Appendix A

Steering Committee and Open House Meeting Summaries

US 101 REGIONAL CIRCULATION PROJECT
STAKEHOLDER COMMITTEE MEETING #1
Port of Grays Harbor Commission Chamber
August 8, 2006
7:00 p.m. – 9:00 p.m.
Meeting Summary

ATTENDEES:

Brian Shay. City of Hoquiam
Gary Nelson, Port of Grays Harbor
Ray Pumphrey, Hoquiam Fire Dept
Leonard Barnes, Port of Grays Harbor
Kathryn Crawford, Exeltech Consulting
Bernie Chaplin, Exeltech Consulting
Vicki Cummings, Council of Governments
Theressa Julius, Council of Governments
Nancy Trask, Council of Governments
John Perlic, Parametrix
Joshua Johnson, Parametrix
John Hart, WSDOT Aberdeen Office
T.J. Nedrow, Olympic Region WSDOT
Nazmul Alam, Olympic Region WSDOT
Vicki Steigner, Olympic Region WSDOT
Debbie Clemen, Olympic Region WSDOT
Yvette Liufau, Olympic Region WSDOT

I. Introductions

The meeting was called to order by Vicki Cummings, Executive Director for the Grays Harbor Council of Governments (GHCOG). The project team was introduced and includes Vicki Cummings and Nazmul Alam (WSDOT) as Project Leads, and John Perlic (Parametrix), as technical assistance.

Project binders were distributed to the stakeholder committee. Binders will also be distributed to those members who were not present. Binders included a project area map, a meeting schedule, and the synopsis of past studies along the corridor. [Additional information will be distributed as necessary].

II. Project Synergy

A. Past History

Vicki explained how the project began with Senator Doumit setting aside $500,000 [SSB 6241] during the 2005 Legislative Session for a regional planning study regarding congestion mitigation improvements and mobility issues along US 101 within the vicinity of Aberdeen. The study boundary was then expanded to include US 12 at Sargent Boulevard, SR 109 from US 101 to the SR 109 Spur (east), US 101 to the SR 109 Spur (west), and US 101 in Cosmopolis at Blue Slough Road. GHCOG is partnering with WSDOT on the project since the GHCOG does transportation planning for the communities within Grays Harbor County and serves as the Regional Transportation Planning Organization. WSDOT will guide the overall process and develop the final document.

Nine (9) separate studies have been done and these studies will be used as the beginning point of the project [refer to the "Synopses" section of the notebook].

Vicki addressed what had taken place up to this point in the project:

- Preliminary stakeholder meetings in the community were held with County Commissioners, Mayors & staff, WSDOT Aberdeen Project and Maintenance staff, the Port of Grays Harbor, Grays Harbor Transit, emergency response staff, Grays Harbor Economic Development Council, and Grays Harbor Chamber of Commerce.

- The Stakeholder Committee has been established and the schedule of meetings set.

  Stakeholder Committee Meeting #2, September 12, 2006 @ 1:00 p.m.,
  Location: Port of Grays Harbor, 111 South Wooding Street, Aberdeen [rescheduled]

  Stakeholder Committee Meeting #3, October 24, 2006 @ 7:00 p.m.,
  Location: Port of Grays Harbor, 111 South Wooding Street, Aberdeen

  Public Open House Meeting #1, September 26, 2006 @ 7:00 p.m.,
  Location: Port of Grays Harbor, 111South Wooding Street, Aberdeen

  Public Open House Meeting #2, November 14, 2006 @ 7:00 p.m.,
  Location: Port of Grays Harbor, 111 South Wooding Street, Aberdeen

- Synopses of past studies and current findings have been completed.

- Compilation of traffic analysis elements is in the beginning stages and the results will be presented at the second stakeholder meeting in September.

B. Project Purpose

Senator Doumit secured the funds for the regional planning study. Those funds came with the caveat that the study region, must supply a prioritized list of recommendations to the Senator by mid-November. He will, in turn, try to help find funding for those identified priorities during the next legislative session. According to the Senator, projects that rank high in this process must have broad regional impact and alleviate problems within a variety of jurisdictions.

C. Project Goals

The goals of the project were identified as follows:

- Community participation.
- Start with what we know.
- Build consensus
- Submit Priority Recommendation List by mid-November.
- Final report, early Spring of 2007

III. Priority Ranking Criteria

Vicki discussed the need to develop criteria (for rating and ranking project alternatives) that is meaningful and measurable adding that the measurements chosen must also be fair and equitable.

John Perlic discussed the goals and priority ranking criteria. The goals and criteria were developed using regionally adopted goals and objectives from the Grays Harbor County Region Surface Transportation Program, the Southwest Washington Regional Transportation Plan, and the Washington Transportation Plan.

The group discussed the proposed goals and criteria and suggested the following revisions. Changes are noted in yellow highlight.

Goal 1: Promote Regional Solutions

Criteria	Measurements
Does the alternative serve important regional and local destinations?	Relative degree in which the project serves important community destinations
Does the alternative have broad regional support?	Relative degree of project support, opposition, and multi-agency partnering opportunities
Is the alternative regional in nature?	Benefit to regional through travel and tsunami evacuation routes

Goal 2: Promote Economic Vitality and Growth

Criteria	Measurements
Does the alternative support economic growth?	Relative improvement in overall economic prosperity
Does the project improve access to tourist destinations and economic centers?	Relative degree in which the improvement enhances accessibility to tourist destinations and economic centers
Is it a cost effective investment?	Cost effectiveness, including long-term maintenance costs for aging infrastructure
Does it have any negative impact to local businesses?	Business access or parking impacts
Does project have potential environmental impacts and mitigation costs?	Relative degree of environmental impacts and mitigation cost

Goal 3: Support Multimodal Solutions (freight, rail, transit, pedestrian)

Criteria	Measurements
Does it reduce delay at intersections?	2006 & 2030 PM peak hour Level of Service (LOS)
Does it improve safety?	Accident reduction potential
Does it reduce the impact of bridge openings or provide an alternate local route?	Delay reduction
Does it improve efficient movement of freight and goods to business and services?	Proximity to freight oriented businesses and impact or benefit to rail transportation
Does it improve transit access or reliability?	Number of transit routes improved
Does it encourage pedestrian or bicycle travel or improve safety?	Improvement to pedestrian or bicycle travel

The goals and criteria will be used to rank projects.

IV. Past Recommendation Synopsis

Vicki presented a synopsis of the recommendations from previous studies and local plans and policies that are within the project area. These included:

- Synopsis of nine formal studies that affect the study area and current findings.
- Current findings - recent plans, policies and projects of the Cities of Aberdeen, Hoquiam and Cosmopolis, the Port of Grays Harbor and Grays Harbor Transit that affect the study area.
- Other recommendations - non-study related information such as projects identified in the Regional Transportation Plan, pre-study stakeholder recommendations, and operational improvements for the Cities of Aberdeen, Hoquiam, and Cosmopolis. (Operational improvements are roadway projects identified by each city that if implemented would help improve the flow of traffic without the need for major construction.)

V. Next Meeting Date

The Stakeholder Committee will reconvene again on Sept. 12th [rescheduled]. Topics of discussion for the second meeting will include: activities that have occurred since the first

meeting, traffic analysis and accident data reports, land use and future growth and development scenarios, and water, rail, and bridge operations research findings.

WSDOT has a dedicated web site for this project is at:

www.wsdot.wa.gov/planning/studies/US101/Aberdeen

Due to the small turnout of stakeholders, it was suggested that the future meetings be moved from evening to daytime. The project team will consider this suggestion.

There being no further discussions, the meeting was adjourned at 8:45 p.m.

Nancy L. Trask
Office Coordinator
GHCOG

US 101 REGIONAL CIRCULATION PROJECT
STAKEHOLDER COMMITTEE MEETING #2
Port of Grays Harbor Commission Chamber
September 12, 2006
1:00 p.m. – 3:00 p.m.
Meeting Summary

ATTENDEES:

Brian Shay, City of Hoquiam
Gary Nelson, Port of Grays Harbor
Barb Smith, GH Tourism
Leonard Barnes, Port of Grays Harbor
Cheryl Turner, City of Cosmopolis
LeRoy Tipton, GH Chamber of Commerce
Jim Maloney, Hoquiam Police
Jonathan Ciesla, Quinault Nation
Commissioner Mike Wilson, GH County
Commissioner Al Carter, GH County
Commissioner Bob Beerbower, GH County
Larry Bledsoe, City of Aberdeen
Michael Tracy, GHEDC
John Green, Aberdeen Police
Doug Craig, Aberdeen Fire
John Perlic, Parametrix
Joshua Johnson, Parametrix
John Hart, WSDOT Aberdeen Office
T.J. Nedrow, WSDOT Olympic Region
Nazmul Alam, WSDOT Olympic Region
Vicki Steigner, WSDOT Olympic Region
Leroy Slemmer, Exeltech Consulting
Bernie Chaplin, Exeltech Consulting
Yvette Liufau, WSDOT Olympic Region
Marcus Cuoio, WSDOT Olympic Region
Tom Gibbs, WSDOT Aberdeen Maintenance
Vicki Cummings, Council of Governments
Theressa Julius, Council of Governments
Nancy Trask, Council of Governments

I. Welcome/Introductions

The meeting was called to order by Vicki Cummings, Executive Director for the Grays Harbor Council of Governments (GHCOG). The project team was introduced and includes Vicki Cummings and Nazmul Alam (WSDOT) as Project Leads, Vicki Steigner/Yvette Liufau (WSDOT), John Perlic/Joshua Johnson (Parametrix) as technical assistance, and Theressa Julius as GIS support (GHCOG).

II. Recap of Meeting #1

Vicki Cummings presented a recap of the first Stakeholder Committee Meeting held on August 8, 2006, discussing the goals and criteria that were presented at that meeting. The complete meeting summary can be found at the US 101 Regional Circulation Project Website under the Stakeholder Committee link.

III. Review Criteria

John Perlic recapped the goals and criteria via a power point presentation and brought attention to the revisions in each goal. He asked the stakeholders if they wanted to make any last minute changes or additions to the criteria. No comments were offered.

He explained that the project team would be meeting to rank all the projects according to the criteria and would share the results with the stakeholders at their next meeting.

IV. Existing Conditions

[NOTE: The PowerPoint presentation and related information under this Agenda item were given to the Stakeholder Committee in hard copy for inclusion in their project binders.]

A. Bridge Openings

Nazmul discussed bridge opening statutes regarding the 33 Code of Federal Regulation (CFR) Part 117.5, 'when the draw shall open' for the Chehalis, Hoquiam and Wishkah Rivers.

The average number of bridge openings for boat ranges between 2 and 32 per month; and the average number of openings for maintenance ranges between 1 and 52 per month. The average duration of openings ranges between 6 and 10 minutes. The Chehalis River Bridge and the Heron Street Bridge all opened more often for maintenance than any of the other bridges.

Go to the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under General Project Information with the file name of Bridge Openings for more detailed information.

B. Rail Operations

Nazmul presented basic rail statistics such as the number of trains per day, speed of the train in the Port of Grays Harbor area, and number of days service is provided in a week. He also talked about the existing railcar storage in the Puget Sound and Pacific's Aberdeen yard, local street blockage from switching and building trains at the Aberdeen yard, and possible solutions such as new storage tracks, relocating existing rail line, etc.

Rail traffic is expected to increase significantly in the future. Without changes to the existing rail infrastructure the local street blockage will continue to increase congestions. Total road blockage for arrival/departure to the Port is expected to increase by 32% between 2005 and 2025. Possible solutions include new storage tracks, rail realignment, and Intelligent Transportation System improvements.

See the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under General Project Information with the file name of Rail Information for more detailed information.

C. Accident Data Analysis

Yvette presented US 101, US 12 and SR 109 highway crash data for the years 2003 through 2005, along with the types of collisions and the contributing factors. High Accident Locations are mainly in downtown Aberdeen. US 12 and SR 109 have more tourists traveling and US 101 has more locals traveling.

Vicki Cummings presented collision data for the local roadway system in Aberdeen, Hoquiam and Cosmopolis. High accident corridors and intersections for both the State highways and the local roads were identified.

See the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under Traffic Analysis with the file names of Highway Collision Data and Local Street Collision Data for more detailed information.

D. Future Growth

Vicki Cummings discussed the future growth of the Hoquiam/Aberdeen/Cosmopolis areas and also the proposed growth and development at the ocean beaches [refer to "Proposed Growth and Development" map handouts in the meeting packet]. A growth of 1,700 jobs and 900 homes is expected over the next three (3) years.

See the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under General Project Information with the file name of Future Growth for more detailed information.

E. Traffic Analysis and Forecasts

John Perlic gave a traffic analysis and forecast overview of the following: 1) level of service criteria, 2) existing traffic conditions, 3) year 2030 traffic conditions, and 4) finding and conclusions. The year 2030 traffic volumes were projected using a 2% compounded annual growth rate and pipeline volumes based on projections in the Port Industrial Road Strategic Analysis [HDR and CH2MHill, 2006].

Key points are:

- One unsignalized intersection, Park and State Street is operating at LOS F
- 6 arterial segments and 13 intersections would operate at LOS E or F in 2030
- Average Travel Times
    - US 101/SR 105 to US 101/SR 109 (Emerson Street)
      Existing ~ 11 minutes
      Future ~ 18 minutes
    - US 12 (Sargent Blvd) to US 101/SR 109 (Emerson Street)
      Existing ~ 13 minutes
      Future ~ 23 minutes

See the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under Traffic Analysis with the file names of Existing Traffic Conditions and Year 2030 Traffic Conditions for more detailed information.

V. Project List

A. Discussion

Vicki Steigner discussed the handout titled "Unranked List of Projects (Draft)" which is a summary description of 29 projects. A map titled "Project Locations" was also provided which shows projects that have specific location.

Commissioner Carter suggested an additional project be added to the list, "build the west half of the truck route first." That project was added to the draft list and identified as Reference ID "AD."

The complete project list can be found at the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under Project Recommendations with the file name of Unranked Projects.

The project location map can be found at the US 101 Regional Circulation Project Website, under Project Info select Meeting Materials. Look under Project Recommendations with the file name of Project Location Map for more detailed information.

B. Pre-Screening Exercise
At this point of the meeting the committee members participated in a pre-screening exercise, placing red dots next to the projects that each member deemed to be important. The project team will take this information and analyze which projects will make the top 10 and will report that finding at the next Stakeholder Committee meeting on October 24th.

VI. Next Meeting Date

The Stakeholder Committee will reconvene again on October 24th at 1 p.m. in the Port of Grays Harbor Commission Chamber, 111 South Wooding Street, Aberdeen.

WSDOT has a dedicated web site for this project at:

www.wsdot.wa.gov/planning/studies/US101/Aberdeen

There being no further discussions, the meeting was adjourned at 3:00 p.m.

US 101 REGIONAL CIRCULATION PROJECT
STAKEHOLDER COMMITTEE MEETING #3
Port of Grays Harbor Commission Chamber
October 18, 2006
1:00 p.m. – 3:00 p.m.
Meeting Summary

ATTENDEES:

Stakeholder Committee

Brian Shay, City of Hoquiam
Gary Nelson, Port of Grays Harbor
Leonard Barnes, Port of Grays Harbor
Cheryl Turner, City of Cosmopolis
Candie Gleason, GH Economic Dev. Council
LeRoy Tipton, GH Chamber of Commerce
Commissioner Mike Wilson, GH County
Larry Bledsoe, City of Aberdeen
John Green, Aberdeen Police Dept.
Dave Carlberg, Aberdeen Fire Dept.
Paul Dean, Hoquiam Fire Dept.
Commissioner Al Carter, GH County
Commissioner Bob Beerbower, GH County

Guests

Laurel Ulatala, Union Gospel Mission
C. Durham, Diesel Power and Electric
Ian and Janice Gegg
Al Bowman

Staff

Vicki Cummings, GH Council of Governments
Theressa Julius, GH Council of Governments
Nancy Trask, GH Council of Governments
John Perlic, Parametrix
Joshua Johnson, Parametrix
Leroy Slemmer, Exeltech Consulting
Bernie Chaplin, Exeltech Consulting
Nazmul Alam, WSDOT
Bob Jones, WSDOT
Yvette Liufau, WSDOT
Vicki Steigner, WSDOT
Marcus Cuoio, WSDOT
Chris Runner, Exeltech Consulting

I. Welcome/Introductions

The meeting was called to order by Vicki Cummings, Executive Director for the Grays Harbor Council of Governments (GHCOG). The project team was introduced and includes Vicki Cummings and Nazmul Alam (WSDOT) as Project Leads, John Perlic, Josh Johnson, Bernie Chaplin, Leroy Slemmer and Chris Runner as technical assistance, Yvette Liufau and Marcus Cuoio from WSDOT, and Theressa Julius and Nancy Trask from the Grays Harbor Council of Governments.

II. Public Comments from September 26 Open House

Vicki Cummings talked about the well attended September 26 Open House. The attendees were given three dots and were provided the opportunity to vote on the projects of their preference. Vicki referred the Committee to two handouts, 1] a summary of the meeting that details what was available and the comments that were returned, and 2] the results of the community dot vote.

She pointed out that the study use of Market Street as a 4-lane roadway feeding into the truck route scored high, and also scoring high was a complete bypass to the north of Aberdeen and Hoquiam called the North Corridor. This project is identified in Appendix B of the Hoquiam-Aberdeen EIS.

III. Initial Priority Ranking List

John Perlic presented the top ten projects recommended by the Technical Team; those top ten are as follows:

- **Truck Route Alternative**
  - Truck Route Alternative – Full [Ranked #1]
  - Truck Route Alternative – West Quarter [Ranked #4]
  - Truck Route Alternative – Half [Ranked #5]
  - Truck Route Alternative – East Quarter [Ranked #9]
- **Intelligent Transportation Systems (ITS)** [Ranked #2]
- **Tri-City Operation Improvements** [Ranked #3]
- **Improve Port Industrial Road** [Ranked #5]
- **Cosmopolis Downtown Revitalization** [Ranked #5]
- **Rail Car Storage Yard East of Aberdeen** [Ranked #5]
- **Replace Existing Hoquiam Bridges** [Ranked #10]
- **Relocate Rail Line South of Port Industrial Road to Eliminate All At Grade Crossings** [Ranked #11]
- **Complete seismic upgrades to Area Bridges** [Ranked #12]
- **Alternate Access to Wishkah Mall and Relocate Rail** [Ranked #13]

IV. Cost Estimate Presentation

Bernie Chaplin and Leroy Slemmer of Exeltech Consulting presented the cost estimates for the top ten projects. Leroy contacted the cities of Hoquiam, Aberdeen and Cosmopolis as well as WSDOT for information in determining costs. Leroy stated that the costs for steel and concrete have increased by 30% in the past year.

Leroy presented the total cost per project as follows:

- **Truck Route Alternative**
  - Truck Route Alternative – Full - $386 M
  - Truck Route Alternative – West Quarter - $169 M
  - Truck Route Alternative – Half - $217 M
  - Truck Route Alternative – East Quarter - $193 M
- **Intelligent Transportation Systems (ITS)** - $ 9 M
- **Tri-City Operation Improvements** - $10 M
- **Improve Port Industrial Road** - $4 M

- **Cosmopolis Downtown Revitalization** - $2 M
- **Rail Car Storage Yard East of Aberdeen** - $4 M
- **Replace Existing Hoquiam Bridges** - $154 M
- **Relocate Rail Line South of Port Industrial Road to Eliminate All At Grade Crossings** - $8 M
- **Complete seismic upgrades to Area Bridges** - $15 M
- **Alternate Access to Wishkah Mall and Relocate Rail** - $4 M

  Leroy discussed the idea of having one type of parking for everybody in the Wishkah Mall area. Phase I at a cost of $300,000 would be to re-design the parking lot to improve circulation. Phase II would be to build a frontage road at a cost of $3.9 million. Relocating the rail behind the mall buildings has too many major flaws and not enough room. Leonard Barnes stated the rail needs to get on the drawing board soon because of the growth. The fire and police departments spoke on how difficult it is to get aid to the Wishkah Mall when the train is traveling through and blocking all entrances. It was suggested that possibly a land culvert could be built under the railroad tracks that emergency responders only would access.

V. Priority Ranking List Discussion

The Stakeholder Committee discussed in detail the initial priority ranking list of projects and chose the following projects to be given to Senator Doumit:

Priority #1 Full Truck Route Alternative
The Full Truck Route Alternative was identified as the top priority project. As an alternative to funding the entire truck route, the Stakeholder Committee recommended moving forward with the project in increments. The first priority would be to fund re-evaluation of the EIS and then fund preliminary engineering to determine the phasing of the project.

Priority #2 Tri-City Operational Improvements
The Tri-City Operational Improvements project provides more than 20 needed short-term improvements in Hoquiam, Aberdeen and Cosmopolis.

Priority #3 Wishkah Mall Access Improvements
This project would alleviate identified traffic problems caused by access issues in two phases. The first phase would fund emergency vehicle access, turning movement and access revisions, signal interconnection and re-striping the internal parking area. The second phase would fund analysis and construction of an alternate access road on the north side of US 12. The project includes public involvement, right-of-way acquisition, preliminary engineering and construction.

Priority #4 Intelligent Transportation Systems (ITS)
This project would identify specific locations, design and install ITS devices such as Variable Message Signs, photo enforcement cameras, closed circuit television, and Highway Advisory Radio.

Priority #5 Improve Port Industrial Road
The Port Industrial Road project would improve capacity, traffic flow and safety by providing right and left turn lanes at key intersections and other improvements as identified in the Port Industrial Road Strategic Analysis.

Maintenance Priority - Seismic Improvements
The Stakeholder Committee determined seismic improvements were the top maintenance priority. Completion of this project is necessary to maintain access to regional hospitals, and fire and police protection in the event of a natural disaster. The three area bridges which need funding for completion of seismic upgrades are the Chehalis River Bridge, the Heron Street Bridge, and the Riverside Bridge.

VII. Wrap Up/Adjourn

Vicki concluded the meeting explaining what the next steps are. Vicki will be meeting with Senator Doumit on October 25 in Pacific County. The Pacific County Council of Governments, our counterpart, is going through a similar process to identify issues along US 101. Our list and Pacific County's list will be presented to the Senator before he leaves office on November 1st. This is our opportunity of letting Senator Doumit know we appreciate what he did, thanking him; and giving him the list of prioritized projects.

The list will be shared with our Stakeholders, our Coastal Caucus as well as with our community members. We are still holding our final public open house on November 14.

This was the third and final meeting of the Stakeholder Committee. The next steps are as follows:

- Provide ranked list to Senator Doumit October 25, 2006
- Share list with Coastal Caucus
- Public Open House November 14, 2006
- Draft Report January 2007
- Final Report March 2007

WSDOT has a dedicated web site for this project at:

www.wsdot.wa.gov/planning/studies/US101/Aberdeen

There being no further discussions, the meeting was adjourned at 3:10 p.m.

US 101 REGIONAL CIRCULATION PROJECT
PUBLIC OPEN HOUSE MEETING

Port of Grays Harbor Commission Chamber
September 26, 2006
7:00 p.m. – 9:00 p.m.
Meeting Summary

The US 101 Regional Circulation Project Team held a public open house meeting on September 26, 2006, at the Port of Grays Harbor Commission Chamber in Aberdeen. The open house was advertised in The Daily World. All addresses within Aberdeen, Hoquiam and Cosmopolis zip codes received post card invitations. Thirty-eight community members signed the official attendance sheet. Coverage of the event was provided by The Daily World Newspaper and Jodesha Broadcasting, a local radio station.

The Open House was organized into 6 stations of information. 1) Project purpose and goals, 2) Future growth in the Tri-City area, 3) Existing and future traffic conditions, 4) Collision data, 5) Bridge openings and rail operations, and 6) List of Projects.

A list of proposed projects was presented. Community members were provided an opportunity to indicate their preferences for the top 3 projects and were encouraged to comment on other aspects of the study. Formal comment cards were provided. The comments that were received from the community were:

- Wonderful presentation and information. People listened. Felt incorporated.

- Full Project: Truck Route Alternate US 12 – SR 109. Prefer that the full project be funded. This would be the 50-75 year fix for Grays Harbor. Funding is always an issue – **Do** the West Quarter – New bridge in Hoquiam Truck Route Connecting Industrial Way to SR 109 **FIRST**. This is the missing piece of our highway system and the most expensive – start the planning now since it may take 5 years to complete. It becomes the major project we work at the State and Federal level. All other fixes are minor or cosmetic.

- The Polson Museum is halfway to funding its major "Railroad Camp" project. Give me a call for details as you seek to identify projects of substantial size happening along US 101.
    1. As the DOT considers traffic changes through Hoquiam, I would ask that consideration be given to reducing Riverside Ave. to two lanes from the Farmers Market to Polson Museum. Riverside parking would do much to improve Hoquiam's cultural re-birth and the change would serve to slow down traffic (which averages 35-45 MPH and sometimes reaches 60+).
    2. Consider a county-wide sign project to direct travelers to area historic, cultural, and recreational destinations. Graphic consistency and detail would do much to encourage tourism.
    3. As re-routing traffic is considered in Hoquiam, has a large roundabout been considered to promote access to downtown?

- A great deal of time and effort has been given to the 101 Reg. Circ. Project. Although my focus is with Cosmopolis and it does not appear that the smallest port city ranks as the larger cities do – we are appreciative of our city's inclusion in the list of project goals. Thank you.

- The transition for trucks from Port Industrial to and from the Hoquiam River Crossings can be greatly improved in the near term.

- The information provided was great! The thought, detail and completeness of information was worth knowing. The potential for traffic congestion and more accidents both vehicle and pedestrian in the Wal-Mart area that will occur when rail traffic increases was not addressed, surprisingly. Both bridge suggestions for replacing bridges in Hoquiam do not appear to be feasible. And moving rail traffic lines in the port area might interfere with potential incoming businesses and render some port property unuseable?

