Capitol Boulevard Feasibility Report
Preliminary Design

Capitol Blvd Corridor Phase 1 – Feasibility and Pre-Design
City of Tumwater



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SCJ ALLIANCE
CONSULTING SERVICES

Capitol Boulevard Feasibility Report

Project Information

Project:	**Capitol Boulevard Phase 1 – Feasibility and Pre-Design**
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1. PURPOSE

The purpose of this report is to present an overview of the findings and recommendations for the Capitol Boulevard Feasibility and Preliminary Design Study. The study consists of the following elements:

- *Traffic Study:*
  - Perform operational analysis of the corridor with the proposed and recommended alternatives.
- *Access Management Strategies:*
  - Recommend access management and neighborhood traffic calming solutions throughout the corridor.
- *Preliminary Design Layout:*
  - Prepare conceptual plans defining the recommended improvements including intersection improvements, key improvements along the corridor, access modifications, stormwater management, and utility undergrounding.
- *Right-of-Way Plans:*
  - Prepare concept right-of-way impacts between Israel Road and M Street.
- *Phasing Plan:*
  - Prepare estimates project costs and recommend phasing of the improvements.
- *Environmental Strategy:*
  - Provide an overall strategy for obtaining environmental permits.
- *Capitol Boulevard/Trosper Road Intersection Final Concept Approvals*
  - Obtain final NEPA and IJR approvals.

The Summary section of the report provides an overview of each element. Detailed technical memorandums for appropriate elements are included in the appendices.

Figure 1 shows the limits of the corridor study.

Figure 1 – Vicinity Map

2. BACKGROUND

2.1 EXISTING CONDITIONS

Capitol Boulevard from Tumwater Boulevard Se to M Street SE is a four-lane National Highway System (NHS) principal arterial with a center turn lane and a general right-of-way width of 70 feet. The existing street width is 54 feet from curb to curb. There are eight-foot sidewalks located along the corridor on each side of the street. The corridor is a built environment in front of small businesses, apartments, government offices, and schools.

Capitol Boulevard provides the primary north-south link for traffic, transit, pedestrians, and bicyclists within the city of Tumwater east of Interstate 5. The corridor currently carries 25,500 vehicles per day and is projected to carry 35,000 to 40,000 vehicles per day by 2035. The corridor also provides neighborhood access to several local streets and collectors serving many homes and multi-family dwellings.

Traffic is heavy and congested along the north end of the corridor between T Street SW and Trosper Road SW. There are large regional traffic movements for (1) southbound I-5 to eastbound Trosper Road to southbound Capitol Boulevard and (2) northbound Capitol Boulevard to westbound Trosper Road to northbound I-5. There are currently double left turn lanes for the southbound I-5 off ramp and for Capitol Boulevard northbound at Trosper Road to help accommodate these heavy moves; however, lane balance at both double left turn lanes locations is poor (approximately 75% of vehicles in the shared through/left turn lane). Southbound vehicles crowd the outside left turn lane because there is only one right turn lane from eastbound Trosper Road to southbound Capitol Boulevard, and northbound vehicles crowd the outside lane because there is only one lane for the northbound I-5 on ramp from Trosper Road.

PREVIOUS WORK

In 2013, the City of Tumwater and Thurston Regional Planning Council (TRPC) partnered on the Capitol Boulevard Corridor Plan (CBCP) from M Street SE to Tumwater Boulevard SE (approximately 1.4 miles). The CBCP was initiated with the purpose of improving (1) economic conditions, (2) transportation options and safety for walkers, cyclists, and motorists, and (3) aesthetic appeal of Capitol Boulevard.

The CBCP identified congestion along Capitol Boulevard between W Lee Street and Trosper Road SW (about 750 feet) as one of the biggest challenges in the area surrounding the Capitol Boulevard/Trosper Road intersection; however, the CBCP did not present any solutions to address the heavy congestion.

3. SUMMARY

3.1 TRAFFIC STUDY

The technical memorandum in Appendix A describes the traffic count collection, traffic forecasting, and operational analysis for the design study. The traffic volumes and analysis were used to determine the intersection and roadway design and as the baseline future condition for a value engineering-style process of considering improvement alternatives for the Trosper Road/Capitol Boulevard intersection.

Traffic volume data was collected on March 25th at the following locations:

- Trosper Road/Lake Park Drive
- Trosper Road/2nd Avenue/Littlerock Road
- Trosper Road/Tyee Drive/I-5 SB Ramps
- Trosper Road/I-5 NB Ramps
- Trosper Road/Capitol Boulevard
- Linda Street/Capitol Boulevard
- Ruby Street/Capitol Boulevard
- Lee Street/Capitol Boulevard
- T Street/Capitol Boulevard
- X Street/Capitol Boulevard
- Dennis Street/Capitol Boulevard

Based on the traffic count surveys the morning and evening peak hours are between 7:15-8:15 AM and 4:30-5:30 PM respectively. These periods represent the highest level of traffic in a single hour and were used as the analysis periods for the study.

