Standard Specifications. The material must be free of roots, debris, organic matter and other deleterious material. Other materials may be appropriate depending on manufacturer specifications and/or local jurisdiction requirements.

4.4.4. Trench Backfill

Trench backfill must be free of debris, organic material and rock fragments larger than 6 inches. We recommend that import trench backfill material consist of material similar to "Select Borrow" or "Gravel Borrow" as described in Section 9-03.14 of the WSDOT Standard Specifications. Where water is present, alternative materials may need to be considered.

4.4.5. Gravel Backfill For Walls

Backfill material used within 5 feet behind retaining walls should consist of free-draining material similar to "Gravel Backfill for Walls" as described in Section 9-03.12(2) of the WSDOT Standard Specifications.

4.4.6. Capillary Break Material

Structural fill placed as capillary break material below on-grade floor slabs should consist of ¾-inch coarse aggregate with negligible sand or silt as described in Section 9-03.1(4)C Grading No. 67 of the WSDOT Standard Specifications. WSDOT Specification 9-03.9 (Aggregates for Ballast and Crushed Surfacing, Crushed Surfacing Base Course [CSBC]) may also be considered.

4.4.7. Crushed Surfacing for Pavements and Sidewalks

Structural fill placed as crushed surfacing base course (CSBC) below pavements and sidewalks should meet the requirements for Crushed Surfacing Base Course, Section 9-03.9(3) of the WSDOT Standard Specifications.

4.4.8. Recycled Materials

Recycled asphalt and concrete can be considered for use as structural fill provided that material meets the gradation requirements for its intended use. Recycled materials should not be used as capillary break material, in drainage applications, within infiltration facilities, or in areas where groundwater flow may occur. Crushed asphalt has the potential to creep under large and sustained loads. Accordingly, we recommend that crushed/recycled asphalt not be used under foundation elements or below slab on grade. Crushed asphalt can be considered for use below pavements.

4.4.9. On-Site Soil

Based on our subsurface explorations and experience, it is our opinion that existing site soils including the existing fill may be considered for use as structural fill and trench backfill, provided they can be adequately moisture conditioned, placed and compacted as recommended and do not contain organic or other deleterious material. The fill and native glacial till soils at the site are primarily comprised of silty sand and are extremely moisture sensitive. These soils will be very difficult or impossible to properly compact when wet and we do not recommend they be reused as structural fill during periods of wet weather. In addition, it is possible that existing soils will be generated at moisture contents above what is optimum for compaction. In this case, the soils would need to be moisture conditioned prior to re-use. Space for drying out material during dryer weather or covering on-site materials generated during wet weather should be considered. During wetter or even slightly colder times of year, such as when temperatures get below about 60 degrees, accommodations to cover stockpiled material generated on site that will be used as structural fill should be planned.

If earthwork occurs during a typical wet season, or if the soils are persistently wet and cannot be dried back due to prevailing wet weather conditions, we recommend the use of imported select granular fill, as described above.

4.4.10. Fill Placement and Compaction

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. 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 by a representative of GeoEngineers to check that adequate compaction is being achieved.

4.4.10.1. Area Fills and Pavement Bases

Fill placed to raise site grades and materials under pavements and structural areas should be placed on subgrades prepared as previously recommended. Fill material placed below structures and footings should be compacted to at least 95 percent of the theoretical maximum dry density (MDD) per ASTM International (ASTM) D 1557. Fill material placed shallower than 2 feet below pavement sections should be compacted to at least 95 percent of the MDD. Fill placed deeper than 2 feet below pavement sections should be compacted to at least 90 percent of the MDD. Fill material placed in landscaping areas should be compacted to a firm condition that will support construction equipment, as necessary, typically around 85 to 90 percent of the MDD.

4.4.10.2. Backfill Behind Below-Grade Structures

Backfill behind retaining walls or below-grade structures should be compacted to between 90 and 92 percent of the MDD. Overcompaction of fill placed directly behind below-grade structures should be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet behind below-grade structures.

4.4.10.3. 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 above the pipe. In addition, rock fragments greater than about 1 inch in maximum dimension should be excluded from this lift.

Trench backfill material placed below structures and footings should be compacted to at least 95 percent of the MDD. In paved 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 non-structural areas, trench backfill should be compacted to a firm condition that will support construction equipment, as necessary.

4.5. Foundation Support

4.5.1. General

In our opinion the proposed structure can be adequately supported on shallow foundations bearing on either existing site soils compacted to a firm and unyielding condition or on structural fill extending to proof compacted existing site soils. The existing fill and weathered glacial till soils in our opinion can remain in place below footings provided they can be compacted in-place and prepared as recommended in the sections below. As discussed previously, all structural fill placed below footings must be compacted to 95 percent of the MDD.

Exterior footings should be established at least 18 inches below the lowest adjacent grade. 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.

The sections below provide our recommendations for foundation bearing surface preparation and foundation design parameters.

4.5.2. Foundation Bearing Surface Preparation and Protection

Shallow footing excavations should be performed using a smooth-edged bucket to limit bearing disturbance. We recommend that the base of all footing excavations be proof compacted to a uniformly firm and unyielding condition prior to placement of structural fill, formwork or rebar. Loose or disturbed materials present at the base of footing excavations should be removed or compacted. Fill within the upper approximately 2 to 3 feet of existing site grades was observed to be loose to medium dense. These soils will need to either be compacted in place or removed from below footings prior to placement of structural fill or construction of foundation elements. If soft or otherwise unsuitable areas are observed at the base of the overexcavation that cannot be compacted to a stable and uniformly firm condition the following options may be considered: (1) the exposed soils may be moisture conditioned and recompacted; or (2) the unsuitable soils may be overexcavated and replaced with compacted structural fill, as needed.

We did not explore subsurface conditions below or directly adjacent to the existing building. In addition, there was no literature that we could find on how the building subgrade was prepared or how it was backfilled. Accordingly, there is some uncertainty of the condition of the soils present in these areas. To account for this uncertainty, we recommend that the project schedule and budget include a contingency to complete up to 2 feet of overexcavation and replacement of unsuitable bearing soils for 25 percent of the proposed foundations that will be located within the footprint of the existing structure.

Foundation bearing surfaces should not be exposed to standing water. If water is present in the excavation, it must be removed before placing structural fill, formwork and reinforcing steel. Protection of exposed soil should be considered during the wetter times of the year. The amount of protection will depend, in part, on prevailing weather, soil type exposed, and duration exposed. Typically, a 3- to 4-inch lean concrete mat or a 6 to 8 inch crushed rock section is suitable for foundation bearing surface protection.

Prepared foundation bearing surfaces should be observed and evaluated by a member of our firm prior to placement of structural fill, formwork or steel reinforcement. Our representative will confirm that the bearing surfaces have been prepared in accordance with our recommendations and is suitable for supporting the design footing load and provide recommendations for remediation, if necessary.

4.5.3. Allowable Soil Bearing Resistance

Shallow foundations bearing on subgrades prepared as recommended may be designed using an allowable soil bearing pressure of 4,000 pounds per square foot (psf). This bearing pressure applies 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. Higher bearing pressures may be applicable on a case-by-case basis provided footing elevations and loading conditions are known. We can work with the design team to evaluate increased bearing pressures, if needed.

4.5.4. Foundation Settlement

Disturbed soil must be removed from the base of footing excavations and the bearing surface should be prepared as recommended. Provided these measures are taken, we estimate the total static settlement of shallow foundations will be on the order of 1 inch or less for the bearing pressures presented above. Differential settlements could be on the order of ¼ to ½ inch between comparably loaded isolated column footings or along 50 feet of continuous footing. Settlement is expected to occur rapidly as loads are applied. Settlements could be greater than estimated if loose or disturbed soil is present beneath footings.

4.5.5. 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. The allowable frictional resistance on the base of the footing may be computed using a coefficient of friction of 0.4 applied to the vertical dead-load forces. The allowable passive resistance on the face of the footing or other embedded foundation elements may be computed using an equivalent fluid density of 300 pounds per cubic foot (pcf) for undisturbed 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. These values include a factor of safety of about 1.5.

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 pressure unless the area adjacent to the foundation is covered with pavement or a slab-on-grade.

4.5.6. Slab-on-Grade Floors

We expect that slab subgrade soils will be comprised of structural fill, existing fill material or glacial till, and all are satisfactory provided the subgrade can be prepared as recommended. The exposed subgrade should be evaluated after site grading is complete. Disturbed areas should be compacted, if possible, or removed and replaced with compacted structural fill. In all cases, the exposed soil should be firm and unyielding. It may be appropriate to compact the exposed subgrade with a smooth drum vibratory roller to a dense and unyielding condition.

We recommend slab-on-grade floors be underlain by a minimum 6-inch-thick capillary break consisting of clean sand and gravel, crushed rock or washed rock with less than 3 percent fines. Material similar to WSDOT Standard Specification 9-03.1(4)C Grading No. 67 is a suitable material for use as capillary break.

The capillary break may be covered with a heavy plastic sheet, such as 10-mil plastic sheeting, to act as a vapor barrier. The need for and specification of a vapor barrier requires consideration of the performance expectations of the occupied space, the type of flooring planned and other factors, and is typically completed by other members of the project team. It may also be prudent to apply a sealer to the slab to further retard the migration of moisture through the floor. The contractor should be made responsible for maintaining the integrity of the vapor retarder during construction.

Provided that loose soil is removed and the subgrade is prepared as recommended, we recommend slabs-on-grade be designed using a modulus of subgrade reaction of 300 pounds per cubic inch (pci). We estimate that settlement for slabs-on-grade constructed as recommended will be less than ¾ inch for a floor load of 500 psf.

4.5.7. Footing and Below-Slab Drainage

In our opinion perimeter footing drains are not necessary to maintain foundation support; however, we recommend that they be included to promote dry conditions below and around the building to intercept seepage during the winter and to reduce migration of water below the slab. Perimeter drains should be provided with cleanouts and should consist of at least 4-inch-diameter perforated pipe surrounded on all sides by 6 inches of drain material enclosed in a non-woven geotextile fabric for underground drainage to prevent fine soil from migrating into the drain material. We recommend that the drainpipe consist of either heavy-wall solid pipe or rigid corrugated smooth interior polyethylene pipe. We do not recommend using flexible tubing for footing drainpipes. The drain material should consist of pea gravel or material similar to

"Gravel Backfill for Drains" per WSDOT Standard Specifications Section 9-03.12(4). The perimeter drains should be sloped to drain by gravity, if practical, to a suitable discharge point. Water collected in roof downspout lines must not be routed to the perimeter footing drains. Provided perimeter footing drains are installed as recommended, in our opinion a below-slab drainage system is not necessary.

4.6. Earth Pressures for Conventional Below-Grade Structures

4.6.1. Design Parameters

We recommend the following lateral earth pressures be used for design of conventional retaining walls and below-grade structures. Our design pressures assume that the ground surface around the retaining structures will be level or near level. If drained design parameters are used, drainage systems must be included in the design in accordance with the recommendations presented in section "4.6.2 Drainage" below.

- Active soil pressure may be estimated using an equivalent fluid density of 35 pcf for the drained condition.
- Active soil pressure may be estimated using an equivalent fluid density of 85 pcf for the undrained condition; this value includes hydrostatic pressures.
- At-rest soil pressure may be estimated using an equivalent fluid density of 55 pcf for the drained condition.
- At-rest soil pressure may be estimated using an equivalent fluid density of 95 pcf for the undrained condition; this value includes hydrostatic pressures.
- For seismic considerations, a uniform lateral pressure of 10H psf (where H is the height of the retaining structure or the depth of a structure below ground surface) should be added to the lateral earth pressure.
- An additional 2 feet of fill representing a typical traffic surcharge of 250 psf should be included if vehicles are allowed to operate within ½ the height of the retaining walls. Other surcharge loads should be considered on a case-by-case basis. We can provide additional surcharge loads for specific loading conditions once known.

The active soil pressure condition assumes the wall is free to move laterally 0.001 H, where H is the wall height). The at-rest condition is applicable where walls are restrained from movement. The above-recommended lateral soil pressures do not include other surcharge loads than described or the effects of sloping backfill surfaces. We should be consulted if other surcharge loads are anticipated or if sloping backfill conditions are planned, this may change the lateral pressure values provided.

Over-compaction of fill placed directly behind retaining walls or below-grade structures must be avoided. We recommend use of hand-operated compaction equipment and maximum 6-inch loose lift thickness when compacting fill within about 5 feet of retaining walls and below-grade structures.

Retaining wall foundation bearing surfaces should be prepared following Section 4.5 "Foundation Support" of this report. Provided bearing surfaces are prepared as recommended retaining wall foundations may be designed using the allowable soil bearing values and lateral resistance values presented above. We estimate settlement of retaining structures will be similar to the values previously presented for building foundations.

4.6.2. Drainage

If retaining walls or below-grade structures are designed using drained parameters, a drainage system behind the structure must be constructed to collect water and prevent the buildup of hydrostatic pressure against the structure. We recommend the drainage system include a zone of free-draining backfill a minimum of 18 inches in width against the back of the wall. The drainage material should consist of coarse sand and gravel containing less that 5 percent fines based on the fraction of material passing the ¾-inch sieve. Material similar to “Gravel Backfill for Drains” per WSDOT Standard Specifications Section 9-03.12(4) is also suitable. Waffle board-type drainage mats may be considered instead of gravel provided they are protected from accumulating silt and discharge appropriately.

A perforated, rigid, smooth-walled drainpipe with a minimum diameter of 4 inches should be placed along the base of the structure within the free-draining backfill and extend for the entire wall length. The drain pipe should be metal or rigid PVC pipe and be sloped to drain by gravity. Discharge should be routed to appropriate discharge areas and designed to reduce erosion potential. Cleanouts should be provided to allow routine maintenance. We recommend roof downspouts or other types of drainage systems not be connected to retaining wall drain systems.

4.7. Pavement Design

4.7.1. General

Paved areas are expected to include parking areas, driveways and sidewalk areas. Based on our experience, we provide recommended conventional asphalt concrete pavement (ACP) and Portland cement concrete (PCC) sections below. These pavement sections may not be adequate for heavy construction traffic loads such as those imposed by concrete transit mixers, dump trucks or cranes. Additional pavement thickness may be necessary to prevent pavement damage during construction if other loading types are planned. The recommended sections assume that final improvements surrounding the pavements will be designed and constructed such that stormwater or excess irrigation water from landscape areas does not accumulate below the pavement section or pond on pavement surfaces.

Existing pavements, hardscaping or other structural elements should be removed prior to placement of new pavement sections. Pavement subgrade should be prepared as recommended in Section 4.3.7 “Subgrade Preparation” of this report. Crushed surfacing base course and subbase should be moisture conditioned to near optimum moisture content and compacted to at least 95 percent of the theoretical MDD per ASTM D 1557.

CSBC and crushed surfacing top course (CSTC) should conform to applicable sections of 4-04 and 9-03.9(3) of the WSDOT Standard Specifications. The top approximate 2 inches of the CSBC sections provided may consist of CSTC as a leveling layer and for more precise grade development.

Subbase should conform to applicable sections of 4-02 “Gravel Base” and 9-03.10 “Aggregate Gravel for Base” of the WSDOT Standard Specifications.

Hot mix asphalt should conform to applicable sections of 5-04, 9-02 and 9-03 of the WSDOT Standard Specifications.

PCC mix design should conform with Section 5-05.3(1) of the WSDOT Standard Specifications. Aggregates for PCC should conform to applicable sections of 9-03.1 of the WSDOT Standard Specifications.

Some areas of pavement may exhibit settlement and subsequent cracking over time. Cracks in the pavement will allow water to infiltrate to the underlying base course, which could increase the amount of pavement damage caused by traffic loads. To prolong the effective life of the pavement, cracks should be sealed as soon as possible.

4.7.2. Asphalt Concrete Pavement Sections

Recommended minimum ACP sections are provided below.

4.7.2.1. Standard-Duty ACP – Automobile Driveways and Parking Areas

- 2 inches of hot mix asphalt, class ½ inch, PG 58-22
- 4 inches of compacted CSBC
- 6 inches of subbase consisting of imported select granular structural fill to provide uniform grading and pavement support, to maintain drainage, and to provide separation from fine-grained subgrade soil
- Native soil, existing fill or structural fill prepared as recommended in Section 4.3.7 "Subgrade Preparation" of this report

4.7.2.2. Heavy-Duty ACP – Areas Subject to Heavy-Duty Traffic

- 3 inches of hot mix asphalt, class ½ inch, PG 58-22
- 6 inches of compacted CSBC
- 6 inches of subbase consisting of imported select granular structural fill to provide a uniform grading surface and pavement support, to maintain drainage, and to provide separation from fine-grained subgrade soil
- Native soil, existing fill or structural fill prepared as recommended in Section 4.3.7 "Subgrade Preparation" of this report

4.7.2.3. Off-site Streets – City of Tacoma Minimum ACP Section for Nonclassified Arterials

- 5 inches of hot mix asphalt, class ½ inch, PG 58-22
- 2 inches of compacted CSTC
- 8 inches of compacted CSBC
- Native soil, existing fill or structural fill prepared as recommended in Section 4.3.7 "Subgrade Preparation" of this report

4.7.3. Portland Cement Concrete Pavement Design

Recommended minimum PCC pavement sections are provided below. The provided sidewalk PCC pavement section meets the minimum sidewalk thickness requirements of the City of Tacoma. PCC pavements used for streets within the City of Tacoma right-of way require an approved supporting design. If PCC will be used within off-site roadways we should be notified and can develop a design section for the roadway. In our opinion steel reinforcement does not need to be included in PCC pavements that will be primarily used in landscaping and pedestrian areas (areas not subjected to heavy vehicle traffic). Reinforcement could be considered to reduce the potential for cracking in areas where the concrete slabs have irregular shapes or where new slabs abut existing concrete slabs, and the joint layout between the slabs cannot be matched. If reinforcement is considered, we are available to discuss typical steel reinforcement volumes with the project structural engineer, who ultimately designs the location, size and layout of reinforcement.

4.7.3.1. Sidewalk PCC Pavement – Pedestrian Areas Not Subjected to Vehicle Loading

- 4 inches of PCC with a minimum 14-day flexural strength of 650 psi
- 2 inches of compacted CSBC
- Native subgrade or structural fill prepared in accordance with Section 4.3.7 "Subgrade Preparation" of this report

4.7.3.2. Standard PCC Pavement – Automobile Driveways and Parking Areas

- 6 inches of PCC with a minimum 14-day flexural strength of 650 psi
- 4 inches of compacted CSBC
- 4 inches of subbase consisting of select granular fill to provide a uniform grading surface and pavement support, to maintain drainage, and to provide separation from subgrade soils
- Native subgrade, existing fill or structural fill prepared in accordance with Section 4.3.7 "Subgrade Preparation" of this report

4.7.3.3. Heavy Duty PCC Pavement – Areas Subject to Heavy Truck Traffic

- 9 inches (minimum) of PCC with a minimum 14-day flexural strength of 650 psi
- 4 inches of compacted CSBC
- 4 inches of subbase consisting of select granular fill to provide a uniform grading surface and pavement support, to maintain drainage, and to provide separation from subgrade soils
- Native subgrade, existing fill or structural fill prepared in accordance with Section 4.3.7 "Subgrade Preparation" of this report.

4.8. Stormwater Infiltration

4.8.1. General

Stormwater facilities at the site will be designed in accordance with the 2021 City of Tacoma SWMM. We understand that a bioswale or rain garden is currently being considered in the northeast corner of the site. The fill and glacial till soils at the site have a low to very low infiltration potential due to the high percentage of fine silt and clay-sized particles and the highly over consolidated nature of the material. Stormwater infiltration is still, in our opinion, feasible, however facilities will likely need to be designed for very low infiltration rates. Additional field infiltration testing will be completed as part of a final design. The sections below provide an estimate of soil infiltration rate based on soil grain size and our experience.

4.8.2. Preliminary Infiltration Rate Estimate

To provide an initial and preliminary estimate of infiltration rates for the site soils, we used the Soil Grain Size Analysis Method presented in the SWMM. The Soil Grain Size Analysis Method is an empirical correlation between soil gradation and infiltration rate. This method typically does not account for other factors that influence in-situ infiltration rate such as relative density, degree of weathering, soil layering, and groundwater conditions. As such, our design values presented are preliminary and further study would be needed if a final design rate is required.

Based on our experience designing infiltration facilities in the area and the results of the Soil Grain Size Analysis Method, we recommend that infiltration facilities be evaluated assuming an infiltration rate of 0.1 inch per hour. This is a the "long-term" saturated infiltration rates, which includes the appropriate reduction factors recommended in the SWMM.

4.8.3. Recommendations for Additional Studies

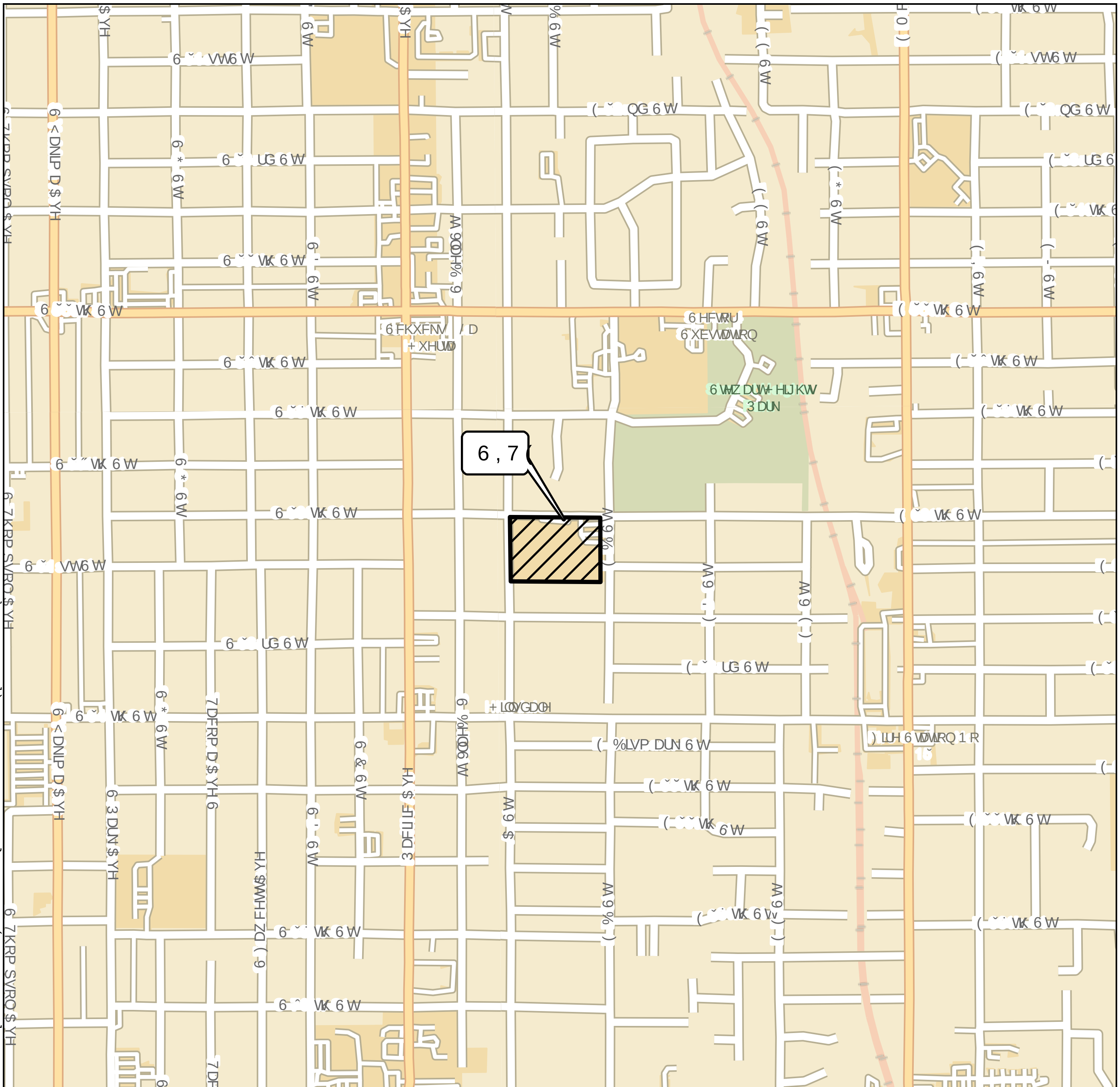
If design of infiltration facilities are included at this site, additional testing, analysis, and reporting will be required to establish the final design infiltration rate. The SWMM requires that for glacially consolidated soils, the long-term design infiltration rate be determined via a pilot infiltration test (PIT). Where infiltration facilities are considered, we recommend that at least one PIT should be performed at each proposed location. The location of the PIT should be near (ideally within) the footprint of the proposed infiltration facilities. We can assist with performing PITs, and associated analysis and reporting, if necessary.

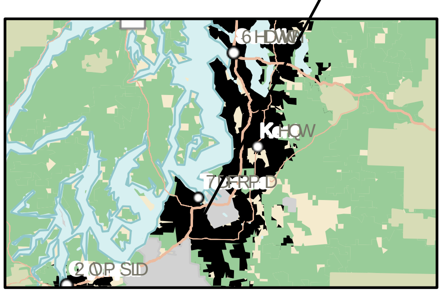
5.0 LIMITATIONS

We have prepared this report for BLRB Architects, for Fawcett Elementary School. BLRB Architects may distribute copies of this report to owner and owner's authorized agents and regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices for geotechnical engineering in this area at the time this report was prepared. The conclusions, recommendations, and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to the services or this report.