- More roundabouts

- I feel that there needs to be more access off the Highway (12) leaving Aberdeen – access to the North – in order to relieve congestion on Hwy 12. Someone put in a curb behind the UPS store and Baskin & Robbins, so now there are less options for turning off the highway. Don't know if this curb is legal or not? There is also no left turn lane for this neighborhood to the north of the highway. Better access to this area is needed. Perhaps even an access road between Hwy 12 and Think-of-me Hill. Thank you.

- I would like to see better access from Port Industrial Road onto residential street by Kens Auto Body. That turn on corner is dangerous.

- Please reroute trucks and recreational vehicles using the parallel corridor plan.

- Well Done. Staff explained things well. If money were no object we should have a big bypass behind the hills. That is the only solution that is not simply piecemeal.

- To relieve US 101 traffic through the Aberdeen and Hoquiam Urban Areas: Look for a workable route along the level bank on the west bank of the Wynoochee River, north of US 12, that allows for a clear Hwy west going north of the urban areas to about the intersection of US 101 and it's spur to SR 109.

- I would like to see Hwy 101 rerouted north of Aberdeen (@ Central Park) to North of Hoquiam. Have 3 offramps in the area to get off 101 to allow Aberdeen & Hoquiam. Return some peace and tranquility to the two towns.

- 2 New Bridges – Hoquiam New Bridge – Rail Out – Move Airport North, Highway Bypass –

The displays that were shown at each station are on the US101 Regional Circulation Project webpage at www.wsdot.wa.gov/planning/studies/US101/Aberdeen. Go to the "Meeting Materials" web page and click on the bulleted list of items. The following is a list of the displays at this meeting:

Station 1, Project Purpose & Goals

- SSB 6241
- Project Location Map
- Approved Goals and Criteria

Station 2, Future Growth

- Future Growth

Station 3, Traffic Conditions

- Level of Service
- Existing Traffic Conditions
- Year 2030 Traffic Conditions
- Traffic Analysis Findings

Station 4, Collision Data Analysis

- Highway Collision Data
- Local Street Collision Data

Station 5, Bridge and Rail

- Bridge Openings
- Rail Information

Station 6, Project List

- Unranked Project List
- Project Location Map
- Aberdeen/Hoquiam EIS Map

US 101 REGIONAL CIRCULATION PROJECT
PUBLIC OPEN HOUSE MEETING
Port of Grays Harbor Commission Chamber
November 14, 2006
5:30 p.m. – 7:30 p.m.
Meeting Summary

The US 101 Regional Circulation Project Team held the final of 2 public open house meetings on November 14, 2006, at the Port of Grays Harbor Commission Chamber in Aberdeen. The open house was advertised in the Daily World. All addresses within Aberdeen, Hoquiam and Cosmopolis zip codes received postcard invitations. Nineteen (19) community members signed the official attendance sheet.

The open house was organized into ten stations of information; 1) project overview, 2) ranked list, 3) prioritized project list, 4) truck route alternative, 5) tri-city improvements, 6) Wishkah Mall entrance, 7) Intelligent Transportation System (ITS), 8) Port Industrial Road improvements, 9) maintenance priority, and 10) next steps.

Formal comment cards were provided. The comments that were received from the community were:

- Great solution to truck issue. Good solution to relieve traffic. Poor for quality of life and no rail study. No transit improvement to reduce local traffic. For example, express service to Olympia, service to meet state Amtrak at Centralia or Lacey.
- Bridges cost money, but it would be nice to see another bridge across the Chehalis River.
- Downtown core area traffic is only going to get worse. You need a real bypass of the entire core area to expedite traffic to the beach areas. Then shoppers will be able to get downtown and find a parking area. Transportation means going from point A to point B. In the case of Seattle/Tacoma to the ocean beaches. Solve that problem first. People will still need to shop downtown, but they shouldn't have to compete with thru traffic. Go for the major bypass first (eliminate over ¾'s of the existing traffic) and you probably need all the little traffic flow tweeks – saving all that money. Money that could be used on the big bypass.
- Push button pedestrian signals to cross Wishkah and between Michigan and "L" Streets. Destination is "The Work Source"and "DSHS Community Services Office". "M" Street would be ideal.

  When you put in wheelchair ramps they should be the same as those in the bulb-outs. They are tactical and visual and last long.

  Simpson and 8th Street has audible signal. Need more of these.
- Some visually impaired in the community feel audible signals don't work.

The displays that were shown at each station are on the US 101 Regional Circulation Project web page at www.wsdot.wa.gov/planning/studies/us101/aberdeen. Go to the "Meeting Materials" web page and click on the bulleted list of items. The information that was displayed at each station is as follows:

Station 1, Project Overview

- SSB6241
- Stakeholder Committee Members
- Study area map

Station 2, Ranked List

- Ranking criteria
- Ranked list with cost column

Station 3, Stakeholder Committee Project Priority List

- 1) Full Truck Route Alternative - $386M
- 2) Tri-City Operational Improvements - $10M
- 3) Wishkah Mall Access Improvements - $4M
- 4) Intelligent Transportation Systems (ITS) - $9M
- 5) Improve Port Industrial Road - $4M
- Maintenance Priority Seismic Improvements - $20M

Station 4, Truck Route Alternative

- Full truck route alternative
- Supporting illustrations

Station 5, Tri-City Operational Improvements

Station 6, Wishkah Mall Entrance

- Mall access improvements

Station 7, Intelligent Transportation System (ITS)

- Description
- Examples of ITS solutions

Station 8, Improve Port Industrial Road

Station 9, Maintenance Priority

- Seismic improvements (photos/illustrations)

Station 10, Next Steps

- Inform Local, State and Federal elected officials of priority projects
- Keep officials current of project status
- Draft report, January 2007
- Final report, March 2007
- Work with Local Governments and Regional Transportation Planning Organizations to move projects forward

Appendix B

Newspaper Articles

The Daily World

Print Page

Local agencies looking for consensus on future projects for Highway 101

By Jordan Kline - Daily World writer

Wednesday, September 27, 2006 10:44 AM PDT

Nine separate studies have been completed in the last 15 years addressing traffic problems stemming from Highway 101's awkward path through the Harbor.

They came with countless recommendations and ideas, but none have been implemented. Last March, Sen. Mark Doumit, D-Cathlamet, secured $500,000 in the state's transportation budget to put an end to the studies and to produce results.

Part of the money is going to the Grays Harbor Council of Governments, a planning agency that coordinates with local governments. Vicki Cummings, its executive director, has compiled the old recommendations and she is taking them to local stakeholders, including the cities of Aberdeen, Hoquiam and Cosmopolis, Grays Harbor County, the Port of Grays Harbor, the Economic Development Council, the Chamber of Commerce, law enforcement and area tribes, to evaluate and prioritize.

"Sen. Doumit wanted us to be proactive and put an end to the never-ending studies," Cummings said. So last night, she coordinated the first public meeting at the Port of Grays Harbor to allow general comment on all of the options and begin prioritizing the list of ideas, which range from installing new traffic signals to overhauling the Chehalis River Bridge.

"We didn't want to give the impression that DOT was telling us 'here's what you need.' We want to tell them what we want," Cummings said.

Attendees, which Cummings estimated at 55 to 60, were given stickers to place next to the projects they felt were needed most, and were given comment cards to write in suggestions. She said 14 comment cards were returned.

Cummings said the public's input will be taken back to the next stakeholders' meeting and be contrasted with their priorities. "We're pulling everybody together to give the senator a list of projects that we think will best solve our issues by November."

Doumit looking for funding

According to Cummings, Doumit will take this list of projects and then begin to seek funding.

The projects could be large or small-scale. "There are several projects that could be done in the next year with little changes and big impact. Things like widening corners, putting in turn pockets, and signals. But there are other projects that could cost billions of dollars and take 20 years," Cummings said.

Some of the larger projects include rerouting Highway 101, diverting rail lines near the Port, and new bridges over the Harbor's rivers.

Consensus hard to reach

With so many stakeholders involved throughout the region, a consensus may be hard to reach. “We might not agree on what the most needed project will be, but we can all agree on a top five, and that’s what we’re going to give the senator.

“Each of these stakeholders has constituents to serve, but they have that added layer of coming together as a group and thinking for the region. We can put aside our internal differences and agree on a bigger picture,” Cummings said.

The list developed by the stakeholders will take various external factors into account, including growth projections, collision statistics, disaster evacuation plans and regional planning. Cummings said she wants the project to make sense not just for 2007, but also for 2030.

The public is also invited to the final stakeholder meeting from 1 to 3 p.m. on Oct. 24 at the Port, and a final list of recommendations will be produced in November.

Interested citizens should visit the project’s Web site at www.wsdot.wa.gov/planning/studies/US101/Aberdeen to submit their comments and track the progress of the project.

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Print Page

Transportation projects for Harbor get an unveiling

By Jordan Kline - Daily World writer

Wednesday, November 15, 2006 11:19 AM PST

Harborites got their first glimpse last night of what could be the region's future traffic flow.

For months, local government leaders have been meeting to look for a consensus on solutions to traffic issues related to the highway system's sometimes awkward path through Grays Harbor.

The series of meetings known as the Highway 101 Circulation Project culminated in an open house for the public at the Port of Grays Harbor offices.

The process identified five projects deemed to be the most effective ways to improve the Harbor's traffic problems. The projects aren't prioritized, but the idea is that should funding become available, the state Department of Transportation will know what the region thinks it needs.

Former Sen. Mark Doumit secured $500,000 from the state's transportation budget, and gave part of that money to the Council of Governments, a planning agency that coordinates with local governments, to complete this task.

Now it will be up to local government leaders and legislators to push for the funding.

The projects

The largest of the five projects is a planned rerouting of the truck route through Aberdeen and Hoquiam to follow the Port Industrial Road, eventually connecting to Highway 109 west of Hoquiam. Theressa Julius, a planner with the Council of Governments, said the project would speed up drive times for everyone.

"Rerouting the truck route through Aberdeen and Hoquiam has been an idea since 1970," she said. "It would alleviate many of the problems stemming from the trucks that currently use city streets."

The plan would redo the off ramp system on the north side of the Chehalis River Bridge, forcing trucks to use State Street instead of Wishkah Street and Heron Street to go through Aberdeen. State Street would connect to the Port Industrial Road and hug the Port of Grays Harbor until crossing the Hoquiam River. The route would continue south of the Hoquiam downtown corridor on a new road that would connect with Highway 109 near Hoquiam High School.

This overhaul comes with a $386 million price tag, with new bridges over the Hoquiam and Wishkah rivers accounting for $270 million. Upgrading the Port Industrial Road to include a turn lane and traffic signals would cost another $4 million.

Another priority is what planners called a "tri-city operational improvement plan," which would redo crosswalks, intersections, traffic signals and turn lanes throughout Aberdeen, Hoquiam and Cosmopolis at a cost of $10 million dollars.

"It's 20 or so projects specifically submitted by the planners of the three cities," Julius said. "These can be done in the short term for an immediate impact."

The project also would improve access to the Wishkah Mall in East Aberdeen and generally smooth out the traffic mess along Wishkah Street at the entrance to town. At a cost of $4 million, access points to

the mall will be "rerouted for a more intelligent design," according to Bernie Chaplin of Exeltech Consulting, a planning firm hired by the Department of Transportation.

He says the ultimate goal is to eliminate any left hand turns out of the mall by "internally improving the circulation" in the parking lot and improving the traffic signal coordination.

Another priority would install an "intelligent transportation system" — a series of changeable message signs, photo enforcement cameras, closed circuit television cameras for traffic monitoring and a highway advisory radio system at a cost of $9 million.

Lastly, the planners want to fund seismic maintenance improvements for the Chehalis River Bridge and the Heron Street Bridge at a cost of $10 million apiece. Vicki Cummings, director of the Council of Governments said that funding will likely come from a separate maintenance budget maintained by the Department of Transportation.

Funding options

Cummings said that they intentionally included several short-term projects like the tri-city plan and the intelligent transportation system to counterbalance the truck route plan, which could take 20 years to complete.

"We wanted to make big, long-term improvements, but while we're doing that, we'll be fixing things physically so that we're not just sitting here waiting for more money," she said.

Cummings is confident that they'll be able to secure funding, even without Mark Doumit in Olympia. "This is why we wanted to get the priority list as soon as possible, because we wanted to leave it done and ready for the next person that came into office," she said.

Cummings said the first target is to acquire funding for the studies and an Environmental Impact Statement for the truck route project, and move forward from there.

For a more detailed look at the plans, visit the project's Web site at www.wsdot.wa.gove/planning/studies/US101/Aberdeen.

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Appendix C

Bridge Openings and Rail Crossing Information

Bridge Opening Statutes

33 Code of Federal Regulation (CFR) Part 117.5

Stipulates when the draw shall open-

… draw bridges shall open promptly and fully for the passage of vessels when a request to open is given in accordance with this subpart.

… If at least one hour notice is given by marine radio, telephone or other suitable means to the Washington State Department of Transportation…

For example, subpart 117.1031 states Chehalis River Bridge shall open on signal from one hour before sunrise and one hour after sunset EXCEPT: from 7:15 a.m. to 8:15 a.m. and 4:15 p.m. to 5:15 p.m…

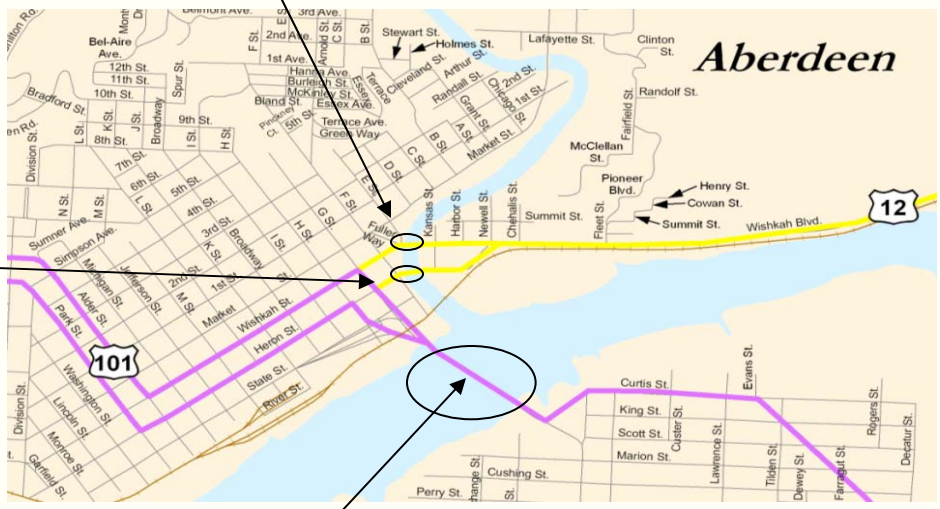
Bridge Locations

Hoquiam River (Riverside Ave) Bridge

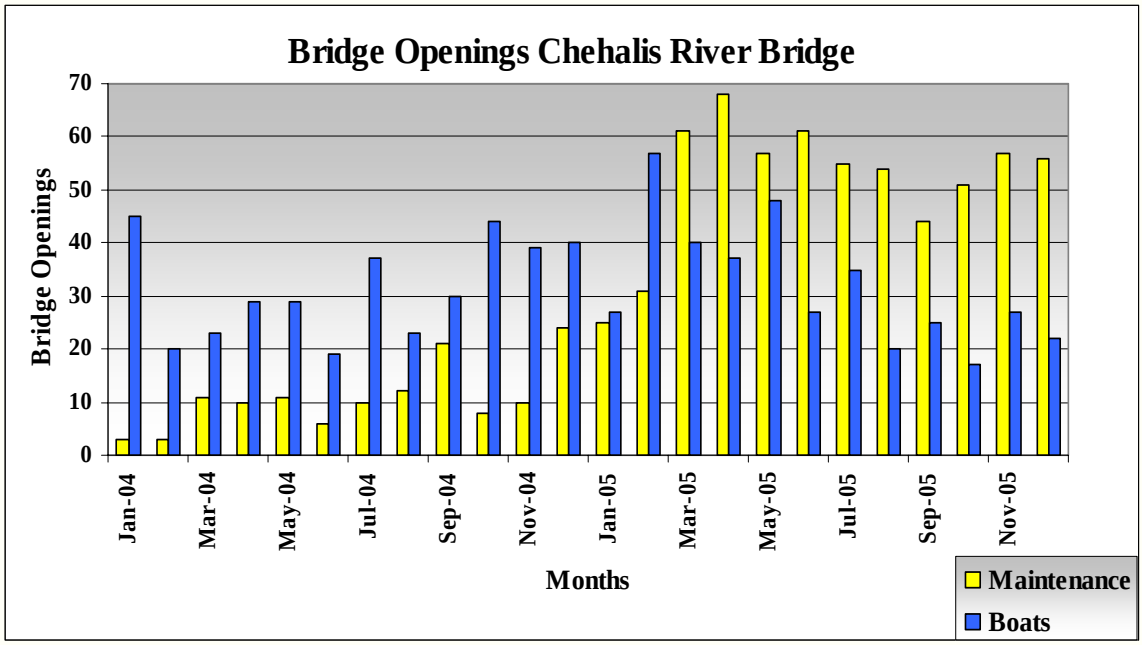
Hoquiam River (Simpson Ave) Bridge

Wishkah River Bridge

Wishkah River (Heron St) Bridge



Chehalis River Bridge


Bridge Openings Chehalis River Bridge
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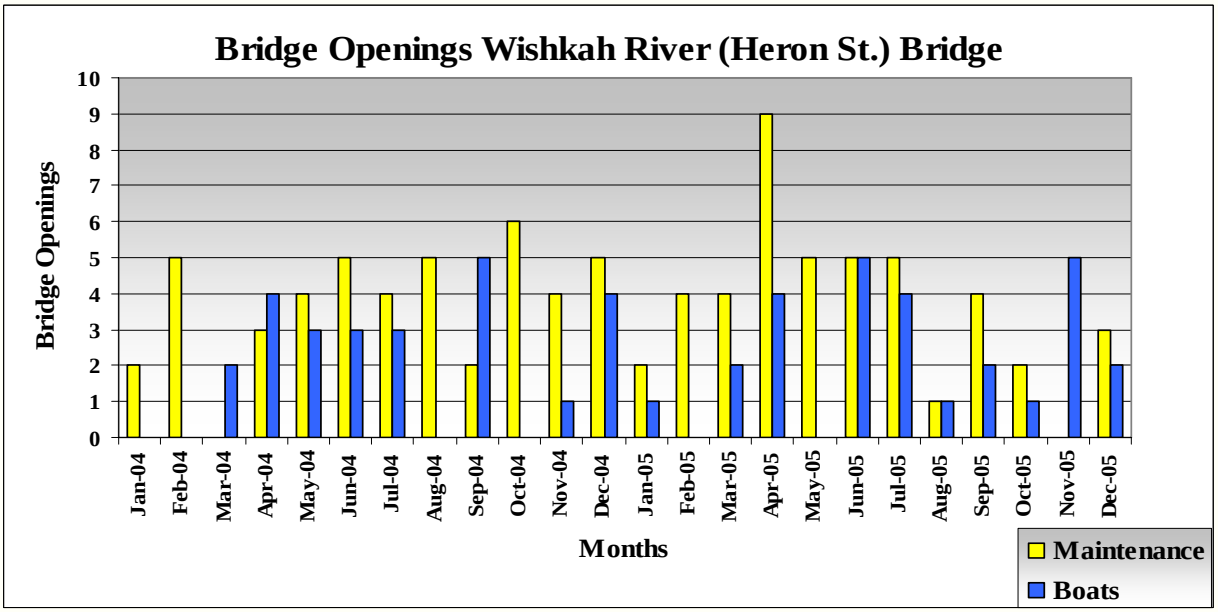
Boats


Bridge Openings Wishkah River (Heron St.) Bridge
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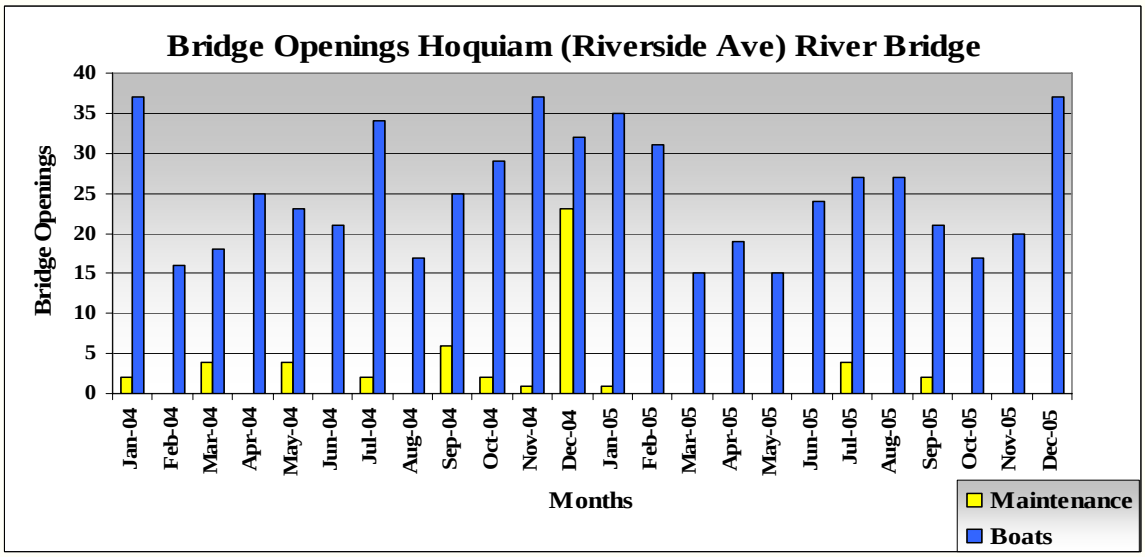
Bridge Openings Hoquiam (Riverside Ave) River Bridge
Bridge Openings
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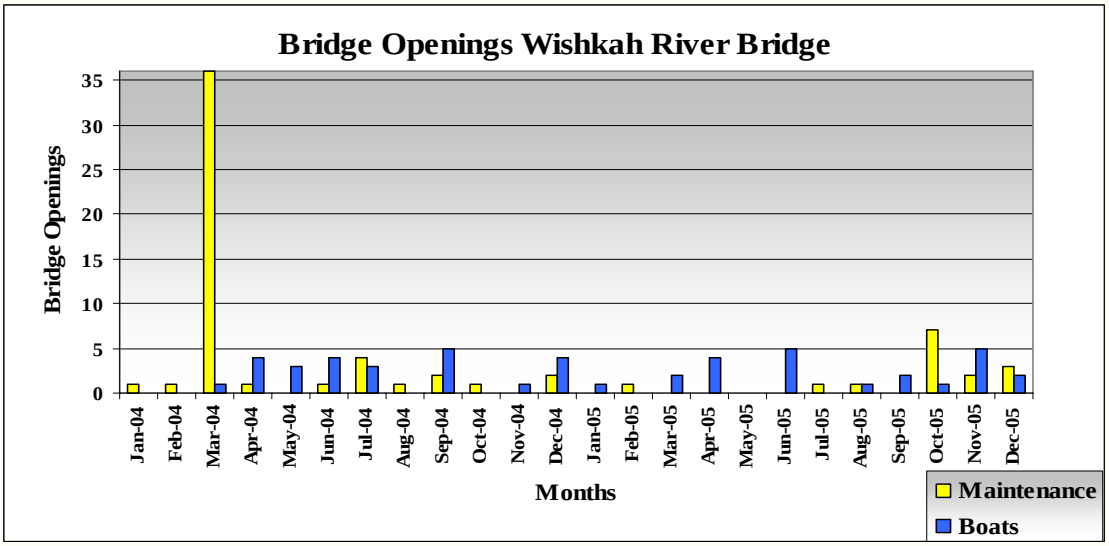
Bridge Openings Wishkah River Bridge
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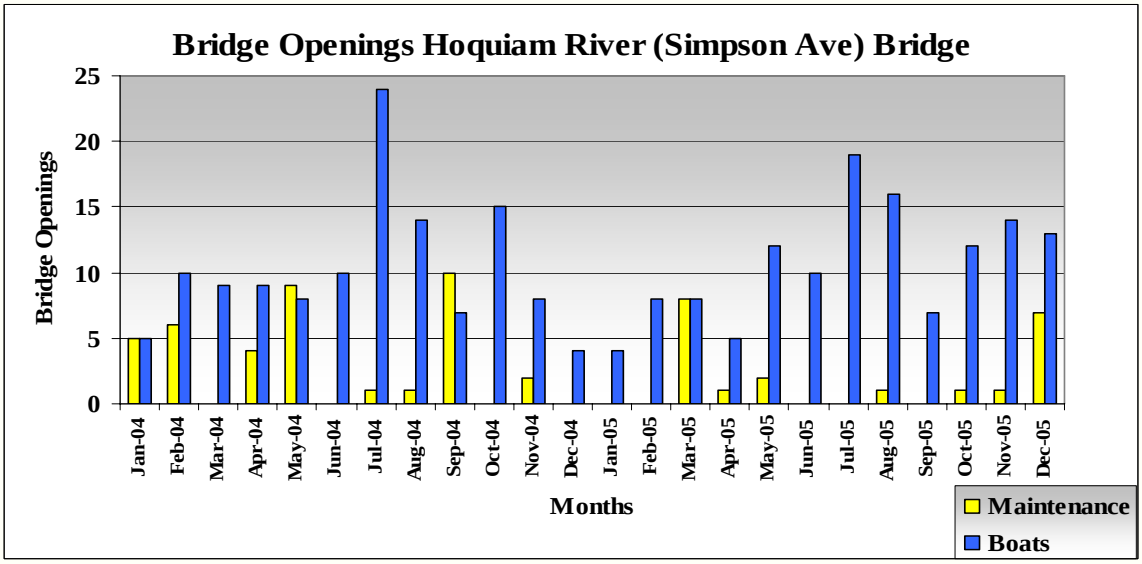
Bridge Openings Hoquiam River (Simpson Ave) Bridge
Bridge Openings
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Months
Maintenance
Boats

Bridge Openings

Summary Table							
			Chehalis River Bridge	Wishkah River (Heron St) Bridge	Hoquiam River (Simpson Ave) Bridge	Hoquiam River (Riverside Ave) Bridge	Wishkah River Bridge
	Year Built		1955	1949	1928 Rebuilt: 1948	1970	1925 Rebuilt: 2003
Boat	**Avg. # of Openings per month**	**2004**	32	2	10	26	2
		2005	32	2	11	24	2
Mainten-ance	**Avg. # of Openings per month**	**2004**	11	4	3	4	4
		2005	52	4	2	1	1
	Avg. Duration of Openings	**2004**	10 min.	10 min.	6 min.	7 min.	7 min.
		2005	6 min.	9 min.	6 min.	7 min.	8 min.