Traffic analyses were conducted for the 2035 Corridor Plan Improvements using the projected 2035 AM and PM peak hour volumes with cycle lengths and phase lengths optimized. The following improvement was integrated into the baseline analysis:

- Addition of an eastbound right-turn pocket at the Trosper Road/Capitol Boulevard intersection to provided two EB to SB right-turn lanes.

The following improvements were integrated into the 2035 Corridor Plan Improvements:

- T Street/Capitol Boulevard intersection conversion to 2-lane roundabout (replaces the eastbound right-turn pocket in the 2035 baseline scenario).
- X Street/Capitol Boulevard intersection conversion to 2-lane roundabout
- Dennis Street/Capitol Boulevard intersection conversion to 2-lane roundabout
- Volume adjustment to account for the improved access and circulation to the properties east of Capitol Boulevard between lee Street and Trosper Road
- Volume adjustment to account for the proposed median on Capitol Boulevard.

The AM and PM peak hour operations results for the existing 2014, 2035 Baseline, and 2035 Corridor Plan Improvement analysis scenarios are summarized below in Tables 1 and 2.

Table 1. AM Peak Hour Intersection LOS Summary

Intersection	Control Type	Existing 2014	2035 Baseline	2035 - Corridor Plan Improvements
		Intersection LOS and Delay	Intersection LOS and Delay	Intersection LOS and Delay
Trosper Road at Tyee Drive/I-5 SB Ramps	Signal	D (42.1)	E (72.5)	E (72.4)
Trosper Road at I-5 NB Ramps	Signal	A (4.8)	A (8.7)	A (8.8)
Trosper Road at Capitol Boulevard	Signal	C (34.3)	C (33.5)	D (37.6)
Linda Street at Capitol Boulevard	Stop	B (13.5)	B (14.7)	B (14.5)
Ruby Street at Capitol Boulevard	Stop	B (12.7)	C (17.8)	B (10.7)
Lee Street at Capitol Boulevard	Signal	B (12.6)	B (18.5)	B (18.2)
T Street at Capitol Boulevard	Stop	C (16.4)	C (23.7)	A (9.3)[1]
X Street at Capitol Boulevard	Signal	A (4.5)	A (8.4)	A (7.4)[1]
Dennis Street at Capitol Boulevard	Signal	A (8.2)	B (10.5)	B (11.3)[1]

1 Reflects conversion to RAB

Table 2. PM Peak Hour Intersection LOS Summary

Intersection	Control Type	Existing 2014	2035 Baseline	2035 - Corridor Plan Improvements
		Intersection LOS and Delay	Intersection LOS and Delay	Intersection LOS and Delay
Trosper Road at Tyee Drive/I-5 SB Ramps	Signal	C (32.2)	E (67.4)	E (67.4)
Trosper Road at I-5 NB Ramps	Signal	A (6.4)	B (10.9)	B (10.9)
Trosper Road at Capitol Boulevard	Signal	D (54.5)	F (124.1)	F (132.8)
Linda Street at Capitol Boulevard	Stop	B (10.0)	B (11.9)	B (11.7)
Ruby Street at Capitol Boulevard	Stop	B (11.1)	C (19.0)	B (11.0)
Lee Street at Capitol Boulevard	Signal	B (19.7)	D (47.8)	D (35.1)
T Street at Capitol Boulevard	Stop	C (20.7)	D (31.2)	B (14.2)[1]
X Street at Capitol Boulevard	Signal	A (5.8)	A (3.3)	A (8.3)[1]
Dennis Street at Capitol Boulevard	Signal	B (11.1)	B (13.2)	B (12.5)[1]

1 Reflects conversion to RAB

3.2 ACCESS MANAGEMENT STRATEGY

Access to neighborhoods and business along with improved circulation is a major component of the CBCP. Multiple unrestricted accesses along the corridor add to congestion especially between T Street and Trosper Road. Improving access management and circulation through the corridor will benefit the economic opportunities through improved safety and reduced congestion.

The feasibility study evaluated the following opportunities identified in the CBCP along with additional options for circulation such as future street connections with between Linderson Road and Capitol Boulevard, 6th Avenue extension to T Street, and connector between 6th Avenue and Capitol Boulevard.