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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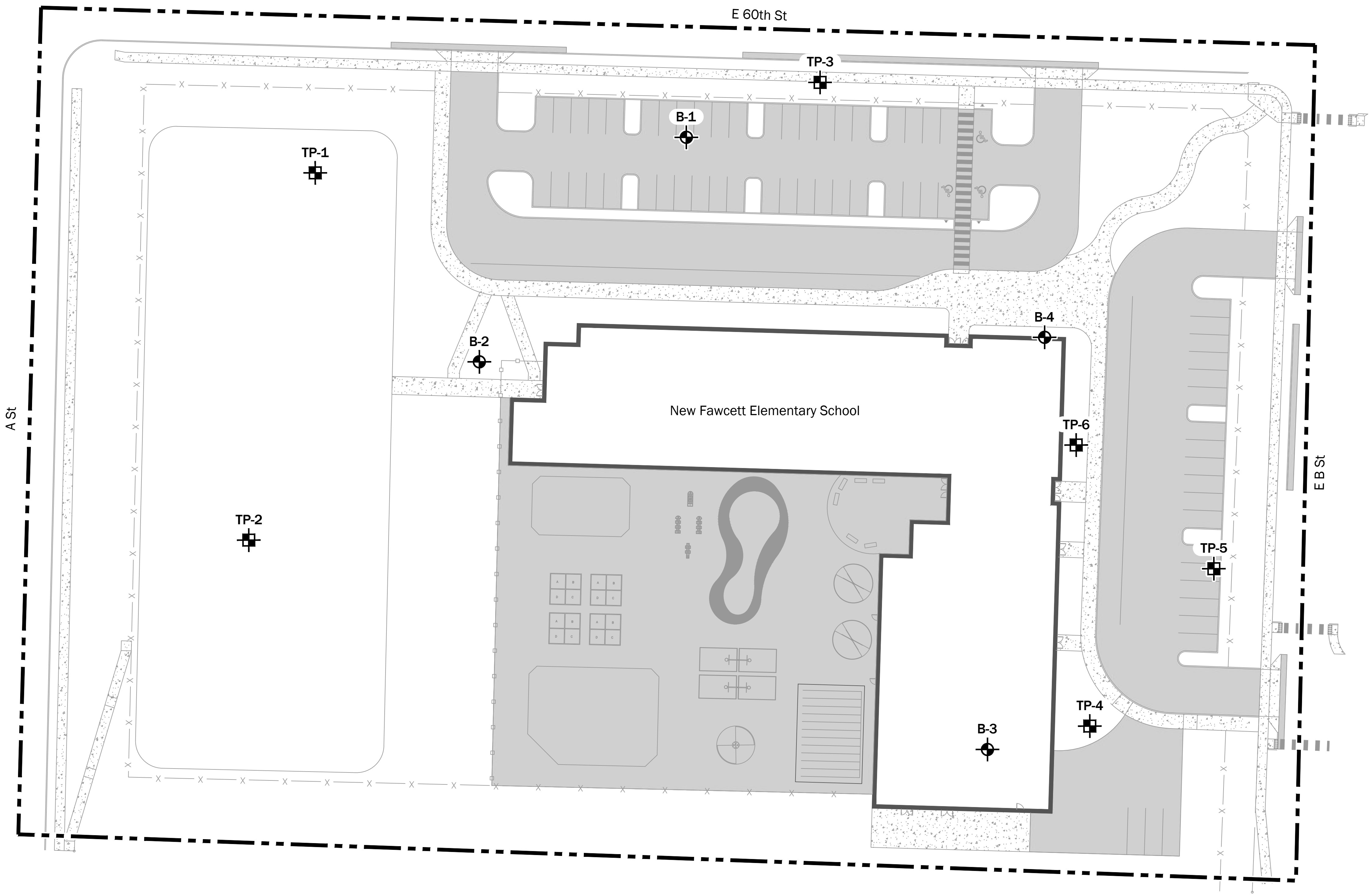

Legend

Site Boundary

B-1 Boring by GeoEngineers, Inc., 2021

TP-1 Test Pit by GeoEngineers, Inc., 2021

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: Aerial from Google Earth Pro dated 08/14/2020.
Background from BLRB Architects, P.S. dated 07/19/2021.

Projection: Washington State Plane, South Zone, NAD83, US Foot

Site Plan

Fawcett Elementary School
Tacoma, Washington

GeoEngineers

Figure 2

P:\0\0522034\CAD\00\052203400_F02_Site Plan.dwg TAB:F02 - Site Plan Date Exported: 07/22/21 - 8:27 by gregister

APPENDIX A
Subsurface Explorations and Laboratory Testing

APPENDIX A
SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

Subsurface Explorations

General

Soil conditions at the project site were explored by advancing four borings on May 28, 2021 and excavating six test pits on June 23, 2021. The approximate locations of our explorations and shown on Figure 2. The explorations were located in the field using a GPS device. The locations of the explorations shown on the Site Plan (Figure 2) should be considered approximate.

Soil Borings

Soil borings were advanced to between 25 feet and 25.5 feet below ground surface (bgs) using a track-mounted hollow-stem auger drill rig equipment and operators under subcontract to GeoEngineers. The explorations were continuously monitored by a representative from our firm who examined and classified the soil encountered, obtained representative soil samples, and maintained a detailed log of the explorations. Soil encountered in the borings was classified in general accordance with ASTM International (ASTM) D 2488 and the classification chart listed in Key to Exploration Logs, Figure A-1. Logs of the borings are presented in Figures A-2 through A-5. The logs are based on interpretation of the field and laboratory data and indicate the depth at which we interpret subsurface materials or their characteristics to change, although these changes might actually be gradual.

Soil samples were obtained from the borings at approximate 2.5- to 5-foot-depth intervals using either a 2-inch, outside-diameter, standard split-spoon sampler (Standard Penetration Test [SPT]) in general accordance with ASTM D 1586 or using a larger 2.4-inch diameter sampler. The samplers were driven into the soil using a 140-pound automatic hammer, free-falling 30 inches. The number of blows required to drive the samplers each of three, 6-inch increments of penetration were recorded in the field. The sum of the blow counts for the final 12 inches of penetration, unless otherwise noted, is reported on the boring logs.

Test Pits

Test pit explorations were excavated using a rubber-tired backhoe at the approximate locations shown on the Site Plan (Figure 2). The excavations were advanced to depths between 5 and 8.5 feet. The explorations were continuously monitored by an engineer from our firm who examined and classified the soil encountered, obtained representative soil samples, and maintained a detailed log of the explorations. Logs of the test pits are presented in Figures A-6 through A-11. Soil generated during excavation was used to backfill the explorations.

Laboratory Testing

General

Soil samples obtained from the borings and test pits were returned to our laboratory for further examination and testing. The testing completed on each sample is presented in the corresponding boring log or test pit log. A description of the laboratory testing completed on this project is provided below.

Grain-Size Analysis

Grain-size analyses were performed on selected soil samples in general accordance with ASTM Test Method D 6913. This test provides a quantitative determination of the distribution of particle sizes in soils. Figures A-12 and A-13 present the results of the grain-size analyses.

Percent Passing the U.S. No. 200 Sieve

Selected samples were “washed” through the U.S. No. 200 sieve to estimate the relative percentages of coarse- and fine-grained particles in the soil. The percent passing value represents the percentage by weight of the sample finer than the U.S. No. 200 sieve (fines). The tests were conducted in general accordance with ASTM D 1140. The test results are presented on the exploration logs in Appendix A at the respective sample depths.

Moisture Content

The moisture content of selected samples was determined in general accordance with ASTM D 2216. The test results are used to aid in determining the moisture content of the soil, soil classification and correlation with other pertinent engineering soil properties. The test results are presented on the exploration logs in Appendix A at the respective sample depths.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	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
	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.

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

"WOH" indicates sampler pushed using the weight of the hammer.

ADDITIONAL MATERIAL SYMBOLS

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

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

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
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

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

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Figure A-1

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft) 25	Logged By SLG Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 390 Vertical Datum NAVD88		Hammer Data	Auto hammer	Drilling Equipment	Diedrich D50
Easting (X) 1160720 Northing (Y) 687540		System Datum	WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0							AC	2 inches asphalt concrete			
								ML	Brown sandy silt with gravel (stiff to very stiff, moist) (fill)			
			12	18		1 / %F				18	56	
385	5		12	50/6"		2		SM	Brown silty fine to coarse sand with gravel (very dense, moist) (glacial till)			
			10	50/4"		3 / %F				8	36	
380	10		3	50/6"		4		SM	Brown silty fine to medium sand with occasional gravel (very dense, moist)			
375	15		3	50/6"		5		GP-GM	Brown fine to coarse gravel with silt and sand (very dense, moist)			
370	20			50/½"		6						No recovery
365	25			50/1"		7						No recovery

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Boring B-1

GeoEngineers

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft) 25.25	Logged By SLG / Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) 390 Vertical Datum NAVD88	Hammer Data: Auto hammer	Drilling Equipment: Diedrich D50
Easting (X) 1160610 Northing (Y) 687430	System Datum: WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
390	0							AC	5 inches asphalt concrete			
								SM	Brown silty fine to coarse sand with gravel (loose, moist) (fill)			
			6	6		1 / %F				12	37	
385	5		6	50/4"		2		SM	Brown silty fine to medium sand with occasional gravel (very dense, moist) (glacial till)			
			10	50/6"		3						
									Grades to with gravel			
380	10		6	50/6"		4						
375	15		2	50/3"		5						
								SP-SM	Brown fine to medium sand with silt and gravel (very dense, moist)			
370	20		6	50/6"		6						
365	25		2	50/2"		7						

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Boring B-2

GEOENGINEERS

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-3
Sheet 1 of 1

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft) 25.5	Logged By SLG / Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow-stem Auger

Surface Elevation (ft) 390 / Vertical Datum NAVD88	Hammer Data: Auto hammer	Drilling Equipment: Diedrich D50
Easting (X) 1160870 / Northing (Y) 687230	System Datum: WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
390	0							SOD	6 inches sod			
								SM	Brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
			6	50/6"		1		SM	Brown silty fine to medium sand with gravel (very dense, moist) (glacial till)			
385	5		6	50/5"		2 %F				7	35	
			5	50/5"		3						
380	10		3	50/5"		4						Rock in shoe
375	15		3	50/3"		5		SM	Gray silty fine to medium sand with gravel (very dense, dry)			Very difficult drilling from 15 fee to 25 feet bgs
370	20		3	50/5"		6						
365	25		4	50/4"		7						

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Boring B-3

GeoEngineers

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Drilled	Start 5/26/2021	End 5/26/2021	Total Depth (ft) 25.5	Logged By SLG / Checked By BEL	Driller Holocene Drilling, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) 390 / Vertical Datum NAVD88			Hammer Data: Auto hammer		Drilling Equipment: Diedrich D50
Easting (X) 1160900 / Northing (Y) 687440			System Datum: WA State Plane South NAD83 (feet)		Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
390	0						AC	2 inches asphalt concrete			
							SM	Brown silty fine to medium sand with occasional gravel (very dense, moist) (fill)			
			6	57		1					
385	5		12	48		2 %F	SM	Brown silty fine to coarse sand with gravel (very dense, moist) (glacial till)	10	41	
			3	50/5"		3					
380	10		5	50/5"		4	SM	Gray silty fine to medium sand with trace gravel (very dense, moist)			
375	15		3	50/3"		5					
370	20		4	50/4"		6					
365	25		4	50/4"		7					

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Boring B-4

GeoEngineers

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-5
Sheet 1 of 1

Date Excavated	6/23/2021	Total Depth (ft)	6	Logged By	OA	Excavator	Kelly's Excavating	Groundwater not observed
				Checked By	BEL	Equipment	WB140	Caving not observed

Surface Elevation (ft)	390	Easting (X)	1160530	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	687520	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0			SOD	Approximately 4 inches sod			
389	1	▯	1 %F	SM	Orange and brown silty fine sand with gravel (medium dense, moist) (fill)	8	3	
388	2	▯	2	SM	Brown silty fine to medium sand with gravel and occasional cobbles (dense, moist) (weathered till)			Oxidation laminations (1 to 2 inches thick)
387, 386, 385, 384	3, 4, 5, 6			SM	Gray to brown silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			

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 ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-1

GEOENGINEERS

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-6
Sheet 1 of 1

Date Excavated 6/23/2021	Total Depth (ft) 7	Logged By OA Checked By BEL	Excavator Kelly's Excavating Equipment WB140		Groundwater not observed Caving not observed
Surface Elevation (ft) 390 Vertical Datum NAVD88		Easting (X) 1160490 Northing (Y) 687340		Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				SOD	Approximately 4 inches sod			
389	1	X	1		SM	Brown silty fine sand with occasional gravel and occasional debris (nails) (medium dense, moist) (fill)			
388	2				SM	Brown with oxidation staining silty fine sand with occasional gravel (medium dense, moist) (weathered till)			
387	3	X	2 SA				12	30	
386	4					Grades to dense and with gravel			
385	5				SM	Gray and brown silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			
384	6								
383	7								

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 ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-2

GeoEngineers

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-7
Sheet 1 of 1

Date Excavated	6/23/2021	Total Depth (ft)	8.5	Logged By	OA	Excavator	Kelly's Excavating	See "Remarks" section for groundwater observed
				Checked By	BEL	Equipment	WB140	Caving not observed

Surface Elevation (ft)	390	Easting (X)	1160790	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	687570	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
					SOD	Approximately 4 inches sod			
389	1		1		GM	Brown silty fine to gravel with sand (medium dense, moist) (fill)			
388	2		2		ML	Brown sandy silt with occasional orange staining (stiff, moist)			
387	3		3		SP-SM	Brown medium sand with occasional gravel and trace silt (medium dense, wet)			Moderate perched groundwater seepage observed at 3 feet bgs
386	4				SM	Brown silty fine to medium sand with gravel and occasional cobbles (dense, moist) (weathered till)			
385	5								
384	6								
383	7		4						
382	8				SM	Gray silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			

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 ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-3

GEOENGINEERS

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-8
Sheet 1 of 1

Date Excavated	6/23/2021	Total Depth (ft)	7	Logged By	OA	Excavator	Kelly's Excavating	Groundwater not observed
				Checked By	BEL	Equipment	WB140	Caving not observed

Surface Elevation (ft)	390	Easting (X)	1160920	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	687240	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	0				SOD	Approximately 6 inches sod			
	0.5				SM	Brown silty fine sand with occasional gravel (medium dense, moist) (fill)			
389	1								
388	2		1 %F				16	4	
	2.5				SM	Gray and orange silty fine to medium sand with gravel and occasional cobbles (dense, moist) (weathered till)			
387	3		2 SA				12	41	
386	4								
385	5				SM	Gray and brown silty fine to medium sand with gravel and occasional cobbles (very dense, moist) (glacial till)			
384	6								
383	7		3						

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 ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-4

GeoEngineers

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Date Excavated	6/23/2021	Total Depth (ft)	7	Logged By	OA	Excavator	Kelly's Excavating	Groundwater not observed
				Checked By	BEL	Equipment	WB140	Caving not observed

Surface Elevation (ft)	390	Easting (X)	1160990	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	687320	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
390	0				SOD	Approximately 6 inches sod			
389.5	0.5				SM	Orange and brown silty fine sand with occasional gravel (medium dense, moist) (fill)			
389	1	▯	1 %F				8	29	
388	2								
387	3					Grades to dense			
386	4				SM	Gray and orange silty fine to medium sand with gravel and occasional cobbles (dense, moist) (weathered till)			
385	5								
384.5	5.5	▯	2 SA				10	27	
384	6				SM	Gray and brown silty fine to coarse sand with gravel and occasional cobbles (very dense, moist) (glacial till)			
383	7								

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 ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-5

GEOENGINEERS

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Date Excavated	6/23/2021	Total Depth (ft)	5	Logged By OA Checked By BEL	Excavator Kelly's Excavating Equipment WB140	Groundwater not observed Caving not observed

Surface Elevation (ft)	390	Easting (X)	1160920	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	687390	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
390	0				SM	Orange and brown silty fine to coarse sand with gravel (medium dense, moist) (fill)			
	0.5				SM	Orange and brown silty fine to medium sand with gravel (medium dense, moist) (weathered till)			
389	1								
388	2				SM	Gray silty fine to coarse sand with gravel and occasional cobbles (very dense, dry) (glacial till)			
387	3								
386	4		1 SA				12	31	
385	5								

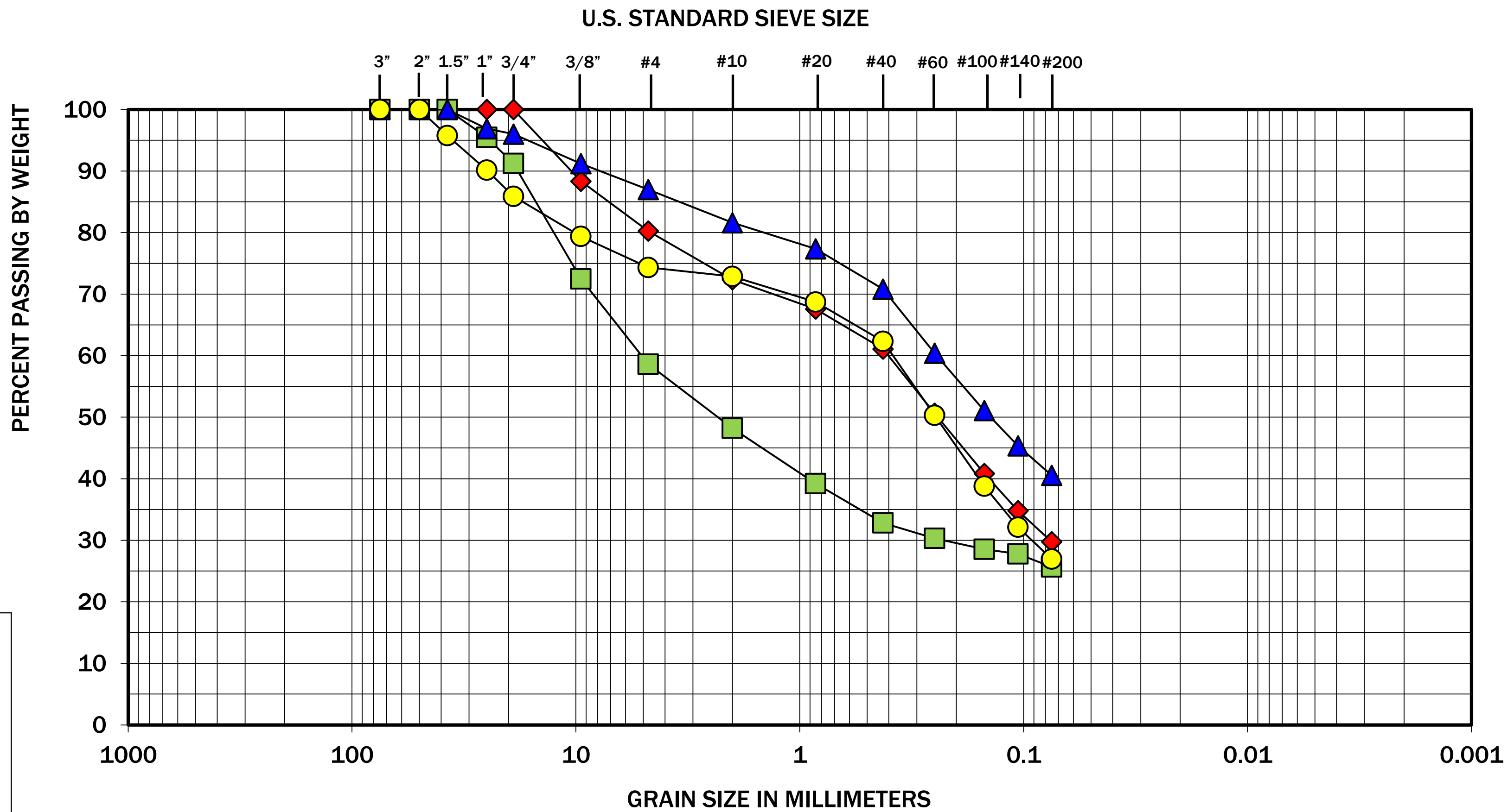
Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to ½ foot.
Coordinates Data Source: Horizontal approximated based on Google Earth. Vertical approximated based on Google Earth.

Log of Test Pit TP-6

GEOENGINEERS

Project: Fawcett Elementary School
Project Location: Tacoma, Washington
Project Number: 0522-034-00

Figure A-11
Sheet 1 of 1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Test Pit Number	Depth (feet)	Moisture (%)	Soil Description
◆	TP-2	2.5	12	Silty sand with gravel (SM)
■	TP-3	0.75	6	Silty sand with gravel (GM)
▲	TP-4	3	12	Silty sand (SM)
●	TP-5	5.5	10	Silty sand with gravel (SM)

AASHTO ACCREDITED

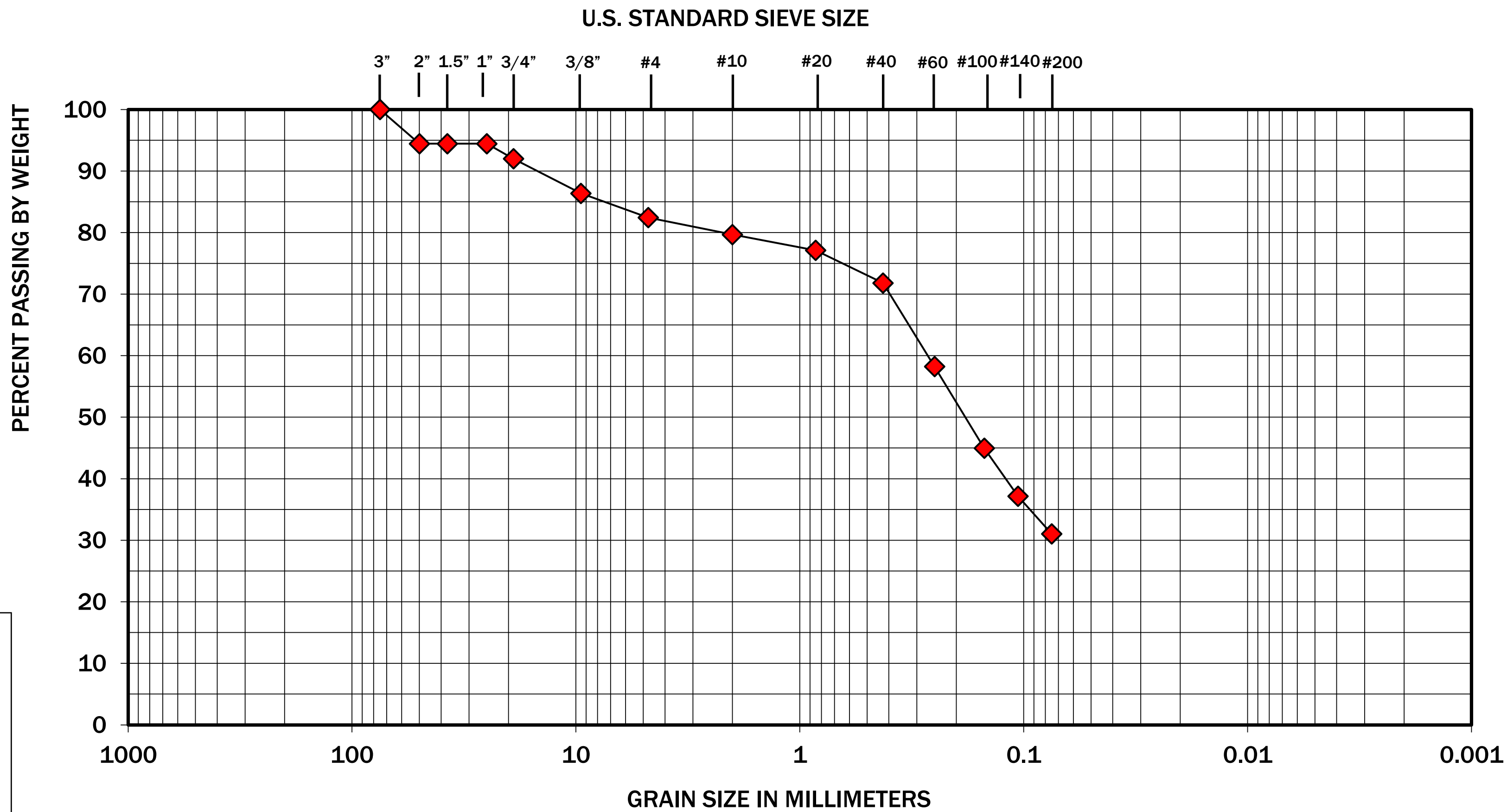
The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

GeoEngineers

Fawcett Elementary School
Tacoma, Washington

Sieve Analysis Results

Figure A-12



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Test Pit Number	Depth (feet)	Moisture (%)	Soil Description
◆	TP-6	4	12	Silty sand with gravel (SM)

The grain size analysis results were obtained in general accordance with ASTM C 136. GeoEngineers 17425 NE Union Hill Road Ste 250, Redmond, WA 98052

GEOENGINEERS

Fawcett Elementary School
Tacoma, Washington

Sieve Analysis Results

Figure A-13

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.

Read These Provisions Closely

It is important to recognize that the geoscience practices (geotechnical engineering, geology and environmental science) rely on professional judgment and opinion to a greater extent than other engineering and natural science disciplines, where more precise and/or readily observable data may exist. To help clients better understand how this difference pertains to our services, GeoEngineers includes the following explanatory "limitations" provisions in its reports. Please confer with GeoEngineers if you need to know more how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for BLRB Architects and for the Project(s) specifically identified in the report. The information contained herein is not applicable to other sites or projects.

GeoEngineers structures its services to meet the specific needs of its clients. No party other than the party to whom this report is addressed may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed scope of services for the Project, and its schedule and budget, our services have been executed in accordance with our Agreement with BLRB Architects dated May 11, 2021 and generally accepted geotechnical practices in this area at the time this report was prepared. We do not authorize, and will not be responsible for, the use of this report for any purposes or projects other than those identified in the report.

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

This report has been prepared for Fawcett Elementary School located in Tacoma 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, it is important not to 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;

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

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

If changes occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations. Based on that review, we can provide written modifications or confirmation, as appropriate.

Environmental Concerns are Not Covered

Unless environmental services were specifically included in our scope of services, this report does not provide any environmental findings, conclusions, or recommendations, including but not limited to, the likelihood of encountering underground storage tanks or regulated contaminants.

Information Provided by Others

GeoEngineers has relied upon certain data or information provided or compiled by others in the performance of our services. Although we use sources that we reasonably believe to be trustworthy, GeoEngineers cannot warrant or guarantee the accuracy or completeness of information provided or compiled by others.

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 man-made events such as construction on or adjacent to the site, new information or technology that becomes available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. If more than a few months have passed since issuance of our report or work product, or if any of the described events may have occurred, please contact GeoEngineers before applying this report for its intended purpose so that we may evaluate whether changed conditions affect the continued reliability or applicability of our conclusions and recommendations.

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 the specific subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions at other locations. Actual subsurface conditions may differ, sometimes significantly, from the opinions presented in this report. Our report, conclusions and interpretations are not a warranty of the actual subsurface conditions.

Geotechnical Engineering Report Recommendations are Not Final

We have developed the following recommendations based on data gathered from subsurface investigation(s). These investigations sample just a small percentage of a site to create a snapshot of the subsurface conditions elsewhere on the site. Such sampling on its own cannot provide a complete and accurate view of subsurface conditions for the entire site. Therefore, the recommendations included in this report are preliminary and should not be considered final. GeoEngineers' recommendations can be finalized only by observing actual subsurface conditions revealed during construction. GeoEngineers cannot assume responsibility or liability for the recommendations in this report if we do not perform construction observation.