Source: WSDOT Aberdeen Bridge Office

Rail Basic Statistics

The Port has easy access to rail with connections to BNSF and UPRR near Centralia through services of Puget Sound & Pacific (PS&P) Railroad

Number of trains per day (over a 24 hour period)	3
Speed of train in Port Area	10 mph
Number of days service provided in a week	6 days
The typical PS&P Grays Harbor train consists of	25-50 cars

Existing Railcar Storage

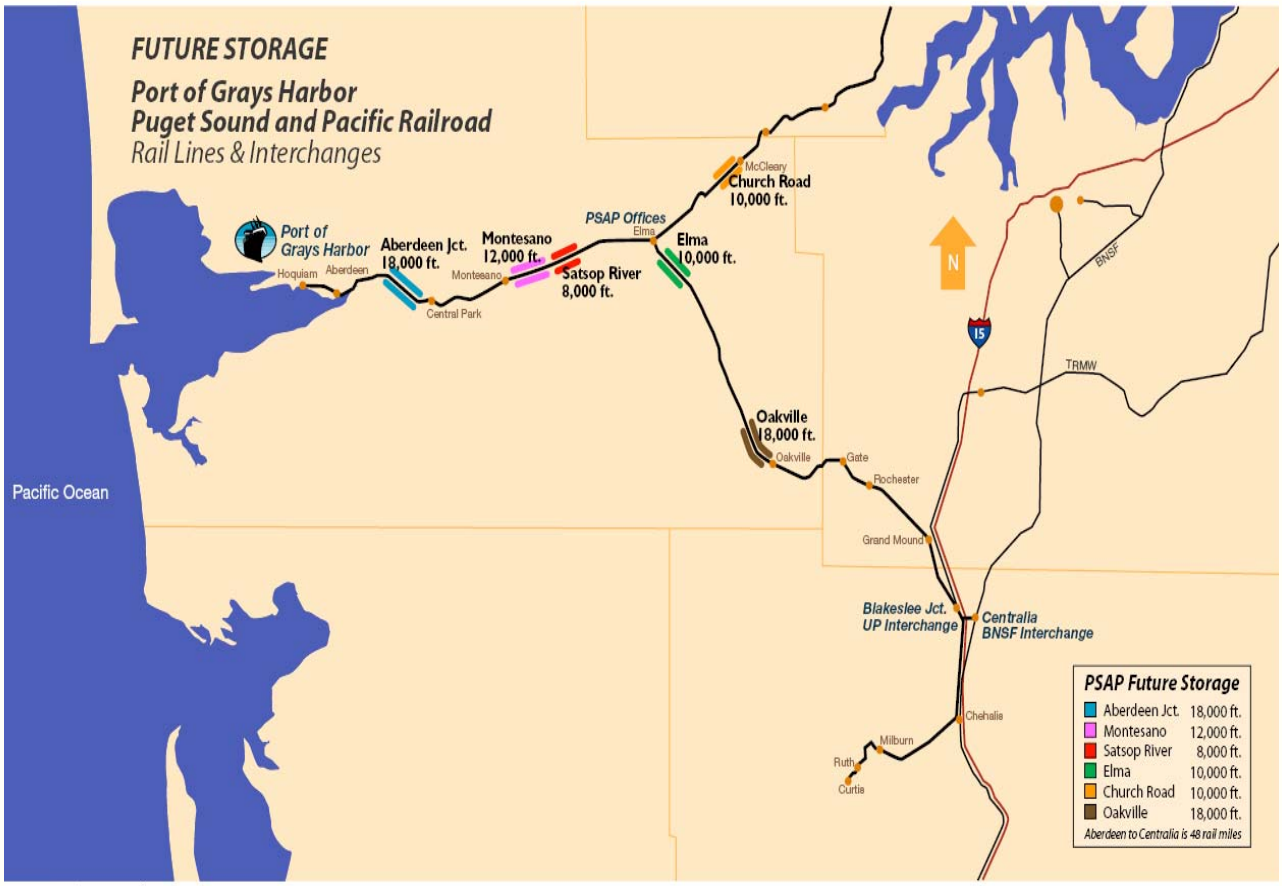
- The majority of railcar storage is at the PS&P's Aberdeen yard
- Aberdeen Yard is comprised of 12 tracks totaling 10,000 feet
- The longest track is 2200 ft. long and can hold 36 sixty-foot railcars
- PS&P has other minor storage tracks through the area

Vessel Loading Capacity

Year	Vessel Calls	Capacity (metric tons / vessel)		Railcars
2005	33	15,909		308
2025	46	25,000		500

Source: Port Industrial Road Strategic Analysis

Future Railcar Storage



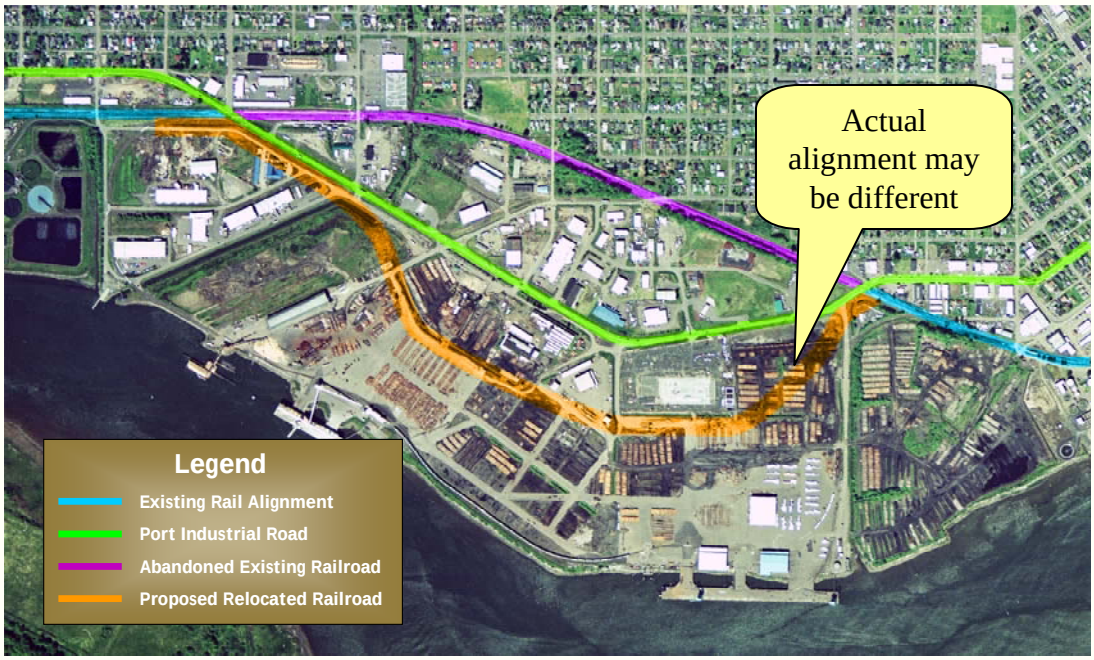
www.PortofGraysHarbor.org

This map is for illustrative purposes only. Storage yard locations have not been identified. Further study is needed.

Local Street Blockage

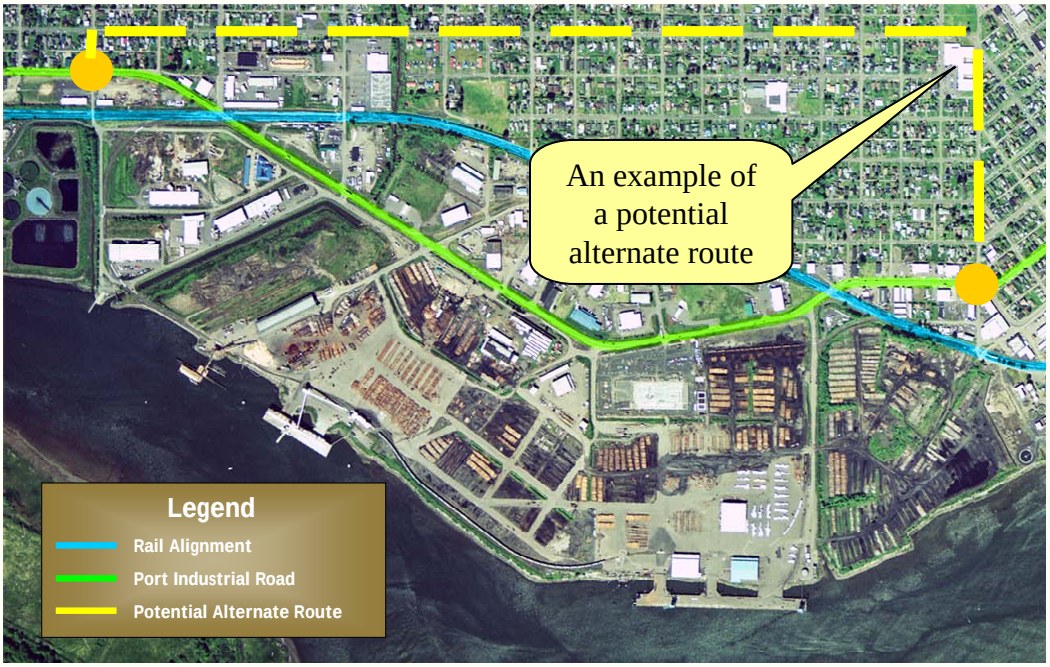
- Blockage comes from switching & building trains at PS&P Aberdeen Yard
- Without changes to the existing rail infrastructure the local street blockage will continue to increase congestion
- Total cumulative road blockage for arrival/departure to the Port is expected to increase 32% between 2005 and 2025
- Possible solutions: new storage tracks, relocating existing rail line, etc.

Rail Realignment Improvement



Port Industrial Strategic Analysis

ITS: Intelligent Transportation System



Port Industrial Strategic Analysis

Appendix D

Future Planned Development

US 101 Regional Circulation Project
Growth and Development

The following projects affect the rate of travel along the US 101 Corridor. Impacts are grouped within the corridor by city and agency and outside of the corridor by city. Also included is general discussion related to county-wide housing and tourism.

Within the Corridor

City of Aberdeen

- Sargent Blvd and Highway 12 – Proposed construction of a $45 million Sierra Pacific Dimension mill with an estimated 150 new jobs.
- Fleet Street/Pioneer Blvd. (Think of Me Hill) – Proposed 200 home development with man made lake.
- E. Heron and G Streets – (Foot of Chehalis River Bridge) Union gospel Mission renovation. Includes demo of building on corner and construction of parking lot and 5,000 sq ft storage building, installation of an elevator and total interior renovation.
- W. Heron & K Streets (Currently the Washington Apartments) - A multi-million dollar 4 star luxury hotel renovation complete with retail space and restaurants. Interior demolition scheduled to begin fall of 2006. Associated with the hotel renovation is the construction of a three story, 300 vehicle public parking structure within 2 blocks of the hotel.
- Oak, Cannon, and Hillcrest Streets, Anderson Drive (Hospital Hill) – Proposed 200 home development.

City of Cosmopolis

- The City recently completed a waterfront development rezone to encourage the siting of retail and office buildings.
- Highway 101 at edge of City limits (Highland Golf Course) - Redevelopment of golf course with additional holes surrounded by three new housing developments; 400 unit total potential.

City of Hoquiam

- Port Industrial Road (vicinity of Myrtle St and John Stevens Way) – Proposed construction of new multi-million dollar biodiesel generation facility. Estimated 200 new construction jobs and 50 +/- family-wage operation jobs. Facility opening scheduled for July of 2007.
- John Stevens Way (Port of Grays Harbor) - Paneltech International expansion ($5.52 million) allows for the replacement of a 40,000 sq. ft. manufacturing facility on Port property in Hoquiam. The project will result in an additional 51 family wage jobs and the retention of 270 manufacturing jobs.
- 28th Street and John Stevens Way (Port of Grays Harbor) - Westport Shipyard Expansion ($4.5 million) to replace an existing rail distribution center and

relocate existing tenants to new building on the site. This project will result in an additional 120 family wage jobs, retention of an existing 520 jobs.

- 23rd St/Bay Ave. (Grays Harbor Paper) - A wood waste biomass generation facility is in the planning stages. When complete the facility will provide 30 new family wage jobs
- 11th & K Streets (Port of Grays Harbor IDD 1 site) - Proposed site of WSDOT construction yard (pontoon construction for 520 bridge). Estimated total 450 new construction jobs to the area.
- East Hoquiam (City officials would not be more specific.) – Proposed 100 home development on 28 acres.

Port of Grays Harbor

Projects affecting jobs and increased cargo/freight capacity include:

- Port Industrial Road Safety and Mobility Improvements, Phase I ($1.8 million) will allow for the design and construction of a third lane to facilitate turning movements without impeding the flow of freight.
- Deeper Draft ($12 million) will allow the harbor to be dredged to its fully authorized depth of 38 feet in order to accommodate new increased vessel sizes.
- AGP export facility storage, terminal 2, Phase I ($9.5 million) to accommodate the construction of a grain products storage facility. Phase I will include land stabilization, rail infrastructure and navigational channel improvements resulting in a doubling of the volume, vessel traffic and employment at the facility. Facility currently supports over 25 full time maritime positions with $125 million in United States exports.

<u>Outside of Corridor</u>

City of Westport

- *The Links at Half Moon Bay* project in Westport is in the final phases of permitting. This Scottish links-style golf course, condo, hotel, and restaurant resort development will bring tourists traveling through State Route 105.
- *Westport by the Sea*, a condominium resort, is a new development that consists of 96 units and a new phase has just been permitted for another 99 units. Total investment in this project will be $80 million. Jobs generated – 50.
- *Islander Hotel* and *Harbor Resort*, a destination point with retail opportunities and condos is a $27.4 million venture generating over 60 jobs.
- Westport Shipyards (at Westport) expansion will add another 75 employees to their 400-person payroll
- Ocean Gold Processing is expanding to new facilities at Firecracker Point, adding another 40+ jobs.

City of Ocean Shores

- Recently completed and opened a $20 million Convention Center and a new hotel and water park.
- The city set an all time record for new home construction issuing 225 building permits in 2005, a 60% increase over 2004 figures. However, as of the first

quarter of 2006 the city has already issued 228 building permits for new home construction.

- A $23 million LID for citywide repaving has been approved and the city is embarking on a major cleanup of its lakes and fresh waterways.

Housing

There are currently 19 residential developments throughout County Grays Harbor. The County is experiencing a housing boom with the highest growth occurring in our coastal communities.

North Beach areas in the county are witnessing large developments:

- Seabrook (a $65,000,000, 400+ home residential project) on SR 109 just south of Moclips, is planned to accommodate 1,200+.
- Hogan's Corner (SR 109/115) adjacent to Ocean Shores is a mixed-use plan including condominiums, hotel, golf course, retail and business park is a $330,000,000 planned investment.

The cities of Ocean Shores and Westport continue their trend of consecutive record breaking years for building permits. Countywide permits for single family homes in 2005 increases by 6.5% over the previous year. There were 7,396 taxable real estate sales, providing a 26.7 % revenue increase over 2004.

Tourism

Tourism is a growth industry drawing over 4 million people to Grays Harbor in 2005. Grays Harbor Tourism has initiated a strong TV advertising campaign and website visits to their site have increased by 48%. Hotel motel taxes demonstrate a 10% annual growth rate. Retail sales support this upward trend. Between 2003 and 2004 retail sales increased by 5.1%. Between 2004 to 2005 retail sales county-wide increased by 14.8%.

Appendix E

Traffic Analysis Report

Traffic Analysis Report

US 101 Regional Circulation Project

Prepared for

Washington State Department of Transportation
Olympic Region
5720 Capitol Boulevard
Tumwater, Washington 98504

and

Grays Harbor Council of Governments
115 South Wooding Street
Aberdeen, Washington 98520

Prepared by

Parametrix
411 108th Avenue NE, Suite 1800
Bellevue, WA 98004-5571
425-458-6200
www.parametrix.com

January 2007

CITATION

Parametrix. 2007. Traffic Analysis Report
US 101 Regional Circulation Project. Prepared by Parametrix, Bellevue,
Washington. January 2007.

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ACRONYMS

FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
GHCOG	Grays Harbor Council of Governments
HCM	Highway Capacity Manual
LOS	level of service
mph	miles per hour
MUTCD	Manual of Uniform Traffic Control Devices
TWLTL	two-way left turn lane
v/c	volume to capacity ratio
WSDOT	Washington State Department of Transportation

1. INTRODUCTION

1.1 PURPOSE OF THE STUDY

The US 101 corridor and connecting highways, US 12 and State Route (SR) 109, are the major routes throughout the cities of Aberdeen, Hoquiam, and Cosmopolis. These highways provide access to the Pacific Ocean beaches, the Western Olympic Peninsula, and Interstate 5 (I-5). These roadways have significant volumes of regional through vehicle trips, especially during the peak spring and summer seasons. Furthermore, they serve as the local main streets for residents traveling to work, school, shopping centers, and other important community destinations. Truck traffic is also dependant on these facilities, with some corridor roadways at over 10 percent heavy vehicles. As a result, the traveling public and local residents are affected by traffic congestion issues.

The purpose of this report is to update and provide traffic analysis support for potential transportation improvement projects in the region. The analysis includes quantifying and reporting year 2006 existing traffic conditions, forecasting year 2030 traffic conditions, and evaluating several projects to determine the benefits or impacts on traffic operations. These projects are varied in scope and extent, ranging from a new truck corridor to improving a turning radius at a single intersection. Moreover, several projects would not have any significant impact on traffic conditions in the region. Traffic analysis was only provided for projects that either improved or degraded roadway traffic conditions.

The methodologies used in this traffic analysis are at a planning level of detail and should not be used for design level analysis. If or when any projects are constructed, a design level traffic analysis may be required.

1.2 STUDY AREA

The project limits of this traffic analysis are US 12/E Sargent Boulevard east of Aberdeen, US 101/Blue Slough Road in Cosmopolis, US 101/SR 109 Spur in Hoquiam, and SR 109/ SR 109 Spur in Hoquiam. Major roadway segments in the study area include:

- US 101 from Blue Slough Road in Cosmopolis to the SR 109 Spur in Hoquiam,
- US 12 from Sargent Boulevard to US 101,
- SR 109 from US 101 to the SR 109 Spur in Hoquiam, and
- Port Industrial Road/Bay Avenue from US 101 in Aberdeen to 23rd Street in Hoquiam.

In addition to analyzing each roadway segment, many intersections along these facilities were identified as candidates for operational analysis. These intersections were identified by project team members as critical locations in the study area. Table 1 lists each intersection, the jurisdiction where it is located, intersection control type, and if the intersection was included in existing conditions and year 2030 operational analysis. Figure 1 illustrates the study area vicinity and highlights the key roadways in the study area.

Table 1. Study Intersections

Intersection	Jurisdiction	Signalized/Unsignalized
Simpson Avenue/5th Street	Hoquiam	Signalized
Simpson Avenue/6th Street	Hoquiam	Signalized
Simpson Avenue/7th Street	Hoquiam	Signalized
Simpson Avenue/8th Street	Hoquiam	Signalized
US 101 (Lincoln Street)/Emerson Street (SR 109)	Hoquiam	Signalized
US 101 (Lincoln Street)/5th Street	Hoquiam	Signalized
5th Avenue/Earley Industrial Way	Hoquiam	Unsignalized
Simpson Avenue/30th Street	Hoquiam	Signalized
Sumner Avenue/30th Street	Hoquiam	Signalized
Industrial Road/30th Street	Hoquiam	Unsignalized
Emerson Street/Adams Street	Hoquiam	Signalized
Simpson Avenue/23rd Street	Hoquiam	Signalized
Sumner Avenue/23rd Street	Hoquiam	Signalized
Simpson Avenue/Ontario Street	Hoquiam	Unsignalized
Sumner Avenue/Ontario Street	Hoquiam	Unsignalized
Simpson Avenue/Myrtle Street	Aberdeen	Signalized
Port Industrial Road/Myrtle Street	Aberdeen	Unsignalized
W Wishkah Street/N Park Street	Aberdeen	Signalized
W Wishkah Street/N Alder Street	Aberdeen	Signalized
W Wishkah Street/L Street	Aberdeen	Signalized
W Wishkah Street/K Street	Aberdeen	Signalized
W Wishkah Street/Broadway Street	Aberdeen	Signalized
W Wishkah Street/I Street	Aberdeen	Signalized
W Wishkah Street/H Street	Aberdeen	Signalized
W Wishkah Street/G Street	Aberdeen	Signalized
W Heron Street/N Park Street	Aberdeen	Signalized
W Heron Street/N Alder Street	Aberdeen	Signalized
W Heron Street/L Street	Aberdeen	Signalized
W Heron Street/K Street	Aberdeen	Signalized
W Heron Street/Broadway Street	Aberdeen	Signalized
W Heron Street/I Street	Aberdeen	Signalized
W Heron Street/H Street	Aberdeen	Signalized
W Heron Street/G Street	Aberdeen	Signalized
Alder Street/Market Street	Aberdeen	Signalized
Alder Street/1st Street	Aberdeen	Signalized
Park Street/Market Street	Aberdeen	Signalized
State Street/N Park Street	Aberdeen	Unsignalized
State Street/N Alder Street	Aberdeen	Unsignalized
US 12/Chehalis Street	Aberdeen	Signalized
US 12/Tyler Street	Aberdeen	Signalized
US 101/SR 105	Aberdeen	Signalized
US 12/Sargent Boulevard	Aberdeen	Signalized

Parametrix US 101/554-2951-002/01(10) 11/06 (B)

N

0 2,500

Scale in Feet

City Boundary

- Aberdeen
- Cosmopolis
- Hoquiam

- Waterbody
- Railroad
- Highway
- River
- Study Limits

Figure 1
Study Area

2. EXISTING CONDITIONS

The 2006 existing traffic conditions were analyzed and documented for roadways within the study area. This analysis includes documenting existing roadway characteristics and traffic distribution patterns, analyzing intersection and arterial level of service operations, and describing transit service in the study area.

2.1 FUNCTIONAL CLASSIFICATION AND ROADWAY CHARACTERISTICS

US 101 is the major roadway corridor through the cities of Aberdeen, Hoquiam, and Cosmopolis. The Washington State Department of Transportation (WSDOT) classifies US 101 as an urban principal arterial throughout the study area. US 101 operates as a one-way couplet through Aberdeen and Hoquiam. This couplet begins at the intersection of Emerson Avenue/5th Street in Hoquiam as a two-lane facility, continues southeast through downtown Hoquiam on Simpson Avenue, crosses the Hoquiam River, and connects with Heron Street in Aberdeen. The roadway continues on Heron Street and a third lane is added though downtown Aberdeen. The couplet joins with the US 101 mainline route on the Chehalis River Bridge and continues south through Cosmopolis. The roadway has multiple signalized intersections, business accesses, and residential driveways that affect the progression of through vehicles on the corridor. Through the downtown areas of Aberdeen and Hoquiam, 2-hour on-street parking is allowed and is typically located on both sides of the roadway. The posted speed limit is 30 miles per hour (mph) through the study area.

SR 109 is classified as an urban minor arterial and extends from the intersection of Lincoln Street to the SR 109 Spur in the study area. This two-lane facility has posted speed limits ranging from 30 mph near the downtown Hoquiam area to 50 mph at the western study area limit. The facility has adjacent residential and commercial land uses, and Hoquiam High School is located on the north side of the corridor.

US 12 is a four-lane urban principal arterial in the study area, with speed limits varying from 30 mph to 45 mph. US 12, via SR 8, provides a direct connection between I-5 and the Aberdeen-Hoquiam-Cosmopolis area and is a vital transportation link to Seattle and other major corridors. This facility has adjacent retail, residential, and industrial land uses. The facility operates as a one-way couplet between US 101 (“G” Street) and S Newell Street and maintains two-way operation to east of S Newell Street.

Port Industrial Road/Bay Avenue is a two-lane arterial street that contains over 20 access points and serves as the primary access into the Port of Grays Harbor. Port Industrial Road connects with US 101 via the Wishkah and Heron Street couplet to the east and by 22nd/23rd Street to the west. It is an established freight corridor for the Aberdeen-Hoquiam area and is used by local traffic and transit as an alternative parallel route to US 101. The corridor provides access to 56 businesses that directly employ over 600 people. This facility, extending a little over a mile in length, has gravel shoulders and no sidewalks. The posted speed limit is 30 mph.

2.2 TRAFFIC VOLUMES DURING AN AVERAGE WEEKDAY

Intersection and arterial traffic counts were collected to establish current traffic conditions in the study area. Arterial traffic count data was collected by WSDOT Olympic Region traffic operations staff over a 5-day weekday period (Monday through Friday) at several key locations using pneumatic tube counters. These counts were conducted to determine traffic patterns within the study area and were used to determine planning level volume to capacity (v/c) ratios where intersection traffic volume data were not available. These count locations included:

- US 12 east of Fleet Street
- Northbound US 101 (Sumner Avenue) east of the Hoquiam River Bridge
- SR 109 west of Adams Street
- US 101 south of the Chehalis River Bridge
- Southbound US 101 (Simpson Avenue) east of the Simpson Avenue Bridge

In addition to daily tube counts, weekday intersection traffic counts were conducted for a 4-hour PM peak period (2:00 PM to 6:00 PM) from 2004 to 2006. Counts were conducted at each of the intersections listed in Table 1. Traffic counts from different years were compared to each other and to the WSDOT annual traffic report. This comparison indicated that traffic volumes from different years did not significantly vary. Therefore, counts conducted prior to 2006 were used as representative of 2006 counts. Traffic counts were compared at each study intersection to determine a "system" peak hour to establish a consistent arterial and intersection analysis time period. An overall system peak hour typically occurs from 4:30 PM to 5:30 PM and was used as the representative peak hour for the existing level of service analysis discussed in Section 2.4.