- New north south street east of Capitol Boulevard between Lee Street and Trosper Road (P 73 CBCP).
    - The final concept plans include the new north south street. This connection will provide improved access to the residential and commercial properties east of Capitol Boulevard between Trosper Road and Lee Street. This will result in reduced congestion on Capitol Boulevard and safer access for vehicles and non-motorized users. It also provides additional access opportunities to the WSDOT Olympic Region site increasing the economic opportunities for the site.
- Opportunity for internal access in the southwest quadrant of Trosper Road / Capitol Boulevard intersection (P 75 CBCP).
    - The feasibility study evaluated options for improved internal access at this location. Immediate opportunities are limited due to the current configuration of the businesses. However, there is opportunity to add a fourth leg to the 6th Avenue roundabout proposed for the Capitol Boulevard/Trosper Road intersection improvements. The local access road would connect 6th Avenue directly to Capitol Boulevard and provide direct access to the commercial properties off I-5. This connection is dependent on redevelopment of the parcels.
- Pedestrian signals at Gerth Street and near the Bonneville Power Administration (BPA) Transmission Lines between Dennis Street and X Street. (CBCP Figure 7-21)
    - The CBCP recommends constructing mid-block crossings throughout the corridor. The distance between proposed roundabouts is 0.25 mile each. Distances of this magnitude encourage unsafe pedestrian crossings and should be avoided in an urban environment. Reducing the distance between pedestrian crossings will improve safety along the corridor without adding to congestion. We evaluated the need for these crossings in the following segments:
        - Israel Road to Dennis Street: This segment includes a school and multiple multi-story office buildings. This segment includes an existing mid-block crossing 380 feet north of Israel Road at the northbound Route 13 bus stop. We recommend constructing an additional crossing approximately 350 north at the southbound Route 13 bus stop.
        - Dennis Street to X Street: This segment includes one minor intersection at Z Street which requires crossings on each leg of the intersection. In addition, there is a shared use path identified in the CBCP near the Bonneville Power Administration (BPA) Transmission lines. We recommend constructing a rapid rectangular flashing beacon (RRFB) crossing at the shared use path crossing and leaving the Z Street crossings unmarked.

        - X Street to T Street: This segment includes three minor intersections at W Street, U Street, and Gerth Street. There is an existing RRFB at Gerth Street. We recommend removing the RRFB at Gerth Street and constructing an RRFB crossing between W Street and U Street. The Gerth Street is 200 feet south of the roundabout cross walks which will include RRFBs. Crossings without RRFBs should remain unmarked.
        - T Street to Trosper Road: This segment includes four minor intersections evenly spaced between the T Street and Trosper Road intersections. The segment is fully developed with potential for redevelopment at the WSDOT site and in the southwest quadrant of the Trosper Road / Capitol Boulevard intersection. Completion of the corridor improvements and redevelopment opportunities will improve economic opportunities and pedestrian access to the businesses along the segment. We anticipate the increased economic opportunities to increase pedestrian traffic through the segment. The existing signal at Lee Street provides a controlled crossing between T Street and Trosper Road. Once this signal is removed, we recommend constructing an RRFB in its place.
- Roundabouts at Trosper Rd, T Street, X Street, and Dennis Street allowing access control throughout the corridor. (CBCP Figure 7-15)
    - Roundabouts provide a great opportunity for access management allowing agencies to restrict left turns by installing curb medians between roundabouts. Eliminating left turns has proven to improve corridor travel time and congestion. In addition, safety is improved as conflict points are reduced. The distance between each of the intersections above are approximately 0.25 mile. This distance allows for u-turns without a significant increase in travel time.
- Neighborhood gateways at Linda Street, Ruby Street, Lee Street, 6th Avenue, T Street, U Street, W Street, X Street, and Z Street. (CBCP Figure 7-27)
    - Linda Street: Linda Street will be converted to a local street with perpendicular parking on the north side. Driveway dust pans are being constructed at each end of Linda Street. The change the character of the street will improve the sense of place for the neighborhood and improve safety.

    - Ruby Street: We recommend constructing a neighborhood gateway with bulb outs and small radius, 10 feet, curb returns at Ruby Street with the construction of the new connector street between T Street and Lee Street. The bulb outs decrease the crossing distance at the intersection improving safety.

    - Lee Street: We recommend constructing neighborhood gateways at Lee Street in two phases. The first phase includes narrowing E Lee Street from Capitol Boulevard to the proposed local collector between Linda Street and Lee Street. The second phase includes removing the signal and converting the Lee Street / Capitol Boulevard intersection into a right-in/right-out intersection. The second phase

    - 6th Avenue/ T Street: The CBCP recommends a neighborhood gateways for the 6th Avenue section between Lee Street and T Street and on T Street. This recommendation was prior to developing the recommended solution for the Capitol Boulevard / Trosper Road intersection which will construct 6th Avenue between Trosper Road and Lee Street. This connection will provide an alternate route to northbound I-5. In addition, the CBCP recommends a roundabout at the T Street / Capitol Boulevard intersection when the

WSDOT site is redeveloped. Construction of this roundabout in combination with the Trosper Road / Capitol Boulevard roundabout provides an opportunity for improved access management at Lee Street. Subsequently, we recommend the City constructs 6th Avenue as a major arterial and removes the signal at Lee Street following the construction of the T Street roundabout. This will improve intersection spacing and access management.