We recommend that you allow sufficient monitoring, testing and consultation during construction by GeoEngineers to confirm that the conditions encountered are consistent with those indicated by the explorations, to provide recommendations for design changes if the conditions revealed during the work differ from those anticipated, and to evaluate whether earthwork activities are completed in accordance with our recommendations. Retaining GeoEngineers for construction observation for this project is the most effective means of managing the risks associated with unanticipated conditions. If another party performs field observation and confirms our expectations, the other party must take full responsibility for both the observations and recommendations. Please note, however, that another party would lack our project-specific knowledge and resources.

A Geotechnical Engineering or Geologic Report Could Be Subject to Misinterpretation

Misinterpretation of this report by members of the design team or by contractors can result in costly problems. GeoEngineers can help reduce the risks of misinterpretation by conferring with appropriate members of the design team after submitting the report, reviewing pertinent elements of the design team's plans and specifications, participating in pre-bid and preconstruction conferences, and 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. The logs included in a geotechnical engineering or geologic report should never be redrawn for inclusion in architectural or other design drawings. Photographic or electronic reproduction is acceptable, but separating logs from the report can create a risk of misinterpretation.

Give Contractors a Complete Report and Guidance

To help reduce the risk of problems associated with unanticipated subsurface conditions, GeoEngineers recommends giving contractors the complete geotechnical engineering or geologic report, including these "Report Limitations and Guidelines for Use." When providing the report, you should preface it with a clearly written letter of transmittal that:

- advises contractors that the report was not prepared for purposes of bid development and that its accuracy is limited; and
- encourages contractors to confer with GeoEngineers and/or to conduct additional study to obtain the specific types of information they need or prefer.

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 adjacent properties.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

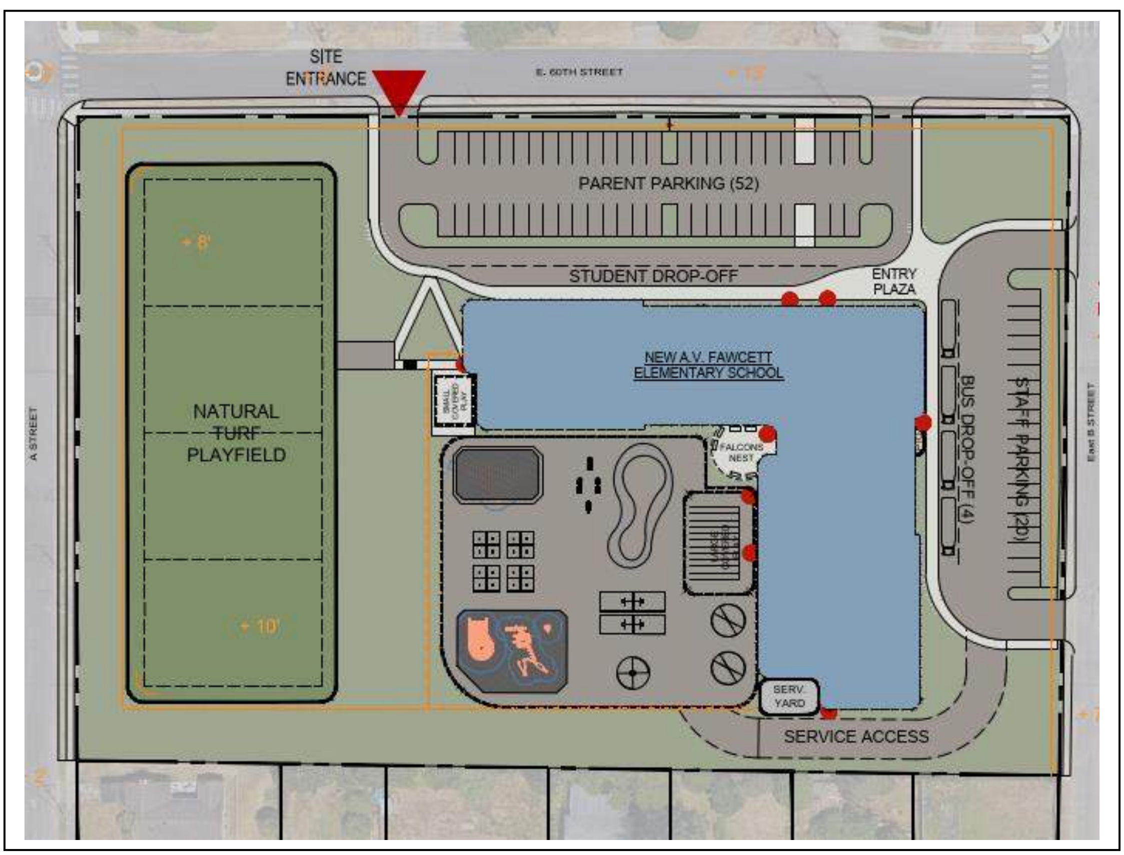
July 8, 2021

Robert Lindstrom, AIA, Principal
BLRB Architects
1250 Pacific Avenue #700
Tacoma, WA 98402

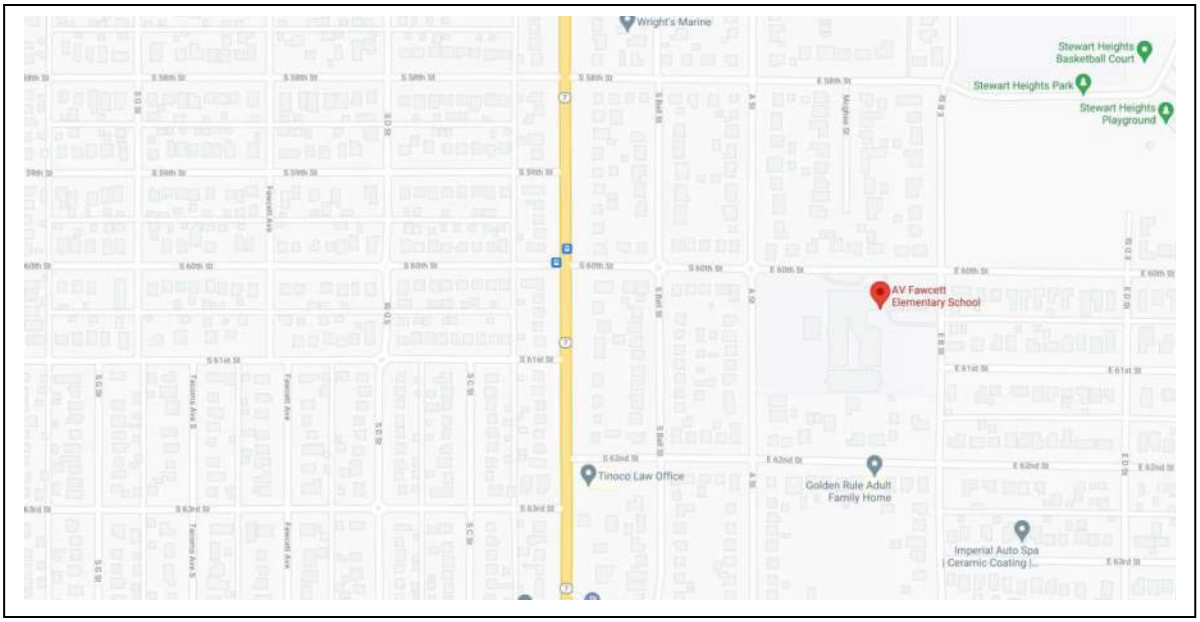
Re: Environmental Noise Study
Fawcett Elementary School

Robert:

This is a report of a predicted noise survey performed in the immediate vicinity of Fawcett Elementary School, based on site plan developed for the new school. The site is located at 126 60th Street in Tacoma, Washington. The existing school is being replace with the design of the new school, as shown below.



This evaluation is completed with the purpose of evaluating environment noise exposure to the building footprint in the above diagram. Noise at the site is associated with auto traffic along the four streets surrounding the site, and to a lesser extent, Pacific Avenue. The purpose of this report is to document the extent and impact of environmental noise due to traffic in the immediate vicinity of the school. The immediate surrounding property to the school is residential. (see below)



This report contains data on the existing and predicted noise environments, impact criteria, an evaluation of the data as they relate to the criteria, and recommendations for improvement if appropriate. The evaluation is conducted to document the impact of environmental noise to planned additions and improvements to the site.

The existing noise environment at the proposed site is primarily the result of auto traffic on the surrounding streets, East 60th, East B, A, E 62nd, all with speeds limited to 20 mph. It is a site bounded on all sides by single-family medium-density, housing. Measurements were made using a Svantek 971 Environmental Noise Monitor for a typical day's traffic near the schrubs to the east side of the proposed building. The equipment conforms to American National Standards Institute (ANSI) requirements for Type 1 instruments. The equipment was within the current calibration period.

Our review was completed in accordance with WAC 246-366-110 Site Approval for educational facilities as required by the Health and Safety Guide for K-12 Schools in Washington. Based on these requirements, noise from any source at a school site shall not exceed an hourly average (Leq) of 55 dB(A) or a maximum (Lmax) of 75 dB(A) during the time school is in session. Exceeding these levels is allowable provided a plan for sound reduction is included in the construction proposal and that the Health Officer approves the plan.

Noise Measurement Descriptors

Sound is measured as sound levels in units of decibels, dB. Environmental noise is typically measured as an A-weighted sound level in units of decibels, symbolized as dB(A). The A-weighting is a frequency-specific weighting that corresponds approximately to the sensitivity of human hearing at the various frequencies, particularly the greater sensitivity at mid and high frequencies.

Sound levels vary significantly depending on location and activities. People normally experience sound levels between about 30 and 90 dB(A), depending on their activity. For example, a nearby noisy vehicle, radio or power tool may produce 90 dB(A); normal conversation is about 55 to 65 dB(A); and a bedroom or quiet office is about 30 to 40 dB(A).

Loudness is judged by an average listener to double for each 10-dBA increase in sound level. For example, 60 dB(A) is judged to be twice as loud as 50 dB(A) and four times as loud as 40 dB(A).

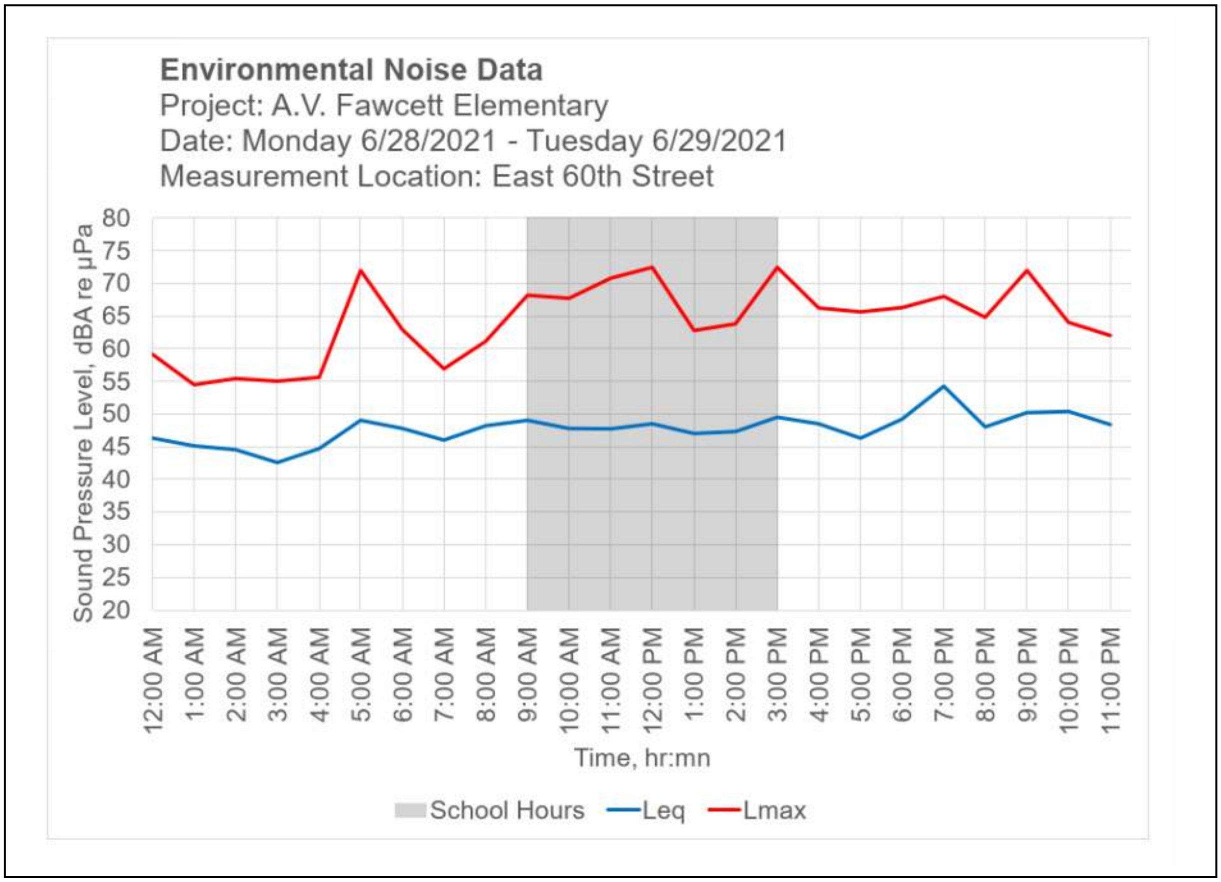
When measuring noise that is fluctuating over time, such as traffic noise, it is common practice to use a descriptor called equivalent A-weighted sound level, Leq. The Leq is that constant sound level in dB(A) which contains the same amount of sound energy over a given time as the measured fluctuating noise. The Leq is often determined for one-hour time periods.

Other descriptors used in this report is the Lmax. The Lmax is the highest instantaneous sound level for a given sound event or time.

Noise Measurement Results

Continuous noise measurements were conducted at the project site to determine existing noise levels. The measurements began at 12:00 am on June 28, 2021, and ended at 11:00 pm, June 29, 2021.

The long-term measurements were presented as hourly Leq and as hourly Lmax values, reported as A-weighted decibels (dB(A)). The average hourly measurements are presented in the following graph.



Values in the graph were measured at the street location and had hourly Leq values during school hours ranged from 46.0 to 49.5 dB(A) between 7:00 a.m. and 5:00 p.m. Lmax values did not exceed 75 dB(A). Based on these noise levels, no mitigation in the building envelope design to achieve full compliance with the requirements of Washington Administrative Code. Standard building construction practices should be utilized. The planned additions to the school will not be impacted by environmental noise.

Primary and Secondary School Regulations

Ambient noise from any source at a proposed site for a new school should not exceed an hourly average of 55 dB(A) (hourly-Leq). Above these levels mitigation measures to achieve 45 dB(A) within instructional interior spaces must be provided by the building envelope. Interior noise levels will not exceed the limits establish by WAC during the time of day the school is in session.

Summary

This report has presented our findings regarding environmental noise at the Fawcett Elementary School. Our findings are based on weekday sound level measurements during school hours and were considered normal for the site and activities of the community. Measurements at the site indicate noise from traffic in the immediate area will not exceed the limits established by WAC Code.

Should you have question regarding our evaluation and recommendations please feel free to contact our office.

Sincerely yours,
SSA Acoustics LLP

William Stewart
Managing Partner

FAWCETT ELEMENTARY SCHOOL
TRAFFIC IMPACT ANALYSIS

City of Tacoma, WA

08/19/2021

Prepared for: Robert A. Lindstrom
Principal
BLRB Architects

August 2021

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FAWCETT ELEMENTARY SCHOOL
TRAFFIC IMPACT ANALYSIS

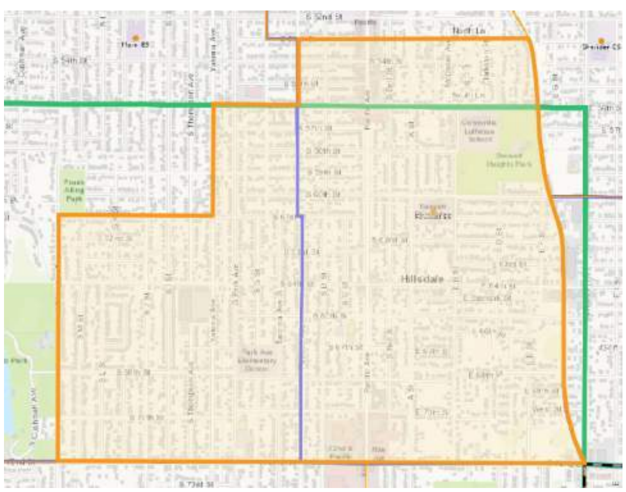
1. INTRODUCTION

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

2. PROJECT DESCRIPTION

The Tacoma School District is proposing the reconstruction of Fawcett Elementary School located in the city of Tacoma. The new 2-story elementary school it to comprise approximately 55,000 square feet with a 500-student capacity. The existing school, which is to be demolished, comprises 60,000 square feet with a 500-student capacity. As such, the new school's expected capacity is not anticipated to increase as a result of the proposed project. The subject site is situated on 5.61-acre tax parcel #: 0320214050. The subject site is bordered to the north by E 60th Street, to the west by A Street and to the east by E B Street. A map illustrating the school service boundary is outlined below to the right.

The proposal includes revisions to parking, on-site circulation and queuing capacity for student pick-up/drop-off. Primary access to the school is proposed via two accesses extending south from E 60th Street (parent parking and student drop-off) and two accesses extending west from E B Street (staff parking and bus drop-off). This study assumes and analyzes the school operating at full capacity. A six-year horizon of 2027 was used for forecast analysis. Figure 1 on the following page shows the general site location along with the local street network serving the vicinity. A site plan illustrating the overall project configuration is presented in Figure 2.



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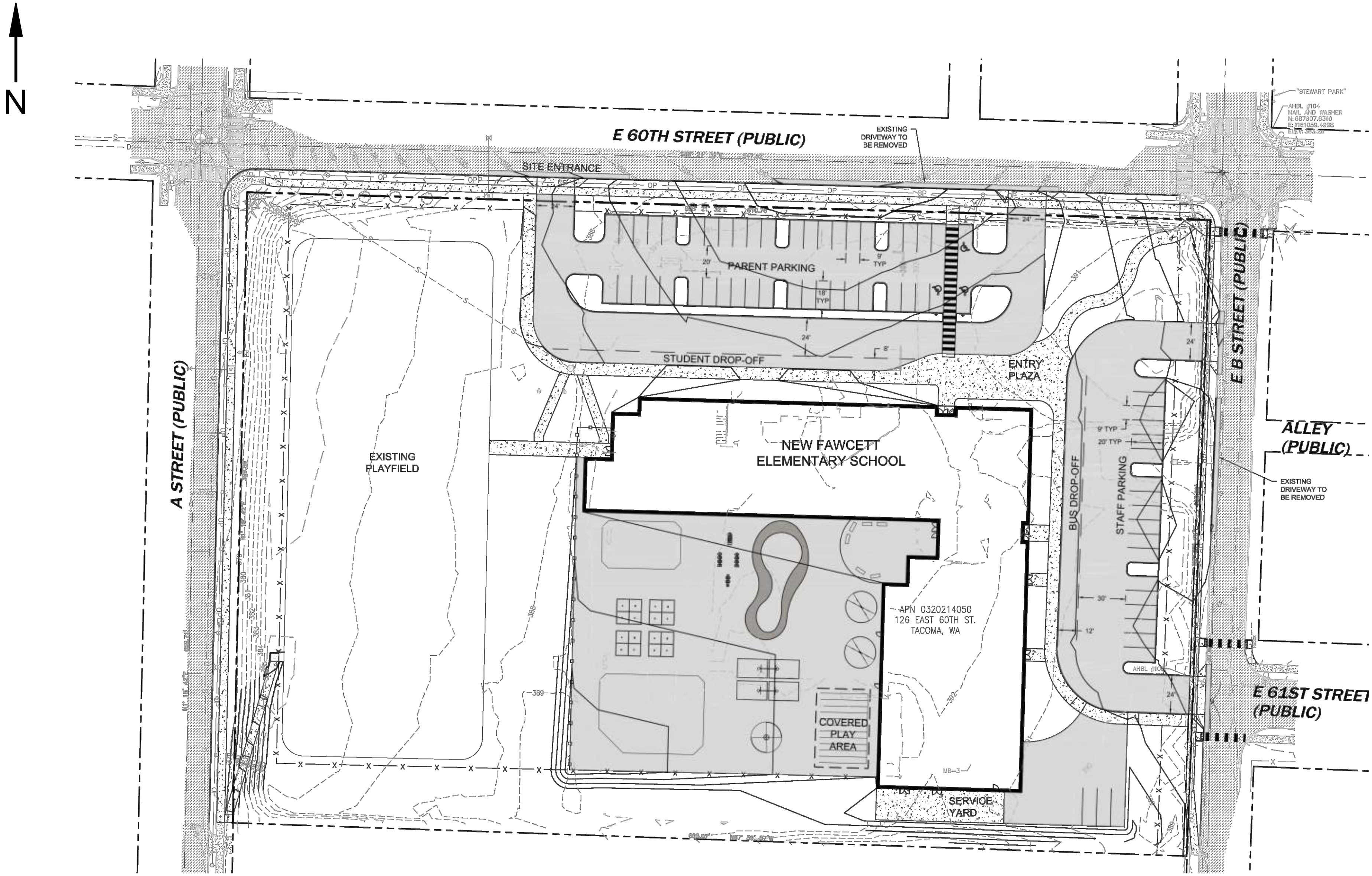
TRAFFIC AND CIVIL ENGINEERING

FAWCETT ELEMENTARY
VICINITY MAP & ROADWAY SYSTEM
FIGURE 1



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FAWCETT ELEMENTARY

SITE PLAN

FIGURE 2

PO Box 397 Puyallup, WA 98371 (253) 770 1401 heathtraffic.com

3. EXISTING CONDITIONS

3.1 Existing Street System

Adjacent streets to the subject site are listed and described in Table 1 below.

Table 1: Roadway Network

Functional Classification	Roadway	Speed Limit	Lanes	Sidewalk	Bike Facilities
Local	E 60th St	20-25 mph	2	Some	No
	E 62nd St	20-25 mph	2	Some	No
	A St	20-25 mph	2	Yes	No
	E B St	20-25 mph	2	Some	No

3.2 Transit Service

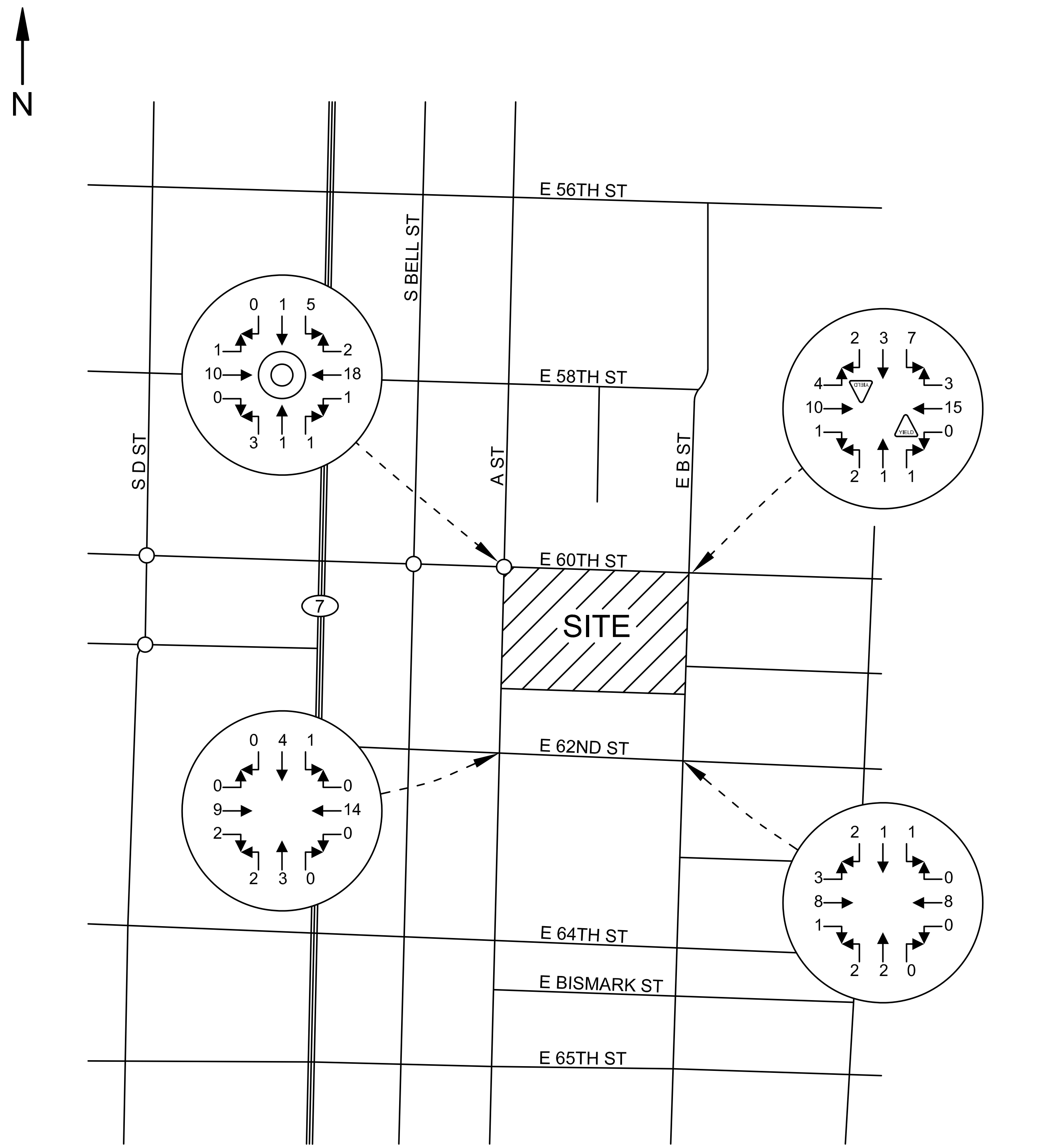
Pierce County Transit Routes 1, 41, 42, 45 and 202 provide service within walking distance to the school campus. Stops are provided along surrounding roadways including S Yakima Avenue, SR-7, McKinley Avenue, E 56th Street and E 72nd Street. Refer to Pierce Transit's regional bus schedule for more detailed information.

3.3 Existing Peak Hour Volumes and Patterns

Field data for this study was collected in August of 2021 while school was not in session. The traffic volumes would therefore be representative of baseline background traffic. Subsequent adjustments for school-related traffic are discussed in later sections. Counts were taken to coincide with the school's peak travel demands for the School AM and PM periods. Turning movement intersection counts were performed between 8:30-10:30 AM and 2:30-4:30 PM as Fawcett Elementary has a school bell schedule starting at 9:00 AM and releasing at 3:30 PM. Field counts were taken at the following intersections.