As shown in Figures 2 though 6, traffic volumes in the study area have a bell curve shape, indicating there is not a clearly defined AM peak hour, and the highest weekday volumes occur during the afternoon. At most locations, particularly on US 101, traffic volumes increase until reaching a plateau from 3:00 PM to 5:00 PM.

Two-directional traffic volumes on US 101 south of the Chehalis River Bridge exceed 2,500 vehicles during the PM peak hour and 31,700 vehicles per day. For both northbound and southbound US 101 over the Hoquiam River, the total peak hour volume reaches 2,500 vehicles per hour, and daily volumes exceed 31,800 vehicles. Higher traffic volumes would be expected during the Friday PM peak hour and on some spring and summer weekend days due to increased tourist activities.

Traffic volumes on SR 109 west of Adams Street have two-directional volumes that peak around 700 vehicles per hour on a typical weekday. Volumes remain around the 700 vehicle threshold at this location between 12:00 PM and 5:00 PM, indicating fairly constant traffic flows during a typical weekday afternoon.

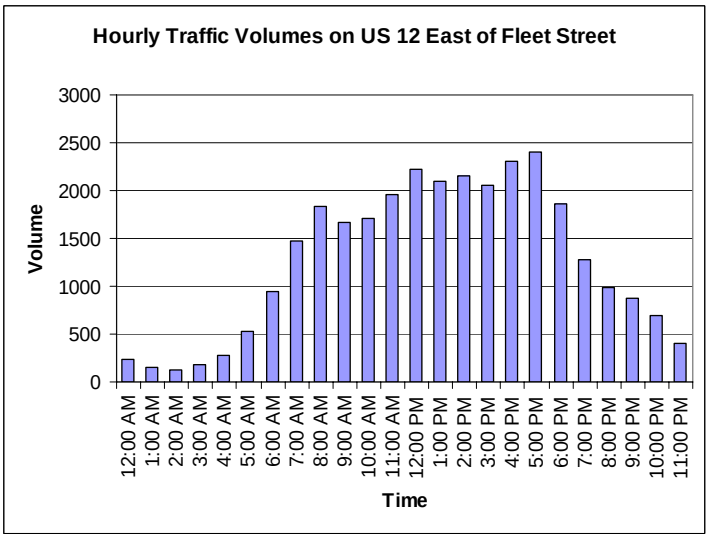

Figure 2. Hourly Traffic Volumes on US 12 East of Fleet Street

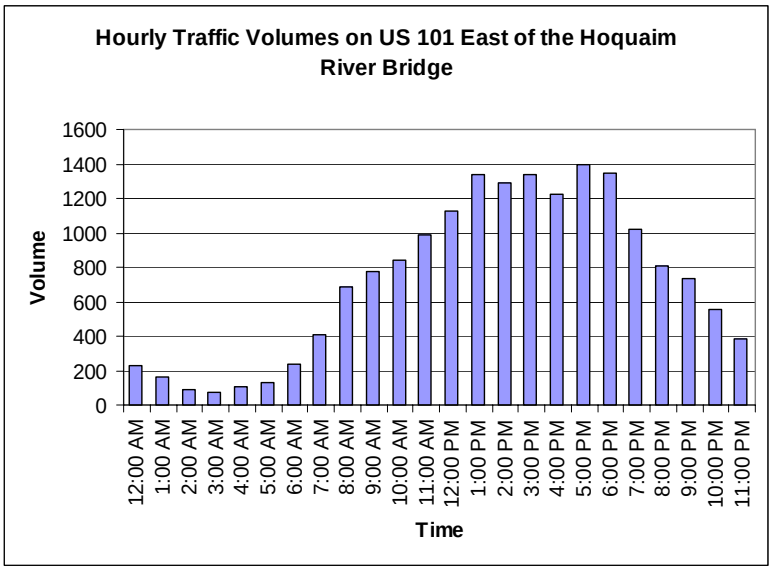

Figure 3. Hourly Traffic Volumes on US 101 East of the Hoquiam River Bridge

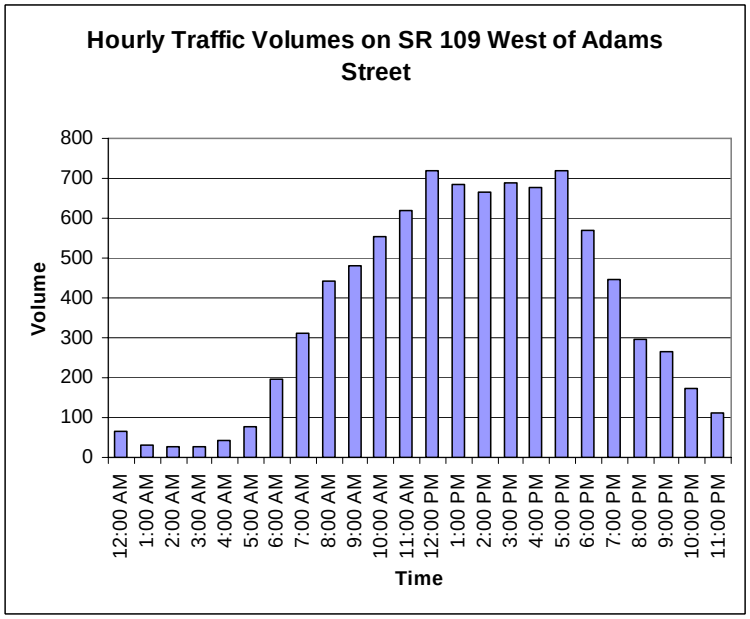

Figure 4. Hourly Traffic Volumes on State Route 109 West of Adams Street

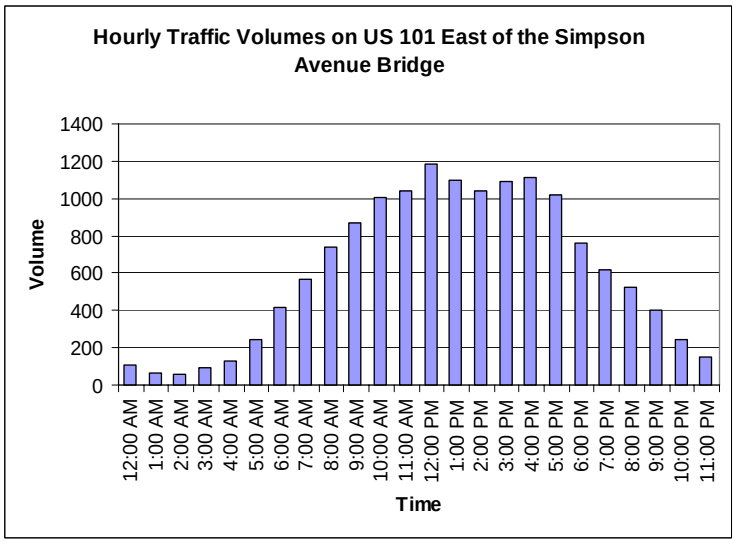

Figure 5. Hourly Traffic Volumes on US 101 East of the Simpson Avenue Bridge

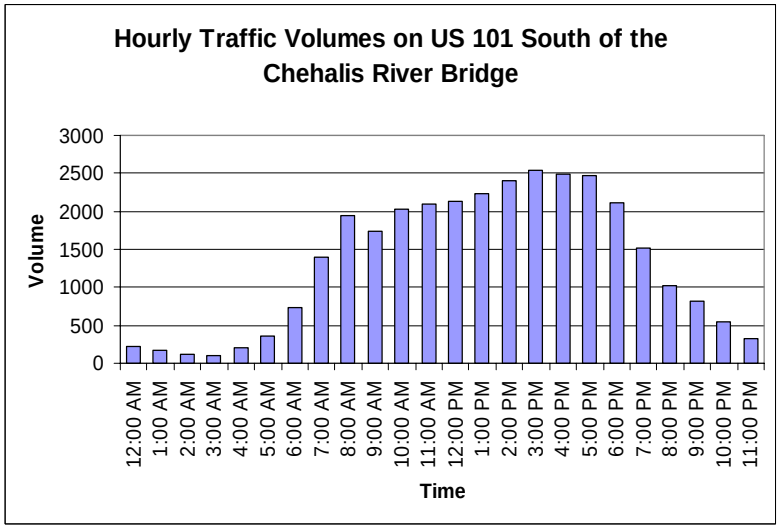

Figure 6. Hourly Traffic Volumes on US 101 South of the Chehalis River Bridge

Truck traffic on US 101 and area roadways is an increasing concern for local residents and through travelers. Figure 7 shows the existing PM peak hour total approach volumes and heavy vehicle percentages for 10 intersection approaches in the study area. The highest heavy vehicle percentages are found around the Port of Grays Harbor, especially on Port Industrial Road. On both northbound and southbound US 101, east of the Port of Grays Harbor, heavy vehicle percentages are between 3 to 4 percent while west of the Port heavy vehicle percentages drop to 2 to 3 percent. Daily heavy vehicle percentages may be higher at some locations.

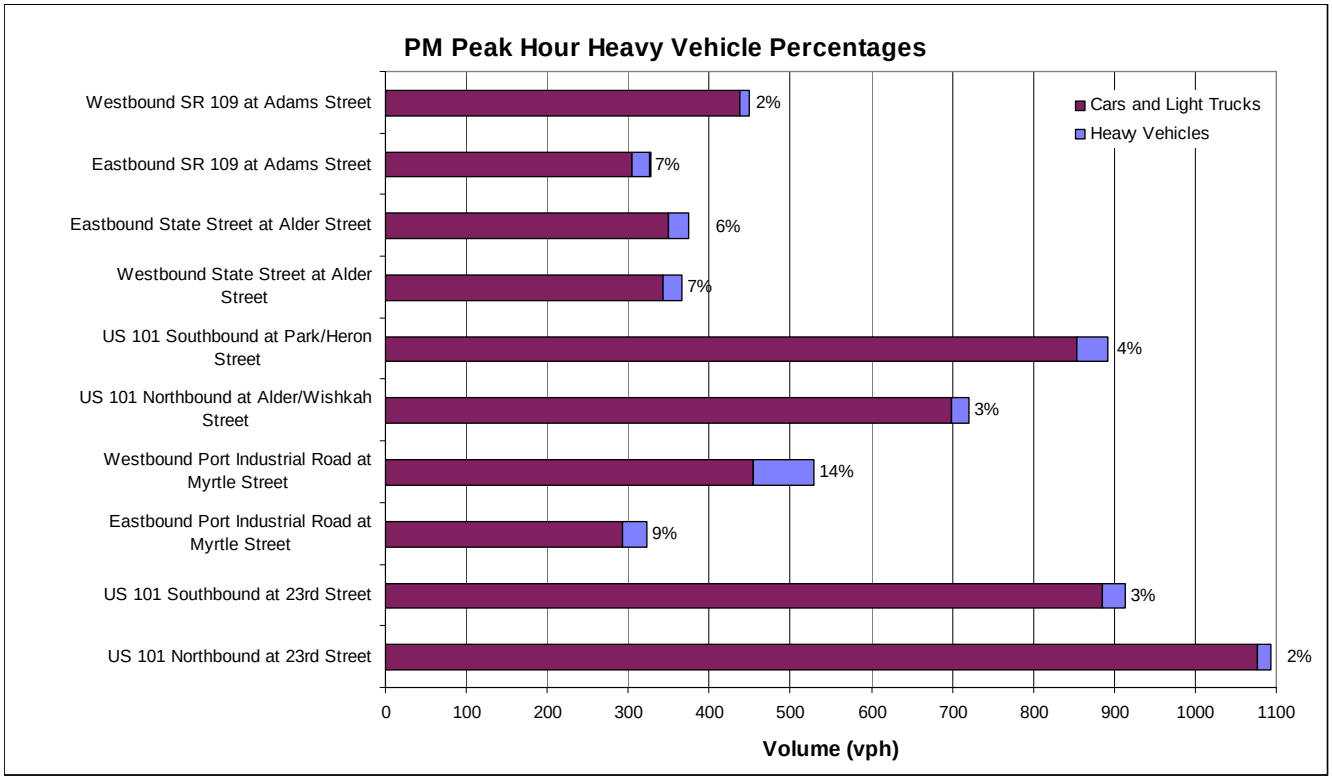

Figure 7. PM Peak Hour Heavy Vehicle Percentages within the Study Area

2.3 2006 AVERAGE WEEKDAY DAILY TRAFFIC VOLUMES

Traffic volumes in the study area were determined from the tube count data described in Section 2.2. From this data, a K-factor, which is the ratio of PM peak hour traffic divided by daily traffic, was determined for each of these locations. This K-factor was applied to PM peak hour counts at critical locations in the study area to approximate average weekday daily traffic volumes where tube count data were not readily available. Typically, PM peak hour volumes were between 7 and 10 percent of the daily traffic volumes in the study area. Figure 8 illustrates the average weekday daily traffic volumes across study area bridges and through downtown Aberdeen.

The total of both northbound and southbound US 101 traffic volumes through Aberdeen and Hoquiam are typically around 30,000 vehicles per day. Similarly, the traffic volume on both US 12 bridges crossing the Wishkah River is approximately 30,000 vehicles per day.

2.4 EXISTING LEVEL OF SERVICE ANALYSIS

2.4.1 Existing Intersection Level of Service Analysis

An intersection level of service (LOS) analysis was conducted for 33 intersections in the study area to determine existing operating conditions. LOS is an estimate of the quality and performance of the transportation system operations. One industry standard for evaluating traffic conditions is based on the Transportation Research Board's methodology outlined in the Highway Capacity Manual (HCM), Special Report 209 (TRB 2000). Using this methodology, traffic conditions are assessed with respect to the average intersection delay

(seconds per vehicle). The letter "A" indicates the least amount of congestion and best operations, while the letter "F" indicates the highest amount of congestion and worst operations. The 2000 HCM LOS ratings and criteria for signalized and unsignalized intersections are shown in Table 2. The LOS reported for two-way stop-controlled intersections is the worst control delay among all the intersection approaches and is not representative of overall intersection operations. The Washington State Department of Transportation (WSDOT) LOS standard for all arterial intersections in the study area is LOS D or better. All intersections were analyzed using Trafficware's Synchro 6.0 (build 614).

Table 2. Level of Service Ratings for Signalized and Unsignalized Intersections

LOS Rating	Average Delay for Signalized Intersections (seconds/vehicle)	Average Delay for Unsignalized Intersections (seconds/vehicle)
A	0 – 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Highway Capacity Manual (TRB 2000).

Study intersections are located primarily along the US 101 and US 12 corridors through the cities of Aberdeen and Hoquiam. Most unsignalized intersections are located within the Port of Grays Harbor area and on State Street east of the port, while signalized intersections are located on US 101, US 12, and SR 109. These intersections were analyzed since they are located on the most heavily traveled routes or are along truck corridors in the study area. Along these major routes, the signalized intersections control roadway capacity.

As shown in Table 3, all study intersections are operating at LOS C or better during the PM peak hour with the exception of the three-way stop-controlled State Street/Park Street intersection, which is currently operating at LOS F for the southwest (State Street) approach. None of the other study intersections are approaching the WSDOT LOS D threshold on the state highway facilities, indicating that the signalized intersections are operating with favorable vehicle progression and adequate allocation of green time to each signal approach.

2.4.2 Existing Arterial Segment Level of Service Analysis

According to the Highway Capacity Manual (HCM) 2000 Update, arterial level of service is a function of through-vehicle travel speed and roadway classification along an arterial. The average travel speed is computed from the running times on the urban street segment and the through movement average vehicle delay at signalized intersections. Arterial LOS, similar to intersection LOS, is categorized by six different levels of service denoted by the letters "A" through "F." LOS A represents free-flow speeds with minimal control delay at signalized intersections, and LOS F represents extremely low travel speeds and intersection congestion likely at critical signalized locations, with long delays, high volumes, and extensive queuing.

Parametrix US 101/554-2951-002/01(10) 11/06 (B)

N

0 2,500

Scale in Feet

City Boundary

- Aberdeen
- Cosmopolis
- Hoquiam

- Waterbody
- Railroad
- Highway
- River

Location
XX,XXX

2006 AWDT

Figure 8
2006 Average Weekday Daily Traffic Volumes

Table 3. Existing Intersection Level of Service Conditions

Study Intersection[1]	Year 2006 Existing Conditions	
	LOS	Delay (sec/veh)
Signalized Intersections		
Simpson Avenue/5th Street	B	18.2
Simpson Avenue/6th Street	C	24.0
Simpson Avenue/8th Street	A	6.8
US 101 (Lincoln Street)/Emerson Street (SR 109)	A	6.0
US 101 (Lincoln Street)/5th Street	A	6.0
Simpson Avenue/30th Street	A	4.4
Sumner Avenue/30th Street	A	2.8
Simpson Avenue/Myrtle Street	B	10.5
W Wishkah Street/N Park Street	B	14.3
W Wishkah Street/N Alder Street	A	7.0
W Wishkah Street/L Street	A	4.4
W Wishkah Street/H Street	A	8.7
W Wishkah Street/G Street	B	12.1
W Heron Street/N Park Street	B	12.6
W Heron Street/N Alder Street	A	7.2
W Heron Street/L Street	B	18.7
W Heron Street/H Street	C	26.3
W Heron Street/G Street	C	22.3
US 12/Chehalis Street	B	19.9
US 12/Tyler Street	C	20.9
US 101/SR 105	B	10.8
US 12/Sargent Boulevard	A	5.3
Simpson Avenue/23rd Street	A	7.6
Sumner Avenue/23rd Street	B	11.5
Alder Street/1st Street	B	15.7
Alder Street/Market Street	B	13.3
Park Street/Market Street	A	5.7
Emerson Street/Adams Street	A	5.2
Unsignalized Intersections		
Port Industrial Road/Myrtle Street (Southbound Approach)	C	21.0
State Street/N Park Street[2] (Southwest Approach)	F	56.8
State Street/N Alder Street (Southeast Approach)	C	16.4
5th Avenue/Earley Industrial Way (Southwest Approach)	A	9.9
Industrial Road/30th Street (Southbound Approach)	B	13.9
W Heron Street/F Street (Southbound Approach)	C	24.1

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

[2] The HCM methodology does not allow three-way stop-controlled intersections. Reported level of service is for the westbound approach and assumes intersection operates as a T-intersection.

This arterial LOS methodology can be used on arterials where intersection control delays are known. The exhibit from the HCM (TRB 2000), shown in Figure 9, lists urban street LOS criteria based on average travel speed and urban street classification. For the existing conditions analysis, this methodology was applied to seven arterial segments within the study area, including:

- Northbound US 101 ("G" Street to Alder Street) – Aberdeen
- Northbound US 101 (Wishkah Street to Emerson Avenue) – Aberdeen/Hoquiam
- Southbound US 101 (Emerson Avenue to 8th Street) – Hoquiam
- Southbound US 101 (8th Street to Heron Street) – Hoquiam/Aberdeen
- Southbound US 101 (Park Street to "H" Street) – Aberdeen
- Westbound US 12 (Sargent Boulevard to Chehalis Street) – Aberdeen
- Eastbound US 12 (Chehalis Street to Sargent Boulevard) – Aberdeen

Urban Street Class	**I**	**II**	**III**	**IV**
Range of Free-Flow Speeds (FFS)	**55 to 45 mph**	**45 to 35 mph**	**35 to 30 mph**	**35 to 25 mph**
Typical FFS	**50 mph**	**40 mph**	**35 mph**	**30 mph**
LOS	**Average Travel Speed (mph)**			
A	>42	>35	>30	>25
B	>34-42	>28-35	>24-30	>19-25
C	>27-34	>22-28	>18-24	>13-19
D	>21-27	>17-22	>14-18	>9-13
E	>16-21	>13-17	>10-14	>7-9
F	≤ 16	≤ 13	≤10	≤ 7

Figure 9. Urban Street Level of Service by Class

Source: Highway Capacity Manual 2000 (Transportation Research Board)

For arterial segments where signalized intersection data were not readily available, or where signalized intersections are not located along the segment, the Florida Department of Transportation's (FDOT) Generalized Level of Service Tables, as shown in Figure 10, were used to determine planning-level existing LOS. These tables are based on the HCM 2000 and field data collected on arterial roadways, and they provide a planning-level estimate of arterial LOS based on volume to capacity ratios. This methodology determines the arterial LOS from roadway information, including peak hour directional volumes, number of signalized intersections per mile, and roadway channelization characteristics. Arterials were analyzed based on the highest directional PM peak hour volumes found on that particular arterial segment. This results in a conservatively high LOS estimate for both directions of the arterial link. The Florida Generalized Level of Service Tables are attached in Appendix A.

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	100	330	620	870	1,200
2	Divided	980	1,590	2,300	2,980	3,390
3	Divided	1,470	2,390	3,460	4,470	5,080

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	210	690	820	860
2	Divided	240	1,470	1,730	1,810	****
3	Divided	370	2,260	2,600	2,710	****

Class II (2.00 to 4.50 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	560	760	810
2	Divided	**	200	1,290	1,620	1,700
3	Divided	**	320	2,000	2,430	2,560

Class III (more than 4.5 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	260	620	770
2	Divided	**	**	620	1,440	1,630
3	Divided	**	**	970	2,220	2,450

NON-STATE ROADWAYS
Major City/County Roadways

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	370	720	770
2	Divided	**	**	870	1,550	1,630
3	Divided	**	**	1,360	2,330	2,450

Other Signalized Roadways
(signalized intersection analysis)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	230	490	630
2	Divided	**	**	540	1,070	1,270

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Lanes	Level of Service A	B	C	D	E
2	1,290	2,130	2,890	3,420	3,800
3	2,000	3,290	4,460	5,280	5,870
4	2,700	4,450	6,030	7,140	7,940
5	3,400	5,600	7,610	9,010	10,010

BICYCLE MODE

(**Note:** Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	***	100	170	720	>720
50-84%	***	130	210	>210	****
85-100%	170	380	>380	****	****

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometric at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	***	***	***	330	810
50-84%	***	***	***	520	990
85-100%	***	120	590	>590	****

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS
DIVIDED/UNDIVIDED

Lanes	Median	Left Turn Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Increase corresponding volume 20%.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

99

Figure 10. FDOT Directional Peak Hour Segment LOS Table

The following six arterial segments were analyzed using the FDOT methodology.

- State Street (US 101 Ramps to Park Street) – Aberdeen
- Eastbound/Westbound SR 109 (SR 109 Spur to Lincoln Street) – Hoquiam Northbound/Southbound US 101 (Blue Slough Road to Wishkah Street) – Cosmopolis/Aberdeen
- Myrtle Street (Sumner Street to Port Industrial Road) – Aberdeen
- Northbound/Southbound US 101 (Emerson Avenue to SR 109 Spur) – Hoquiam
- Port Industrial Road/Bay Road (22nd Street to N Division Road) – Hoquiam/Aberdeen

Table 4 shows both the operational-level arterial LOS and planning-level arterial LOS estimates for arterial segments in the study area, and Figure 11 illustrates the arterial and intersection LOS conditions.

Table 4. Existing Arterial Segment Level of Service Conditions

	Existing Conditions	
Operational-Level Arterial LOS (HCM Methodology)	**Arterial Speed (mph)**	**LOS**
Northbound US 101 (“G” Street to Alder Street)	26.9	B
Northbound US 101 (Wishkah Street to Emerson Avenue)	26.7	B
Southbound US 101 (Emerson Avenue to 10th Street)	13.9	C
Southbound US 101 (10th Street to Heron Street)	21.7	B
Southbound US 101/Eastbound US 12 (Park Street to “H” Street)	14.2	C
Westbound US 12 (Sargent Boulevard to Chehalis Street)	30.2	B
Eastbound US 12 (Chehalis Street to Sargent Boulevard)	26.8	C
Planning-Level Arterial LOS (FDOT Methodology)	**Highest Directional Volume**	**LOS**
State Street (US 101 Ramps to Park Street)	375	C
Eastbound/Westbound SR 109 (SR 109 Spur to Lincoln Street)	405	C
Northbound/Southbound US 101 (Blue Slough Road to SR 105)	475	B
Myrtle Street (Sumner Street to Port Industrial Road)	190	C
Northbound/Southbound US 101 (Emerson Avenue to SR 109 Spur)	585	C
Port Industrial Road/Bay Road (22nd Street to N Division Road)	530	C

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Parametrix

N

0 1,500 3,000 Feet

Existing Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Existing Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Highway
Other Road
Railroad

Waterbody
River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 11
2006 Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project

2.5 TRANSIT SERVICE

Transit service for the cities of Aberdeen, Hoquiam, and Cosmopolis is primarily provided by Grays Harbor Transit with eight service routes:

- Route 10A – North Aberdeen
- Route 10B – S. Aberdeen
- Route 15 – Cosmopolis
- Route 20 – Aberdeen-Hoquiam
- Route 40 – East County
- Route 50 – Ocean Shores
- Route 55 – Westport-Grayland
- Route 60 – Aberdeen-Quinault

These routes are shown in Figure 12. Transit routes generally provide service to Aberdeen, Hoquiam, and other Grays Harbor County destinations such as the Quinault Indian Nation, Ocean Shores, Westport, Montesano, North Shore, and Olympia. All eight routes connect to the Aberdeen Transit Station and provide weekend service. Grays Harbor Transit also provides dial-a-ride service to several locations in the study area.

Route 10A is a local transit route providing loop service to the downtown Aberdeen area, West Aberdeen, and the Fern Hill and Bend Drive neighborhoods. This route services Wal-Mart and the Aberdeen senior center. Transit service on this route operates with half-hour headways between 7:00 AM and 8:00 PM and alternates service between the Fern Hill/ Bench Drive neighborhoods and West Aberdeen.