- U Street: We recommend constructing a neighborhood gateway on U Street immediately east of the commercial properties to separate the zoning districts. A neighborhood gateway concept is included in the Appendix B.

- W Street: We recommend constructing a neighborhood gateway on W Street immediately east of the commercial properties to separate the zoning districts. A neighborhood gateway concept is included in the Appendix B.

- Z Street: We recommend constructing a neighborhood gateway on Z Street immediately east of the commercial properties to separate the zoning districts. A neighborhood gateway concept is included in the Appendix B.

- Additional Gateways: In addition to the above gateways, we recommend constructing neighborhood gateways at Gerth Street and Pinehurst Drive. These gateways should be constructed after the Capitol Boulevard corridor and 6th Avenue/T Street corridor is complete. These gateways will help discourage traffic from using Gerth Street and Pinehurst Drive as shortcuts to access the 6th Avenue and Capitol Boulevard corridors.

- Traffic calming devices within neighborhoods.
  - This study did not analyze the traffic calming devices at locations identified in the CBCP Figure 7-27. These areas are outside the Capitol Boulevard roadway corridor.

Appendix B includes access management exhibits and references from the CBCP.

3.3 Preliminary Design Layouts

We evaluated three cross-sections, Figure X, including the cross section in Chapter 7 of the CBCP with the following goals:

1. Must be consistency with the Goals and Objectives in the CBCP
2. Must utilize the existing curb and gutter alignment where feasible
3. Must include multimodal transportation elements

The cross section provided in the CBCP maintains the existing 56-foot curb and gutter width while providing 5-foot bike lanes and a 6-foot center median. The wider center median reduces the inside lanes to 9-feet, which is less than the recommended 10-12 feet for urban arterials *(AASHTO)*.

To provide adequate lane widths for both lanes, the outside lane would need to be reduced to 10-feet. However, Intercity Transit Route 13 operates on Capitol Boulevard. The typical bus width used on Route 13 requires 10.5 feet of clearance. Reducing the outside lane width would impact their ability to operate safely on the corridor.

The two alternate cross-sections analyzed included reducing the median to 4-feet. Cross Section Alternative 1 included 10-foot inside lanes with a 1-foot shy distance between edge line and the curb face, 10-foot outside lanes and the 5-foot bike lane. Cross Section Alternative 2 included the 10-foot inside lanes and a 15-foot multi-use lane for bicycles and vehicles. Both alternatives utilized the existing curb to curb width.

Cross Section Alterative 1 was chosen as the preferred alternative as it provided lane widths consistent with the AASHTO manual and adequate for transit use while still maintaining the proposed bike lines and multimodal use in the CBCP. Although the outside lane is only 10-feet, the striping the bike route is the preferred alternative as the transit volume is less than 0.5% of the average daily traffic volume.

The roadway curb to curb width was expanded to 58-feet at mid-block crossings to provide a refugee for pedestrians in the center median. The wider curb to curb width will require right-of-way at each location. There are 4 mid-block crossings proposed. The mid-block crossings are shown in the preliminary plans in Appendix C.

The preliminary plans do not include the 6-foot planting strip as shown in the cross section and the CBCP. Due to existing structure locations, this planting strip would not be consistent throughout the corridor without significant right-of-way and building impacts. As properties are developed, we recommend the City adopt a plan requiring the developer to reconstruct the sidewalk with a 6-foot planting strip separating the sidewalk and street. As the horizontal layout at the mid-block crossings and intersections will require right-of-way, we recommend constructing the planting strip in these locations.

Roundabouts were selected for intersection improvements at Trosper Road, T Street, X Street, and Dennis Street. These intersections were chosen to provide a consistent quarter mile distance between roundabouts and allow for a center median and access control from Dennis Street to Trosper Road.

3.3.1 Capitol Boulevard/Trosper Road Alternative Analysis

The purpose of the Capitol Boulevard/Trosper Road Alternative Analysis was to evaluate alternatives and recommend improvements for the intersection to relieve congestion.

In May 2014, SCJ hosted a half-day workshop to brainstorm ways to address congestion at the intersection which resulted in 42 alternatives to address traffic congestion at the intersection. The workshop included representatives from the City of Tumwater, City of Olympia, City of Lacey, Thurston County, Thurston Regional Planning Council, Intercity Transit, and Washington Department of Transportation (WSDOT) Headquarters Traffic.

The workshop resulted in 42 alternatives to address traffic congestion at the Capitol Boulevard/Trosper Road intersection. SCJ then performed a simple scoring and ranking analysis to screen the alternatives down to 11 alternatives. The results of the workshop and the subsequent screening were carried forward and used as a starting point by the Support Team for the Transportation Study.