- A Street & E 60th Street
- A Street & E 62nd Street
- E B Street & E 60th Street
- E B Street & E 62nd Street

The one hour reflecting highest overall roadway volumes (peak hour) was then derived from these counts. Existing School AM and School PM peak hour volumes at the study intersections are illustrated in Figures 3 and 4, respectively. Full-count sheets have been included in the appendix.



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EXISTING SCHOOL AM PEAK HOUR VOLUMES

FIGURE 3

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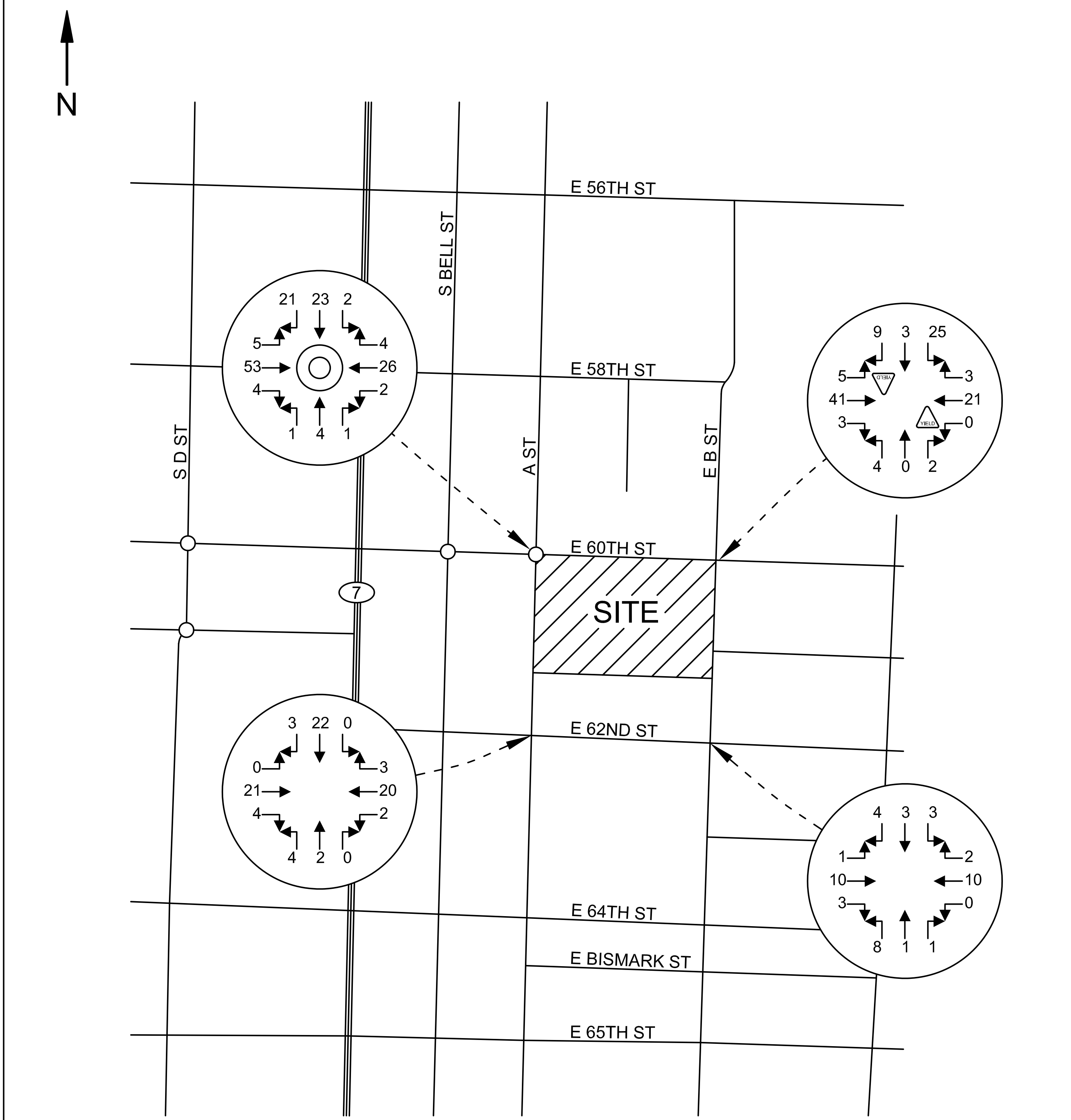

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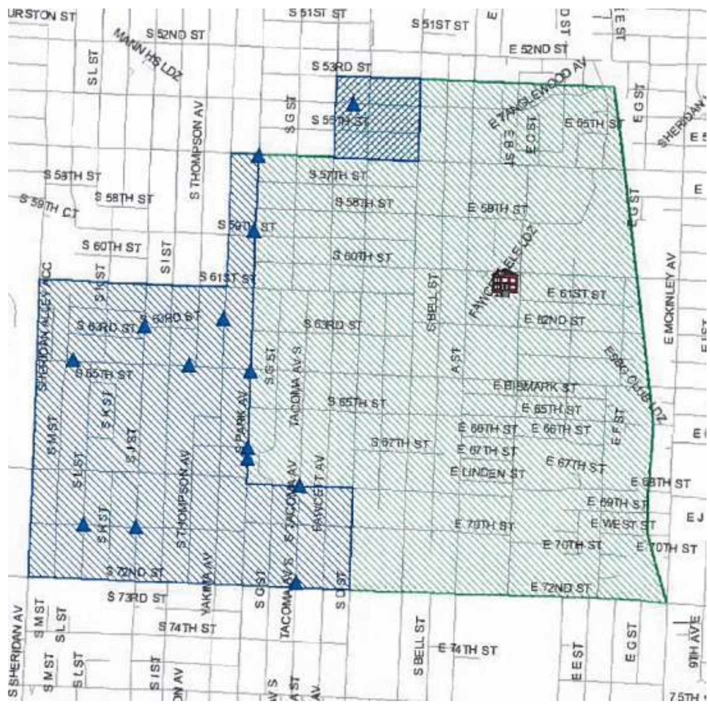
FAWCETT ELEMENTARY

EXISTING SCHOOL PM PEAK HOUR VOLUMES
FIGURE 4

3.4 Non-Motorist Traffic & Safety

The service area for Fawcett Elementary extends beyond a one-mile radius. Therefore, bus service would be available to students residing over one-mile walking distance from the elementary school. The graphic below illustrates areas within the school's service boundaries that are walkable (lime) versus hazardous for students to walk (blue). Blue triangles represent available bus stops for transport to/from Fawcett Elementary. As illustrated in the graphic, students residing in areas west of the school would have the opportunity to utilize school bus service. Moreover, parent pick-up/drop-off would be available given the new, regulated site queueing and internal circulation.

Non-Motorist Accessibility



The project would replace any defective or unsafe sidewalk abutting school property. The site plan shows a sidewalk connection from the new school location northeasterly to E 60th Street & S B Street and from the playfield southwesterly to A Street. A new sidewalk segment is to be constructed along the west side of E B Street between the subject site and E 62nd Street, facilitating safer southerly pedestrian connections.

Moreover, ramp improvements are to be made at the southeastern and southwestern corners of E B Street & E 60th Street and at the E B Street & E 62nd Street intersection. Adequate school zone signage alerting drivers of the upcoming school zone was found along all streets bordering the subject site (A Street; E B Street; E 60th Street). Crosswalks serving the site should include S1-1 signage supplemented with W16-7P signage, as outlined in the MUTCD Manual (2009). Coordination should be made with the City concerning static school zone speed signs, which should be extended beyond their current locations on A Street and E B Street. Lastly, A Street is considered a bicycle boulevard. As such, painted bike lanes or sharrow markings may need to be installed along per City standards.

3.5 Roadway Improvements

A review of the draft City of Tacoma Six-Year Comprehensive Transportation Improvement Program Amended 2021 (2022-2027) indicates that the following projects are currently planned in the vicinity of Fawcett Elementary.

> *South 72nd Improvements - D to A Streets (WBS: $PWKE-00028):* This project entails a crosswalk signal, median island and sidewalk improvements at S 72nd Street & D Street (Phase 1). Phase 2 includes pedestrian improvements along S 72nd Street and A Street. The total estimated cost is $5,880,000.
>
> *Active Transportation Access to Pacific Avenue High Capacity Transit - Pacific Avenue and adjacent (WBS: $PWE3-00001):* This project entails a providing pedestrian access to SR-7, including a bicycle boulevard on A Street. The total estimated cost is $1,000,000.
>
> *E 64th (Phase 1, 2 & 3) - Pacific Avenue to W City Limits (WBS: PWK-G0042; PWK-G0018; $PWE1-10003):* This project entails rehabilitating the roadway, adding bike lanes and installing/replacing sidewalk. The total estimated cost for all three projects is $17,698,263.

In addition, the city's Safe Routes to School 2017 Action Plan was also reviewed, which discusses various considerations and strategies to best serve students. The matrix associated with Fawcett indicates that bicycle parking, parent education programs and police enforcement are items that have been identified along with infrastructure improvements. The priority array in this document identifying the school sites by overall needs lists Fawcett Elementary at near the middle as it is ranked 24th out of 54 sites indicating mid priority.

3.6 Access & Sight Distance

Access to the school is proposed via two driveways via E 60th Street which will primarily serve passenger vehicles (parent drop-off/parking) and two driveways via E B Street that will serve school buses and staff parking. Both roadways have an upper speed limit of 25-mph. In accordance with AASHTO standards, a minimum entering sight distance of 280 feet is required on either roadway. Based on preliminary examinations, all proposed accesses are anticipated to meet sight distance requirements. Further, the presence of the local school and mandatory reduced speed zones should result in lower travel speeds than the posted 25-mph.

3.7 Existing Level of Service

Existing peak hour delays were determined through the use of the *Highway Capacity Manual* 6th Edition. Capacity analysis is used to determine level of service (LOS) which is an established measure of congestion for transportation facilities. The range[1] for intersection level of service is LOS A to LOS F with the former indicating the best operating conditions with low control delays and the latter indicating the worst conditions with heavy control delays. Level of service calculations were made through the use of the *Synchro 10* analysis program. For roundabouts and uncontrolled intersections, LOS is determined by the intersection's overall weighted average delay for each approaching leg.

Table 2: Existing School Peak Hour Level of Service

Delays given in seconds per vehicle

Intersection	Control	Peak Hour	LOS	Delay
A Street & E 60th Street	Roundabout	School AM	A	2.8
		School PM	A	3.1
E B Street & E 60th Street	Yield Controlled	School AM	A	3.6
		School PM	A	3.7
A Street & E 62nd Street	Uncontrolled	School AM	A	7.0
		School PM	A	7.1
E B Street & E 62nd Street	Uncontrolled	School AM	A	7.0
		School PM	A	7.0

The uncontrolled intersections of A Street & E 62nd Street and E B Street & E 62nd Street currently operate by standard right-of-way rules. All legs were considered yield-controlled for LOS analysis. E B Street & E 60th Street is presently yield-controlled from the north/south approaches.

As shown in Table 2, existing School AM and School PM peak hour delays at the intersections of study are mild at LOS A indicating stable conditions and no operational deficiencies. The local roadways carry relatively low amounts of vehicular volumes with minimal conflicts and driver delay during the school peak periods of travel.

---

1 *Signalized Intersections - Level of Service*

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

Stop Controlled Intersections – Level of Service

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

Highway Capacity Manual, 6th Edition

4. FUTURE TRAFFIC DEMAND

4.1 School Traffic Generation & Flow

Trip generation is used to determine the magnitude of project impacts on the surrounding street system. This is denoted by the quantity or specific number of new trips that enter or exit a project during a designated time period, such as a specific peak hour or an entire day. Data presented in this report was obtained from the Institute of Transportation Engineer's (ITE) publication *Trip Generation*, 10th Edition. The designated land use for this project is defined by ITE's Land Use Code (LUC) 520 – Elementary School.

It should be noted that baseline peak hour data were collected while school was not in session. Therefore, trip generation utilized herein is to represent the proposed school operating at full capacity (500 students). While recent attendance trends based on OSPI data have shown attendance to decrease over the past few years (462: 2016-2017; 373: 2020-2021), the maximum 500-student capacity was utilized for project trip generation to present a conservative analysis. Table 3 below shows the projected number of average weekday daily trips (AWDT), School AM and School PM peak hour trips using the proposed 500-student maximum capacity as the input variable to derive vehicular volumes. Refer to the appendix for trip generation output.

Table 3: Project Trip Generation – 500-Student Capacity

Land Use	Students	AWDT	School AM Peak Hour Trips			School PM Peak Hour Trips		
			In	Out	Total	In	Out	Total
Elementary School	500	945	175	150	**325**	76	94	**170**

Based on ITE data, approximately 945 average weekday daily trips, 325 AM School (175 inbound / 150 outbound) and 170 PM School (76 inbound / 94 outbound) trips are projected given the proposed 500-student capacity.

It should be noted that these trip generation estimates are likely conservative given the school's location and characteristics. ITE data for LUC 520 – Elementary School is more representative of a rural setting where students are more likely to be driven to school by their guardian. As the proposed project is located in a more urban setting that encourages non-motorist student transport, trip generation associated with the proposed elementary school is likely to be less than estimated via ITE data.

4.2 Distribution & Assignment

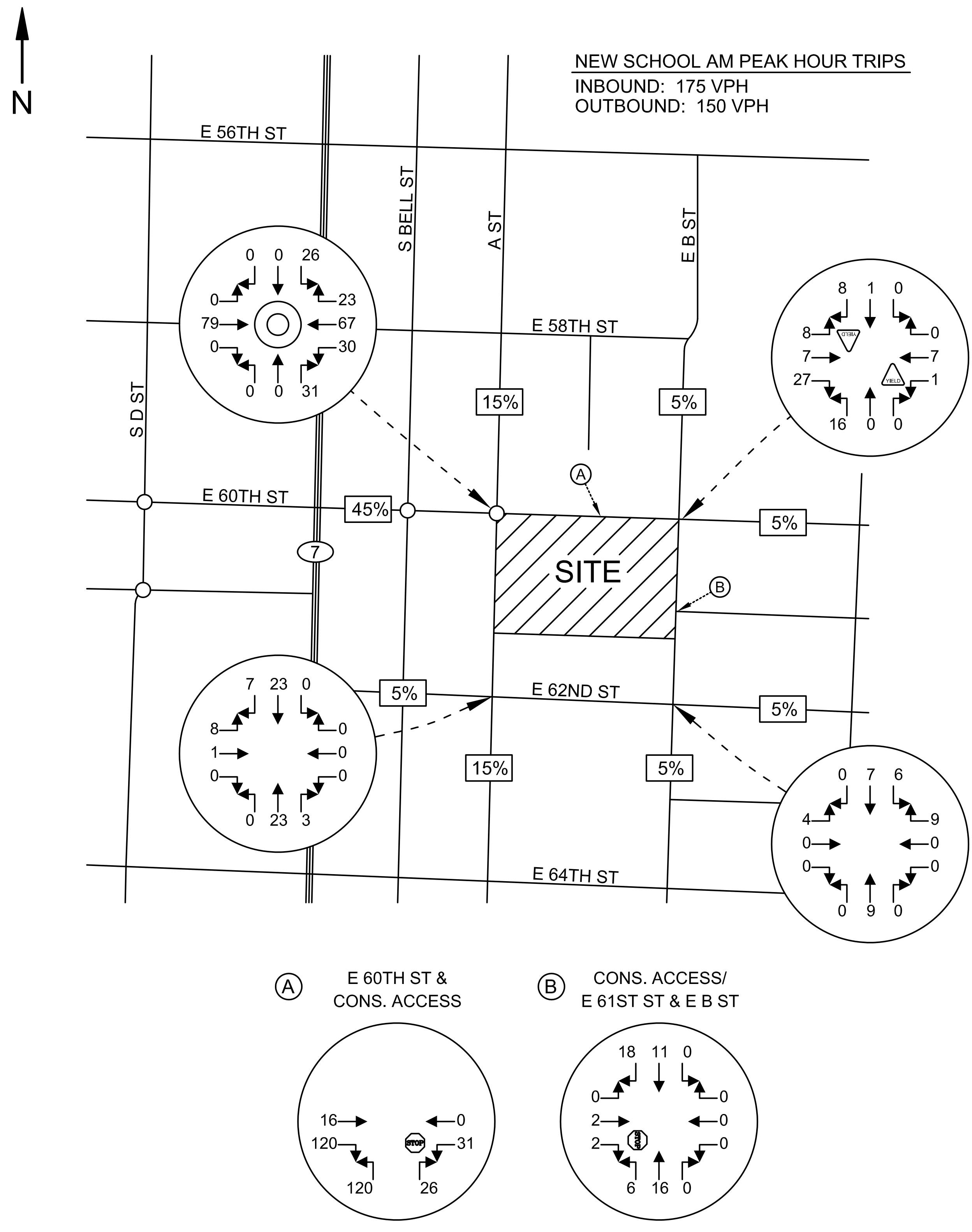
Inbound and outbound travel assignments were largely based on the school's service boundary map. Forecast School AM and School PM peak hour trip distribution percentages are illustrated in Figures 5 and 6 on the following pages. It should be noted that the majority of students residing east of SR-7 would likely walk to school given available safe pedestrian routes. As such, the majority of site-generated traffic was assigned to/from the west.

Moreover, approximately 20 inbound trips associated with the proposed elementary school's staff and 8 school bus trips (4 inbound / 4 outbound) are anticipated at the E B Street access during the School AM peak hour. Concerning the School PM peak hour, 20 outbound staff trips and 8 school bus trips (4 inbound / 4 outbound) were analyzed at the E B Street access. While inbound and outbound traffic would likely be disseminated between the two accesses on both E 60th Street and E B Street, all site traffic was consolidated to a single access per roadway.

4.3 Forecast Traffic Volumes

A six-year horizon of 2027 was used in order to assess future impacts on the roadways serving the vicinity of the school. Forecast 2027 background traffic volumes were derived by applying a 1.2 percent compound annual growth rate to the existing volumes in Figures 3 and 4. Forecast 2027 School AM and PM peak hour volumes without the new Fawcett Elementary School are illustrated in Figures 7 and 8. Forecast 2027 School AM and PM peak hour volumes with Fawcett Elementary School are illustrated in Figures 9 and 10.

It should be noted that the consolidated access on E B Street utilized in analysis is located opposite E 61st Street. As such, a handful of trips were added to the eastern leg of the E B Street & E 61st Street intersection.



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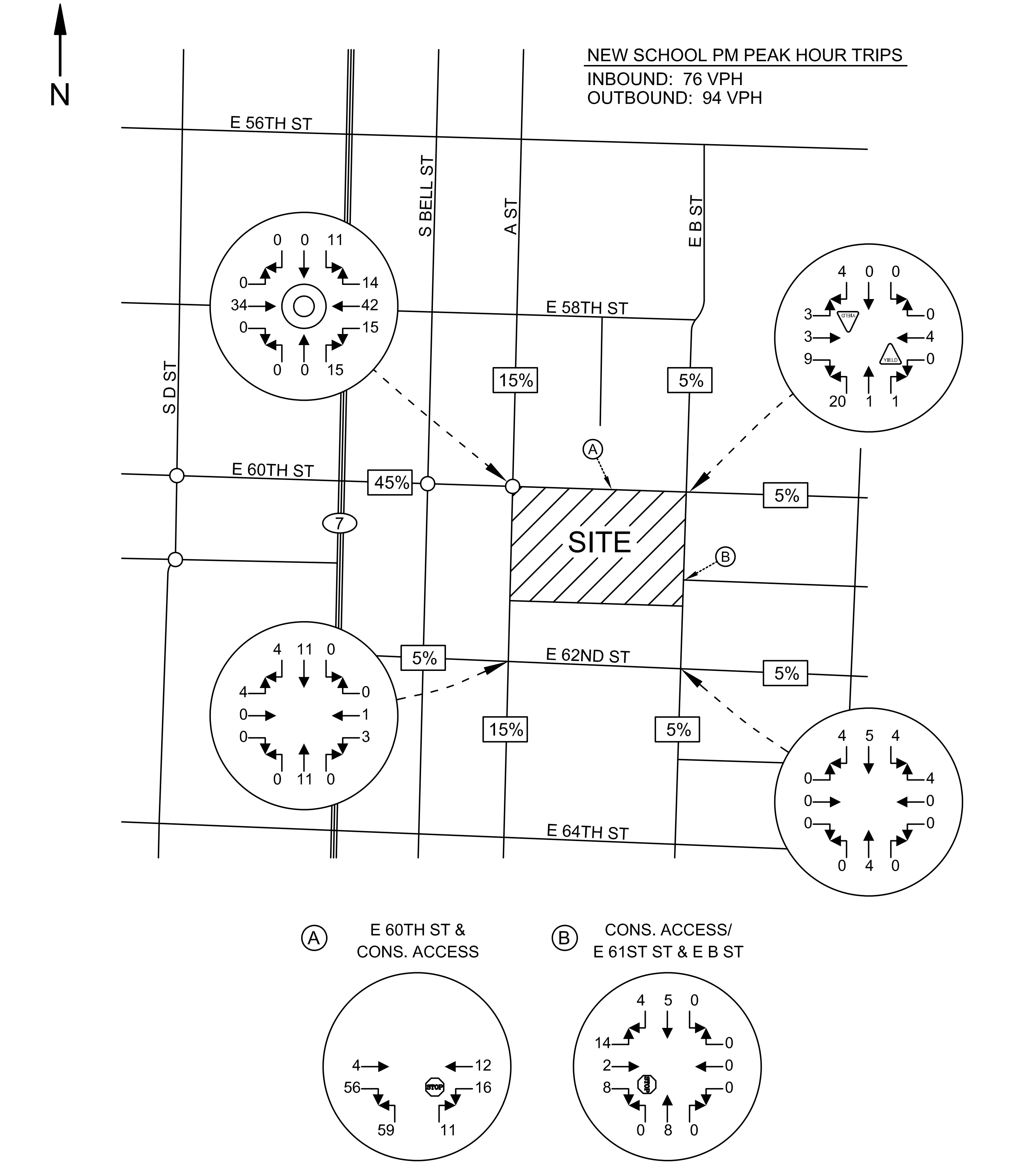
SCHOOL AM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT

FIGURE 5



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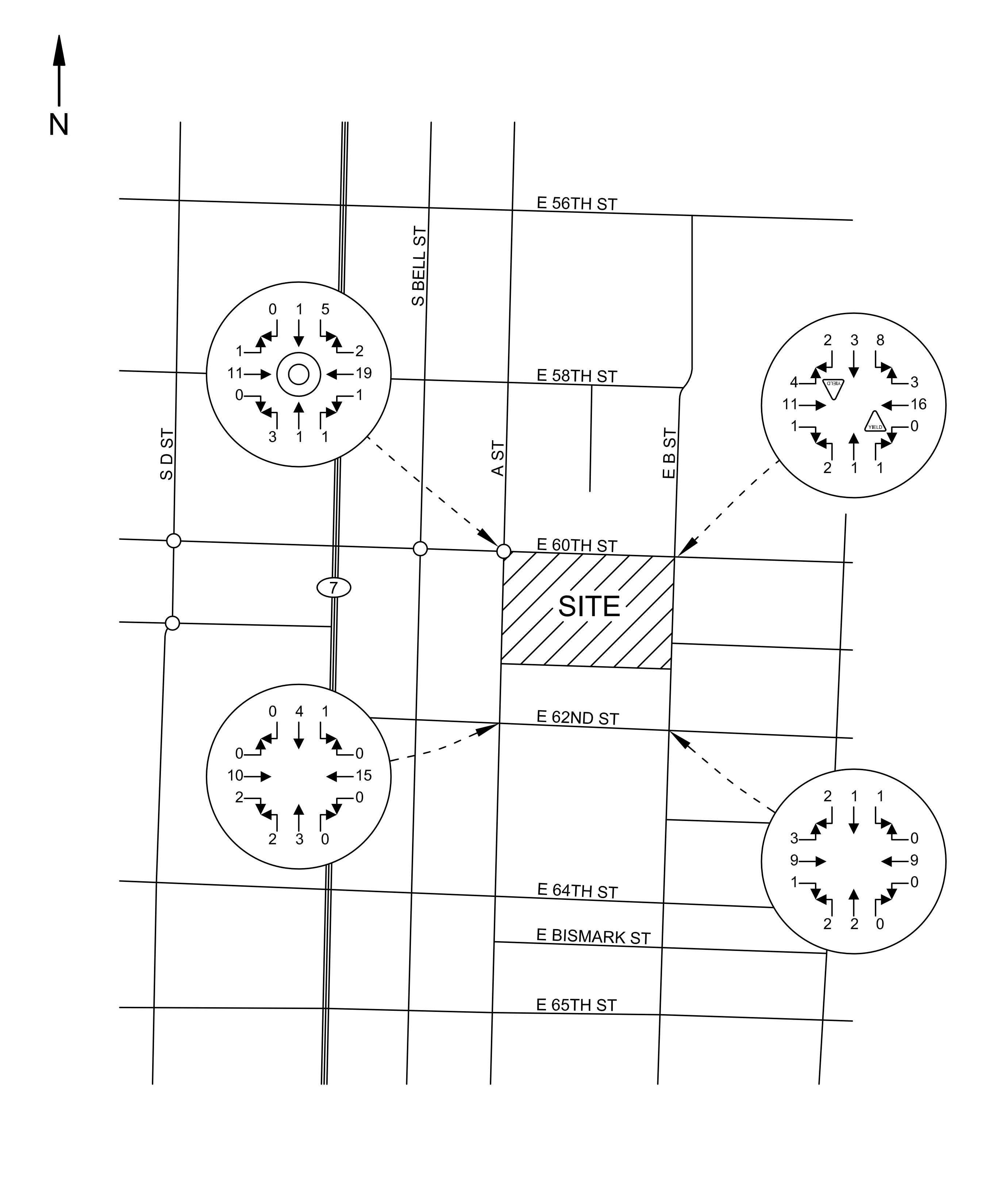
SCHOOL PM PEAK HOUR TRIP DISTRIBUTION & ASSIGNMENT