Route 10B provides loop service between the Downtown Aberdeen Station and South Aberdeen. Route 10B primarily follows US 101 via Wishkah Street to “L” Street, “L” Street to Heron Street, and Heron Street over the Chehalis River Bridge to Boone Street. The route circles through South Aberdeen before crossing back over the Chehalis River Bridge and terminating at the Aberdeen Station. This route operates on half-hour headways between 7:00 AM and 9:00 PM.

Route 15 provides loop service between Cosmopolis and Downtown Aberdeen Station. This route follows US 101 south over the Chehalis River Bridge and serves several neighborhoods in Cosmopolis before returning to Aberdeen Station via US 101. The route operates on 1-hour headways between 7:00 AM and 8:00 PM on weekdays and operates on 2-hour headways between 10:00 AM and 6:00 PM on weekends.

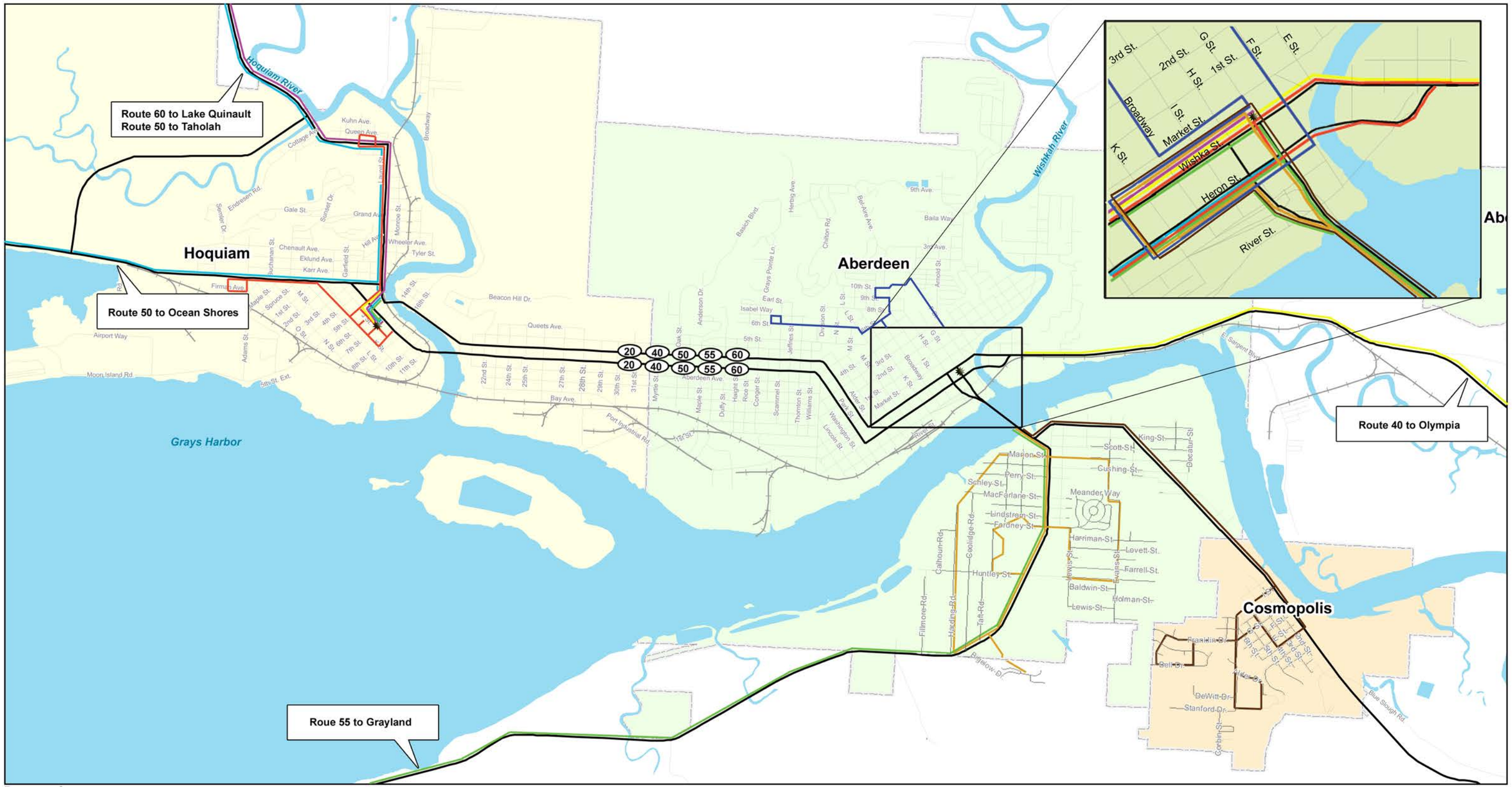
Route 20 travels west from the Aberdeen Station to Hoquiam via northbound US 101, loops around Hoquiam, providing service to Hoquiam High School and Hoquiam Transit Station, and back to Aberdeen Station via southbound US 101. This route also provides intermittent service to Aberdeen Community Hospital and Wal-Mart. This route has varying headways between the hours of 5:10 AM and 9:30 PM.

Route 40 provides two-directional service from Aberdeen Transit Station to the cities of Montesano, Elma, McCleary, and Olympia between the hours of 5:10 AM and 7:30 PM. This route operates with approximately 1-hour headways and also provides intermittent service to Wal-Mart.

Route 50 connects Downtown Aberdeen to Ocean Shores and other communities on the Pacific Ocean coast. It operates between 5:10 AM and 9:10 PM and has headways approximately every hour. This route provides intermittent service to Ocean City, Copalis Beach, Pacific Beach, Moclips, Taholah, and Copalis Crossing.

Route 55 begins at Hoquiam Transit Station, provides service to the Aberdeen Transit Station, then heads west on SR 105 to the cities of Westport and Grayland. This route has headways approximately every 90 minutes and operates between 5:25 AM and 8:30 PM on weekdays.

Route 60 provides service between the Quinault Indian Nation and the cities of Aberdeen and Hoquiam. Headways are spaced periodically throughout the day, with most trips occurring during the morning and afternoon peak periods. This route provides service to and from the communities of Humptulips, Neilton, and Lake Quinault via US 101.



Parametrix US 101/554-2951-002/01(10) 11/06 (B)

N

0 2,500

Scale in Feet

City Boundary

- Aberdeen
- Cosmopolis
- Hoquiam

- Transit Center
- Waterbody
- Railroad
- Highway
- River

- Route 10A North Aberdeen
- Route 10B South Aberdeen
- Route 15 Cosmopolis
- Route 20 Aberdeen - Hoquiam
- Route 40 East County
- Route 50 Ocean Shores
- Route 55 Westport - Grayland
- Route 60 Aberdeen - Quinault

Figure 12
Transit Routes

3. YEAR 2030 BASELINE TRAFFIC CONDITIONS

To identify and analyze roadway impacts for each proposed transportation improvement project, future traffic volumes within the study area were projected to the year 2030. This projection is used as a baseline and assumes that existing roadway characteristics would remain the same. The methodology for forecasting future year traffic volumes and the resulting arterial and intersection operations are included in this section of the report.

3.1 TRAFFIC VOLUME FORECASTS

Year 2030 traffic volumes were forecasted using a multi-step process. Historical traffic growth rates, proposed residential dwelling unit growth, and proposed new employment were reviewed to initially forecast growth in the study area. Several sources were reviewed and analyzed to develop traffic volume growth forecasts in the study area. This review included the following sources, and a more detailed summary of this review is provided in Appendix B:

- WSDOT Annual Traffic Reports (2002–2005)
- Aberdeen-Hoquiam Corridor Project Year 2020 Traffic Analysis (T-4) (Sverdrup Civil, Inc. 1998)
- Aberdeen-Hoquiam Corridor Project Final Environmental Impact Statement (EIS) (Sverdup Civil, Inc. April 2000)
- Port Industrial Road Strategic Analysis (HDR and CH2M Hill 2006)
- Grays Harbor Council of Governments documentation

Based on the review of these studies, a 2 percent annual compounded growth rate was recommended and was applied to existing traffic volumes. In addition, forecasted traffic volumes and trip distribution patterns provided in the Port Industrial Road Strategic Analysis (CHM2Hill 2006) were added to the 2030 baseline traffic volume forecasts. This combined approach forecasts a conservatively high growth estimate within the study area. This forecast results in traffic volume increases ranging from 61 percent (in Hoquiam) to 185 percent (along Port Industrial Road) for the PM peak hour.

3.2 YEAR 2030 LEVEL OF SERVICE ANALYSIS

Future year 2030 intersection traffic operations were analyzed using the same level of service methodologies outlined in Section 2.3. The future year LOS analysis assumed that fixed-time signalized intersections in downtown Aberdeen would operate as actuated-coordinated signals by 2030. For the baseline analysis, traffic signal cycle lengths, green time to capacity ratios (g/C), and offsets were optimized. Table 5 provides a summary of existing and year 2030 baseline traffic conditions for each of the study intersections during the PM peak hour.

Table 5 shows the year 2006 intersection LOS and year 2030 baseline intersection LOS. The table indicates that 11 out of 28 signalized intersections and 5 out of 6 unsignalized intersections would operate worse than LOS D by 2030. Intersections near the Wishkah Mall vicinity, including US 12/Chehalis and US 12/Tyler Street, would operate poorly due to forecasted growth and increased shopping trips to the Wishkah Mall. The Heron Street/“H” Street and Heron Street/“G” Street intersections would have average vehicle delays greater than 100 seconds and would operate at LOS F.

Table 5. Existing and Year 2030 Baseline Level of Service

Study Intersection[1]	Year 2006 Conditions		Year 2030 Baseline Conditions	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Signalized Intersections				
Simpson Avenue/5th Avenue	B	18.2	D	36.7
Simpson Avenue/6th Avenue	C	24.0	E	68.1
Simpson Avenue/8th Avenue	A	6.8	B	15.5
US 101 (Lincoln Street)/ Emerson Street (SR 109)	A	6.0	F	110.3
US 101 (Lincoln Street)/5th Street	A	6.0	B	16.9
Simpson Avenue/30th Street	A	4.4	A	9.3
Sumner Avenue/30th Street	A	2.8	A	6.3
Simpson Avenue/Myrtle Street	B	10.5	F	86.4
W Wishkah Street/N Park Street	B	14.3	D	49.2
W Wishkah Street/N Alder Street	A	7.0	B	15.1
W Wishkah Street/L Street	A	4.4	B	11.6
W Wishkah Street/H Street	A	8.7	B	14.0
W Wishkah Street/G Street	B	12.1	B	18.0
W Heron Street/N Park Street	B	12.6	F	131.1
W Heron Street/N Alder Street	A	7.2	B	13.0
W Heron Street/L Street	B	18.7	D	45.8
W Heron Street/H Street	C	26.3	F	103.6
W Heron Street/G Street	C	22.3	F	227.0
US 12/Chehalis Street	B	19.9	E	68.8
US 12/Tyler Street	C	20.9	F	174.4
US 101/SR 105	B	10.8	F	122.2
US 12/Sargent Boulevard	A	5.3	C	26.8
Simpson Avenue/23rd Street	A	7.6	D	38.0
Sumner Avenue/23rd Street	B	11.5	F	88.3
Alder Street/1st Street	B	15.7	E	69.7
Alder Street/Market Street	B	13.3	B	15.4
Park Street/Market Street	A	5.7	B	14.1
Emerson Street/Adams Street	A	5.2	A	7.9
Unsignalized Intersections				
Port Industrial Road/Myrtle Street (Southbound Approach)	C	21.0	F	*
State Street/N Park Street[2] (Southwest Approach)	F	56.8	F	>100
State Street/N Alder Street (Southeast Approach)	C	16.4	F	86.4
5th Avenue/Earley Industrial Way (Southwest Approach)	A	9.9	B	10.4
Industrial Road/30th Street (Southbound Approach)	B	13.9	F	>100
W Heron Street/F Street (Southbound Approach)	D	31.9	F	*

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.
[2] The HCM methodology does not allow three-way stop controlled intersections. Reported level of service is for the westbound approach and assumes intersection operates as a T-intersection.
* Delay cannot be calculated at this intersection.

Year 2030 baseline traffic conditions for arterial segments were also analyzed using the same methodology outlined in Section 2.3. For both the operational- and planning-level LOS methodologies, existing geometric characteristics and intersection operations (signalized or unsignalized) were assumed to remain the same for each segment between 2006 and 2030. Figure 13 shows 2030 baseline intersection and arterial LOS conditions, and Table 6 reports the existing and year 2030 baseline arterial LOS results.

Table 6. Existing and Year 2030 Baseline Arterial LOS

	Existing Conditions		Year 2030 Baseline Conditions	
Operational-Level Arterial LOS (HCM Methodology)	**Arterial Speed (mph)**	**LOS**	**Arterial Speed (mph)**	**LOS**
Northbound US 101 (“G” Street to Alder Street)	26.9	B	22.6	C
Northbound US 101 (Wishkah Street to Emerson Avenue)	26.7	B	16.0	D
Southbound US 101 (Emerson Avenue to 10th Street)	13.9	C	7.9	E
Southbound US 101 (10th Street to Heron Street)	21.7	B	18.2	C
Southbound US 101/Eastbound US 12 (Park Street to “H” Street)	14.2	C	4.4	F
Westbound US 12 (Sargent Boulevard to Chehalis Street)	30.2	B	23.6	C
Eastbound US 12 (Chehalis Street to Sargent Boulevard)	26.8	C	6.6	F
Planning-Level Arterial LOS (FDOT Methodology)	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**
State Street (US 101 Ramps to Park Street)	375	C	880	E
Eastbound/Westbound SR 109 (SR 109 Spur to Lincoln Street)	405	C	950	F
Northbound/Southbound US 101 (Blue Slough Road to SR 105)	475	B	900	B
Myrtle Street (Sumner Street to Port Industrial Road)	190	C	380	C
Northbound/Southbound US 101 (Emerson Avenue to SR 109 Spur)	585	C	1140	F
Port Industrial Road/Bay Road (22nd Street to N Division Road)	530	C	1465	F

Most segments would degrade at least one letter designation by 2030. Seven out of the thirteen analyzed segments would operate below the LOS D threshold, including:

- Southbound US 101 between Emerson Avenue and 10th Street in Hoquiam.
- Southbound US 101 between Park Street and “H” Street in Aberdeen.
- Eastbound US 12 between Chehalis Street and Sargent Boulevard in Aberdeen.

- State Street between the US 101 Interchange and Park Street in Aberdeen.
- Westbound/Eastbound SR 109 between SR 109 Spur and SR 105 in Hoquiam.
- Northbound and Southbound US 101 between Emerson Avenue and SR 109 Spur.
- Port Industrial Road/Bay Avenue between 22nd Street and N Division Road in Aberdeen-Hoquiam.

Arterial segments operating below the LOS D threshold in 2030 are caused by two reasons. An increase in vehicle volumes would cause several of these facilities to operate over capacity. In addition to increased vehicular volumes, delay at intersections will increase proportionately at higher volumes, resulting in longer vehicle idle times and slower arterial travel speeds. Although the arterial analysis indicates potential capacity restrictions along a few arterials, the capacity of the roadway is primarily affected by how well signals operate in the study area. With improved signal timings, cycle lengths, and vehicle progression at signalized intersections, the roadway, in most likelihood, would operate at a better LOS than indicated in Table 6.

3.3 YEAR 2030 AVERAGE WEEKDAY DAILY TRAFFIC VOLUMES

Year 2030 average daily traffic volumes were forecasted by using the same k-factors used for the existing conditions average weekday daily traffic volume analysis. These factors were applied to forecasted PM peak hour intersection volumes to determine an estimate of traffic volumes in the study area. As shown in Figure 14, traffic volumes are expected to increase significantly between 2006 and the year 2030 due to the increase in background trips and the anticipated growth in the Port of Grays Harbor. Traffic volumes are forecasted to near 60,000 vehicles per day across the Wishkah River, and around 53,500 vehicles per day over the Chehalis River.

Parametrix

N

0 1,500 3,000 Feet

2030 Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

2030 Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

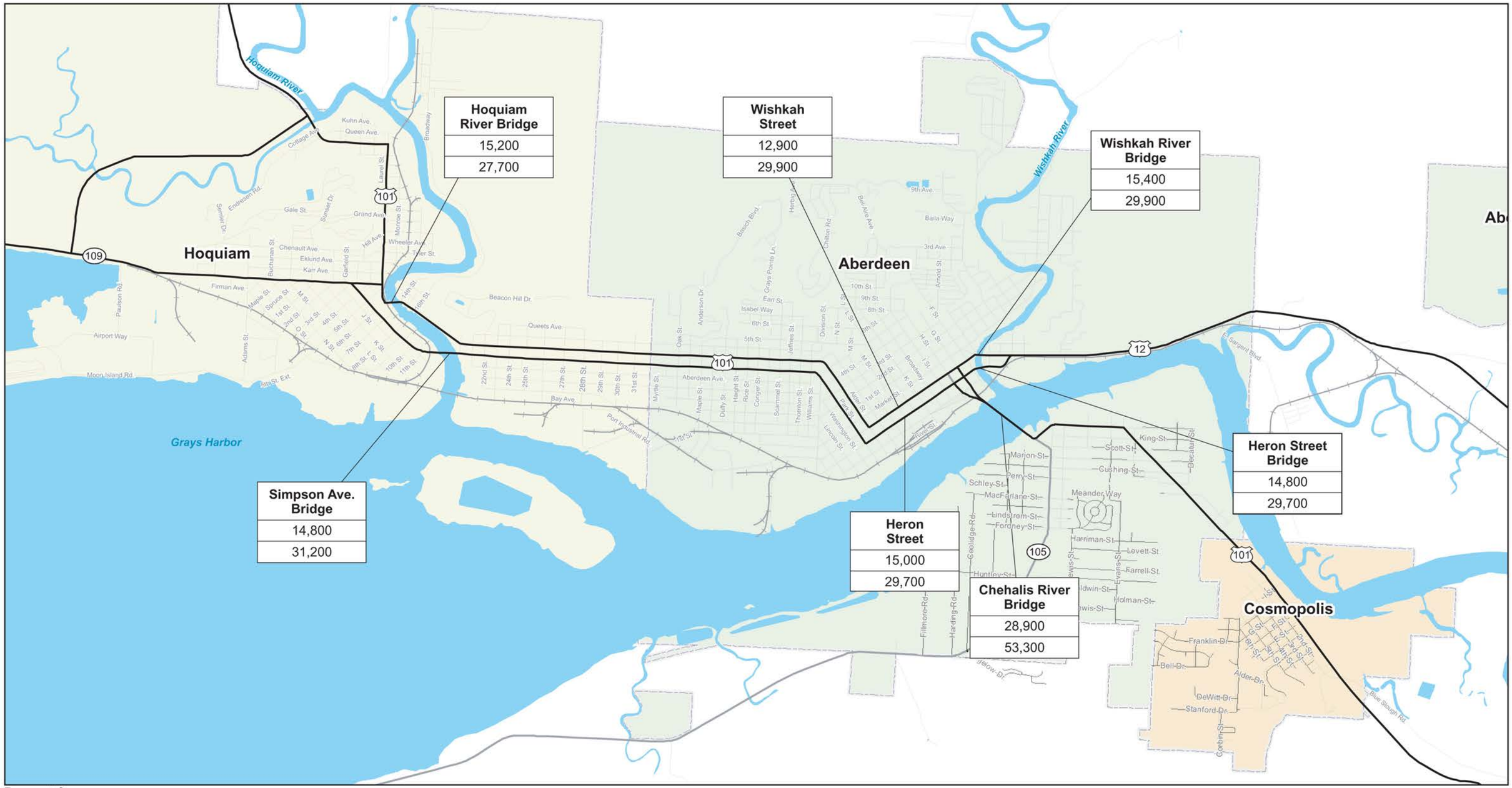
Highway
Other Road
Railroad

Waterbody
River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 13
Year 2030 Baseline Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project



Parametrix US 101/554-2951-002/01(10) 12/06 (B)

N

0 2,500

Scale in Feet

City Boundary

- Aberdeen
- Cosmopolis
- Hoquiam

- Waterbody
- Railroad
- Highway
- River

Location	
XX,XXX	2006 AWDT
XX,XXX	Baseline 2030

Figure 14
2006 Existing and 2030 Baseline Average Weekday Daily Traffic Volumes

4. PROJECT EVALUATION

4.1 PROJECT DESCRIPTIONS

A list of potential transportation improvement projects was developed to improve roadway operations, safety, and aesthetics. Most projects were analyzed to determine how the project would improve intersection and arterial LOS. A few projects were not analyzed since they would not provide an operational improvement or are not located at or along a study intersection or arterial. The following list provides a brief summary of each identified project. Table 7 indicates if a specific traffic analysis was performed on the particular project.

A Tri-city operational improvements

The tri-city operational improvements are a series of small improvements suggested by local jurisdictions to address current operational issues in Hoquiam, Aberdeen, and Cosmopolis. These projects range from intersection improvements to a downtown revitalization project in Cosmopolis.

B Truck route alternative (US 12 to SR 109)

The truck route alternative is divided into four separate elements, including:

Full: High-level Wishkah River Bridge; US 101/US 12 connection; State Street; new route to north of railroad (in Aberdeen); high-level Hoquiam River Bridges; new route north and parallel to railroad (in Hoquiam) to SR 109.

Half: High-level Wishkah Bridge; US 101/US 12 connection; Port Industrial Road to 22nd/23rd Street (no new Hoquiam River Bridge).

East quarter: High-level Wishkah Bridge; US 101/US 12 connection; connect State Street to Port Industrial Road; Port Industrial Road improvements.

West quarter: New high-level Hoquiam River Bridge crossing; continues along a new alignment adjacent to the railroad; connects to SR 109 east of Paulson Road, follows SR 109 and terminates at the SR 109/SR 109 Spur intersection.

Each of these projects would require an update of the Aberdeen-Hoquiam Corridor Project Environmental Impact Statement.

C Directional signing

Provide directional signing along US 101, US 12, and other locations around Aberdeen, Cosmopolis, and Hoquiam.

D ITS (Intelligent Transportation Systems)

Consider the use of ITS to direct traffic to alternate routes when bridges are open or trucks block roadways. Programmable emergency notification signage could be placed throughout communities. Cameras also may be installed to improve enforcement at important signalized intersections with high accident rates.

E Sargent Boulevard signal and channelization phase II

Complete the project to widen US 12 five feet to the north to enlarge the acceleration lane and revise the turn-lane onto Sargent Boulevard. Install traffic signals controlling US 12 eastbound, traffic entering from Sargent Boulevard, and traffic entering Sargent Boulevard from US 12.

F Improve Port Industrial Road

Provide additional left-turn pockets on Port Industrial Road at Industrial Way and Jeffries Street and construct right-turn pockets and left-turn pockets on Port Industrial Road at Commerce Street and Myrtle Street.

G Parking study

Perform a parking survey to assist downtown businesses in Hoquiam, Aberdeen, and Cosmopolis to identify locations for implementing new parking strategies.

H Study proposal to reroute US 101 traffic in Hoquiam

Study proposal to reroute US 101 traffic across the Simpson Avenue Bridge into Hoquiam heading west and north or make both bridges open to two-way traffic.

I Install signal at "F" Street and Heron Street

Provide a new signal at F Street and Heron Street, and widen Heron Street from Wishkah Bridge to "K" Street, including lighting, sidewalks, and street widening.

K Cosmopolis downtown revitalization

Downtown corridor improvement project includes new sidewalks, lighting, storm-drainage, installing underground utilities, Americans with Disabilities Act (ADA) ramps, landscaping, and retrofitting existing ADA ramps with truncated domes.

L Rail car storage yard east of Aberdeen

Design and build a rail car storage yard to the east of Aberdeen to minimize the frequency of rail/vehicle conflicts.

M Alternate access to Wishkah Mall

Alleviate traffic circulation problems caused by access issues at the Wishkah Mall. This project includes restriping of the internal parking lot, revising access to the site, and improving turning movements. A second phase would construct an alternative access road on the north side of US 12.

N Replace existing Hoquiam River Bridges

Replace the existing Hoquiam River Bridges at their current locations with either low or high-rise structures.

R Widen State Street to Monroe Street and widen Monroe Street and Lincoln Street from State Street to Wishkah Street

Widen State Street to Monroe Street and widen Monroe Street and Lincoln Street from State Street to Wishkah Street.

S Widen "G" Street and Heron Street to improve right-turn movements

Provide right-turn pocket at the "G" Street/Heron Street intersection with sidewalk and lighting improvements.

T Grays Harbor regional transportation planning model

Build a travel demand forecasting model for the study area to enable local governments to test roadway improvements and land use changes.

U Relocate rail line south of Port Industrial Road to eliminate all at-grade crossings

The railroad would be relocated south of Port Industrial Road to eliminate all at-grade crossings at each end of Port Industrial Road.

W Provide interjurisdictional signal coordination between Hoquiam and Aberdeen

Coordinate signal systems along US 101 and US 12 so that the signals operate in a synchronized fashion to move through vehicles through the project area.

X Remove bicycle hazards

Improve streets to remove hazards to bicycle use wherever possible, and sign bicycle routes.

Y Complete seismic upgrades to area bridges

Fund retrofit project for the Chehalis River Bridge and Wishkah River Bridge in the project area to ensure mobility in case of an earthquake.

Z Chehalis/US 101 intersection realignment and channelization from Harbor Street to Chehalis Street

Realign US 101 from Chehalis Street to Harbor Street to provide improved channelization and traffic flow.

AA Study use of Market Street as a four-lane connector between US 101 and the truck route

Evaluate the advantages and disadvantages of using Market Street as a four-lane roadway connector between US 101 and the truck route.

AB Widen Emerson Avenue (SR 109)

Widen Emerson Avenue to increase capacity and provide additional turn lanes at intersections.