The 11 alternatives carried forward were then evaluated and ranked in according to the criteria established by the Support Team. A discussion of the alternatives and scoring is included in Appendix D – Step One Ranking Memorandum. The 6th Avenue (Ruby St) roundabout was the preferred alternative in the Step One Ranking. However, the analysis showed that the Ruby St roundabout was not enough by itself to solve the congestion problems at Capitol Boulevard / Trosper Road. A combination of

alternatives needed to be evaluated to determine the preferred solution for the intersection. The Step One Ranking Memorandum recommended evaluating the following alternatives as a second step:

1. 6th Avenue (Ruby Street) Roundabout
2. 6th Avenue (Ruby Street) Roundabout + Context Sensitive Roundabout at Capitol Boulevard / Trosper Road
3. 6th Avenue (Ruby Street) Roundabout +Double Rights (EB Trosper Road to SB Capitol Boulevard)
4. Transit Improvements + Context Sensitive Roundabout at Capitol Boulevard / Trosper Road

These four alternatives were carried forward and scored against the no-build scenario. A discussion of the alternatives and scoring is included in Appendix E – Step Two Rankings Memorandum. The recommended alternative was Alternative 2 – 6th Avenue (Ruby Street) Roundabout + Capitol Boulevard/Trosper Road Roundabout. While Alternative 1 had the highest value, it did not solve the congestion problems at Capitol Boulevard/Trosper Road. Solving the congestion and improving neighborhood and economic access near the intersection is a major component of the CBCP and the selected alternative needed to address those issues.

To complete the feasibility analysis of the intersection and ensure WSDOT and FHWA would approve the proposed plan, the concept was carried forward through NEPA and the IJR process with the two agencies. NEPA and IJR approval was obtained in September 2017. See Section 3.6 for further discussion regarding the NEPA and IJR.

3.3.2 Stormwater Management Evaluation

The existing stormwater management system includes an underground collection and conveyance system that discharges into the Deschutes River northeast of the corridor. There are no stormwater treatment or flow control facilities for the corridor.

The improvements will add or replace impervious surface above thresholds requiring stormwater treatment and flow control. Existing utilities combined with limited right-of-way provide a challenge for fitting the facilities within right-of-way and construction. City records indicate there is a 20-foot wide concrete road surface along the center of the corridor with minimal or no utilities beneath it. This corridor provides an opportunity to provide underground infiltration facilities throughout the corridor along with engineered treatment facilities.

The City owns a parcel west of Capitol Boulevard along the BPA/Bonneville Transmission Lines near Z Street. There is opportunity to utilize this parcel as a regional stormwater facility for runoff south of X Street. The City Parks department is planning to locate a trail on this parcel as a separate project. Use of this parcel would need to be coordinated with the Parks department.

Flow control would be provided via infiltration facilities throughout the corridor. A review of recent geotechnical reports along the corridor indicate conservative infiltration rates of 1 to 2 inches per hour are achievable. Underground solutions for infiltration should consider maintenance operations and include a contingency plan.

The existing collection and conveyance system would remain in place. This system collects runoff from adjacent streets and neighborhoods and must be maintained. The proposed Capitol Boulevard system must allow for continued maintenance on the existing system. We recommend performing an inspection

of the existing facilities prior to constructing improvements along the corridor to be certain the facilities are in good condition and not in need of repair.

3.3.3 Illumination Strategy

The CBCP recommended section suggested placing the illumination in the center median. This has the benefit of installing the luminaries independent of the utility underground. However, the proposed 4-foot center median in the revised section does not provide adequate room for illumination. As an alternative, we recommend locating the illumination along the side of the street with a staggered spacing of 90-95 feet similar to the recent improvements on Tyee Drive. This will require utility relocation along the corridor.

3.3.4 Utility Undergrounding

The preferred method for relocating utilities is to underground them. Though this is a much more expensive option, it will improve the aesthetics of the corridor, allow for illumination along the side of the street, and provide opportunity for street trees.

The utilities can be relocated underground with one project or in phases as each phase of the project is constructed. Underground everything at one time will have a significant upfront cost, while undergrounding in phases allows the City to budget for individual projects and spread the cost over multiple years. However, undergrounding in phases will increase the overall cost to underground as it requires additional drop connections.

We recommend working with the utility purveyors to finalize the underground design during the final PS&E phase. This will increase the accuracy of the Engineer's Estimate allowing the City to review the cost/benefit of the two options, adopt the appropriate utility undergrounding plan, and seek funding.

3.4 RIGHT OF WAY PLAN

While the corridor is designed to utilize the existing back of sidewalk to back of sidewalk width of 54 feet, the improvements at the intersections and key locations along the corridor require right-of-way acquisition. The table below summarizes the estimated right-of-way acquisition and cost for each phase listed in Section 3.5 Phasing Plan and Cost Estimates. Appendix F includes a copy of the conceptual right-of-way plans and estimates.