FIGURE 6



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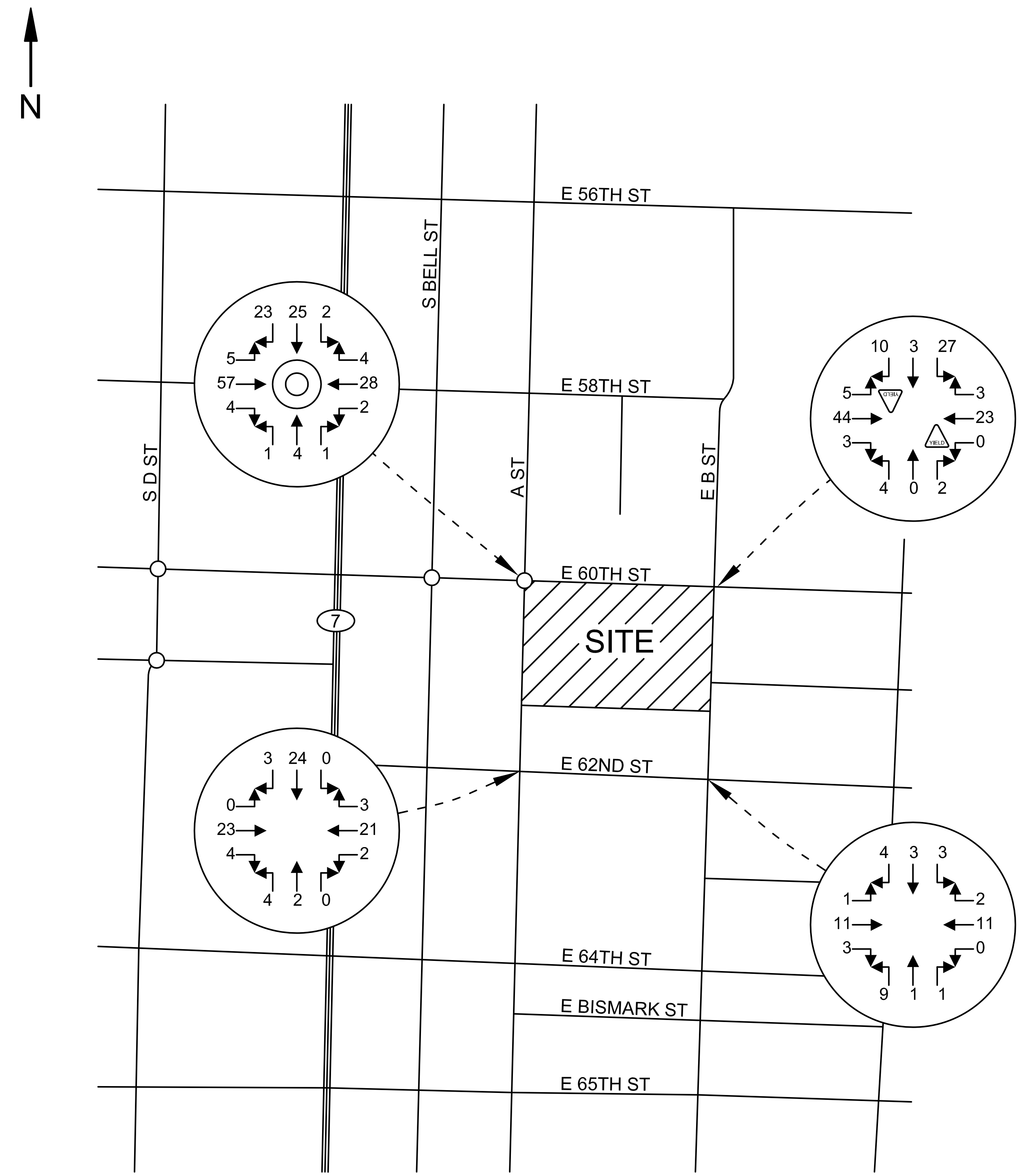
FORECAST 2027 SCHOOL AM PEAK HOUR BACKGROUND VOLUMES

FIGURE 7



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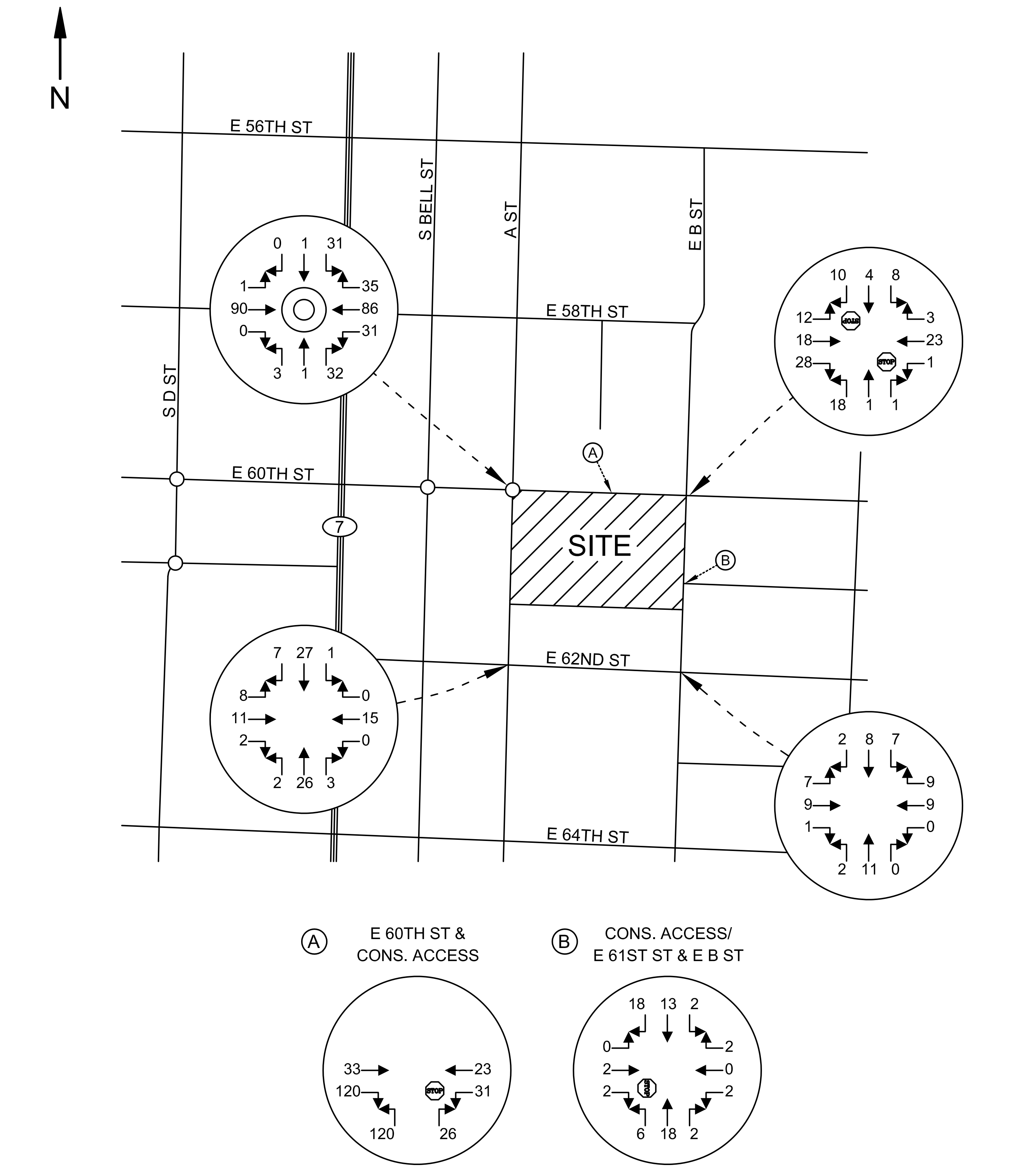
FORECAST 2027 SCHOOL PM PEAK HOUR BACKGROUND VOLUMES

FIGURE 8



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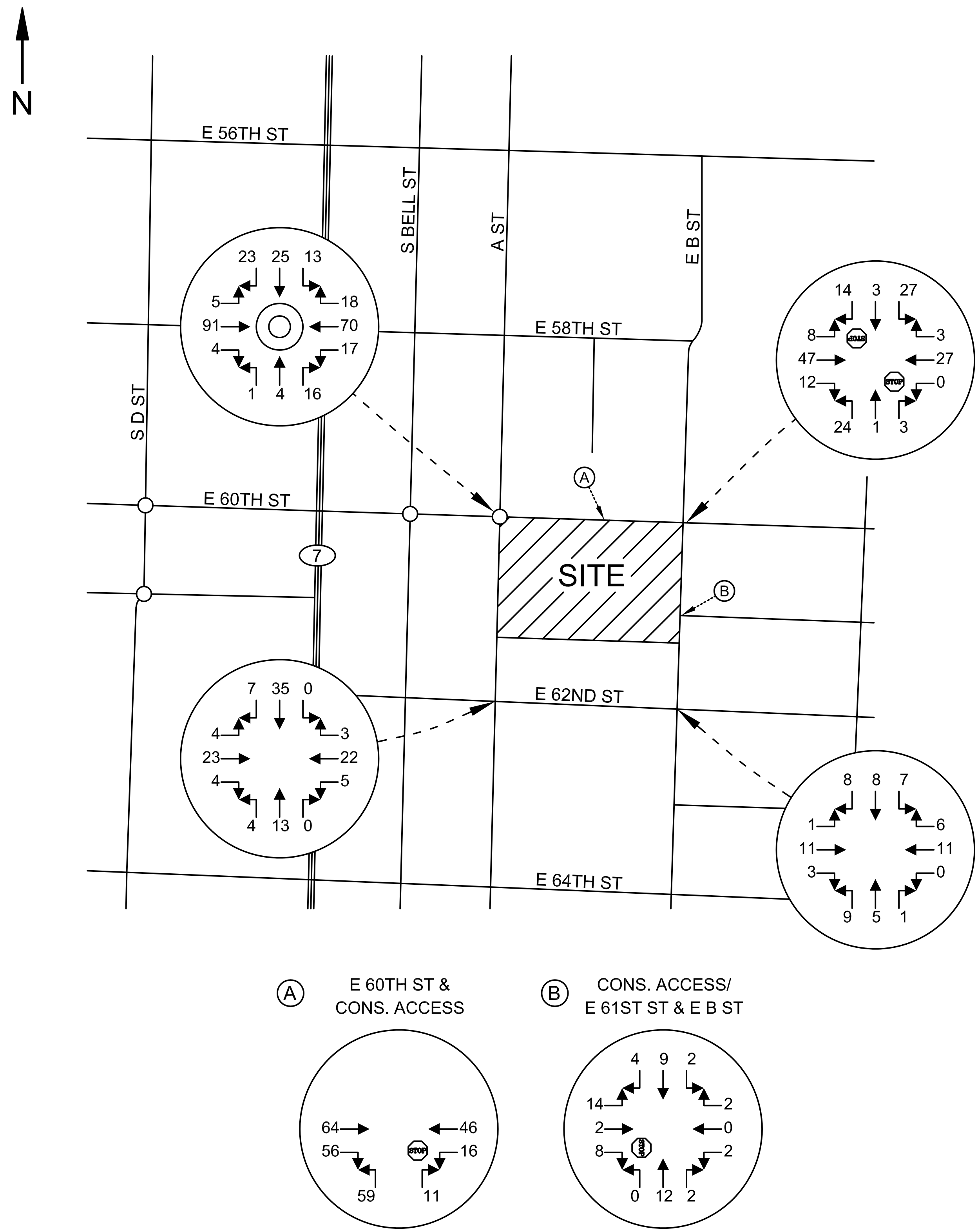
FORECAST 2027 SCHOOL AM PEAK HOUR VOLUMES WITH PROJECT

FIGURE 9



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FAWCETT ELEMENTARY

FORECAST 2027 SCHOOL PM PEAK HOUR VOLUMES WITH PROJECT

FIGURE 10

4.4 Future Level of Service

Level of service analyses were made of the future School AM and School PM peak hour volumes at the key intersections and consolidated accesses using the Synchro 10 analysis program. Delays under future conditions without and with the reconstruction of Fawcett Elementary are summarized below.

Table 4: Forecast 2027 School Peak Hour Level of Service

Delays given in seconds per vehicle

	School AM Peak Hour				School PM Peak Hour			
	Without		With		Without		With	
Intersection	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay
A St & E 60th St	A	2.8	A	3.7	A	3.1	A	3.5
E B St & E 60th St	A	3.5	A	9.6	A	3.7	A	9.4
A St & E 62nd St	A	7.0	A	7.2	A	7.2	A	7.3
E B St & E 62nd St	A	7.0	A	7.0	A	7.0	A	7.1
Cons. Access & E 60th St	-	-	B	12.8	-	-	B	10.5
E B St & Cons. Access/E 61st St	-	-	B	10.1	-	-	A	9.0

As shown in the table, forecast 2027 school peak hour delays are anticipated to remain minimal at LOS A at the outlying study intersections. The access driveways are shown to operate at LOS B or better. It should be noted that School AM and PM peak hour intersection evaluation with project at the intersection of E B Street & E 60th Street included stop-controls at the north and south legs. As this intersection is currently yield-controlled, the City may want to consider replacing the yield signs with stop signs. According to the MUTCD Manual (2009) Section 2B.04, stop control may be implemented where two similar roadways intersect to: control the direction that conflicts the most with established pedestrian crossing activity or school walking routes. With a new crosswalk and pedestrian activity occurring near the school, a stop sign application may be appropriate at this intersection.

Overall, the school's new design will allow for more efficient progression of vehicular flow to and from the site with additional on-site queuing and parking capacity. No level of service intersection deficiencies are identified with the proposed Fawcett Elementary School replacement.

4.5 Site Access, Queuing & Circulation

The school is identified as a partial walking school indicating lesser vehicle traffic than a school in a more rural setting. However, inclement weather and shorter daylight hours would cause an increase in parent drop-off and pick-up. Moreover, students residing in areas with hazardous walking conditions or located greater than 1.0-mile walking distance from the school (see graphic on Page 9) may be dropped off/picked up by their guardians.

Site Access:

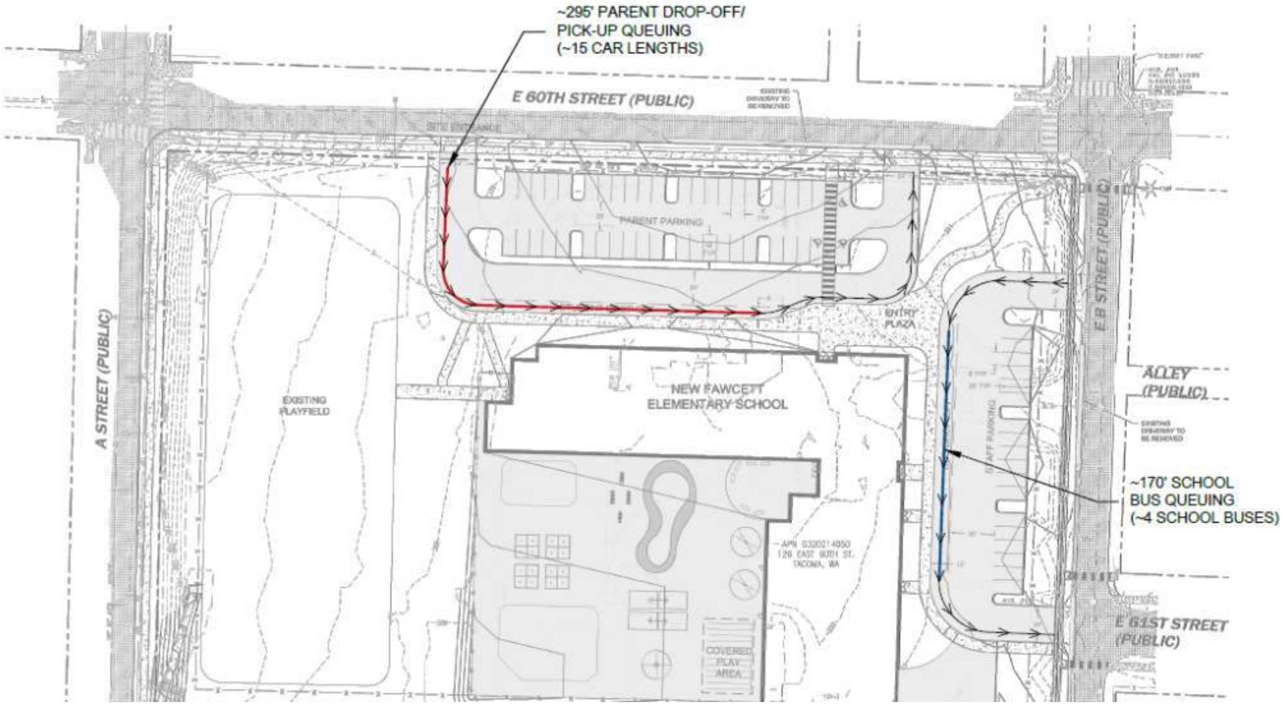
As shown in the site plan, two accesses are proposed on E 60th Street accommodating parent parking and student pickup/drop-off. Moreover, two accesses are to be provided along E B Street accommodating bus pickup/drop-off and staff parking. The separation of parent and school bus pick-up/drop-off is anticipated to provide more efficient on-site circulation. Moreover, field measurements were taken of E B Street's width along the project frontage, which indicated the roadway to be approximately 23-feet wide (see Figure A in the appendix). As the roadway width is under 28-feet, it is recommended that "No Parking" signs be installed along the west side of the roadway. This restriction will enhance bus maneuverability at the E B Street accesses and allow for bus routing to/from the south.

Queuing & Circulation:

Existing parent drop-off and pick-up currently occur on-site and off-site in several areas. The proposed design formalizes a designated student loading zone near the school entrance. The on-site parent drop-off/pick-up queuing capacity for the site is shown in the following graphic in red with a total queue length of approximately 295 linear feet reflecting a capacity of 15 vehicles. Should additional queueing capacity be required, queueing could be extended easterly (demarcated by the black line). Moreover, unoccupied stalls in the parent parking lot would also be available for parent pick-up/drop-off. The blue line below depicts the available bus queue length, which totals approximately 170 linear feet and is anticipated to accommodate up to 4 school buses.

Also illustrated in the graphic is the anticipated on-site circulation. E 60th Street access circulation for parent drop-off/pick-up is to consist of ingress at the western access and egress at the eastern access. E B Street access circulation for school bus drop-off/pick-up is to consist of ingress at the northern access and egress at the southern access.

Proposed Fawcett Elementary Queuing & Circulation



5. CONCLUSIONS AND MITIGATION

Fawcett Elementary School is proposing a reconstruction of its existing facility located in the city of Tacoma. The school will remain generally at its current location, bordered to the north by E 60th Street, to the west by A Street and the east by E B Street. The new two-story school is to comprise approximately 55,000 square feet with a 500-student capacity. The existing school, which is to be demolished, comprises 60,000 square feet with a 500-student capacity. As such, the new school's expected capacity is not anticipated to increase as a result of the proposed project. Access to the subject site is proposed via two driveways extending south from E 60th Street (parent parking/student pick-up) and two driveways extending west from E B Street (staff parking/student pick-up).

Existing field counts were taken in August while school was not in session. Therefore, the maximum capacity of 500-students was utilized for trip generation and forecast analysis purposes. Based on ITE data, a 500-student elementary school is anticipated to generate 945 average weekday daily trips, 325 School AM peak hour trips (175 inbound / 150 outbound) and 170 School PM peak hour trips (76 inbound / 94 outbound). The proposed design, as shown in Figure 2, allows for improved new student drop-off/pick-up loop offering additional on-site queuing capacity and parking. Similarly, a separate bus loop would be available on the east side of the property. The layout is anticipated to reduce and minimize impacts to the surrounding neighborhoods as vehicular activity can be captured on-site. Moreover, forecast 2027 level of service delays are calculated to be minimal at LOS B or better indicating sufficient roadway capacity. Overall, no roadway deficiencies are identified as a result of the proposed development.

Based on the above analysis, recommended mitigation is as follows:

1. Exact intersection control and design shall be coordinated and approved by the City for the intersections of E B Street & E 60th Street. Currently, the north/south approaches are yield controlled and may need to be replaced with stop signs.

2. All non-motorist infrastructure should be constructed to City of Tacoma standards.
    a. Coordinate with City on location and extent of school zone speed sign relocation. The MUTCD Manual (2009), Section 7B.15.07, recommends the beginning point of a reduced school speed limit zone to be at least 200 feet in advance of the school grounds, a school crossing, or other school related activities.

3. Install no parking signs along the west side of E B Street so as to keep bus routing and maneuverability clear from parked vehicles. The no parking may be time restricted to school hours or permanent restriction depending on City review.

No additional mitigation is recommended at this time.

FAWCETT ELEMENTARY SCHOOL
TRAFFIC IMPACT ANALYSIS

APPENDIX

Heath & Associates

PO Box 397
Puyallup, WA 98371

File Name : 4674d
Site Code : 00004674
Start Date : 8/12/2021
Page No : 1

Groups Printed- Passenger + - Heavy

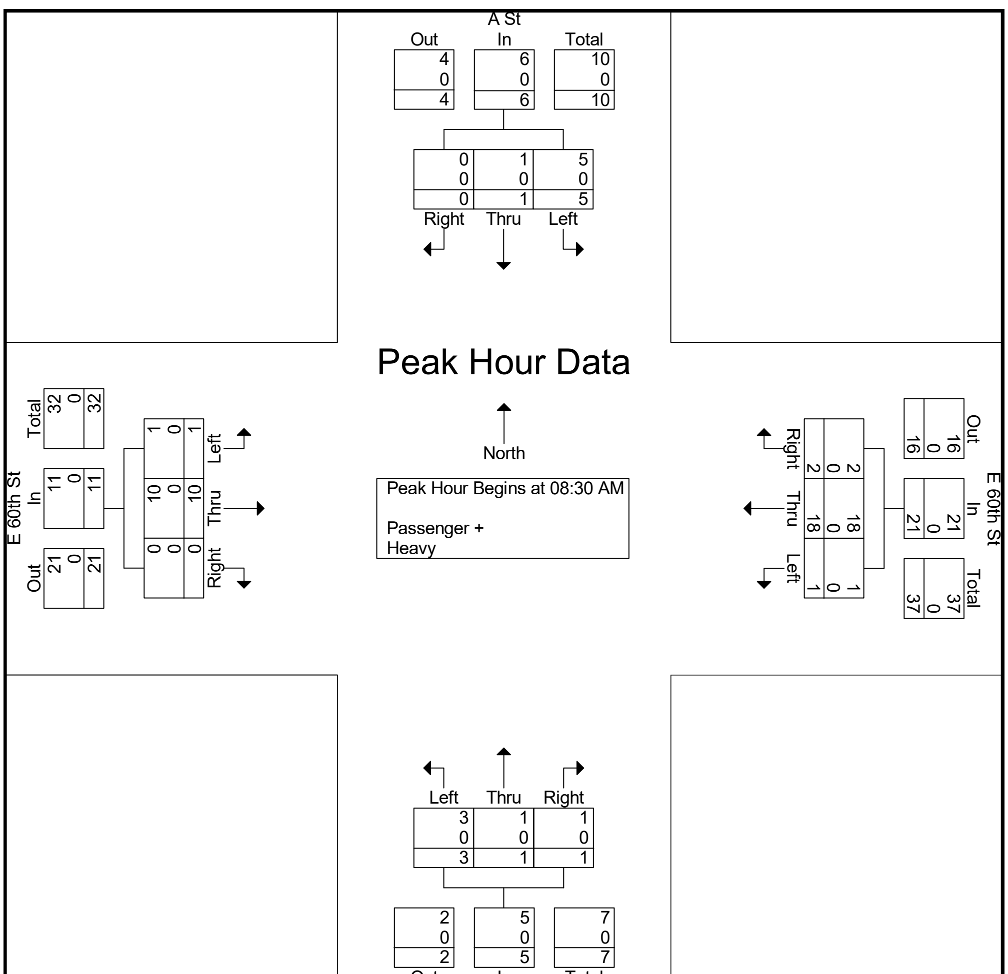
	A St Southbound				E 60th St Westbound				A St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
08:30 AM	0	0	2	2	0	7	0	7	0	0	1	1	0	1	0	1	11
08:45 AM	0	0	2	2	1	7	0	8	0	1	1	2	0	2	0	2	14
Total	0	0	4	4	1	14	0	15	0	1	2	3	0	3	0	3	25
09:00 AM	0	1	0	1	1	0	1	2	0	0	1	1	0	5	1	6	10
09:15 AM	0	0	1	1	0	4	0	4	1	0	0	1	0	2	0	2	8
09:30 AM	0	2	0	2	1	3	0	4	0	0	0	0	0	2	0	2	8
09:45 AM	1	0	0	1	1	4	0	5	0	0	0	0	0	1	0	1	7
Total	1	3	1	5	3	11	1	15	1	0	1	2	0	10	1	11	33
10:00 AM	0	1	0	1	0	3	0	3	0	2	0	2	1	4	0	5	11
10:15 AM	0	1	2	3	0	2	1	3	0	0	0	0	1	2	0	3	9
Grand Total	1	5	7	13	4	30	2	36	1	3	3	7	2	19	1	22	78
Apprch %	7.7	38.5	53.8		11.1	83.3	5.6		14.3	42.9	42.9		9.1	86.4	4.5		
Total %	1.3	6.4	9	16.7	5.1	38.5	2.6	46.2	1.3	3.8	3.8	9	2.6	24.4	1.3	28.2	
Passenger +	1	5	7	13	4	30	2	36	1	3	3	7	2	19	1	22	78
% Passenger +	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Heath & Associates

PO Box 397
Puyallup, WA 98371

File Name : 4674d
Site Code : 00004674
Start Date : 8/12/2021
Page No : 2

	A St Southbound				E 60th St Westbound				A St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:30 AM																	
08:30 AM	0	0	**2**	**2**	0	**7**	0	7	0	0	**1**	1	0	1	0	1	11
08:45 AM	0	0	2	2	**1**	7	0	**8**	0	**1**	1	**2**	0	2	0	2	**14**
09:00 AM	0	**1**	0	1	1	0	**1**	2	0	0	1	1	0	**5**	**1**	**6**	10
09:15 AM	0	0	1	1	0	4	0	4	**1**	0	0	1	0	2	0	2	8
Total Volume	0	1	5	6	2	18	1	21	1	1	3	5	0	10	1	11	43
% App. Total	0	16.7	83.3		9.5	85.7	4.8		20	20	60		0	90.9	9.1		
PHF	.000	.250	.625	.750	.500	.643	.250	.656	.250	.250	.750	.625	.000	.500	.250	.458	.768
Passenger +	0	1	5	6	2	18	1	21	1	1	3	5	0	10	1	11	43
% Passenger +	0	100	100	100	100	100	100	100	100	100	100	100	0	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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PO Box 397
Puyallup, WA 98371

File Name : 4674e
Site Code : 00004674
Start Date : 8/12/2021
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Groups Printed- Passenger + - Heavy