Table 7. Proposed Regional Transportation Projects

Project	Description	LOS Analyzed
A	Tri-City Operational Improvements	✓
B1	Truck Route Alternative (Full)	✓
B2	Truck Route Alternative (Half)	✓
B3	Truck Route Alternative (East Quarter)	✓
B4	Truck Route Alternative (West Quarter)	✓
C	Directional Signing	
D	ITS	
E	Sargent Boulevard Signal and Channelization Phase II	✓
F	Improve Port Industrial Road	✓
G	Parking Study	
H	Study Proposal to Reroute US 101 Traffic in Hoquiam	✓
I	Install Signal at "F" Street and Heron Street	✓
K	Cosmopolis Downtown Revitalization	
L	Rail Car Storage Yard East of Aberdeen	

Table 7 Proposed Regional Transportation Projects (continued)

Project	Description	LOS Analyzed
M	Alternate Access to Wishkah Mall	
N	Replace Existing Hoquiam River Bridges	
R	Widen State Street to Monroe Street and Widen Monroe Street and Lincoln Street from State Street to Wishkah Street	
S	Widen Intersection of "G" Street and Heron Street to Improve Right-Turn Movement	✓
T	Grays Harbor Regional Transportation Planning Model	
U	Relocate Rail Line South of Port Industrial Road to Eliminate All At-Grade Crossings	
W	Provide Interjurisdictional Signal Coordination Between Hoquiam and Aberdeen	✓
X	Remove Bicycle Hazards	
Y	Complete Seismic Upgrades to Area Bridges	
Z	Chehalis/US 12 Intersection Realignment and Channelization from Harbor Street To Chehalis Street	
AA	Study Use of Market Street as a Four-Lane Roadway Connector Between US 101 and the Truck Route	
AB	Widen Emerson Avenue	

4.2 ALTERNATIVES ANALYSIS

4.2.1 Project A – Tri-City Operational Improvements

The Tri-City Operational Improvements are several small-scale projects identified by the three local jurisdictions and the Port of Grays Harbor to improve traffic conditions throughout the region. Table 8 lists each project, its jurisdiction, and if a traffic analysis was conducted.

Although only three specific projects were analyzed, two other projects, installing a left-turn pocket at Mill Creek Trail and constructing a center turn lane from Lions Park to Blue Slough Road, would improve traffic operations in Cosmopolis. Further analysis at these locations would determine the extent of these improvements.

Table 8. Tri-City Operational Improvements Project List

Project Description	Location	LOS Analyzed
Improve Signage and Lighting on Riverside Bridge	Hoquiam	
Simpson Avenue and 7th Avenue Intersection Improvements	Hoquiam	
US 101 Simpson Avenue Bridge Approach Signage/Lighting	Hoquiam	
SR 109 and Spencer Crosswalk Improvements	Hoquiam	
Lincoln Street and 6th Avenue Downtown Access Improvements	Hoquiam	✓
Install Signal at Oak Street and Simpson Avenue	Aberdeen	✓
Replace Old Span Wire Signal Systems	Aberdeen	✓
Heron Street and Park Street Intersection Widening	Aberdeen	
Intersection Improvements at US 101 at S. Aberdeen Fire Station	Aberdeen	
Wishkah Street and Alder Street Right Turn Widening	Aberdeen	

Table 8. Tri-City Operational Improvements Project List (continued)

Project Description	Location	LOS Analyzed
1st Street and Alder Street Right Turn Widening	Aberdeen	
Widen Wishkah Street and Heron Street	Aberdeen	
Extend Bulbouts at Wishkah Street and Heron Street	Aberdeen	
Install Left Turn Pocket at Mill Creek Trail	Cosmopolis	
Center Turn Lane from Lions Park to Blue Slough Road	Cosmopolis	
Completion of Sidewalk Project 1st Street to H Street	Cosmopolis	

Replace old wire span systems and activate the traffic actuation system

This project includes replacing all the old span wire traffic signal systems throughout downtown Aberdeen and activating the traffic actuation system in the study area. Currently, signals along Heron Street and Wishkah Street are operating on fixed time, meaning the green time for any approach cannot be lengthened or shortened by the presence of a vehicle. This analysis included activating the actuation system at study intersections in downtown Aberdeen, which allows the green signal indications on the minor street to be skipped if a vehicle is not present. This would provide more green time on the major through routes. Table 9 shows the expected improvements for the typical PM peak hour, based on existing 2006 traffic conditions, since the actuation system was assumed to be activated prior to the 2030 analysis year.

Table 9. Year 2006 Conditions with Aberdeen Traffic Actuation System Activated

	Year 2006 Existing Conditions		Year 2006 With Actuation System Activated	
Study Intersection[1]	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Signalized Intersections				
W Wishkah Street/N Park Street	B	14.3	B	14.3
W Wishkah Street/N Alder Street	A	7.0	A	7.1
W Wishkah Street/L Street	A	4.4	A	9.2
W Wishkah Street/H Street	A	8.7	A	7.4
W Wishkah Street/G Street	B	12.1	B	13.8
W Heron Street/N Park Street	B	12.6	B	12.6
W Heron Street/N Alder Street	A	7.2	A	7.2
W Heron Street/L Street	B	18.7	B	17.0
W Heron Street/H Street	C	26.3	C	22.7
W Heron Street/G Street	C	22.3	C	20.3
Alder Street/First Street	B	15.7	B	16.0
Alder Street/Market Street	B	13.3	B	13.2
Park Street/Market Street	A	5.7	A	5.7
Unsignalized Intersections				
W Heron Street/F Street (Southbound Approach)	C	24.1	D	25.4

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

The overall intersection delays do not vary significantly between each alternative. In most cases, average vehicle delays improve by a few seconds, with the most significant improvements occurring at W Heron Street/"H" Street and W Heron Street/"G" Street. Only one intersection, W Heron Street/"F" Street showed a negative change in LOS. The LOS at this intersection degraded from LOS C to LOS D for the southwest approach because platoons would arrive at more intermittent intervals, since more intersection green time is allocated to Heron Street. Delay improvements during the PM peak period are minimal. However, during off peak periods when arrivals are more intermittent on the minor streets, delays would be reduced more significantly for the major through movements at these intersections.

Levee Street and 6th Street Downtown Access Improvements

The intersection of Levee Street and 6th Street is currently confusing for drivers who are unfamiliar with the local road system. This intersection provides access to downtown Hoquiam and Simpson Avenue via 6th Street. Currently, this intersection operates at LOS F for the northwest approach and would continue to operate at LOS F in 2030. Two improvements were analyzed to improve LOS at this intersection, constructing a signal at the intersection or constructing a roundabout to improve traffic circulation.

The proposed roundabout was analyzed using the intersection capacity utilization (ICU) and the volume to capacity (v/c) ratio as the primary measures of effectiveness. The ICU is a measure of how much capacity is available at an intersection or how much the intersection is over capacity. The v/c ratio indicates the amount of congestion present at the intersection. Any v/c ratio greater than or equal to 1 indicates the intersection approach is overcapacity. The value reported for the v/c ratio is for the worst entering approach.

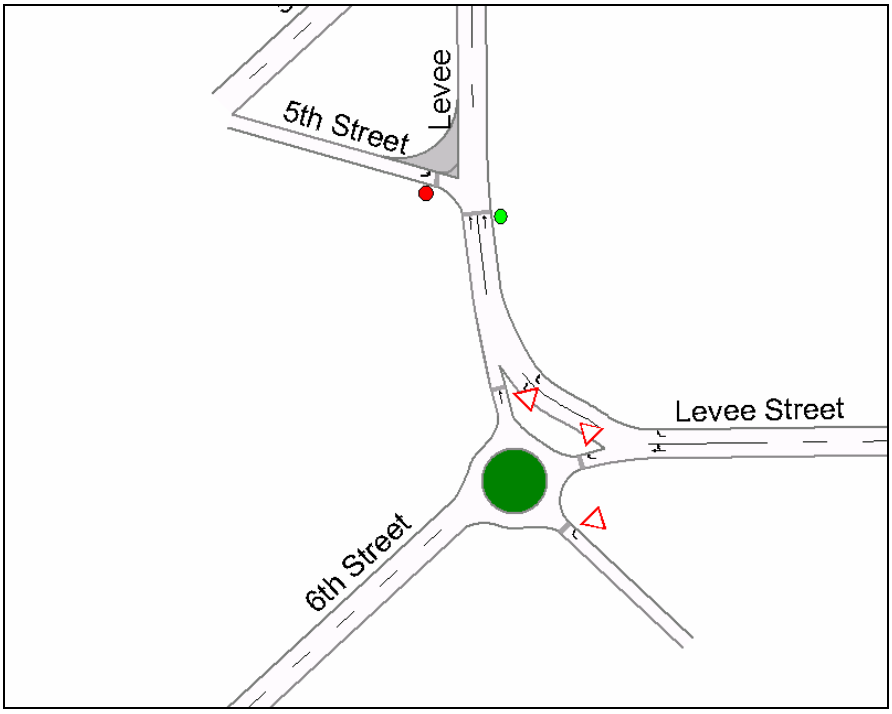


Figure 15. Potential Levee Street/6th Street Roundabout Improvement

The construction of a roundabout, as shown in Figure 15, would improve vehicle delay at this intersection. This roundabout, designed with a two-lane bypass for northbound US 101 traffic, would improve delay for the northwestbound approach of Levee Street for this intersection and would not adversely affect vehicle delay on northbound US 101. Table 10 shows the existing conditions, 2030 with project, 2006 with the roundabout, and 2030 with the roundabout.

Although constructing a roundabout at this location would improve intersection operations, a roundabout may not be the best alternative at this intersection. Typically, a roundabout may be considered when[1]:

- No physical or geometric complications exist. This could include right-of-way limitations, utility conflicts, and drainage problems.
- Limited volumes of over-sized trucks are present.
- Traffic control devices that require preemptions, such as a drawbridge, are not located close by.
- Upstream bottlenecks that would backup into the roundabout, such as overcapacity signals, are not located close by.

At this location, a business is located on the northwest corner of this intersection, and some right-of-way acquisition may be required to construct the roundabout. Furthermore, heavy truck volumes are anticipated through this intersection, the Hoquiam River Bridge is upstream of the roundabout, and vehicle queuing may occur from the intersections of Levee Street/5th Street and Emerson Street/Lincoln Street.

Table 10. Existing and Year 2030 with Roundabout Improvements at Levee Street/6th Street in Hoquiam

	Existing Conditions		2030 Baseline		2006 with Roundabout Improvement		2030 with Roundabout Improvement	
Intersection	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	ICU	v/c	ICU	v/c
Levee Street (US 101)/ 6th Street (Northbound Approach)	F	78.1	F	>100	36.9%	0.35	55.5%	0.60

The construction of a traffic control signal at this intersection would operate at LOS A in 2006 and would degrade to LOS E by 2030, as shown in Table 11. Currently, this intersection does not meet PM peak hour signal warrants; however, by 2030, this intersection would warrant a traffic control signal. Although this intersection would still operate at an unacceptable level with a traffic signal in 2030, providing additional channelization improvements, such as a two-lane left-turn pocket from US 101 to 6th Street, would improve traffic operations at this intersection to LOS B.

[1] Roundabouts: An informational Guide. FHWA-RD_00-068, March 2000. Pages 54-55.

Table 11. Existing and Year 2030 with Signalization Improvements at Levee Street/6th Street in Hoquiam

Intersection	Existing Conditions		2030 Baseline		2006 with Signalization		2030 with Signalization	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Levee Street (US 101)/ 6th Street (Northbound approach)	F	78.1	F	>100	A	7.0	E	64.6

Install Traffic Signal at Simpson Avenue and Oak Street

A peak hour signal warrant analysis was completed prior to analyzing the operational benefits of installing a traffic signal at the Simpson Avenue/Oak Street intersection. As shown in Table 12, this intersection does not currently meet peak hour signal warrants; however, by 2030, signalization would be warranted due to increased traffic volumes at the intersection.

Table 12. Simpson Avenue/Oak Street Peak Hour Signal Warrant Analysis

Study Intersection	Existing Conditions		Year 2030 Baseline	
	Major/Minor Approach Volume [1]	Signal Warrant Met? [2]	Major/Minor Approach Volume [1]	Signal Warrant Met? [2]
Simpson Avenue/ Oak Street	1,280/205	No	2,100/330	Yes

[1] Two-way volumes are reported for the major approach, and the highest directional volume is reported for the minor approach.

[2] Signal warrant analysis is based on Section 4C.04 Warrant 3, Peak Hour, Figure 4C-3 from the *Manual of Uniform Traffic Control Devices (MUTCD) 2003 Edition.*

This intersection is operating at LOS E for the southbound approach, as shown in Table 13. By the year 2030, this intersection is anticipated to operate at LOS F for both minor approaches, with vehicular delays greater than 100 seconds. The intersection would operate at LOS D with a traffic signal in 2030.

Table 13. Simpson Avenue/Oak Street LOS Analysis

Study Intersection [1]	Existing Conditions		Year 2030 Without a Traffic Signal (Baseline)		Year 2030 With a Traffic Signal	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Simpson Avenue/Oak Street (Southbound Approach)	E	40.2	F	>100	D	29.6

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

4.2.2 Project B – Truck Route Corridor

The truck route corridor analysis consisted of updating the previous traffic analysis identified in the Aberdeen-Hoquiam Corridor Project Final Environmental Impact Statement (EIS), April 2000. Based on discussions with WSDOT, Grays Harbor Council of Governments (GHCOG), and stakeholder committee members, the preferred alternative for this project was divided into four "phased" elements. Each phase was tested separately to determine how well traffic improved in the study area. The four phases include:

- **A Full Truck Corridor** which includes all elements outlined in the preferred alternative of the Aberdeen-Hoquiam Corridor Final EIS.
- **The Half Truck Corridor** consists of a new high-level Wishkah River Bridge, the completion of the US 12/US 101 interchange, and surface street widening and improvements along State Street and Port Industrial Road. No new bridge crossing of the Hoquiam River is associated with this phase.
- **The East Quarter Truck Corridor** segment is similar to the half truck corridor, consisting of a new high-level Wishkah River Bridge, the completion of the US 12/ US 101 interchange, and widening of State Street to a five-lane section. Channelization improvements would also be completed at critical intersections along Port Industrial Road.
- **A West Quarter Truck Corridor** phase includes constructing the west portion of the preferred alternative first, starting with a new high-level Hoquiam River Bridge crossing connecting Bay Avenue to Earley Industrial Way, that continues west along an existing railroad alignment and terminates at the junction of SR 109.

A future year 2030 intersection and arterial LOS analysis was completed for each truck corridor phase using the same methodology described in the existing conditions section of this report. All new intersections along the proposed truck corridor were assumed to have the same geometric configurations, operation type (signalized or unsignalized), and accessibility as identified in the Final EIS. The new truck corridor was assumed to be a five-lane (two travel lanes in each direction with a two-way left-turn lane), managed access facility with a speed limit of 35 mph. The results of this analysis are included in Table 14 and are illustrated on Figures 16, 17, 18, and 19. The arterial LOS results are also documented in Table 15.

The full truck corridor improves average vehicle delay at study intersections and would improve corridor travel speeds throughout the study area. Almost all signalized intersections would operate at LOS D or better in the vicinity of the truck corridor. One signalized intersection, State Street/Park Street on the proposed truck corridor, will operate at LOS F with the full truck corridor due to the forecasted increase in vehicle and truck trips to the Port of Grays Harbor, and additional trips that would use the new interchange between US 101 and US 12. Additional geometric improvements at this intersection, including adding left-turn pockets on southbound Park Street, would improve signal operations to LOS C or better. Outlier intersections, including US 12/Tyler Street and US 101/SR 105, are expected to operate at LOS E or worse with or without the proposed full truck corridor. Future traffic volume forecasts are not affected by the truck corridor improvements at these locations. Therefore, the future LOS is the same with or without the full truck corridor improvements.

Table 14. Existing and Year 2030 Level of Service Conditions Without and With the Truck Corridor

Study Intersection[1]	Year 2006 Conditions		Year 2030 Baseline Conditions		2030 with Full Truck Corridor		2030 with Half Truck Corridor		2030 with East Quarter Truck Corridor		2030 with West Quarter Truck Corridor	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Signalized Intersections												
Simpson Avenue/5th Street	B	18.2	D	35.3	D	39.0	D	35.3	D	36.2	D	37.6
Simpson Avenue/6th Street	C	24.0	E	68.1	C	28.6	E	68.1	E	68.1	C	31.8
Simpson Avenue/8th Street	A	6.8	B	15.5	A	5.6	B	15.5	B	15.5	A	5.3
US 101 (Lincoln Street)/ Emerson Street (SR 109)	A	6.0	F	110.3	A	7.7	F	110.3	F	110.3	B	17.5
US 101 (Lincoln Street)/ 5th Street	A	6.0	B	16.9	A	7.6	B	16.9	B	16.9	B	19.1
Simpson Avenue/30th Street	A	4.4	A	9.3	B	11.5	C	28.0	A	9.3	A	7.6
Sumner Avenue/30th Street	A	2.8	A	6.3	A	4.5	C	22.4	A	6.1	A	4.5
Simpson Avenue/ Myrtle Street	B	10.5	F	86.4	A	8.4	A	9.9	F	86.4	C	26.3
W Wishkah Street/ N Park Street	B	14.3	D	49.2	B	12.5	B	15.4	B	19.5	D	45.0
W Wishkah Street/ N Alder Street	A	7.0	B	15.1	A	5.2	B	13.1	A	8.2	B	14.8
W Wishkah Street/L Street	A	4.4	B	11.6	A	9.2	B	11.5	B	11.8	A	9.2
W Wishkah Street/H Street	A	8.7	B	14.0	B	11.4	B	15.8	B	15.4	B	14.5
W Wishkah Street/G Street	B	12.1	B	18.0	A	9.1	A	8.2	A	8.8	B	14.9
W Heron Street/N Park Street	B	12.6	F	131.1	B	14.1	C	21.4	E	69.8	F	161.2
W Heron Street/ N Alder Street	A	7.2	B	13.0	B	10.4	B	12.1	B	13.0	B	11.4
W Heron Street/L Street	B	18.7	D	45.8	B	12.9	C	20.7	C	22.5	D	45.8
W Heron Street/H Street	C	26.3	F	103.6	B	14.3	C	23.8	C	31.8	F	103.6
W Heron Street/G Street	C	22.3	F	227.0	B	13.8	C	30.9	B	18.4	F	227.0

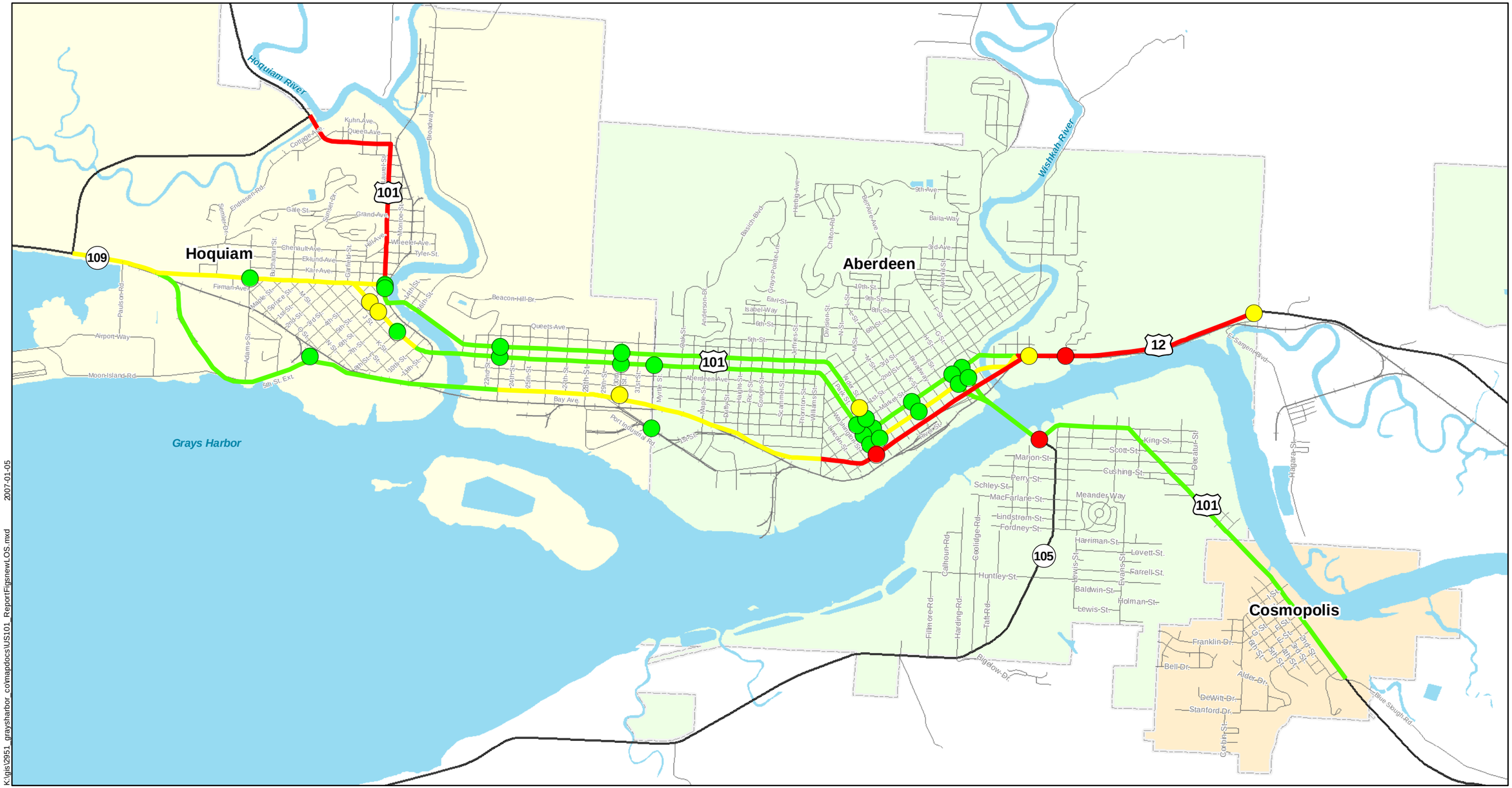
Table 14. Existing and Year 2030 Level of Service Conditions Without and With the Truck Corridor (continued)

Study Intersection[1]	Year 2006 Conditions		Year 2030 Baseline Conditions		2030 with Full Truck Corridor		2030 with Half Truck Corridor		2030 with East Quarter Truck Corridor		2030 with West Quarter Truck Corridor	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Signalized Intersections (continued)												
US 12/Chehalis Street	B	19.9	E	68.8	C	33.4	C	31.4	C	34.7	E	68.8
US 12/Tyler Street	C	20.9	F	174.4	F	154.8	F	168.3	F	150.6	F	174.2
US 101/SR 105	B	10.8	F	122.2	F	122.2	F	122.2	F	122.2	F	122.2
US 12/Sargent Boulevard	A	5.3	C	26.8	C	26.8	C	26.8	C	26.8	C	26.8
Simpson Avenue/23rd Street	A	7.6	D	38.0	B	10.6	D	38.0	D	42.6	A	9.8
Sumner Avenue/23rd Street	B	11.5	F	88.3	B	14.6	E	79.3	F	88.3	B	17.0
Alder Street/First Street	B	19.4	E	69.7	C	23.1	E	66.7	E	66.0	D	39.9
Alder Street/Market Street	B	13.2	B	15.4	B	17.0	B	15.0	B	19.6	B	19.8
Park Street/Market Street	A	5.7	B	14.1	A	7.9	A	9.3	B	12.8	A	8.9
Emerson Street/Adams Street	A	5.2	A	7.9	A	8.2	A	7.9	A	7.9	A	6.2
Unsignalized Intersections												
Port Industrial Road/ Myrtle Street[5] (Southbound Approach)	C	21.0	F	*	B	12.2	B	12.2	C	32.5	F	*
State Street/N Park Street[2, 3] (Southwestbound Approach)	F	56.8	F	>100	F	93.5	E	73.1	D	41.8	F	>100
State Street/N Alder Street[5] (Southeastbound Approach)	C	16.4	F	86.4	n/a	n/a	n/a	n/a	n/a	n/a	F	86.4
5th Avenue/ Earley Industrial Way[6] (Northwestbound Approach)	A	9.9	B	10.4	A	7.7	B	10.4	B	10.4	A	7.5
Industrial Road/30th Street [4] (Southbound Approach)	B	13.9	F	>100	C	22.9	C	28.2	F	>100	F	>100

Table 14. Existing and Year 2030 Level of Service Conditions Without and With the Truck Corridor (continued)

Study Intersection[1]	Year 2006 Conditions		Year 2030 Baseline Conditions		2030 with Full Truck Corridor		2030 with Half Truck Corridor		2030 with East Quarter Truck Corridor		2030 with West Quarter Truck Corridor	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Unsignalized Intersections (continued)												
W Heron Street/F Street (Southbound Approach)	D	31.9	F	*	F	96.3	F	>100	F	*	F	*
Simpson Avenue/Oak Street (Southbound Approach)	E	40.2	F	*	F	>100	F	*	F	*	F	*
Riverside Avenue/16th Street (Southbound Approach)	B	14.8	F	>100	E	47.9	F	>100	F	>100	F	73.1
Sumner Avenue/ Ontario Street (Northbound Approach)	D	25.9	F	*	F	>100	F	*	F	*	F	82.8
Simpson Avenue/ Ontario Street (Southbound Approach)	E	36.3	F	*	F	>100	F	*	F	*	F	*
Levee Street/6th Street (Northbound Approach)	F	78.1	F	*	F	>100	F	*	F	*	F	*

1 Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.
2 The HCM methodology does not allow three-way stop controlled intersections. Reported level of service is for the westbound approach and assumes intersection operates as a T-intersection.
3 Intersection assumed to be signalized for the full, half, and east quarter alternative.
4 Values reported for the full and half corridor alternative are for the intersection of the proposed corridor and 30th Street.
5 Assumed signalized intersection at this location for the east quarter alternative.
6 Assumed signalized intersection at this location for the full truck corridor alternative.
* Delay cannot be calculated at this intersection.