Table 3. Right-of-Way Summary

Project	Description	Property Acquisitions	Relocations	Cost
Project 1	Capitol Boulevard / Trosper Road Intersection Improvements	12	10	$4,520,000
Project 2	T Street Roundabout	10	2	$2,260,000
Project 3	T Street to Trosper Road	6	0	$330,000
Project 4	North-South Collector	4	3	$1,100,000
Project 5	X Street Roundabout	8	2	$2,500,000
Project 6	X Street to T Street	4	0	$70,000
Project 7	Dennis Street Roundabout	5	0	$840,000
Project 8	Dennis Street to X Street	2	0	$30,000
Project 9	Israel Road to Dennis Street	1	0	$20,000
Project 10	Neighborhood Calming	0	0	$0

*Cost includes right-of-way acquisition and engineering.

Project funding estimates (PFE) for each project should be completed during the preliminary engineering (PE) phase. Project funding estimates should consider loss of parking and circulation impacts to each parcel. We also recommend establishing contact with each affected property owner early in the PE phase to setup expectations and understand their needs.

3.5 PHASING PLAN AND COST ESTIMATES

We evaluated alternative construction project and phasing options for improvements along Capitol Boulevard. We based the phasing options on operational benefit, funding opportunities, and practical project size. First, we gave priority to projects providing more operational benefit. Second, we defined projects based on funding opportunities. Third, we grouped projects limits to keep the costs for individual projects roughly between $1M and $5M (in 2019 dollars).

Our analysis recommends constructing the Capitol Boulevard/Trosper Road Intersection Improvement Project first followed by the three roundabouts in order at T Street (Project 2), X Street (Project 5), and Dennis Street (Project 7). Constructing the T Street roundabout will provide the most benefit to the corridor as it will allow access control and center medians between T Street and Trosper Road. This segment sees the highest volume of traffic and most congestion. However, constructing this roundabout is dependent on the timing of the WSDOT Olympic Region site redevelopment. If funding is available for the X Street and Dennis Street roundabouts prior to redevelopment of the WSDOT site, we recommend proceeding with those intersections prior to the T Street roundabout.

The roundabouts are constructed first to provide u-turn opportunities for properties before center medians (Projects 3, 6, and 8) are constructed and access points are modified. We recommend constructing the median from north to south as funds become available. Traffic volumes are higher and access points are denser along the northerly segments increasing the need for access management.

In addition to the Capitol Boulevard improvements, the City has identified a north-south collector road that will connect Trosper Road and Lee Street east of Capitol Boulevard (Project 4). This project is City funded and the City has already began purchasing right-of-way as it becomes available. This collector will serve a vital for accessing the commercial and residential neighborhoods between Trosper Road and Lee Street. We recommend constructing this street in following the Capitol Boulevard / Trosper Road Intersection Improvement project.

Table 4. Project Costs

Project	Description	Cost*
Project 1	Capitol Boulevard / Trosper Road Intersection Improvements	$11,5000,000
Project 2	T Street Roundabout	$4,953,200
Project 3	T Street to Trosper Road	$2,988,110
Project 4	North-South Collector	$3,157,750
Project 5	X Street Roundabout	$5,001,200
Project 6	X Street to T Street	$2,776,600
Project 7	Dennis Street Roundabout	$3,104,600
Project 8	Dennis Street to X Street	$2,619,600
Project 9	Israel Road to Dennis Street	$1,810,200
Project 10	Neighborhood Calming	$425,000

*Cost includes right-of-way acquisition and engineering.

The total phase cost in Table 4 are preliminary and represented in 2019 dollars. Over the last three to five years we have experienced a 15-20% increase in construction costs and continue to see increases on a yearly basis. These costs increases are unprecedented and difficult to predict. Due to these increases and general inflation, we recommend doing a cost analysis to account for inflation and increased construction costs prior to submitting grant applications. Appendix G includes copies of the conceptual cost estimates for each project.

3.6 Environmental Strategy

The feasibility study included a preliminary review of the environmental permitting requirements including the need for NEPA, shoreline, critical areas, and stormwater permitting.

Coverage under the National Environmental Policy Act (NEPA) is required anytime there is a federal nexus in the project including funding in the PE, RW, or CN phase or altering federally managed facilities. At the time of this report there are no federal funds allocated for the PE, RW, or CN phases of the projects. Although there is not a federal nexus for projects 2 through 8, we evaluated these projects to determine if the project would be Categorically Excluded or require an Environmental Assessment or Environmental Impact Statement. Based on the known conditions and typical funding amounts, less than $5 million in federal grants per project, we believe the projects will be Categorically Exempt per

exemption (23)(i). If a NEPA is required, we anticipate needing discipline reports for Cultural Resources, Hazardous Materials, and Environmental Justice. Prior to scoping the NEPA requirements, we recommend scheduling a kickoff meeting with WSDOT Local Programs to confirm the scope of the NEPA and discipline reports.