	E B St Southbound				E 60th St Westbound				E B St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
08:30 AM	0	0	3	3	0	6	0	6	0	0	1	1	0	2	0	2	12
08:45 AM	0	1	2	3	1	8	0	9	1	1	0	2	0	2	3	5	19
Total	0	1	5	6	1	14	0	15	1	1	1	3	0	4	3	7	31
09:00 AM	1	1	2	4	1	0	0	1	0	0	0	0	0	3	1	4	9
09:15 AM	1	1	0	2	1	1	0	2	0	0	1	1	1	3	0	4	9
09:30 AM	0	2	0	2	1	3	0	4	0	0	0	0	1	0	0	1	7
09:45 AM	0	0	2	2	1	4	1	6	0	0	0	0	0	1	0	1	9
Total	2	4	4	10	4	8	1	13	0	0	1	1	2	7	1	10	34
10:00 AM	0	1	3	4	1	1	0	2	0	0	2	2	0	3	0	3	11
10:15 AM	0	0	1	1	1	3	0	4	0	1	0	1	0	2	1	3	9
Grand Total	2	6	13	21	7	26	1	34	1	2	4	7	2	16	5	23	85
Apprch %	9.5	28.6	61.9		20.6	76.5	2.9		14.3	28.6	57.1		8.7	69.6	21.7		
Total %	2.4	7.1	15.3	24.7	8.2	30.6	1.2	40	1.2	2.4	4.7	8.2	2.4	18.8	5.9	27.1	
Passenger +	2	6	13	21	7	26	1	34	1	2	4	7	2	16	5	23	85
% Passenger +	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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File Name : 4674e
Site Code : 00004674
Start Date : 8/12/2021
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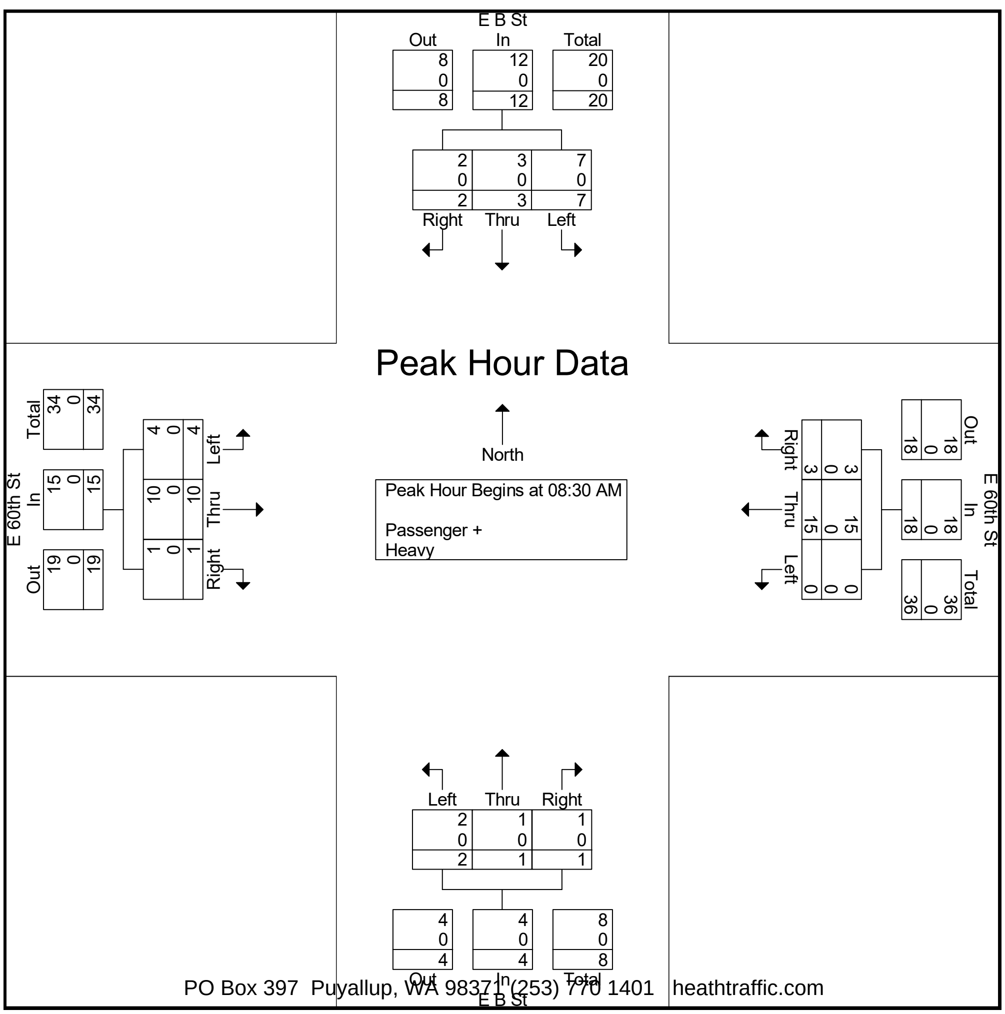
	E B St Southbound				E 60th St Westbound				E B St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 08:30 AM																	
08:30 AM	0	0	**3**	3	0	6	0	6	0	0	**1**	1	0	2	0	2	12
08:45 AM	0	**1**	2	3	**1**	**8**	0	**9**	**1**	**1**	0	**2**	0	2	**3**	**5**	**19**
09:00 AM	**1**	1	2	**4**	1	0	0	1	0	0	0	0	0	**3**	1	4	9
09:15 AM	1	1	0	2	1	1	0	2	0	0	1	1	**1**	3	0	4	9
Total Volume	2	3	7	12	3	15	0	18	1	1	2	4	1	10	4	15	49
% App. Total	16.7	25	58.3		16.7	83.3	0		25	25	50		6.7	66.7	26.7		
PHF	.500	.750	.583	.750	.750	.469	.000	.500	.250	.250	.500	.500	.250	.833	.333	.750	.645
Passenger +	2	3	7	12	3	15	0	18	1	1	2	4	1	10	4	15	49
% Passenger +	100	100	100	100	100	100	0	100	100	100	100	100	100	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : 4674f
Site Code : 00004674
Start Date : 8/12/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	A St Southbound				E 62nd St Westbound				A St Northbound				S 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
08:30 AM	0	0	0	0	0	5	0	5	0	0	0	0	1	0	0	1	6
08:45 AM	0	0	0	0	0	3	0	3	0	1	0	1	0	3	0	3	7
Total	0	0	0	0	0	8	0	8	0	1	0	1	1	3	0	4	13
09:00 AM	0	1	0	1	0	2	0	2	0	0	1	1	0	3	1	4	8
09:15 AM	0	0	1	1	0	4	0	4	0	1	1	2	0	3	0	3	10
09:30 AM	0	1	0	1	0	3	0	3	0	0	0	0	0	2	0	2	6
09:45 AM	0	1	0	1	0	2	0	2	0	0	1	1	1	3	0	4	8
Total	0	3	1	4	0	11	0	11	0	1	3	4	1	11	1	13	32
10:00 AM	0	2	0	2	0	5	0	5	0	2	0	2	1	1	0	2	11
10:15 AM	1	1	0	2	0	3	0	3	0	0	0	0	0	4	0	4	9
Grand Total	1	6	1	8	0	27	0	27	0	4	3	7	3	19	1	23	65
Apprch %	12.5	75	12.5		0	100	0		0	57.1	42.9		13	82.6	4.3		
Total %	1.5	9.2	1.5	12.3	0	41.5	0	41.5	0	6.2	4.6	10.8	4.6	29.2	1.5	35.4	
Passenger +	1	6	1	8	0	27	0	27	0	4	3	7	3	18	1	22	64
% Passenger +	100	100	100	100	0	100	0	100	0	100	100	100	100	94.7	100	95.7	98.5
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	5.3	0	4.3	1.5

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File Name : 4674f
Site Code : 00004674
Start Date : 8/12/2021
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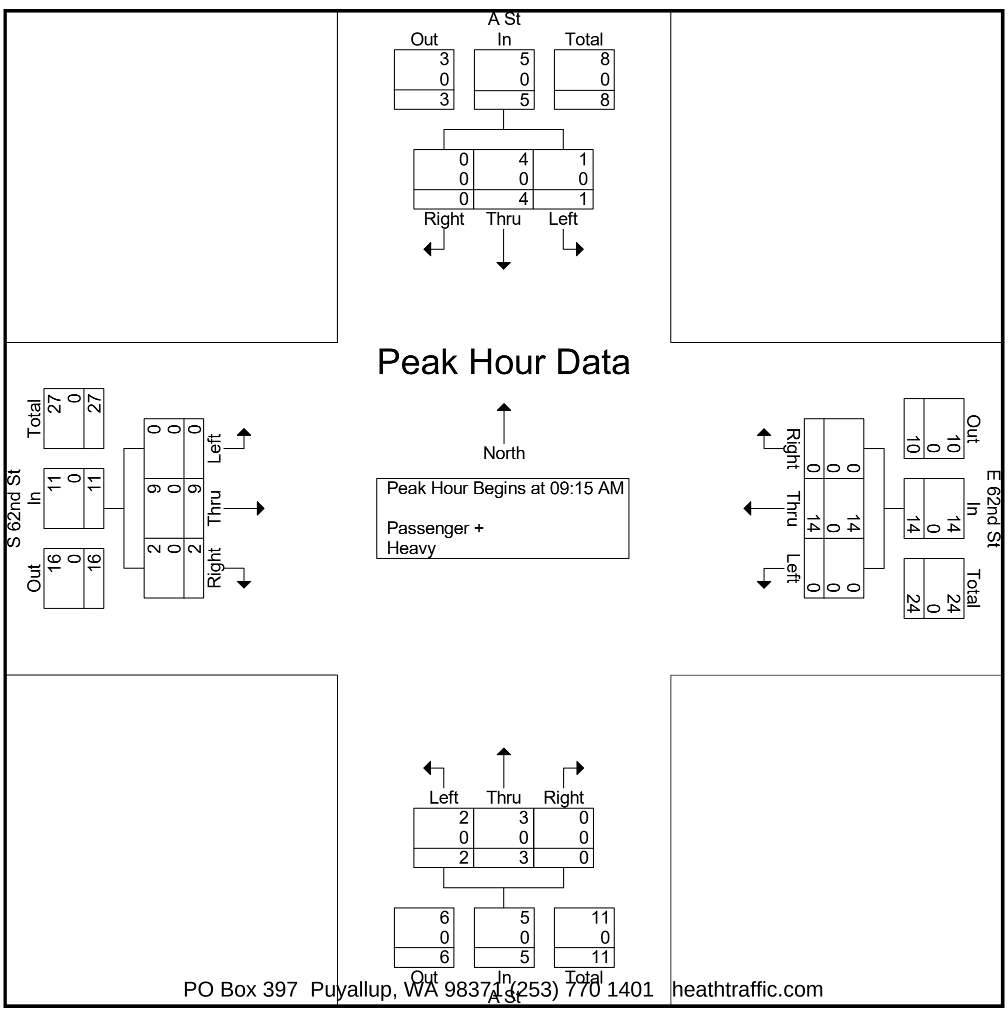
	A St				E 62nd St				A St				S 62nd St				
	Southbound				Westbound				Northbound				Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 09:15 AM																	
09:15 AM	0	0	**1**	1	0	4	0	4	0	1	**1**	**2**	0	**3**	0	3	10
09:30 AM	0	1	0	1	0	3	0	3	0	0	0	0	0	2	0	2	6
09:45 AM	0	1	0	1	0	2	0	2	0	0	1	1	**1**	3	0	**4**	8
10:00 AM	0	**2**	0	**2**	0	**5**	0	**5**	0	**2**	0	2	1	1	0	2	**11**
Total Volume	0	4	1	5	0	14	0	14	0	3	2	5	2	9	0	11	35
% App. Total	0	80	20		0	100	0		0	60	40		18.2	81.8	0		
PHF	.000	.500	.250	.625	.000	.700	.000	.700	.000	.375	.500	.625	.500	.750	.000	.688	.795
Passenger +	0	4	1	5	0	14	0	14	0	3	2	5	2	9	0	11	35
% Passenger +	0	100	100	100	0	100	0	100	0	100	100	100	100	100	0	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : 4674g
Site Code : 00004674
Start Date : 8/12/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	E B St Southbound				E 62nd St Westbound				E B St Northbound				E 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
08:30 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	1	0	1	3
08:45 AM	0	0	1	1	0	4	0	4	0	1	0	1	0	3	0	3	9
Total	0	0	1	1	0	6	0	6	0	1	0	1	0	4	0	4	12
09:00 AM	1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	1	3
09:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	3	2	5	7
09:30 AM	1	1	1	3	0	2	0	2	0	1	0	1	1	1	0	2	8
09:45 AM	0	0	0	0	0	3	0	3	0	0	0	0	0	2	1	3	6
Total	2	1	1	4	0	8	0	8	0	1	0	1	1	7	3	11	24
10:00 AM	1	0	0	1	0	1	0	1	0	1	2	3	0	2	0	2	7
10:15 AM	0	0	0	0	0	2	0	2	0	0	1	1	2	1	0	3	6
Grand Total	3	1	2	6	0	17	0	17	0	3	3	6	3	14	3	20	49
Apprch %	50	16.7	33.3		0	100	0		0	50	50		15	70	15		
Total %	6.1	2	4.1	12.2	0	34.7	0	34.7	0	6.1	6.1	12.2	6.1	28.6	6.1	40.8	
Passenger +	3	1	2	6	0	17	0	17	0	3	3	6	3	13	3	19	48
% Passenger +	100	100	100	100	0	100	0	100	0	100	100	100	100	92.9	100	95	98
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	7.1	0	5	2

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File Name : 4674g
Site Code : 00004674
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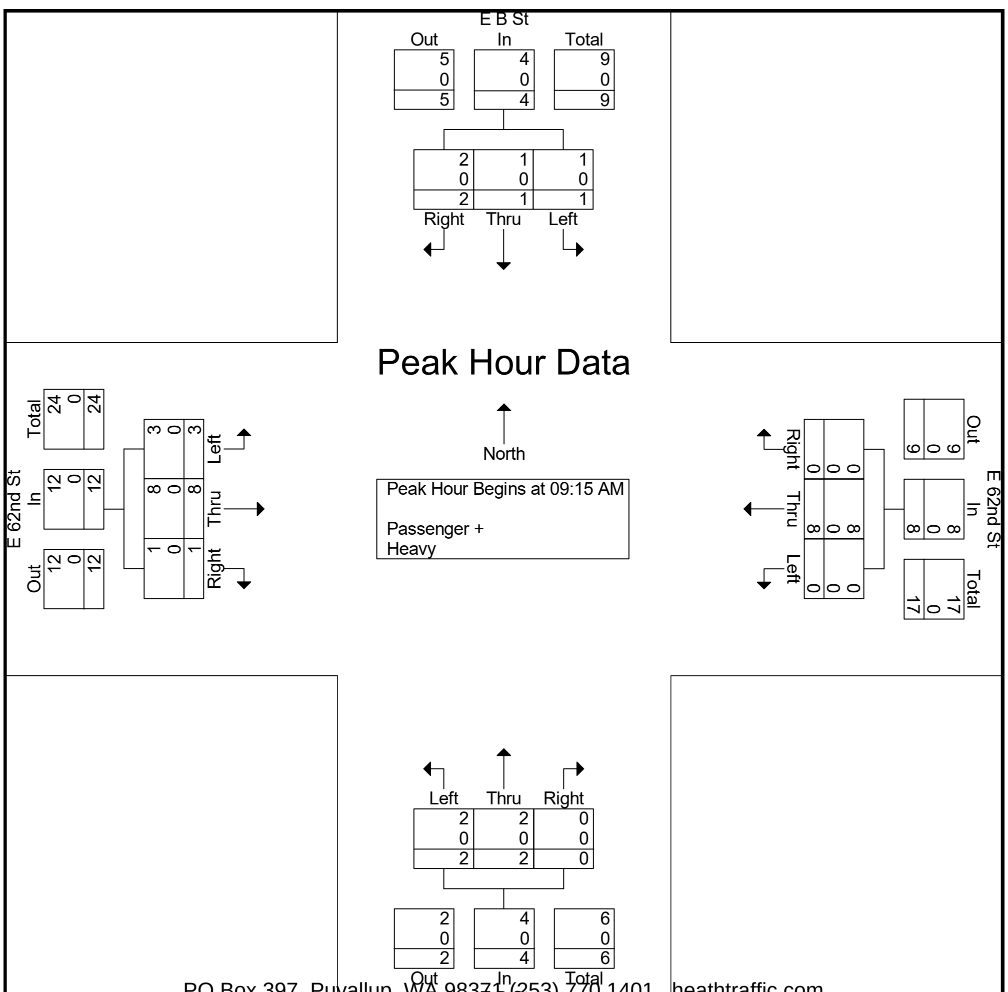
	E B St Southbound				E 62nd St Westbound				E B St Northbound				E 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 08:30 AM to 10:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 09:15 AM																	
09:15 AM	0	0	0	0	0	2	0	2	0	0	0	0	0	**3**	**2**	**5**	7
09:30 AM	**1**	**1**	**1**	**3**	0	2	0	2	0	**1**	0	1	**1**	1	0	2	**8**
09:45 AM	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	2	1	3	6
10:00 AM	1	0	0	1	0	1	0	1	0	1	**2**	**3**	0	2	0	2	7
Total Volume	2	1	1	4	0	8	0	8	0	2	2	4	1	8	3	12	28
% App. Total	50	25	25		0	100	0		0	50	50		8.3	66.7	25		
PHF	.500	.250	.250	.333	.000	.667	.000	.667	.000	.500	.250	.333	.250	.667	.375	.600	.875
Passenger +	2	1	1	4	0	8	0	8	0	2	2	4	1	8	3	12	28
% Passenger +	100	100	100	100	0	100	0	100	0	100	100	100	100	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : 4676a
Site Code : 00004676
Start Date : 8/11/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	A St Southbound				S 60th St Westbound				A St Northbound				S 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	4	3	0	7	0	4	1	5	0	0	0	0	0	14	0	14	26
02:45 PM	2	6	0	8	1	11	0	12	1	0	0	1	0	11	0	11	32
Total	6	9	0	15	1	15	1	17	1	0	0	1	0	25	0	25	58
03:00 PM	4	8	2	14	0	9	0	9	0	0	0	0	1	9	0	10	33
03:15 PM	6	4	0	10	1	8	0	9	0	2	0	2	3	9	0	12	33
03:30 PM	6	6	1	13	1	4	0	5	0	1	1	2	1	14	0	15	35
03:45 PM	7	3	0	10	0	8	0	8	0	2	0	2	1	17	4	22	42
Total	23	21	3	47	2	29	0	31	0	5	1	6	6	49	4	59	143
04:00 PM	3	6	1	10	0	7	1	8	1	0	0	1	0	9	0	9	28
04:15 PM	5	8	0	13	3	7	1	11	0	1	0	1	2	13	1	16	41
Grand Total	37	44	4	85	6	58	3	67	2	6	1	9	8	96	5	109	270
Apprch %	43.5	51.8	4.7		9	86.6	4.5		22.2	66.7	11.1		7.3	88.1	4.6		
Total %	13.7	16.3	1.5	31.5	2.2	21.5	1.1	24.8	0.7	2.2	0.4	3.3	3	35.6	1.9	40.4	
Passenger +	36	43	4	83	6	56	3	65	2	6	1	9	6	96	5	107	264
% Passenger +	97.3	97.7	100	97.6	100	96.6	100	97	100	100	100	100	75	100	100	98.2	97.8
Heavy	1	1	0	2	0	2	0	2	0	0	0	0	2	0	0	2	6
% Heavy	2.7	2.3	0	2.4	0	3.4	0	3	0	0	0	0	25	0	0	1.8	2.2

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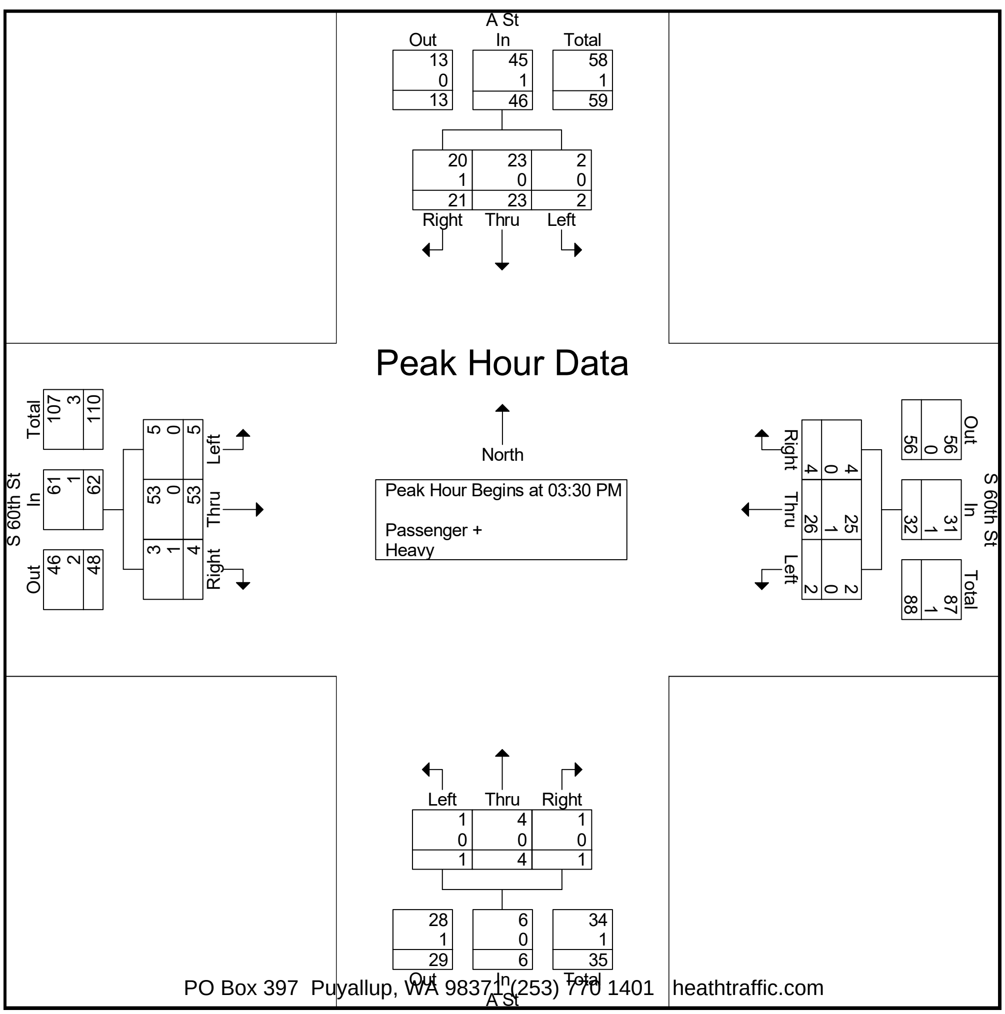
	A St Southbound				S 60th St Westbound				A St Northbound				S 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	6	6	**1**	**13**	1	4	0	5	0	1	**1**	**2**	1	14	0	15	35
03:45 PM	**7**	3	0	10	0	**8**	0	8	0	**2**	0	2	1	**17**	**4**	**22**	**42**
04:00 PM	3	6	1	10	0	7	**1**	8	**1**	0	0	1	0	9	0	9	28
04:15 PM	5	**8**	0	13	**3**	7	1	**11**	0	1	0	1	**2**	13	1	16	41
Total Volume	21	23	2	46	4	26	2	32	1	4	1	6	4	53	5	62	146
% App. Total	45.7	50	4.3		12.5	81.2	6.2		16.7	66.7	16.7		6.5	85.5	8.1		
PHF	.750	.719	.500	.885	.333	.813	.500	.727	.250	.500	.250	.750	.500	.779	.313	.705	.869
Passenger +	20	23	2	45	4	25	2	31	1	4	1	6	3	53	5	61	143
% Passenger +	95.2	100	100	97.8	100	96.2	100	96.9	100	100	100	100	75.0	100	100	98.4	97.9
Heavy	1	0	0	1	0	1	0	1	0	0	0	0	1	0	0	1	3
% Heavy	4.8	0	0	2.2	0	3.8	0	3.1	0	0	0	0	25.0	0	0	1.6	2.1



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File Name : 4676b
Site Code : 00004676
Start Date : 8/11/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	E B St Southbound				E 60th St Westbound				E B St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	1	0	2	3	0	2	1	3	0	2	1	3	2	9	3	14	23
02:45 PM	2	6	6	14	0	6	0	6	0	1	1	2	2	6	3	11	33
Total	3	6	8	17	0	8	1	9	0	3	2	5	4	15	6	25	56
03:00 PM	4	0	12	16	0	5	0	5	0	0	0	0	1	8	1	10	31
03:15 PM	0	1	2	3	2	7	0	9	1	0	2	3	0	8	1	9	24
03:30 PM	3	1	7	11	0	3	0	3	1	0	0	1	0	11	1	12	27
03:45 PM	2	1	4	7	1	6	0	7	0	0	2	2	2	14	2	18	34
Total	9	3	25	37	3	21	0	24	2	0	4	6	3	41	5	49	116
04:00 PM	3	2	3	8	2	2	0	4	0	1	3	4	1	4	3	8	24
04:15 PM	3	3	2	8	2	5	0	7	1	0	1	2	0	12	2	14	31
Grand Total	18	14	38	70	7	36	1	44	3	4	10	17	8	72	16	96	227
Apprch %	25.7	20	54.3		15.9	81.8	2.3		17.6	23.5	58.8		8.3	75	16.7		
Total %	7.9	6.2	16.7	30.8	3.1	15.9	0.4	19.4	1.3	1.8	4.4	7.5	3.5	31.7	7	42.3	
Passenger +	17	14	38	69	7	36	1	44	3	4	9	16	8	72	16	96	225
% Passenger +	94.4	100	100	98.6	100	100	100	100	100	100	90	94.1	100	100	100	100	99.1
Heavy	1	0	0	1	0	0	0	0	0	0	1	1	0	0	0	0	2
% Heavy	5.6	0	0	1.4	0	0	0	0	0	0	10	5.9	0	0	0	0	0.9