Parametrix

N

0 1,500 3,000 Feet

2030 Full Truck Corridor Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

2030 Full Truck Corridor Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Highway
Other Road
Railroad

Waterbody
River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 16
Year 2030 with Full Truck Corridor Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project

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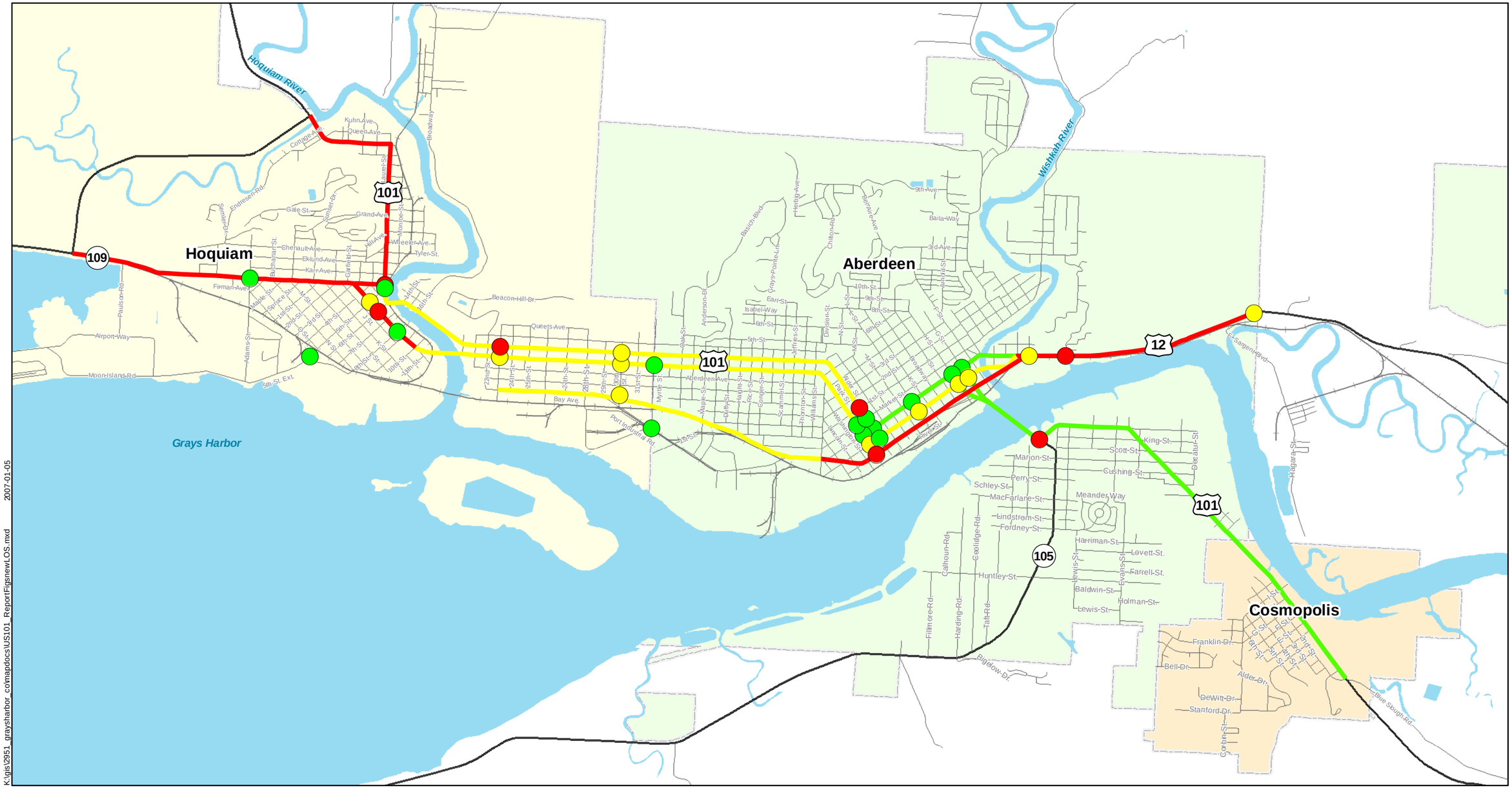

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Parametrix

N

0 1,500 3,000 Feet

2030 Half Truck Corridor Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

2030 Half Truck Corridor Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Highway
Other Road
Railroad

Waterbody
River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 17
Year 2030 with Half Truck Corridor Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project

Parametrix

N

0 1,500 3,000 Feet

2030 East Quarter Truck Corridor Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

2030 East Quarter Truck Corridor Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Highway

Other Road

Railroad

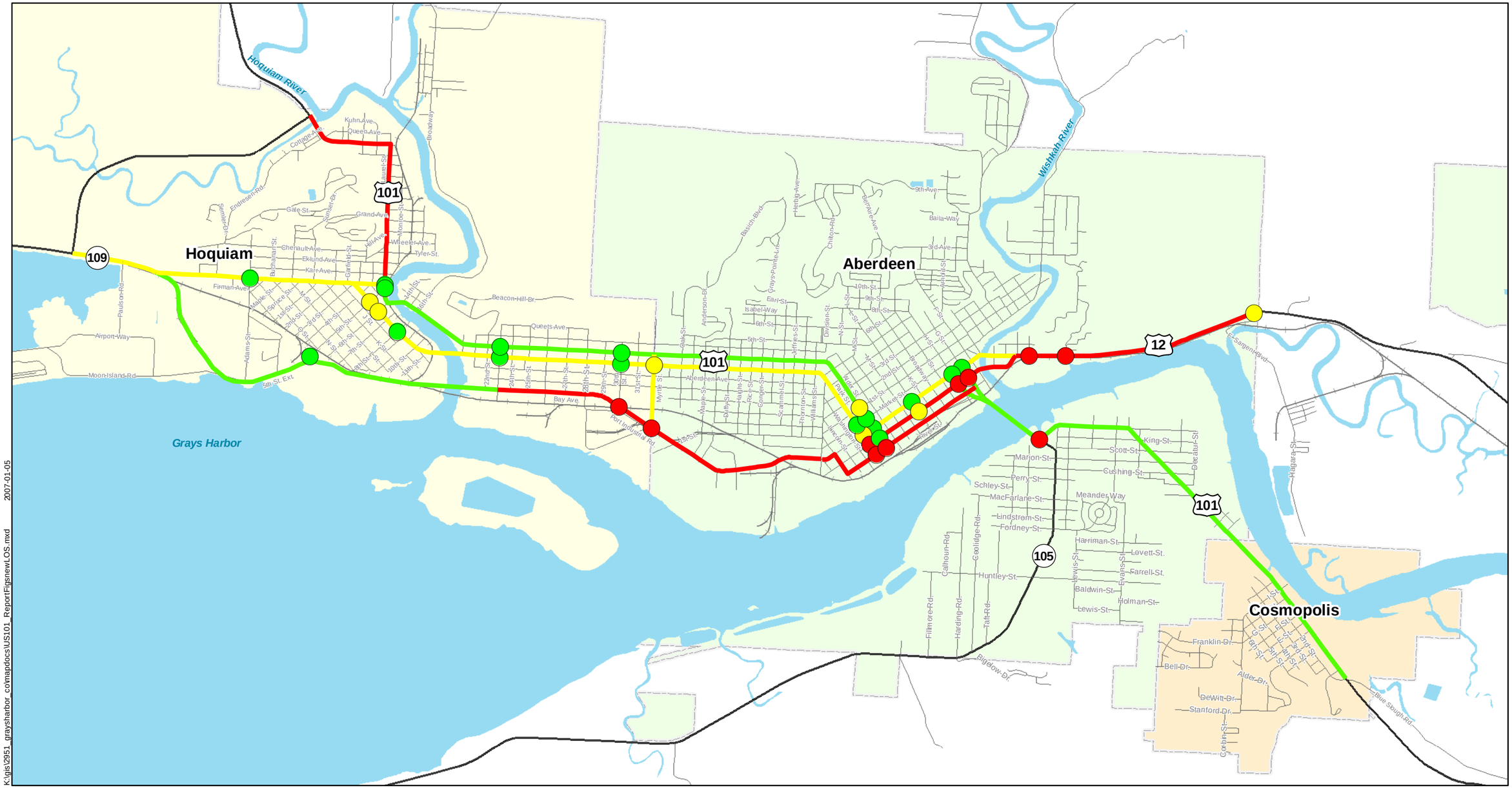
Waterbody

River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 18
Year 2030 with East Quarter Truck Corridor Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project



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Parametrix

N

0 1,500 3,000 Feet

2030 West Quarter Truck Corridor Intersection LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

2030 West Quarter Truck Corridor Arterial LOS
- Level of Service A or B
- Level of Service C or D
- Level of Service E or F

Highway
Other Road
Railroad

Waterbody
River

City Boundary
- Aberdeen
- Cosmopolis
- Hoquiam

Figure 19
Year 2030 with West Quarter Truck Corridor Intersection and Arterial Level of Service Conditions

US 101 Regional Circulation Project

Table 15. Existing and Year 2030 Level of Service Conditions Without and With the Truck Corridor

	Existing Conditions		Year 2030 Baseline Conditions		Alternative 1a - Full Truck Corridor[1]		Alternative 1b - Half Truck Corridor		Alternative 1c - Quarter Truck Corridor		Alternative 1d - West Quarter Truck Corridor	
Operational Level Arterial LOS (HCM Methodology)	**Arterial Speed (mph)**	**LOS**	**Arterial Speed (mph)**	**LOS**	**Arterial Speed (mph)**	**Arterial LOS**	**Arterial Speed (mph)**	**Arterial LOS**	**Arterial Speed (mph)**	**Arterial LOS**	**Arterial Speed (mph)**	**Arterial LOS**
Northbound US 101 (“G” Street to Alder Street)	26.9	B	22.6	C	25.5	B	22.8	C	21.5	C	24.3	B
Northbound US 101 (Wishkah Street to Emerson Avenue)	26.7	B	16.0	D	25.8	B	23.1	C	19.7	C	18.7	C
Southbound US 101 (Emerson Avenue to 10th Street)	13.9	C	7.9	E	14.6	D	7.9	E	7.6	E	13.8	C
Southbound US 101 (10th Street to Heron Street)	21.7	B	18.2	C	21.8	B	20.4	B	20.3	B	18.0	C
Southbound US 101/Eastbound US 12 (Park Street to Chehalis Street)	14.2	C	4.4	F	15.1	C	10.1	D	12.6	D	4.1	F
Westbound US 12 (Sargent Boulevard to Chehalis Street)	30.2	B	23.6	C	27.3	C	25.4	C	26.7	C	25.6	C
Eastbound US 12 (Chehalis Street to Sargent Boulevard)	26.8	C	6.6	F	12.6	F	10.3	F	12.5	F	6.6	F

Table 15. Existing and Year 2030 Level of Service Conditions Without and With the Truck Corridor (continued)

	Existing Conditions		Year 2030 Baseline Conditions		Alternative 1a - Full Truck Corridor[1]		Alternative 1b - Half Truck Corridor		Alternative 1c - Quarter Truck Corridor		Alternative 1d - West Quarter Truck Corridor	
Planning Level Arterial LOS (FDOT Methodology)	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**	**Highest Directional Volume**	**LOS**
State Street (US 101 Ramps to Park Street)	375	C	880	E	1895	F	1660	E	1550	D	880	E
Eastbound/Westbound SR 109 (SR 109 Spur to Lincoln Street)	405	C	950	F	485	C	950	F	950	F	485	C
Northbound/Southbound US 101 (Blue Slough Road to SR 105)	475	B	900	B	900	B	900	B	900	B	900	B
Myrtle Street (Sumner Street to Port Industrial Road)	190	C	380	C	n/a	n/a	n/a	n/a	380	C	380	C
Northbound/Southbound US 101 (Emerson Avenue to SR 109 Spur)	585	C	1140	F	840	E	1140	F	1140	F	1025	F
Port Industrial Road/Bay Road (22nd Street to N Division Road)	530	C	1465	F	1750	D	1530	C	1465	F	1690	F

[1] Signal timings, cycle lengths, and offsets were optimized for each truck corridor alternative. Not every alternative maintained a consistent system cycle length.

The half truck corridor segment analysis shows similar results compared to the full truck corridor, with the exception of signal and arterial operations through downtown Hoquiam. Several signals around downtown Hoquiam are expected to operate at LOS E or worse, including:

- Simpson Avenue/6th Street
- Levee Street/SR 109 (Emerson Avenue)

Furthermore, Simpson Avenue between 5th Street and 8th Street is expected to operate at LOS F due to high vehicle delays at these intersections. Several intersections along Simpson Avenue and Sumner Avenue, including 30th Street, Ontario Street, and 23rd Street, serve as the only access roads between the new truck corridor and the US 101 couplet and are forecasted to have higher volumes compared with the 2030 baseline conditions. The new Hoquiam River Bridge would not be present with the half truck corridor, resulting in limited access to and from US 101 to the new truck corridor. Through trips would use Simpson Avenue and Sumner Avenue instead of the new truck corridor.

The east quarter truck corridor alternative provides substantial intersection and arterial improvements through the downtown Aberdeen area, limited improvements along Port Industrial Road, and no improvement to traffic operations in Hoquiam. This alternative provides direct access from US 101 and US 12 to the Port of Grays Harbor via the new US 12/US 101 interchange, but would not divert as many trips from the US 101 couplet. Port Industrial Road would operate at LOS E or worse with this alternative, since an increase in capacity is not provided.

The west quarter truck corridor alternative would improve intersection and arterial operations in the city of Hoquiam; however, it does not provide any operational improvements at intersections or along arterials east of the new Hoquiam River Bridge. Traffic volumes on Port Industrial Road are expected to be higher compared with the 2030 baseline network, since local residents and through travelers would use the new connection between Hoquiam and Aberdeen. This volume increase would further degrade Bay Avenue/ Port Industrial Road operations without additional improvements.

A traffic signal warrant analysis was also completed at critical unsignalized intersections and proposed access points in the study area. Several unsignalized intersections, including five on the proposed truck corridor, were analyzed using peak hour signal warrants. This analysis is based on the Manual on Uniform Traffic Control Devices (MUTCD) 2003 Edition (FHWA 2003). The MUTCD provides methodologies for signalization based on eight different warrants, including peak hour. According to the MUTCD, a peak hour signal warrant can be conducted when minor street traffic suffers undue delay when entering or crossing the major street. The satisfaction of a traffic signal warrant does not in itself require the installation of a traffic control signal.

As shown in Table 16, several intersections would meet traffic signal warrants by 2030. Constructing the new truck corridor would cause several different intersections to meet signal warrants, while other intersections that met signal warrants in the 2030 baseline scenario would no longer meet the peak hour warrant.

Table 16. PM Peak Hour Signal Warrant Analysis Without and With the Truck Corridor

	Existing Conditions		Year 2030 Baseline		Full Truck Corridor		Half Truck Corridor		East Quarter Truck Corridor		West Quarter Truck Corridor	
Intersection	**Both Major Approach Volumes/ Highest Minor Approach Volume**	**Signal Warrant Met?**	**Both Major Approach Volumes/ Highest Minor Approach Volume**	**Signal Warrant Met?**	**Both Major Approach Volumes/ Highest Minor Approach Volume**	**Signal Warrant Met?**	**Total Major Approaches Volume/ Highest Minor Approach Volume**	**Signal Warrant Met?**	**Both Major Approach Volumes/ Highest Minor Approach Volume**	**Signal Warrant Met?**	**Both Major Approach Volumes/ Highest Minor Approach Volume**	**Signal Warrant Met?**
Port Industrial Road/30th Street	680/10	No	1905/50	No	3075/340	Yes[1]	2670/490	Yes[1]	1905/50	No	2610/50	No
Port Industrial Road/ Myrtle Street	855/50	No	2350/200	Yes	390/120	No	390/120	No	2350/200	Yes	3025/200	Yes
Riverside Avenue/16th Street	1275/80	No	2555/270	Yes[2]	1705/270	Yes[2]	2555/270	Yes[2]	2555/270	Yes[2]	1870/270	Yes[2]
State Street/Park Street	320/230	No	780/550	Yes	2945/660	Yes	2400/660	Yes	1845/660	Yes	780/685	Yes
State Street/Alder Street	740/20	No	1720/40	No	n/a	n/a	n/a	n/a	n/a	n/a	1705/40	No
5th Street/Earley Industrial Way	110/40	No	175/65	No	1660/285	Yes	175/65	No	175/65	No	1495/285	Yes
Heron Street/"F" Street	1115/190	No	2215/300	Yes	925/300	No	1245/300	Yes	1245/300	Yes	2215/300	Yes
Proposed Truck Corridor/ Adams Street	n/a	n/a	n/a	n/a	1550/225	Yes	n/a	n/a	n/a	n/a	1385/225	No
Proposed Truck Corridor/ Emerson Street (SR 109)	n/a	n/a	n/a	n/a	1695/485	Yes	n/a	n/a	n/a	n/a	1695/485	Yes
Proposed Truck Corridor/ Ontario Street	n/a	n/a	n/a	n/a	2775/205	Yes	2040/205	Yes	n/a	n/a	n/a	n/a
Proposed Truck Corridor/ First Street	n/a	n/a	n/a	n/a	3360/340	Yes	2925/340	Yes	n/a	n/a	n/a	n/a

[1] Intersection is assumed to be part of the new truck corridor for this alternative.

[2] All minor street volumes are right-turning vehicles, and signalization may not be required at this intersection.

n/a = Not Applicable

Figure 20 illustrates a comparative analysis of average weekday traffic volumes with each particular element of the truck corridor. The full truck corridor alternative is anticipated to divert approximately 33 percent of vehicle trips from US 101 to the new corridor across the Hoquiam River and almost 50 percent of trips from US 12 over the Wishkah River to the new truck corridor. Traffic volumes on US 101 and US 12 over each of these rivers would be near existing levels with the full truck corridor alternative. The other three alternatives would not divert as much traffic from US 101 and US 12 compared with the full truck corridor alternative, although both the half truck corridor alternative and east quarter truck corridor alternative would still divert a significant number of vehicle trips from US 12.

4.2.3 Project E – Sargent Boulevard Signal and Channelization Phase II

The US 12/Sargent Boulevard intersection improvements were identified in the US 12 Route Development Plan, and other sources, such as the City of Aberdeen Transportation Improvement Plan and Comprehensive Plan and Port of Grays Harbor Plans. This project was to be completed in two phases, the first of which is already completed. Phase II of this project consists of widening US 12 five feet to the north, lengthening the westbound acceleration lane, providing right-turn channelization improvements from eastbound US 12, and installing new traffic signals and poles. Signal timing/phasing revisions or additional turn pockets were not identified in this phase.

Phase II of this project would not improve LOS, although it would provide a safety and accessibility benefit. This intersection would continue to operate at LOS C (26.8 seconds average delay/vehicle) in 2030 with and without this project.

4.2.4 Project F – Improve Port Industrial Road

Port Industrial Road improvements were identified in the Port Industrial Road Strategic Analysis (HDR and CH2M Hill 2006), the SR 105 Corridor Management Plan, and the Port of Grays Harbor Plans. These improvements include additional left-turn pockets at the intersections of Industrial Way and Jefferies Street and constructing right- and left-turn pockets at the intersections of Commerce Street and Myrtle Street. A later phase suggests adding a center two-way left-turn lane (TWLTL) and signalizing the Myrtle Street and Commerce Street intersections.

This roadway segment is currently operating at LOS C with most unsignalized intersections along the corridor operating in the LOS B/C range. Due to projected growth in the Port of Grays Harbor and through vehicle traffic increases, this arterial is anticipated to operate at LOS F by 2030, and almost all intersections along the corridor would operate at an unacceptable level (Port Industrial Road Strategic Analysis, 2006).

For this analysis, improvements were tested in two parts for one critical intersection in the study area, Myrtle Street. The first project specifically analyzed channelization improvements, and the second phase analyzed both channelization improvements and signalization at this intersection. A second analysis tested the effects of the TWLTL specifically at the intersection of Port Industrial Road and 30th Street, and at an arterial level. This improvement would add some capacity to Port Industrial Road and would shorten side street queues and average vehicle delays. Table 17 shows the phased improvements to the intersection of Myrtle Street, and Table 18 indicates the improvement of a TWLTL to the intersection of 30th Street.

Table 17. Existing, Year 2030 Baseline, and Year 2030 with Port Industrial Road Improvements LOS Analysis

	Year 2006 Conditions		Year 2030 Baseline Conditions		Year 2030 With Channelization Improvements		Year 2030 With Channelization and Signalization	
Study Intersection[1]	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**
Port Industrial Road/Myrtle Street (Southbound Approach)	C	21.0	F	*	F	>100	C	32.3

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

* Delay cannot be calculated at this intersection.

Channelization improvements alone to the intersection of Port Industrial Road and Myrtle Street would not improve intersection operations better than LOS D in 2030. Channelization improvements in the interim may keep this intersection operating at an acceptable level; however, by 2030, a signal would be required to maintain LOS D or better.

Table 18. Two-Way Left-Turn Lane Improvements to Port Industrial Road and 30th Street

	Year 2006 Conditions		Year 2030 Without Project (Baseline)		Year 2030 With TWLTL	
Study Intersection [1]	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**
Port Industrial Road/30th Street (Southbound Approach)	D	31.9	F	>100	D	29.6

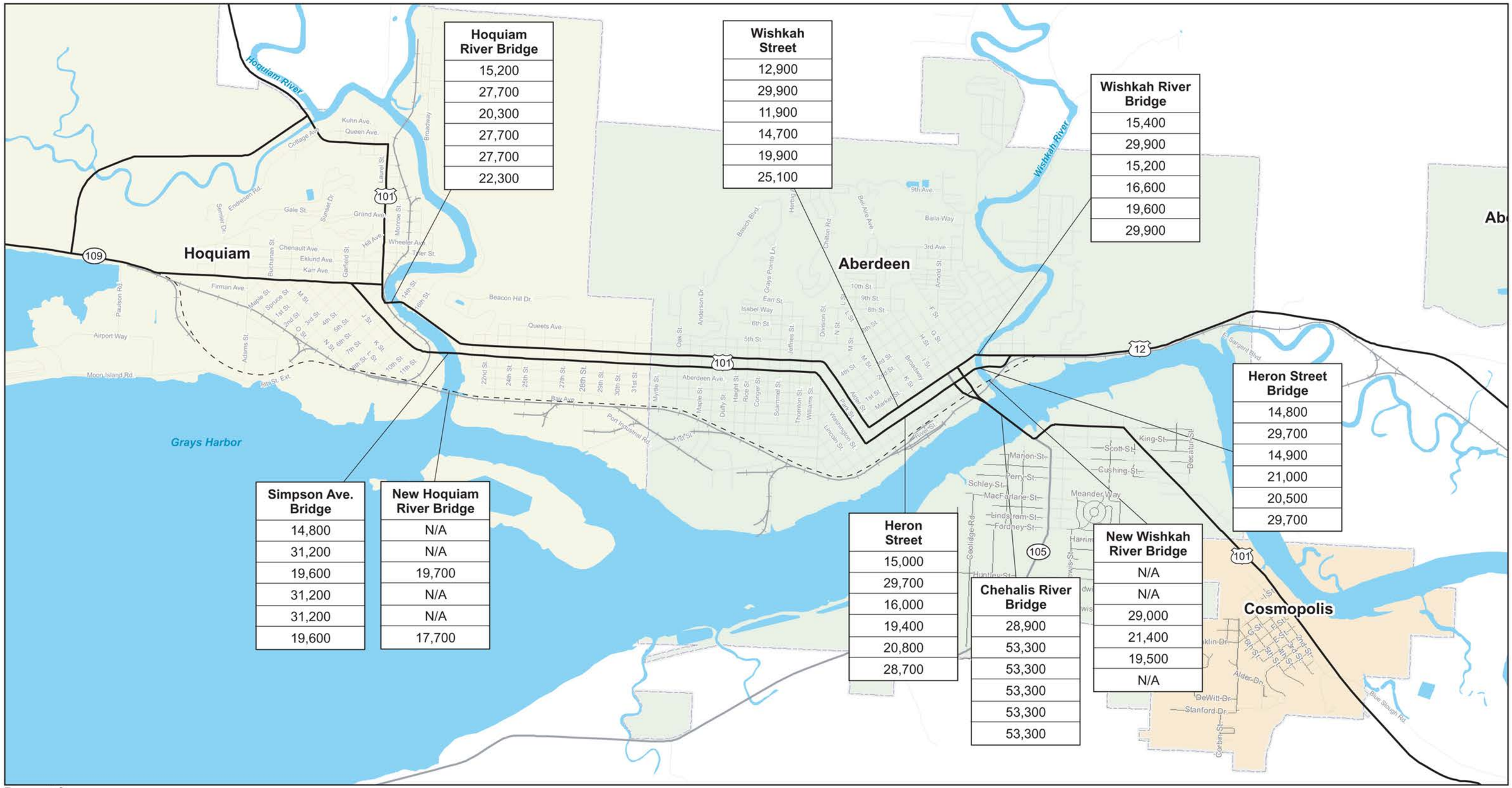
[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

4.2.5 Project H – Study Proposal to Reroute Traffic through Hoquiam

Providing additional access through downtown Hoquiam and two-way access on both the Hoquiam River and Simpson Avenue Bridge was identified as a project by several stakeholder committee members. Preliminary sketch drawings would allow traffic on northbound US 101 to make a left turn onto 24th Street, right onto Simpson Avenue, continue through downtown Hoquiam on a two-way Simpson Avenue, make a left onto Garfield Street at Emerson Avenue and continue on SR 109. Southbound on US 101, vehicles would travel from SR 109 and make a right on Lincoln Street, continuing on Lincoln Street/Riverside Avenue on a two-way street until 22nd Street, where motorists would make a right turn, and then make a left turn onto Simpson Avenue. Simpson Avenue would maintain one-way operation east of 24th Street. Figure 21 illustrates this potential reroute through Hoquiam.

Since the scope and nature of this project was not fully defined, the following assumptions were included in the analysis of this project:

- No right-of-way acquisition would be required on either Simpson Avenue or Riverside Avenue.
- Existing left- and right-turn pockets within the project limits would remain.
- Signals would be rearranged and retimed to accommodate two-way traffic on Simpson Avenue.
- Both the Simpson Avenue and Hoquiam River Bridges could accommodate two-way traffic.