Project 1, Capitol Boulevard / Trosper Road Intersection Improvements, includes alterations to Interstate 5 and requires an approved NEPA prior to construction. To complete the Interchange Justification Report and confirm the project is feasible, the NEPA and associated discipline reports discussed in section 3.7 were completed for the Capitol Boulevard / Trosper Road intersection project were completed as part of this study. The NEPA was approved in August 2017 and will need an extension prior to August 2020 to remain current.

The projects do not impact any critical areas and does not involve work within shorelines. Therefore, we do not anticipate needing any shoreline or critical area permits for the corridor projects.

The General Stormwater Construction Permit covers projects under one acre of disturbance. For projects with over one acre of disturbance a National Pollutant Discharge Elimination System (NPDES) permit. We anticipate each project will need coverage under the NPDES permit. The NPDES permit application should be filled out within 60 days of going out to ad for construction.

3.7 Capitol Boulevard/Trosper Road Intersection Final Concept Approvals

To determine the feasibility of implementing the recommended alternative at the Capitol Boulevard/Trosper Road intersection, we needed to complete a NEPA CE and an Interchange Justification Report. These documents were prepared in close coordination with WSDOT, FHWA, and the City of Tumwater.

3.7.1 Interchange Justification Report

During the alternatives analysis, FHWA and WSDOT determined changing the northbound I-5 on- and off-ramps at Trosper Road required an Interchange Justification Report (IJR) to document and justify the decision to alter the existing interchange configuration. The IJR was completed in September 2017 and has been approved by FHWA and WSDOT.

The IJR will serve as the basis of design for the Capitol Boulevard/Trosper Road intersection during the Preliminary Engineering (PE) phase of the project. A copy of the approved IJR is included in Appendix H.

3.7.2 NEPE CE and Discipline Reports

The NEPA CE was prepared under Exemption (23)(i) for projects with less than $5,000,000 in federal funds for construction under the premise that the project would be funded through City and State funds. The area of potential effects (APE) for this project was limited to the Capitol Boulevard/Trosper Road intersection project. After meeting with the Local Programs Environmental Engineer, Jodie Beall, we determined the following discipline studies were required:

1. Cultural Resources
2. Hazardous Materials
3. Noise
4. Environmental Justification

Each of these studies were completed and reviewed by WSDOT and FHWA during the NEPA permitting process which was approved by WSDOT and FHWA in August 2017. The signed NEPA CE and associated discipline reports are included in Appendix I.

3.7.2.1 Cultural Resources

Historical Research Associates (HRA) prepared a Cultural Resources Inventory. HRA recommended a finding of no historic properties affected by the project as no historically significant properties appear to be present. In addition, it is unlikely archaeological resources are discovered due to previous excavation activity. As a precaution it is recommended that the inadvertent discovery plan (IDP) in Sections 9.1 and 9.2 of the Cultural Resources Inventory Study be followed by construction crews during ground-disturbing activities. Appendix J includes a copy of the study.

3.7.2.2 Hazardous Materials

GeoEngineers prepared the Hazardous Materials Environmental Report. The purpose of the study was to identify and evaluate suspect and known environmental conditions relating to hazardous materials that could affect property or right-of-way acquisition. Appendix K includes a copy of the study. The following tasks were preformed as part of the study:

- Site Screening
- Regulatory Database Review
- Field Reconnaissance/Windshield Survey
- File Review
- Aerial Photograph Review
- Historical Records Review
- Risk Analysis of Impacts and Mitigation Measures