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File Name : 4676b
Site Code : 00004676
Start Date : 8/11/2021
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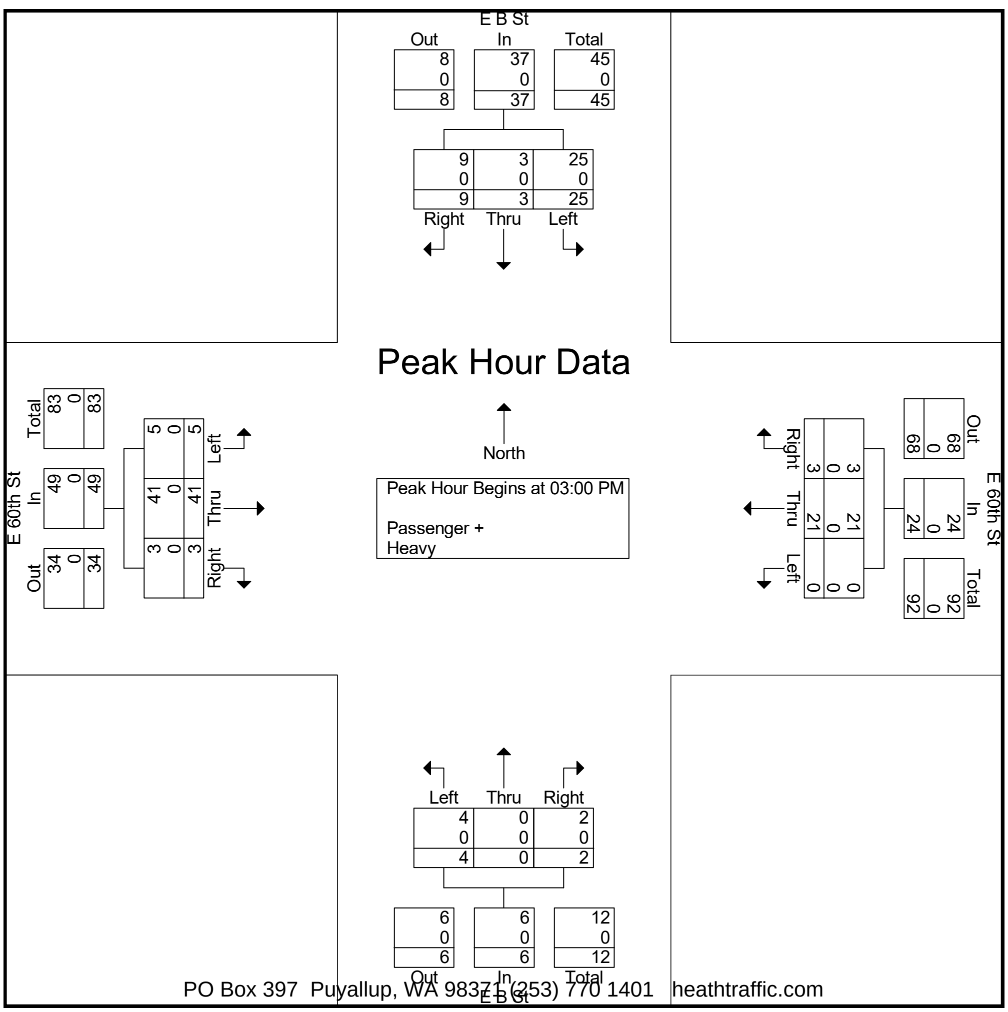
	E B St Southbound				E 60th St Westbound				E B St Northbound				E 60th St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:00 PM																	
03:00 PM	**4**	0	**12**	**16**	0	5	0	5	0	0	0	0	1	8	1	10	31
03:15 PM	0	**1**	2	3	**2**	**7**	0	**9**	**1**	0	**2**	**3**	0	8	1	9	24
03:30 PM	3	1	7	11	0	3	0	3	1	0	0	1	0	11	1	12	27
03:45 PM	2	1	4	7	1	6	0	7	0	0	2	2	**2**	**14**	**2**	**18**	**34**
Total Volume	9	3	25	37	3	21	0	24	2	0	4	6	3	41	5	49	116
% App. Total	24.3	8.1	67.6		12.5	87.5	0		33.3	0	66.7		6.1	83.7	10.2		
PHF	.563	.750	.521	.578	.375	.750	.000	.667	.500	.000	.500	.500	.375	.732	.625	.681	.853
Passenger +	9	3	25	37	3	21	0	24	2	0	4	6	3	41	5	49	116
% Passenger +	100	100	100	100	100	100	0	100	100	0	100	100	100	100	100	100	100
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Heath & Associates

PO Box 397
Puyallup, WA 98371

File Name : 4674c
Site Code : 00004674
Start Date : 8/11/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	A St Southbound				E 62nd St Westbound				A St Northbound				S 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	0	3	0	3	0	4	0	4	0	0	0	0	1	6	0	7	14
02:45 PM	1	7	1	9	0	3	0	3	0	1	0	1	0	5	0	5	18
Total	1	10	1	12	0	7	0	7	0	1	0	1	1	11	0	12	32
03:00 PM	1	8	0	9	0	1	0	1	0	0	0	0	2	2	0	4	14
03:15 PM	1	5	1	7	1	3	1	5	0	0	0	0	0	5	1	6	18
03:30 PM	0	6	0	6	0	2	0	2	0	1	2	3	1	4	0	5	16
03:45 PM	1	2	0	3	1	5	0	6	0	1	1	2	1	6	0	7	18
Total	3	21	1	25	2	11	1	14	0	2	3	5	4	17	1	22	66
04:00 PM	1	7	0	8	1	6	2	9	0	0	1	1	1	7	0	8	26
04:15 PM	1	7	0	8	1	7	0	8	0	0	0	0	1	4	0	5	21
Grand Total	6	45	2	53	4	31	3	38	0	3	4	7	7	39	1	47	145
Apprch %	11.3	84.9	3.8		10.5	81.6	7.9		0	42.9	57.1		14.9	83	2.1		
Total %	4.1	31	1.4	36.6	2.8	21.4	2.1	26.2	0	2.1	2.8	4.8	4.8	26.9	0.7	32.4	
Passenger +	5	44	2	51	4	31	3	38	0	3	4	7	6	38	1	45	141
% Passenger +	83.3	97.8	100	96.2	100	100	100	100	0	100	100	100	85.7	97.4	100	95.7	97.2
Heavy	1	1	0	2	0	0	0	0	0	0	0	0	1	1	0	2	4
% Heavy	16.7	2.2	0	3.8	0	0	0	0	0	0	0	0	14.3	2.6	0	4.3	2.8

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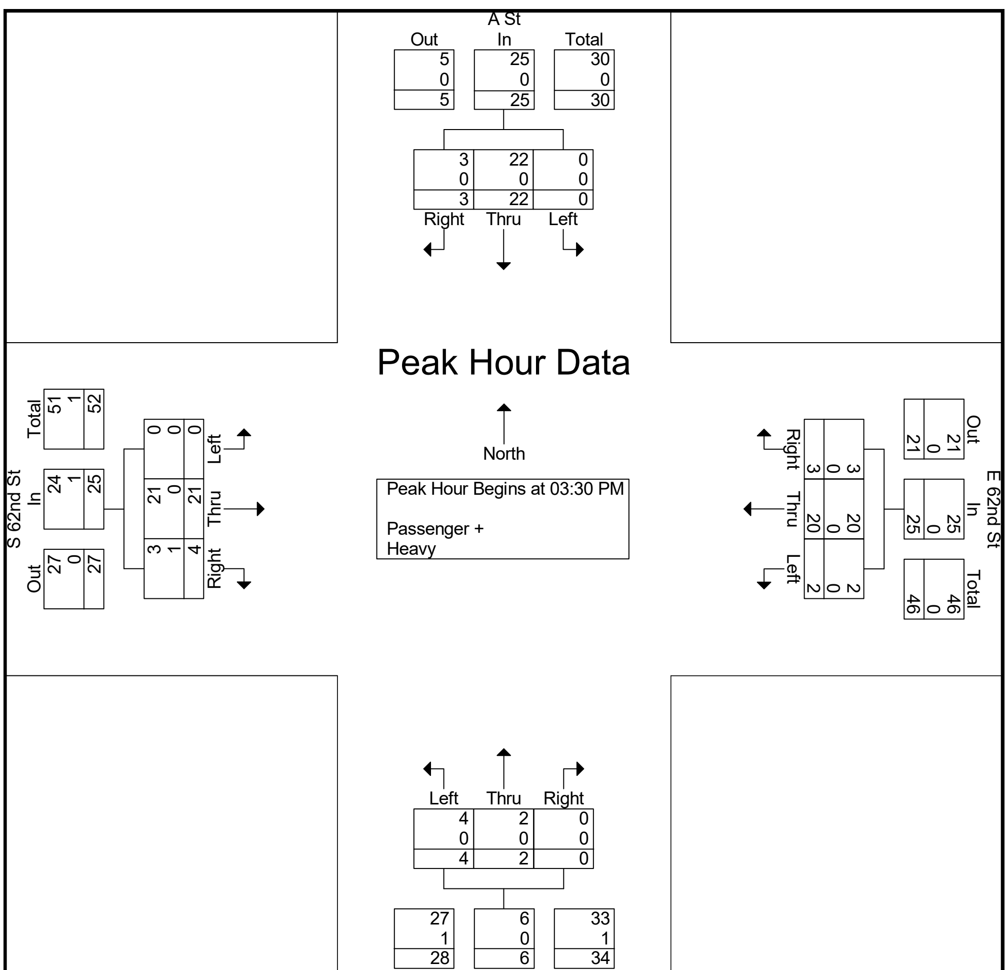
File Name : 4674c
Site Code : 00004674
Start Date : 8/11/2021
Page No : 2

	A St Southbound				E 62nd St Westbound				A St Northbound				S 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	0	6	0	6	0	2	0	2	0	**1**	**2**	**3**	**1**	4	0	5	16
03:45 PM	**1**	2	0	3	**1**	5	0	6	0	1	1	2	1	6	0	7	18
04:00 PM	1	**7**	0	**8**	1	6	**2**	**9**	0	0	1	1	1	**7**	0	**8**	**26**
04:15 PM	1	7	0	8	1	**7**	0	8	0	0	0	0	1	4	0	5	21
Total Volume	3	22	0	25	3	20	2	25	0	2	4	6	4	21	0	25	81
% App. Total	12	88	0		12	80	8		0	33.3	66.7		16	84	0		
PHF	.750	.786	.000	.781	.750	.714	.250	.694	.000	.500	.500	.500	1.00	.750	.000	.781	.779
Passenger +	3	22	0	25	3	20	2	25	0	2	4	6	3	21	0	24	80
% Passenger +	100	100	0	100	100	100	100	100	0	100	100	100	75.0	100	0	96.0	98.8
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	25.0	0	0	4.0	1.2



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Puyallup, WA 98371

File Name : 4674b
Site Code : 00007674
Start Date : 8/11/2021
Page No : 1

Groups Printed- Passenger + - Heavy

	E B St Southbound				E 62nd St Westbound				E B St Northbound				E 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
02:30 PM	1	1	0	2	0	1	0	1	0	0	2	2	1	4	1	6	11
02:45 PM	0	2	2	4	0	2	0	2	0	1	0	1	0	3	1	4	11
Total	1	3	2	6	0	3	0	3	0	1	2	3	1	7	2	10	22
03:00 PM	1	0	0	1	0	0	1	1	0	0	0	0	0	3	0	3	5
03:15 PM	1	0	0	1	0	3	0	3	0	0	0	0	2	3	1	6	10
03:30 PM	1	0	0	1	0	3	0	3	1	0	1	2	0	2	0	2	8
03:45 PM	0	1	0	1	1	2	0	3	0	0	1	1	2	2	0	4	9
Total	3	1	0	4	1	8	1	10	1	0	2	3	4	10	1	15	32
04:00 PM	1	1	2	4	0	2	0	2	0	0	4	4	1	4	1	6	16
04:15 PM	2	1	1	4	1	3	0	4	0	1	2	3	0	2	0	2	13
Grand Total	7	6	5	18	2	16	1	19	1	2	10	13	6	23	4	33	83
Apprch %	38.9	33.3	27.8		10.5	84.2	5.3		7.7	15.4	76.9		18.2	69.7	12.1		
Total %	8.4	7.2	6	21.7	2.4	19.3	1.2	22.9	1.2	2.4	12	15.7	7.2	27.7	4.8	39.8	
Passenger +	7	6	5	18	2	15	1	18	1	2	10	13	6	21	4	31	80
% Passenger +	100	100	100	100	100	93.8	100	94.7	100	100	100	100	100	91.3	100	93.9	96.4
Heavy	0	0	0	0	0	1	0	1	0	0	0	0	0	2	0	2	3
% Heavy	0	0	0	0	0	6.2	0	5.3	0	0	0	0	0	8.7	0	6.1	3.6

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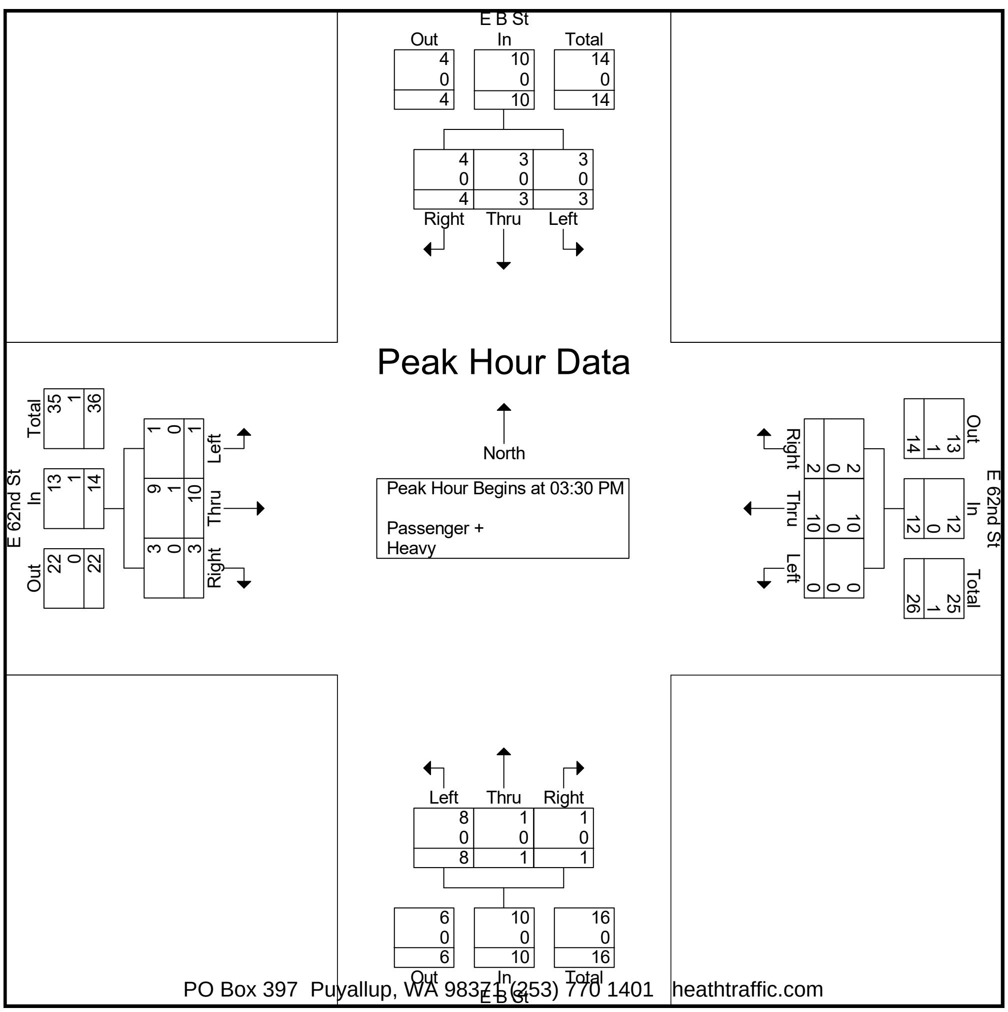
File Name : 4674b
Site Code : 00007674
Start Date : 8/11/2021
Page No : 2

	E B St Southbound				E 62nd St Westbound				E B St Northbound				E 62nd St Eastbound				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 02:30 PM to 04:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 03:30 PM																	
03:30 PM	1	0	0	1	0	**3**	0	3	**1**	0	1	2	0	2	0	2	8
03:45 PM	0	**1**	0	1	**1**	2	0	3	0	0	1	1	**2**	2	0	4	9
04:00 PM	1	1	**2**	**4**	0	2	0	2	0	0	**4**	**4**	1	**4**	**1**	**6**	**16**
04:15 PM	**2**	1	1	4	1	3	0	**4**	0	**1**	2	3	0	2	0	2	13
Total Volume	4	3	3	10	2	10	0	12	1	1	8	10	3	10	1	14	46
% App. Total	40	30	30		16.7	83.3	0		10	10	80		21.4	71.4	7.1		
PHF	.500	.750	.375	.625	.500	.833	.000	.750	.250	.250	.500	.625	.375	.625	.250	.583	.719
Passenger +	4	3	3	10	2	10	0	12	1	1	8	10	3	9	1	13	45
% Passenger +	100	100	100	100	100	100	0	100	100	100	100	100	100	90.0	100	92.9	97.8
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
% Heavy	0	0	0	0	0	0	0	0	0	0	0	0	0	10.0	0	7.1	2.2



Elementary School
(520)

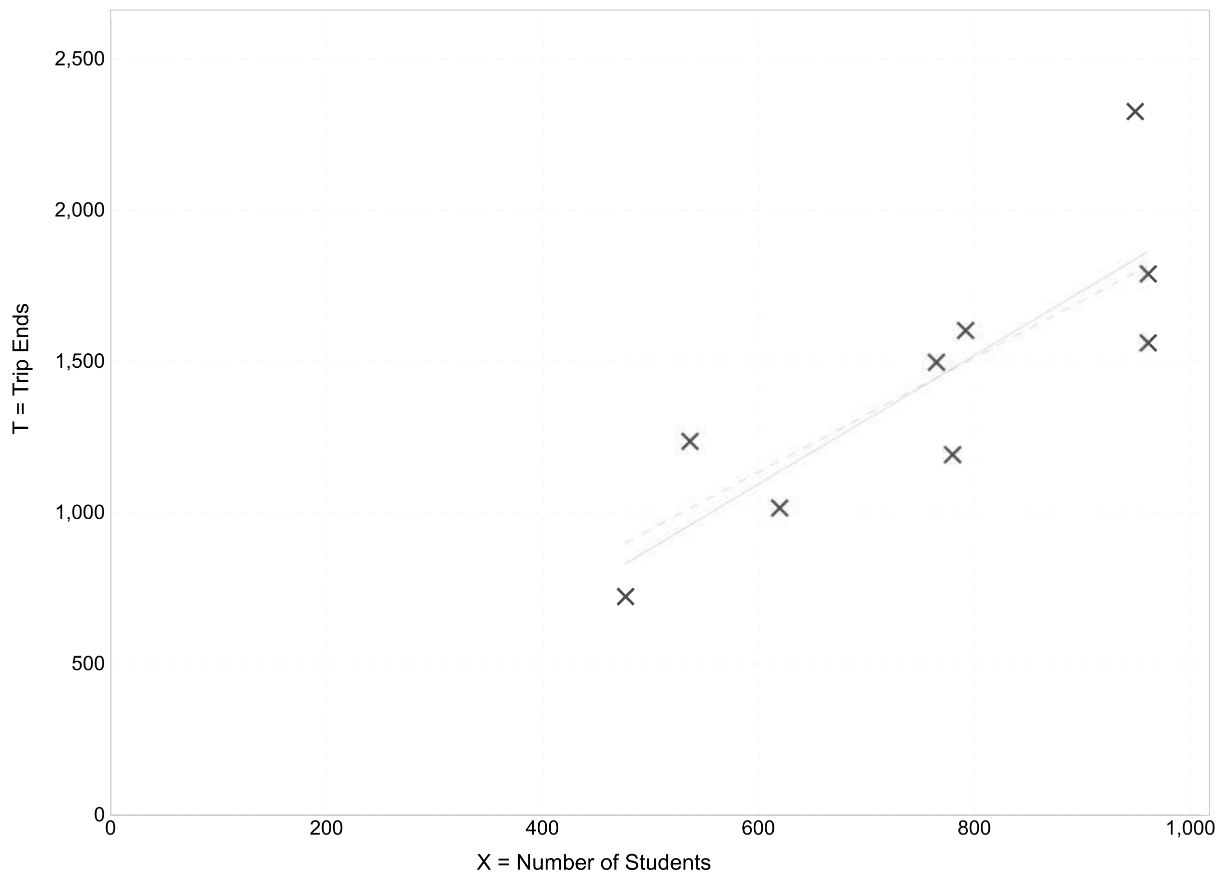
Vehicle Trip Ends vs: Students
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. Num. of Students: 760
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
1.89	1.51 - 2.45	0.34

Data Plot and Equation



× **Study Site** —— **Fitted Curve** **Average Rate**

Fitted Curve Equation: T = 2.13(X) - 184.07 **R^2= 0.70**

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Elementary School
(520)

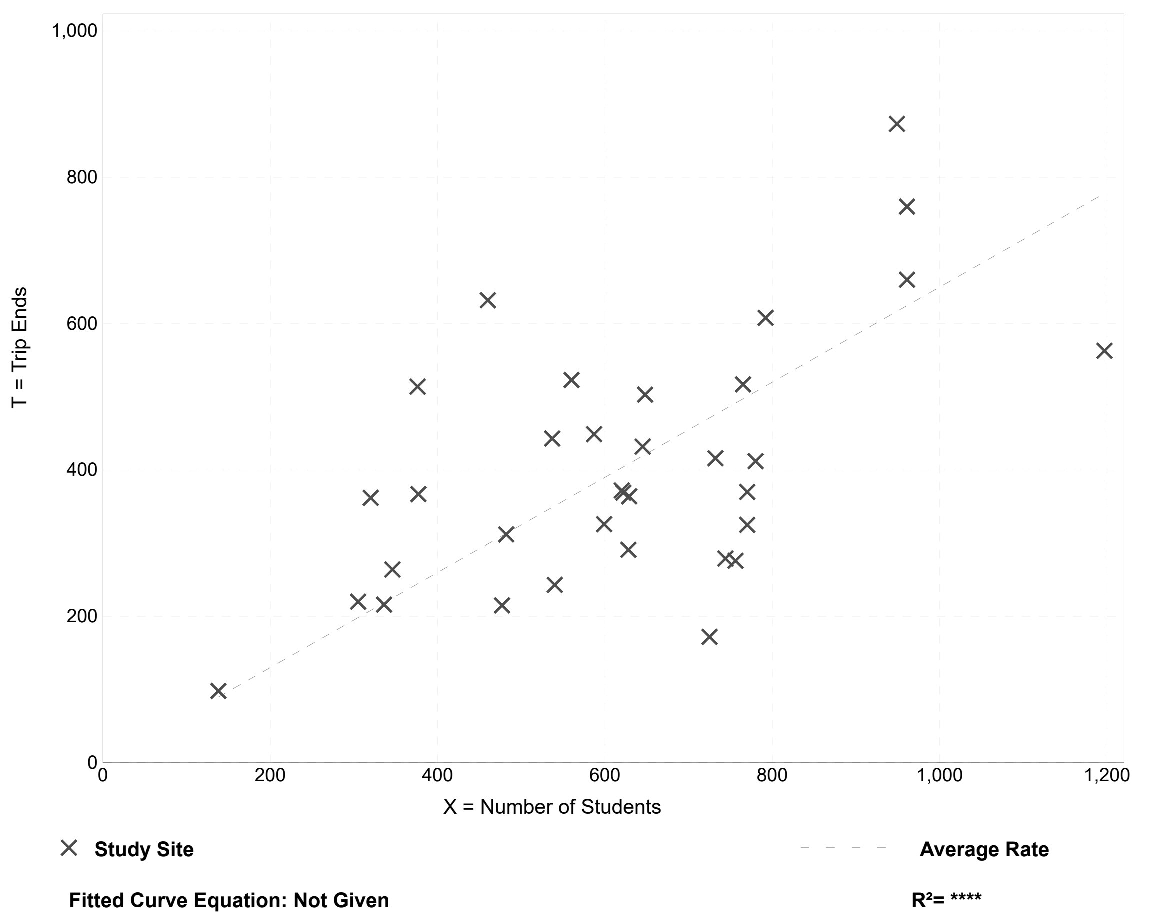
Vehicle Trip Ends vs: **Students**
On a: **Weekday,**
AM Peak Hour of Generator

Setting/Location: **General Urban/Suburban**
Number of Studies: 34
Avg. Num. of Students: 622
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.65	0.24 - 1.37	0.24

Data Plot and Equation



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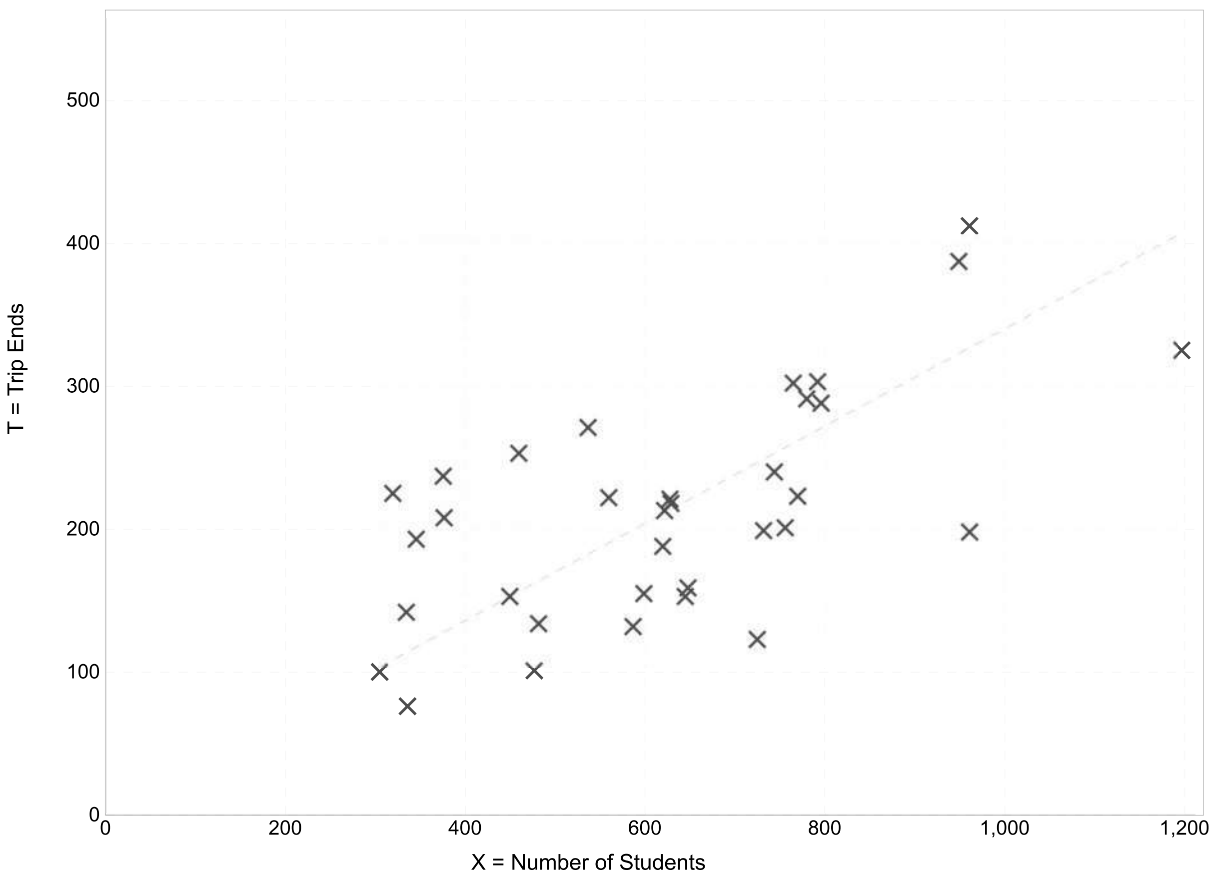
Elementary School
(520)

Vehicle Trip Ends vs:	**Students**
On a:	**Weekday,** **PM Peak Hour of Generator**
Setting/Location:	**General Urban/Suburban**
Number of Studies:	34
Avg. Num. of Students:	626
Directional Distribution:	45% entering, 55% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.34	0.17 - 0.70	0.11

Data Plot and Equation



× **Study Site** **Average Rate**

Fitted Curve Equation: Not Given **R^2= ******

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Intersection	
Intersection Delay, s/veh	2.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	14	27	6	7
Demand Flow Rate, veh/h	14	27	6	7
Vehicles Circulating, veh/h	8	6	20	28
Vehicles Exiting, veh/h	27	20	2	5
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.8	2.7	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	14	27	6	7
Cap Entry Lane, veh/h	1369	1371	1352	1341
Entry HV Adj Factor	0.991	0.992	0.998	0.999
Flow Entry, veh/h	14	27	6	7
Cap Entry, veh/h	1356	1360	1350	1339
V/C Ratio	0.010	0.020	0.004	0.005
Control Delay, s/veh	2.7	2.8	2.7	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	10	1	0	15	3	2	1	1	7	3	2
Future Volume (Veh/h)	4	10	1	0	15	3	2	1	1	7	3	2
Sign Control		Free			Free			Yield			Yield	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	6	15	2	0	23	5	3	2	2	11	5	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	28			17			59	56	16	56	54	26
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	28			17			59	56	16	56	54	26
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	99	100
cM capacity (veh/h)	1592			1607			930	834	1066	937	835	1053

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	23	28	7	19
Volume Left	6	0	3	11
Volume Right	2	5	2	3
cSH	1592	1607	933	924
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (ft)	0	0	1	2
Control Delay (s)	1.9	0.0	8.9	9.0
Lane LOS	A		A	A
Approach Delay (s)	1.9	0.0	8.9	9.0
Approach LOS			A	A

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	14.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	9	2	0	14	0	2	3	0	1	4	0
Future Volume (vph)	0	9	2	0	14	0	2	3	0	1	4	0
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	11	3	0	18	0	3	4	0	1	5	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	14	18	7	6
Volume Left (vph)	0	0	3	1
Volume Right (vph)	3	0	0	0
Hadj (s)	-0.11	0.02	0.10	0.05
Departure Headway (s)	3.8	4.0	4.1	4.0
Degree Utilization, x	0.01	0.02	0.01	0.01
Capacity (veh/h)	928	901	863	882
Control Delay (s)	6.9	7.0	7.1	7.1
Approach Delay (s)	6.9	7.0	7.1	7.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	3	8	1	0	8	0	2	2	0	1	1	2
Future Volume (vph)	3	8	1	0	8	0	2	2	0	1	1	2
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	3	9	1	0	9	0	2	2	0	1	1	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	13	9	4	4
Volume Left (vph)	3	0	2	1
Volume Right (vph)	1	0	0	2
Hadj (s)	0.02	0.02	0.12	-0.23
Departure Headway (s)	3.9	3.9	4.1	3.7
Degree Utilization, x	0.01	0.01	0.00	0.00
Capacity (veh/h)	904	905	867	957
Control Delay (s)	7.0	7.0	7.1	6.7
Approach Delay (s)	7.0	7.0	7.1	6.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

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Intersection	
Intersection Delay, s/veh	3.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	72	37	7	52
Demand Flow Rate, veh/h	74	38	7	53
Vehicles Circulating, veh/h	30	12	70	34
Vehicles Exiting, veh/h	57	65	34	16
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.2	2.9	2.9	3.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	74	38	7	53
Cap Entry Lane, veh/h	1338	1363	1285	1333
Entry HV Adj Factor	0.978	0.969	0.993	0.976
Flow Entry, veh/h	72	37	7	52
Cap Entry, veh/h	1309	1320	1276	1301
V/C Ratio	0.055	0.028	0.005	0.040
Control Delay, s/veh	3.2	2.9	2.9	3.1
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	41	3	0	21	3	4	0	2	25	3	9
Future Volume (Veh/h)	5	41	3	0	21	3	4	0	2	25	3	9
Sign Control		Free			Free			Yield			Yield	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	48	4	0	25	4	5	0	2	29	4	11
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	29			52			102	91	50	91	91	27
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	29			52			102	91	50	91	91	27
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	97	99	99
cM capacity (veh/h)	1591			1560			866	798	1021	891	798	1051

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	58	29	7	44
Volume Left	6	0	5	29
Volume Right	4	4	2	11
cSH	1591	1560	905	917
Volume to Capacity	0.00	0.00	0.01	0.05
Queue Length 95th (ft)	0	0	1	4
Control Delay (s)	0.8	0.0	9.0	9.1
Lane LOS	A		A	A
Approach Delay (s)	0.8	0.0	9.0	9.1
Approach LOS			A	A

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	16.6%	ICU Level of Service	A
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	21	4	2	20	3	4	2	0	0	22	3
Future Volume (vph)	0	21	4	2	20	3	4	2	0	0	22	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	27	5	3	26	4	5	3	0	0	28	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	32	33	8	32
Volume Left (vph)	0	3	5	0
Volume Right (vph)	5	4	0	4
Hadj (s)	-0.01	-0.04	0.14	-0.06
Departure Headway (s)	4.0	4.0	4.2	4.0
Degree Utilization, x	0.04	0.04	0.01	0.04
Capacity (veh/h)	883	890	829	884
Control Delay (s)	7.2	7.1	7.2	7.1
Approach Delay (s)	7.2	7.1	7.2	7.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.1		
Level of Service	A		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	1	10	3	0	10	2	8	1	1	3	3	4
Future Volume (vph)	1	10	3	0	10	2	8	1	1	3	3	4
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	1	14	4	0	14	3	11	1	1	4	4	6

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	19	17	13	14
Volume Left (vph)	1	0	11	4
Volume Right (vph)	4	3	1	6
Hadj (s)	0.01	-0.09	0.14	-0.18
Departure Headway (s)	4.0	3.9	4.1	3.8
Degree Utilization, x	0.02	0.02	0.01	0.01
Capacity (veh/h)	890	914	852	931
Control Delay (s)	7.1	7.0	7.2	6.9
Approach Delay (s)	7.1	7.0	7.2	6.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	2.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	15	29	6	7
Demand Flow Rate, veh/h	15	29	6	7
Vehicles Circulating, veh/h	8	6	21	30
Vehicles Exiting, veh/h	29	21	2	5
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	2.7	2.8	2.7	2.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	15	29	6	7
Cap Entry Lane, veh/h	1369	1371	1351	1338
Entry HV Adj Factor	0.991	0.991	0.998	0.999
Flow Entry, veh/h	15	29	6	7
Cap Entry, veh/h	1356	1360	1348	1336
V/C Ratio	0.011	0.021	0.004	0.005
Control Delay, s/veh	2.7	2.8	2.7	2.7
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	4	11	1	0	16	3	2	1	1	8	3	2
Future Volume (Veh/h)	4	11	1	0	16	3	2	1	1	8	3	2
Sign Control		Free			Free			Yield			Yield	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Hourly flow rate (vph)	6	17	2	0	25	5	3	2	2	12	5	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	30			19			63	60	18	60	58	28
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	30			19			63	60	18	60	58	28
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	99	99	100
cM capacity (veh/h)	1589			1604			924	830	1063	931	831	1051

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	25	30	7	20
Volume Left	6	0	3	12
Volume Right	2	5	2	3
cSH	1589	1604	929	919
Volume to Capacity	0.00	0.00	0.01	0.02
Queue Length 95th (ft)	0	0	1	2
Control Delay (s)	1.8	0.0	8.9	9.0
Lane LOS	A		A	A
Approach Delay (s)	1.8	0.0	8.9	9.0
Approach LOS			A	A

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	14.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	10	2	0	15	0	2	3	0	1	4	0
Future Volume (vph)	0	10	2	0	15	0	2	3	0	1	4	0
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	0	13	3	0	19	0	3	4	0	1	5	0

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	16	19	7	6
Volume Left (vph)	0	0	3	1
Volume Right (vph)	3	0	0	0
Hadj (s)	-0.10	0.02	0.10	0.05
Departure Headway (s)	3.9	4.0	4.1	4.0
Degree Utilization, x	0.02	0.02	0.01	0.01
Capacity (veh/h)	924	900	862	880
Control Delay (s)	6.9	7.0	7.1	7.1
Approach Delay (s)	6.9	7.0	7.1	7.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	3	9	1	0	9	0	2	2	0	1	1	2
Future Volume (vph)	3	9	1	0	9	0	2	2	0	1	1	2
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	3	10	1	0	10	0	2	2	0	1	1	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	14	10	4	4
Volume Left (vph)	3	0	2	1
Volume Right (vph)	1	0	0	2
Hadj (s)	0.02	0.02	0.12	-0.23
Departure Headway (s)	3.9	3.9	4.1	3.7
Degree Utilization, x	0.02	0.01	0.00	0.00
Capacity (veh/h)	904	905	866	955
Control Delay (s)	7.0	7.0	7.1	6.7
Approach Delay (s)	7.0	7.0	7.1	6.7
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Intersection Delay, s/veh	3.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	77	39	7	57
Demand Flow Rate, veh/h	79	40	7	58
Vehicles Circulating, veh/h	33	12	75	36
Vehicles Exiting, veh/h	61	70	37	16
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.2	3.0	2.9	3.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	79	40	7	58
Cap Entry Lane, veh/h	1334	1363	1278	1330
Entry HV Adj Factor	0.979	0.968	0.993	0.978
Flow Entry, veh/h	77	39	7	57
Cap Entry, veh/h	1306	1320	1269	1301
V/C Ratio	0.059	0.029	0.005	0.044
Control Delay, s/veh	3.2	3.0	2.9	3.1
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	44	3	0	23	3	4	0	2	27	3	10
Future Volume (Veh/h)	5	44	3	0	23	3	4	0	2	27	3	10
Sign Control		Free			Free			Yield			Yield	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	6	52	4	0	27	4	5	0	2	32	4	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	31			56			109	97	54	97	97	29
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	31			56			109	97	54	97	97	29
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			99	100	100	96	99	99
cM capacity (veh/h)	1588			1555			856	792	1016	883	792	1049

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	62	31	7	48
Volume Left	6	0	5	32
Volume Right	4	4	2	12
cSH	1588	1555	896	911
Volume to Capacity	0.00	0.00	0.01	0.05
Queue Length 95th (ft)	0	0	1	4
Control Delay (s)	0.7	0.0	9.0	9.2
Lane LOS	A		A	A
Approach Delay (s)	0.7	0.0	9.0	9.2
Approach LOS			A	A

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	16.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	0	23	4	2	21	3	4	2	0	0	24	3
Future Volume (vph)	0	23	4	2	21	3	4	2	0	0	24	3
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	0	29	5	3	27	4	5	3	0	0	31	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	34	34	8	35
Volume Left (vph)	0	3	5	0
Volume Right (vph)	5	4	0	4
Hadj (s)	-0.01	-0.04	0.14	-0.05
Departure Headway (s)	4.0	4.0	4.2	4.0
Degree Utilization, x	0.04	0.04	0.01	0.04
Capacity (veh/h)	880	887	827	880
Control Delay (s)	7.2	7.1	7.3	7.2
Approach Delay (s)	7.2	7.1	7.3	7.2
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	13.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	1	11	3	0	11	2	9	1	1	3	3	4
Future Volume (vph)	1	11	3	0	11	2	9	1	1	3	3	4
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	1	15	4	0	15	3	13	1	1	4	4	6

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	20	18	15	14
Volume Left (vph)	1	0	13	4
Volume Right (vph)	4	3	1	6
Hadj (s)	0.02	-0.08	0.15	-0.18
Departure Headway (s)	4.0	3.9	4.1	3.8
Degree Utilization, x	0.02	0.02	0.02	0.01
Capacity (veh/h)	886	911	848	929
Control Delay (s)	7.1	7.0	7.2	6.9
Approach Delay (s)	7.1	7.0	7.2	6.9
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

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Intersection	
Intersection Delay, s/veh	3.7
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	118	197	47	41
Demand Flow Rate, veh/h	119	198	47	41
Vehicles Circulating, veh/h	81	6	159	157
Vehicles Exiting, veh/h	117	200	41	47
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.6	3.8	3.4	3.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	119	198	47	41
Cap Entry Lane, veh/h	1270	1371	1173	1176
Entry HV Adj Factor	0.990	0.994	1.000	1.000
Flow Entry, veh/h	118	197	47	41
Cap Entry, veh/h	1258	1364	1173	1175
V/C Ratio	0.094	0.144	0.040	0.035
Control Delay, s/veh	3.6	3.8	3.4	3.3
LOS	A	A	A	A
95th %tile Queue, veh	0	1	0	0

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	12	18	28	1	23	3	18	1	1	8	4	10
Future Vol, veh/h	12	18	28	1	23	3	18	1	1	8	4	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	65	65	65	65	65	65	65	65	65
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	18	28	43	2	35	5	28	2	2	12	6	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	40	0	0	71	0	0	138	130	50	130	149	38
Stage 1	-	-	-	-	-	-	86	86	-	42	42	-
Stage 2	-	-	-	-	-	-	52	44	-	88	107	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1576	-	-	1536	-	-	835	762	1021	845	744	1037
Stage 1	-	-	-	-	-	-	924	826	-	975	862	-
Stage 2	-	-	-	-	-	-	963	860	-	922	809	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1576	-	-	1536	-	-	809	752	1021	834	734	1037
Mov Cap-2 Maneuver	-	-	-	-	-	-	809	752	-	834	734	-
Stage 1	-	-	-	-	-	-	913	816	-	963	861	-
Stage 2	-	-	-	-	-	-	941	859	-	908	799	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	0.3	9.6	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	814	1576	-	-	1536	-	-	891
HCM Lane V/C Ratio	0.038	0.012	-	-	0.001	-	-	0.038
HCM Control Delay (s)	9.6	7.3	0	-	7.3	0	-	9.2
HCM Lane LOS	A	A	A	-	A	A	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.1

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	8	11	2	0	15	0	2	26	3	1	27	7
Future Volume (vph)	8	11	2	0	15	0	2	26	3	1	27	7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Hourly flow rate (vph)	10	14	3	0	19	0	3	33	4	1	34	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	27	19	40	44
Volume Left (vph)	10	0	3	1
Volume Right (vph)	3	0	4	9
Hadj (s)	0.02	0.02	-0.03	-0.10
Departure Headway (s)	4.1	4.1	4.0	3.9
Degree Utilization, x	0.03	0.02	0.04	0.05
Capacity (veh/h)	850	851	873	898
Control Delay (s)	7.3	7.2	7.2	7.1
Approach Delay (s)	7.3	7.2	7.2	7.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.2		
Level of Service	A		
Intersection Capacity Utilization	17.8%	ICU Level of Service	A
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	7	9	1	0	9	9	2	11	0	7	8	2
Future Volume (vph)	7	9	1	0	9	9	2	11	0	7	8	2
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	8	10	1	0	10	10	2	13	0	8	9	2

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	19	20	15	19
Volume Left (vph)	8	0	2	8
Volume Right (vph)	1	10	0	2
Hadj (s)	0.07	-0.28	0.04	0.04
Departure Headway (s)	4.1	3.7	4.0	4.0
Degree Utilization, x	0.02	0.02	0.02	0.02
Capacity (veh/h)	872	956	869	879
Control Delay (s)	7.1	6.8	7.1	7.1
Approach Delay (s)	7.1	6.8	7.1	7.1
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.0		
Level of Service	A		
Intersection Capacity Utilization	16.8%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	33	120	31	23	120	26
Future Vol, veh/h	33	120	31	23	120	26
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	60	60	60	60	60	60
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	55	200	52	38	200	43

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	255	0	297	155
Stage 1	-	-	-	-	155	-
Stage 2	-	-	-	-	142	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1322	-	698	896
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	890	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1322	-	670	896
Mov Cap-2 Maneuver	-	-	-	-	670	-
Stage 1	-	-	-	-	878	-
Stage 2	-	-	-	-	854	-

Approach	EB	WB	NB
HCM Control Delay, s	0	4.5	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	702	-	-	1322	-
HCM Lane V/C Ratio	0.347	-	-	0.039	-
HCM Control Delay (s)	12.8	-	-	7.8	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	1.6	-	-	0.1	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	2	2	2	0	2	6	18	2	2	13	18
Future Vol, veh/h	0	2	2	2	0	2	6	18	2	2	13	18
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
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	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	0	100	100	2	2	2	2	2	2	2	2	25
Mvmt Flow	0	3	3	3	0	3	10	30	3	3	22	30

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	96	96	37	98	110	32	52	0	0	33	0	0
Stage 1	43	43	-	52	52	-	-	-	-	-	-	-
Stage 2	53	53	-	46	58	-	-	-	-	-	-	-
Critical Hdwy	7.1	7.5	7.2	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	6.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	6.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.9	4.2	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	891	642	813	884	780	1042	1554	-	-	1579	-	-
Stage 1	976	700	-	961	852	-	-	-	-	-	-	-
Stage 2	965	692	-	968	847	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	882	636	813	871	773	1042	1554	-	-	1579	-	-
Mov Cap-2 Maneuver	882	636	-	871	773	-	-	-	-	-	-	-
Stage 1	969	699	-	954	846	-	-	-	-	-	-	-
Stage 2	955	687	-	958	845	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.1	8.8	1.7	0.4
HCM LOS	B	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1554	-	-	714	949	1579	-	-
HCM Lane V/C Ratio	0.006	-	-	0.009	0.007	0.002	-	-
HCM Control Delay (s)	7.3	0	-	10.1	8.8	7.3	0	-
HCM Lane LOS	A	A	-	B	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0	0	-	-

Intersection	
Intersection Delay, s/veh	3.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	116	121	24	70
Demand Flow Rate, veh/h	118	124	24	71
Vehicles Circulating, veh/h	64	12	127	104
Vehicles Exiting, veh/h	111	139	55	32
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	3.6	3.4	3.1	3.4
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	118	124	24	71
Cap Entry Lane, veh/h	1293	1363	1212	1241
Entry HV Adj Factor	0.983	0.974	0.998	0.982
Flow Entry, veh/h	116	121	24	70
Cap Entry, veh/h	1270	1328	1210	1218
V/C Ratio	0.091	0.091	0.020	0.057
Control Delay, s/veh	3.6	3.4	3.1	3.4
LOS	A	A	A	A
95th %tile Queue, veh	0	0	0	0

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Intersection												
Int Delay, s/veh	4.3											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	8	47	12	0	27	3	24	1	3	27	3	14
Future Vol, veh/h	8	47	12	0	27	3	24	1	3	27	3	14
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	85	85	85	85	85	85	85	85	85	85	85	85
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	9	55	14	0	32	4	28	1	4	32	4	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	36	0	0	69	0	0	124	116	62	117	121	34
Stage 1	-	-	-	-	-	-	80	80	-	34	34	-
Stage 2	-	-	-	-	-	-	44	36	-	83	87	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1581	-	-	1538	-	-	853	776	1006	862	771	1042
Stage 1	-	-	-	-	-	-	931	830	-	985	869	-
Stage 2	-	-	-	-	-	-	973	867	-	928	825	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1581	-	-	1538	-	-	833	771	1006	854	766	1042
Mov Cap-2 Maneuver	-	-	-	-	-	-	833	771	-	854	766	-
Stage 1	-	-	-	-	-	-	925	825	-	979	869	-
Stage 2	-	-	-	-	-	-	954	867	-	918	820	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0	9.4	9.2
HCM LOS			A	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	846	1581	-	-	1538	-	-	899
HCM Lane V/C Ratio	0.039	0.006	-	-	-	-	-	0.058
HCM Control Delay (s)	9.4	7.3	0	-	0	-	-	9.2
HCM Lane LOS	A	A	A	-	A	-	-	A
HCM 95th %tile Q(veh)	0.1	0	-	-	0	-	-	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	4	23	4	5	22	3	4	13	0	0	35	7
Future Volume (vph)	4	23	4	5	22	3	4	13	0	0	35	7
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	5	29	5	6	28	4	5	17	0	0	45	9

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	39	38	22	54
Volume Left (vph)	5	6	5	0
Volume Right (vph)	5	4	0	9
Hadj (s)	0.02	-0.01	0.06	-0.08
Departure Headway (s)	4.1	4.1	4.2	4.0
Degree Utilization, x	0.04	0.04	0.03	0.06
Capacity (veh/h)	852	859	832	877
Control Delay (s)	7.3	7.3	7.3	7.3
Approach Delay (s)	7.3	7.3	7.3	7.3
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.3		
Level of Service	A		
Intersection Capacity Utilization	14.2%	ICU Level of Service	A
Analysis Period (min)	15		

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Yield			Yield			Yield			Yield	
Traffic Volume (vph)	1	11	3	0	11	6	9	5	1	7	8	8
Future Volume (vph)	1	11	3	0	11	6	9	5	1	7	8	8
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	1	15	4	0	15	8	13	7	1	10	11	11

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	20	23	21	32
Volume Left (vph)	1	0	13	10
Volume Right (vph)	4	8	1	11
Hadj (s)	0.02	-0.19	0.11	-0.13
Departure Headway (s)	4.1	3.8	4.1	3.9
Degree Utilization, x	0.02	0.02	0.02	0.03
Capacity (veh/h)	870	919	849	911
Control Delay (s)	7.1	6.9	7.2	7.0
Approach Delay (s)	7.1	6.9	7.2	7.0
Approach LOS	A	A	A	A

Intersection Summary			
Delay	7.1		
Level of Service	A		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	64	56	16	46	59	11
Future Vol, veh/h	64	56	16	46	59	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	60	60	85	60	60
Heavy Vehicles, %	2	0	0	2	0	0
Mvmt Flow	75	93	27	54	98	18

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	168	0	230	122
Stage 1	-	-	-	-	122	-
Stage 2	-	-	-	-	108	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1422	-	763	935
Stage 1	-	-	-	-	908	-
Stage 2	-	-	-	-	921	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1422	-	748	935
Mov Cap-2 Maneuver	-	-	-	-	748	-
Stage 1	-	-	-	-	908	-
Stage 2	-	-	-	-	903	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	10.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	772	-	-	1422	-
HCM Lane V/C Ratio	0.151	-	-	0.019	-
HCM Control Delay (s)	10.5	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.5	-	-	0.1	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Vol, veh/h	14	2	8	2	0	2	0	12	2	2	9	4
Future Vol, veh/h	14	2	8	2	0	2	0	12	2	2	9	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
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	60	60	60	60	60	60	60	85	60	60	85	60
Heavy Vehicles, %	0	100	25	0	2	2	2	2	2	2	2	100
Mvmt Flow	23	3	13	3	0	3	0	14	3	3	11	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	38	38	15	45	40	16	18	0	0	17	0	0
Stage 1	21	21	-	16	16	-	-	-	-	-	-	-
Stage 2	17	17	-	29	24	-	-	-	-	-	-	-
Critical Hdwy	7.1	7.5	6.45	7.1	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	6.5	-	6.1	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	6.5	-	6.1	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.9	3.525	3.5	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	972	696	1002	962	852	1063	1599	-	-	1600	-	-
Stage 1	1003	718	-	1009	882	-	-	-	-	-	-	-
Stage 2	1008	721	-	993	875	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	967	695	1002	945	850	1063	1599	-	-	1600	-	-
Mov Cap-2 Maneuver	967	695	-	945	850	-	-	-	-	-	-	-
Stage 1	1003	717	-	1009	882	-	-	-	-	-	-	-
Stage 2	1005	721	-	973	873	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9	8.6	0	1.2
HCM LOS	A	A		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1599	-	-	947	1001	1600	-	-
HCM Lane V/C Ratio	-	-	-	0.042	0.007	0.002	-	-
HCM Control Delay (s)	0	-	-	9	8.6	7.3	0	-
HCM Lane LOS	A	-	-	A	A	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0	0	-	-

HEATH & ASSOCIATES

TRAFFIC AND CIVIL ENGINEERING

FAWCETT ELEMENTARY SCHOOL

ROADWAY WIDTH MEASURMENTS
FIGURE A

City of Tacoma
Public Works Department
747 Market Street
Tacoma, Washington 98402
(253) 591-5500

Traffic Generation Worksheet

Date:	8/18/2021	SEPA/Permit Number:	21TMP-011444
Project Name:	Fawcett Elementary Replacement	Parcel Number:	0320214050
Project Address:	126 E 60th Street, Tacoma		
Applicant Name:	Sarah Fischer	Applicant Phone:	253-627-5599
Applicant Address:	1250 Pacific Ave, Ste. 700, Tacoma, WA 98402	Applicant Email:	sfischer@blrb.com

Please attach a site plan

Do you anticipate modifying or adding to the driveway or roadway access?	☒Yes	☐No
Does the proposal include a boundary/lot line adjustment or subdivision?	☐Yes	☒No
Will you anticipate importing or exporting earth from the site?	☒Yes	☐No
Is the proposed zoning different than the existing zoning?	☐Yes	☒No

	Existing Use	Proposed Use
Project site, acres:	5.61	5.61
Land use:	School	School
Type of business:	Elementary School	Elementary School
Building area (gross square feet):	~60,000 sq. ft.	~55,000 sq. ft.
Number of employees:	~55	~55
Number of parking stalls:	~57	~67
Number of units (apartments, etc.):	NA	NA
Number of students / children:	Up to 500	Up to 500
Number of rooms (hotels, etc.):	NA	NA
Number of beds:	NA	NA
Number of pumps/fueling positions:	NA	NA
Number of service bays:	NA	NA
Number of drive-through windows:	NA	NA
Number of seats:	NA	NA

Has the existing use been vacant for more than 18 months?	☐Yes	☒No	☐N/A
Will any of the existing buildings be demolished?	☒Yes	☐No	☐N/A

Please provide additional information you feel is relevant in determining traffic generation: ____________________

____

Projects can cover a wide variety of land uses, and not all land uses have established trip generation rates. A private Traffic Engineer may be required. Please provide as much information as possible regarding your proposed development.

By checking this box, I declare that I have completed this form and to the best of my knowledge. I understand the City is relying on this information to accurately determine the traffic impacts from my development.

☒ Name: Sarah Fischer Date: 08/20/2021