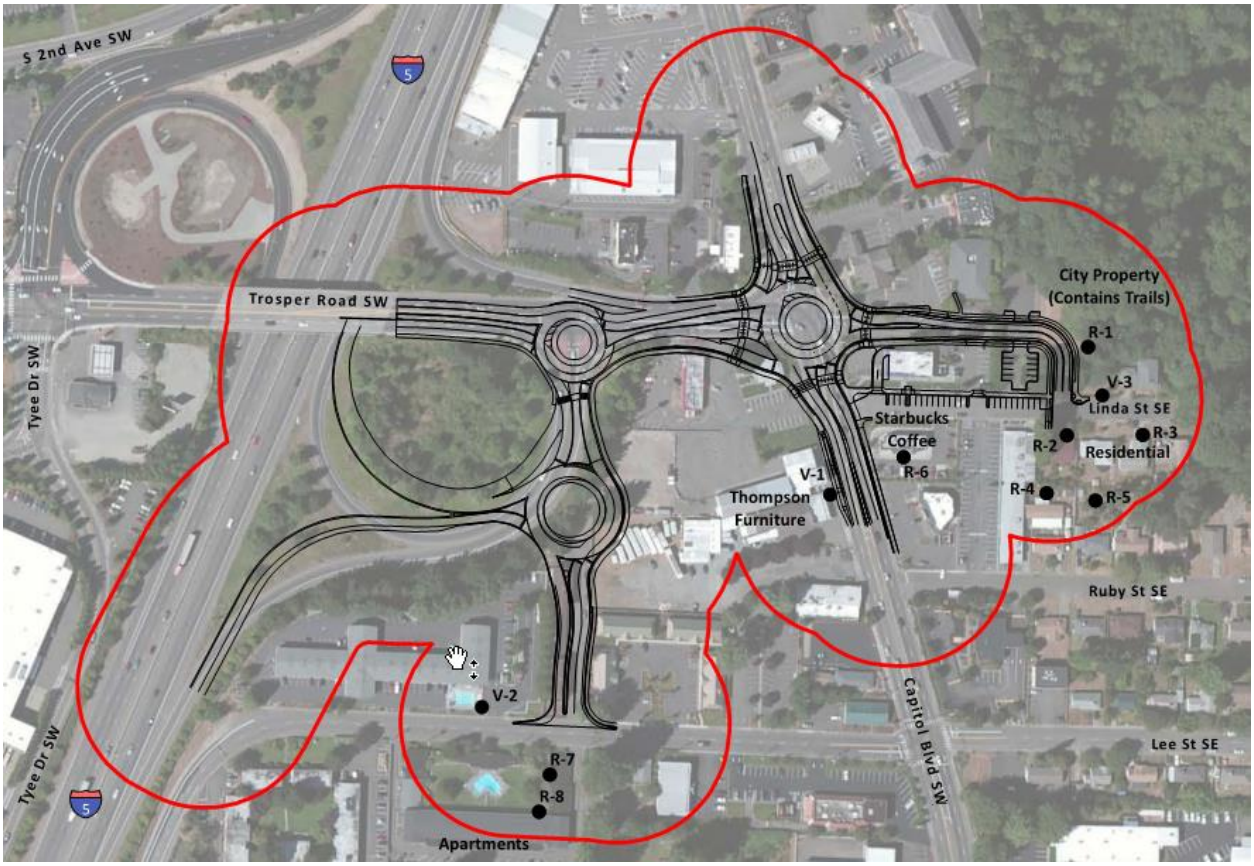
The investigations determined there are one low-risk, four moderate-risk, and two high-risk sites. Brief descriptions of each site are included in Table 1 of the report. The two sites with high-risk are due to the potential for petroleum contamination from Parcel 09080038000 and Parcel 1283440701 and the stormwater facilities proposed near these parcels. The study recommends Phase I ESAs be conducted on sites where more than 500 square feet of property acquisition is planned and on sites of concern where any property acquisition is planned.

Based on the limited excavation work within the acquired parcels and low risk for contaminants, we recommend proceeding without a Phase I ESA. Construction documents should inform the Contractor of potential hazardous materials that could be encountered during construction. In addition, the construction documents should require the Contractor to develop a contaminated media identification and management plan (CMMP) and plans to protect their employees and the public from exposure to hazardous materials should the be encountered.

3.7.2.3 Noise

Landau and Associates prepared the Noise study. By law the traffic noise analysis is required as the project will add new roads, 6th Avenue and Trosper Road E. The noise analysis was carried out following WSDOT guidelines. The study area included the entire project area and surrounding area as shown in Figure X. A detailed description of the project area and Traffic Noise Model (TNM) is included in Appendix L.

Modeled noise levels are below the FHWA NAC levels and no substantial noise increases were modeled between the Existing and Build conditions. Subsequently, abatement was not considered for this project as there are no traffic noise impacts.



3.7.2.4 Environmental Justice

The Capitol Boulevard / Trosper Road Intersection Improvement project required analyzing environmental justice in compliance with FHWA guidance, due to the presence of low-income and minority populations in the study area and the right-of-way impacts.

Environmental justice acknowledges that the quality of our environment affects the quality of our lives, and that negative environmental effects should not disproportionately burden low-income or minority populations. Effects associated with transportation projects may include disruption in community cohesion, restricted commercial access, presence of hazardous material, raised noise levels, increased air pollution, and other adverse effects.

This environmental justice analysis was developed in a manner consistent with NEPA, Executive Order 12898, USDOT Order 5610.2, FHWA Order 6640.23, and the following guidance documents:

- WSDOT Environmental Procedures Manual (2014)
- Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (as amended)

The demographics in the project area show higher concentrations of low-income and minority populations than the citywide average. Impacts would be disproportionally borne by the whole parcel acquisitions of the 8-unit apartment complex and the two commercial parcels, a restaurant, and bank. However, the proposed 6th Avenue alignment provides the most desirable operation and safety benefit and minimizes the total impacts to private property and commercial businesses. This was determined by analyzing four different alignments for 6th Avenue. Acquisitions of property will be performed in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

The beneficial effects due to the new transportation systems and configuration will provide increased vehicle, bicycle, and pedestrian mobility and increased access to neighborhood facilities that will be experienced equally by the general population and minority and low-income populations. Therefore, this proposed project has met the provisions of Executive Order 12898, as it is supported by Title VI of the Civil Rights Act of 1964. The further discussion, please refer to Appendix M for the complete Environmental Justice report.