Parametrix US 101/554-2951-002/01(10) 12/06 (B)

Location	
XX,XXX	2006 AWDT
XX,XXX	Baseline 2030
XX,XXX	2030 with Full Truck Corridor
XX,XXX	2030 with Half Truck Corridor
XX,XXX	2030 with East Truck Corridor
XX,XXX	2030 with West Truck Corridor

N

0 2,500

Scale in Feet

City Boundary

- Aberdeen
- Cosmopolis
- Hoquiam

- Waterbody
- Railroad
- Highway
- River
- Proposed Truck Corridor

Figure 20
2006 Existing, 2030 Baseline, and 2030 with Truck Corridor Average Weekday Daily Traffic Volumes

As shown in Table 19, LOS through Hoquiam would improve at the intersection of US 101 (Lincoln Street)/SR 109 (Emerson Avenue) and Sumner Avenue/23rd Street, while the other study intersection would operate worse than the 2030 baseline traffic conditions. The Simpson Avenue/23rd Street intersection would not accommodate the increased traffic volumes and would operate at LOS F without further capacity and/or channelization improvements.

This alternative would improve access from land uses along 16th Street/Broadway Avenue to community destinations to the east. Currently, motorists from 16th Street have to continue westbound on Riverside Avenue, cross over the Hoquiam River Bridge and turn onto 6th Street. Finally, vehicles make a left turn from 6th Street onto Simpson Avenue prior to heading east. Coming from the west, motorists must travel along Simpson Avenue, across the Simpson Avenue Bridge, turn left onto 23rd Street, and then turn left onto Sumner Avenue to access 16th Street.

4.2.6 Project I – Install a Traffic Signal at Heron Street/"F" Street

As identified in the City of Aberdeen's Transportation Improvement Plan and Comprehensive Plan, the Heron Street/"F" Street intersection has been identified for signalization. Currently, this intersection is operating at LOS D for the southwest approach. A relatively high volume turns left from "F" Street onto Heron Street during the PM peak hour; however, this intersection does not currently meet peak hour signal warrants. As shown in Table 20, volumes at this intersection would warrant signalization without any other improvements by the Year 2030.

Table 19. Existing and Year 2030 Level of Service Conditions Without and With US 101 Reroute through Hoquiam

	Year 2006 Conditions		Year 2030 Baseline Conditions		Year 2030 with US 101 Reroute Through Hoquiam	
Study Intersection[1]	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**
Signalized Intersections						
Simpson Avenue/5th Street	B	18.2	D	35.3	E	72.5
Simpson Avenue/6th Street	C	24.0	E	68.1	F	158.4
Simpson Avenue/8th Street	A	6.8	B	15.5	C	25.7
US 101 (Lincoln Street)/ Emerson Avenue (SR 109)	A	6.0	F	110.3	B	13.1
US 101 (Lincoln Street)/5th Street	A	6.0	B	16.9	E	79.3
Simpson Avenue/7th Avenue	A	4.1	A	7.9	B	11.8
Simpson Avenue/23rd Street	A	7.6	D	38.0	F	>100
Sumner Avenue/23rd Street	B	11.5	F	88.3	B	12.7
Unsignalized Intersections						
Riverside Avenue/16th Street (Southbound Approach)	B	14.8	F	>100	F	*

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

* Delay cannot be calculated at this intersection.

Table 20. Heron Street/"F" Street Signal Warrant Analysis

Study Intersection	Year 2006 Conditions		Year 2030 Baseline	
	Major/Minor Approach Volume[1]	Signal Warrant Met?[2]	Major/Minor Approach Volume[1]	Signal Warrant Met?[2]
Heron Street/"F" Street	1115/190	No	2215/300	Yes

[1] Two-way volumes are reported for the major approach, and the highest directional volume is reported for the minor approach.

2. Signal warrant analysis is based on Section 4C.04 Warrant 3, Peak Hour, Figure 4C-3 from the *Manual of Uniform Traffic Control Devices (MUTCD) 2003 Edition.*

Table 21 illustrates the LOS for existing conditions, 2030 baseline, and 2030 with signalization. By 2030, this intersection is expected to operate at LOS F for both "F" Street approaches. Signalization at this intersection would improve intersection operations to LOS B, and the intersection would operate better than existing conditions.

Table 21. Heron Street/"F" Street Level of Service Analysis

Study Intersection [1]	Year 2006 Conditions		2030 Without Project (Baseline)		2030 With Signalization	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
W Heron Street/"F" Street (Southbound Approach)	D	31.9	F	*	B	17.4

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

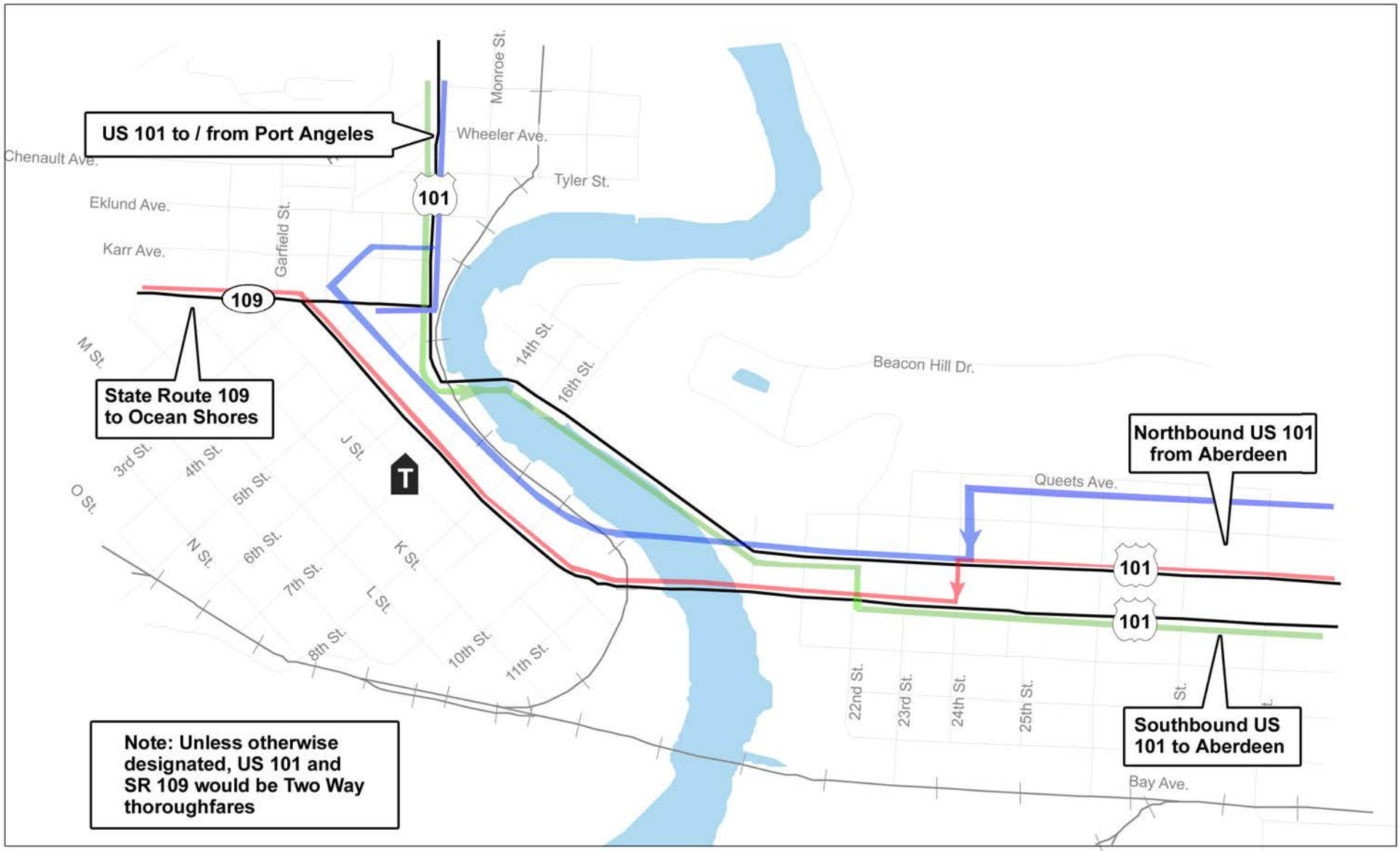
* Delay cannot be calculated at this intersection.

4.2.7 Project S – Widen Intersection of Heron Street/"G" Street

The Heron Street/"G" Street intersection was identified by the City of Aberdeen Public Works Director as a candidate for improvement. Currently, this intersection is operating at LOS C with an average vehicle delay of 20.4 seconds. During the PM peak hour, approximately 400 vehicles make a right turn from "G" Street onto Heron Street without any dedicated right-turn channelization. By the year 2030, this right-turn movement volume is expected to increase by 220 vehicles per hour, and as a result, this intersection would operate at LOS F. To mitigate this LOS F condition, two different scenarios were tested:

- Provide a right-turn pocket and two through lanes.
- Provide a right-turn pocket, a shared through/right lane, and a through lane.

While the addition of a right-turn pocket would improve average vehicle delay at this intersection, it would continue to operate at LOS F in 2030. Table 22 shows the existing conditions, 2030 baseline, and the two tested scenarios for this project. The construction of a dedicated right-turn pocket would decrease average vehicle delay by 50 seconds, and an additional through/right lane would improve average delay by approximately 63 seconds.



Parametrix US 101 554-2951-002/01(10) 12/06 (B) PS

Potential New Routes to:
- Southbound US 101
- Northbound US 101
- Westbound State Route 109
- Water Body
- Railroad
- Highway

Figure 21
Potential US 101 Reroute
Through Downtown Hoquiam

Table 22. Existing and Year 2030 Heron Street/"H" Street Level of Service Conditions Without and With Channelization Improvements

	Year 2006 Conditions		Year 2030 Baseline Conditions		Widen "G" and Heron - Right Turn Pocket		Widen "G" and Heron - Right Turn Pocket and Channelization Revisions	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
W Heron Street/ "G" Street	C	22.3	F	227.0	F	177.0	F	164.2

4.2.8 Project W – Provide Interjurisdictional Signal Coordination between Hoquiam and Aberdeen

This project would provide coordination between the signal systems on US 101 and US 12 in both Aberdeen and Hoquiam. Currently, there are three separate signal groups that are coordinated in the study area: downtown Hoquiam, downtown Aberdeen, and two signals adjacent to the Wishkah Mall. Other traffic signals in the study area operate independently.

An intersection LOS analysis was conducted according to the methodology outlined in Section 2.3 of this report. The major through movements at each signal were coordinated with each other, resulting in all signals operating with the same cycle length. This coordination plan allows the major through movements to move in a platoon through the study area.

As shown in Table 23, most signals operate at the same LOS with and without interjurisdictional signal coordination. The largest delay improvements would occur at signals that are not closely spaced with other signals. Two intersections in particular, US 12/Sargent Boulevard and Sumner Avenue/23rd Street, would benefit the most from signal coordination.

Although these results show some potential delay reduction, interjurisdictional signal coordination may not be effective for a number of reasons. For signal coordination to be most effective, vehicles must move in platoons through signalized intersections. In most cases, traffic on a facility without driveways, opportunities to pass, and minimal roadside friction will maintain a cohesive platoon for distances in excess of 0.5 mile; however, most sections of US 101 and US 12 do not have these characteristics. The random arrival of vehicles from midblock intersections and from on-street parking maneuvers disperses the platoon, possibly resulting in ineffective signal coordination. In particular, signals along Simpson Avenue and Sumner Avenue would likely not benefit from signal coordination, counter to the information provided in Table 23. However, this project may be beneficial during high volume periods, in particular, weekends that have heavy through tourist traffic. Since through volumes will be relatively high, platoons would remain cohesive through the study area, and signal coordination would alleviate some delay at isolated intersections.

Table 23. Existing, Year 2030 Baseline, and Year 2030 with Interjurisdictional Signal Coordination Level of Service Conditions

	Year 2006 Conditions		Year 2030 Baseline Conditions		Interjurisdictional Signal Coordination	
Study Intersection[1]	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**
Signalized Intersections						
Simpson Avenue/5th Street	B	18.2	D	35.3	D	39.0
Simpson Avenue/6th Street	C	24.0	E	68.1	E	57.2
Simpson Avenue/8th Street	A	6.8	B	15.5	B	18.4
US 101 (Lincoln Street)/ Emerson Avenue (SR 109)	A	6.0	F	110.3	F	81.3
US 101 (Lincoln Street)/5th Street	A	6.0	B	16.9	B	10.9
Simpson Avenue/30th Street	A	4.4	A	9.3	A	6.9
Sumner Avenue/30th Street	A	2.8	A	6.3	A	7.4
Simpson Avenue/Myrtle Street	B	10.5	F	86.4	E	74.4
W Wishkah Street/N Park Street	B	14.3	D	49.2	D	40.6
W Wishkah Street/N Alder Street	A	7.0	B	15.1	B	14.9
W Wishkah Street/L Street	A	4.4	B	11.6	B	12.0
W Wishkah Street/H Street	A	8.7	B	14.0	B	14.2
W Wishkah Street/G Street	B	12.1	B	18.0	B	12.9
W Heron Street/N Park Street	B	12.6	F	131.1	F	130.1
W Heron Street/N Alder Street	A	7.2	B	13.0	B	12.9
W Heron Street/L Street	B	18.7	D	45.8	D	46.8
W Heron Street/H Street	C	26.3	F	103.6	F	103.6
W Heron Street/G Street	C	22.3	F	227.0	F	227.0
US 12/Chehalis Street	B	19.9	E	68.8	F	81.3
US 12/Tyler Street	C	20.9	F	174.4	F	212.9
US 101/SR 105	B	10.8	F	122.2	F	145.0
US 12/Sargent Boulevard	A	5.3	C	26.8	B	11.0
Simpson Avenue/23rd Street	A	7.6	D	38.0	C	32.5
Sumner Avenue/23rd Street	B	11.5	F	88.3	E	65.8
Alder Street/First Street	B	15.7	E	69.7	E	62.5
Alder Street/Market Street	B	13.3	B	15.4	C	21.3
Park Street/Market Street	A	5.7	B	14.1	B	18.1
Emerson Street/Adams Street	A	5.2	A	7.9	A	7.4

[1] Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop-controlled minor approach.

5. REFERENCES

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APPENDIX A

Florida's Generalized Level of Service Tables

TABLE 4 - 1
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	2,000	7,000	13,800	19,600	27,000
4	Divided	20,400	33,000	47,800	61,800	70,200
6	Divided	30,500	49,500	71,600	92,700	105,400

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	4,200	13,800	16,400	16,900
4	Divided	4,800	29,300	34,700	35,700	***
6	Divided	7,300	44,700	52,100	53,500	***
8	Divided	9,400	58,000	66,100	67,800	***

Class II (2.00 to 4.50 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	1,900	11,200	15,400	16,300
4	Divided	**	4,100	26,000	32,700	34,500
6	Divided	**	6,500	40,300	49,200	51,800
8	Divided	**	8,500	53,300	63,800	67,000

Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	5,300	12,600	15,500
4	Divided	**	**	12,400	28,900	32,800
6	Divided	**	**	19,500	44,700	49,300
8	Divided	**	**	25,800	58,700	63,800

Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	5,200	13,700	15,000
4	Divided	**	**	12,300	30,300	31,700
6	Divided	**	**	19,100	45,800	47,600
8	Divided	**	**	25,900	59,900	62,200

NON-STATE ROADWAYS

Major City/County Roadways

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	9,100	14,600	15,600
4	Divided	**	**	21,400	31,100	32,900
6	Divided	**	**	33,400	46,800	49,300

Other Signalized Roadways
(signalized intersection analysis)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	4,800	10,000	12,600
4	Divided	**	**	11,100	21,700	25,200

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Interchange spacing ≥ 2 mi. apart

Lanes	Level of Service A	B	C	D	E
4	23,800	39,600	55,200	67,100	74,600
6	36,900	61,100	85,300	103,600	115,300
8	49,900	82,700	115,300	140,200	156,000
10	63,000	104,200	145,500	176,900	196,400
12	75,900	125,800	175,500	213,500	237,100

Interchange spacing < 2 mi. apart

Lanes	Level of Service A	B	C	D	E
4	22,000	36,000	52,000	67,200	76,500
6	34,800	56,500	81,700	105,800	120,200
8	47,500	77,000	111,400	144,300	163,900
10	60,200	97,500	141,200	182,600	207,600
12	72,900	118,100	170,900	221,100	251,200

BICYCLE MODE

(**Note**: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	3,200	13,800	>13,800
50-84%	**	2,500	4,100	>4,100	***
85-100%	3,100	7,200	>7,200	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	6,400	15,500
50-84%	**	**	**	9,900	19,000
85-100%	**	2,200	11,300	>11,300	***

BUS MODE (Scheduled Fixed Route)

(Buses per hour)

(**Note:** Buses per hour shown are only for the **peak hour** in the **single direction** of the higher traffic flow.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED
(alter corresponding volume by the indicated percent)

Lanes	Median	Left Turns Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Decrease corresponding two-directional volumes in this table by 40% to obtain the equivalent one directional volume for one-way facilities.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.

**Cannot be achieved using table input value defaults.

***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 1 (continued)
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S
Urbanized Areas
INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES			
	Freeways		Highways	
ROADWAY CHARACATERISTICS	**Class III**	**Class IV**		
Number of through lanes	4 - 12	4 - 12	2	4 - 6
Posted speed (mph)	65	55	50	50
Free flow speed (mph)	70	60	55	55
Basic segment length (mi)	1.5	0		
Interchange spacing per mile	2.5	1		
Median (n,y)			n	y
Left turn lanes (n,y)			y	y
Terrain (r,l)	l	l	l	l
% no passing zone			80	
Passing lanes (n,y)			n	
TRAFFIC CHARACTERISTICS				
Planning analysis hour factor (K)	0.097	0.093	0.095	0.095
Directional distribution factor (D)	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.95	0.925	0.925
Base capacity (pcphpl)			1700	2100
Heavy vehicle percent	6.0	4.0	2.0	2.0
Local adjustment factor	0.98	1.00	1.0	1.0

	INTERRUPTED FLOW FACILITIES																	
	State Arterials												Non-State Roadways			Bicycle	Pedestrian	Bus
ROADWAY CHARACTERISTICS	Class I			Class II			Class III			Class IV			Major City/County		Other Signalized	Class II	Class II	
Number of through lanes	2	4 - 6	8	2	4 – 6	8	2	4 - 6	8	2	4 – 6	8	2	4 - 6	2 - 4	4	4	
Posted speed (mph)	45	50	50	45	45	45	35	35	35	30	30	30	45	45		40	40	
Free flow speed (mph)	50	55	55	50	50	50	40	40	40	35	35	35	50	50		45	45	
Median type (n,nr,r)	N	r	r	n	r	r	n	r	r	n	r	r	n	r		r	r	
Left turn lanes (n,y)	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	
Paved shoulder/bicycle lane (n,y)																n,50%,y	n	
Outside lane width (n,t,w)																t	t	
Pavement condition (u,t,d)																t		
Sidewalk (n,y)																	n,50%,y	n,y
Sidewalk/roadway separation (a,t,w)																	t	
Sidewalk/roadway protective barrier (n,y)																	n	
Obstacle to bus stop (n,y)																		n
TRAFFIC CHARACTERISTICS																		
Planning analysis hour factor (K)	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	
Peak hour factor (PHF)	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Heavy vehicle percent	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	2.0	2.0	
Local adjustment factor	1.0	1.0	0.95	0.98	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.90	0.98	0.98	0.95	0.98	0.98	
% turns from exclusive turn lanes	12	12	12	12	12	12	12	12	12	12	12	12	14	14	16	12	12	
Bus span of service																		15
CONTROL CHARACTERISTICS																		
Signalized intersections per mile	1.5	1.0	1.0	3.0	3.0	3.0	5.0	5.0	5.0	8.0	8.0	8.0	3.0	3.0		3.0	3.0	
Arrival type (1-6)	3	3	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	
Signal type (a,s,f)	a	a	a	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44	

LEVEL OF SERVICE THRESHOLDS

	Freeways				Highways			State Two-Way Arterials				Non-State Roadways		Bicycle	Pedestrian	Bus
Level of	Class III		Class IV		Two-Lane	Multilane		Class I	Class II	Class III	Class IV	Major City/County	Other Signalized			
Service	v/c	Density	v/c	Density	% FFS	v/c	Density	ATS	ATS	ATS	ATS	ATS	Control Delay	Score	Score	Buses per hr.
A	≤ 0.32	≤ 11	≤ 0.29	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 25 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5	> 6
B	≤ 0.53	≤ 18	≤ 0.47	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 19 mph	> 28 mph	≤ 20 sec	≤2.5	≤ 2.5	> 4
C	≤ 0.74	≤ 26	≤ 0.68	≤ 26	> 0.750	≤ 0.68	≤ 26	> 21 mph	> 22 mph	> 18 mph	> 13 mph	> 22 mph	≤ 35 sec	≤3.5	≤ 3.5	≥ 3
D	≤ 0.90	≤ 35	≤ 0.88	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 9 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5	≥ 2
E	≤ 1.00	≤ 45	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 7 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5	≥ 1
F	> 1.00	> 45	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 7 mph	≤ 13 mph	> 80 sec	> 5.5	> 5.5	< 1

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 2
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	2,100	6,900	12,900	18,200	24,900
4	Divided	18,600	30,200	43,600	56,500	64,200
6	Divided	27,900	45,200	65,500	84,700	96,200

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	4,000	13,100	15,500	16,300
4	Divided	4,600	27,900	32,800	34,200	***
6	Divided	6,900	42,800	49,300	51,400	***

Class II (2.00 to 4.50 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	10,500	14,500	15,300
4	Divided	**	3,700	24,400	30,600	32,200
6	Divided	**	6,000	38,000	46,100	48,400

Class III (more than 4.5 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	5,000	11,800	14,600
4	Divided	**	**	11,700	27,200	30,800
6	Divided	**	**	18,400	42,100	46,300

NON-STATE ROADWAYS

Major City/County Roadways

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	7,000	13,600	14,600
4	Divided	**	**	16,400	29,300	30,900
6	Divided	**	**	25,700	44,100	46,400

Other Signalized Roadways
(signalized intersection analysis)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	4,400	9,400	12,000
4	Divided	**	**	10,300	20,200	24,000

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

	Level of Service				
Lanes	A	B	C	D	E
4	23,500	38,700	52,500	62,200	69,100
6	36,400	59,800	81,100	96,000	106,700
8	49,100	80,900	109,600	129,800	144,400
10	61,800	101,800	138,400	163,800	182,000

BICYCLE MODE

(**Note:** Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service				
	A	B	C	D	E
0-49%	**	1,900	3,300	13,600	>13,600
50-84%	**	2,500	4,000	>4,000	***
85-100%	3,200	7,100	>7,100	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometric at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine two-way maximum service volumes.)

	Level of Service				
% Sidewalk Coverage	A	B	C	D	E
0-49%	**	**	**	6,300	15,400
50-84%	**	**	**	9,800	18,800
85-100%	**	2,200	11,200	>11,200	***

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED

Lanes	Median	Left Turn Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Decrease corresponding two-directional volumes in this table by 40% to obtain the equivalent one directional volume for one-way facilities.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.

**Cannot be achieved using table input value defaults.

***Not applicable for the level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 2 (continued)
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES		
	Freeways	Highways	
ROADWAY CHARACATERISTICS	Class II		
Number of through lanes	4 - 10	2	4 - 6
Posted speed (mph)	70	50	50
Free flow speed (mph)	75	55	55
Basic segment length (mi)	3		
Interchange spacing per mile	4		
Median (n,y)		n	y
Left turn lanes (n,y)		y	y
Terrain (r,l)	l	l	l
% no passing		60	
Passing lanes (n,y)		n	
TRAFFIC CHARACTERISTICS			
Planning analysis hour factor (K)	0.100	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.910	0.910
Base capacity (pcphpl)		1700	2100
Heavy vehicle percent	9.0	4.0	4.0
Local adjustment factor	0.95	0.95	0.95

	INTERRUPTED FLOW FACILITIES										
	State Arterials						Non-State Roadways			Bicycle	Pedestrian
ROADWAY CHARACTERISTICS	Class I		Class II		Class III		Major City/County		Other Signalized	Class II	Class II
Number of through lanes	2	4 - 6	2	4 - 6	2	4 - 6	2	4 - 6	2 - 4	4	4
Posted speed (mph)	45	50	45	45	35	35	40	40		40	40
Free flow speed (mph)	50	55	50	50	40	40	45	45		45	45
Median type (n,nr,r)	n	r	n	r	n	r	n	r		r	r
Left turn lanes (n,y)	y	y	y	y	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n,y)										n,50%,y	n
Outside lane width (n,t,w)										t	t
Pavement condition (u,t,d)										t	
Sidewalk (n,y)											n,50%,y
Sidewalk/roadway separation (a,t,w)											t
Sidewalk/roadway protective barrier (n,y)											n
TRAFFIC CHARACTERISTICS											
Planning analysis hour factor (K)	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy vehicle percent	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Local adjustment factor	0.98	0.98	0.95	0.95	0.92	0.92	0.95	0.95	0.92	0.95	0.95
% turns from exclusive turn lanes	12	12	12	12	12	12	14	14	16	12	12
CONTROL CHARACTERISTICS											
Signalized intersections per mile	1.5	1.0	3.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0
Arrival type (1-6)	3	3	4	4	4	4	4	4	3	4	4
Signal type (a,s,f)	a	a	s	s	s	s	s	s	s	s	s
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		Highways			State Two-Way Arterials			Non-State Roadways		Bicycle	Pedestrian
Level of Service	Class II v/c	Density	Two-Lane % FFS	Multilane v/c	Density	Class I ATS	Class II ATS	Class III ATS	Major City/County ATS	Other Signalized Control Delay	Score	Score
A	≤ 0.34	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 28 mph	≤ 20 sec	≤2.5	≤ 2.5
C	≤ 0.76	≤ 26	> 0.750	≤ 0.68	≤ 26	> 27 mph	> 22 mph	> 18 mph	> 22 mph	≤ 35 sec	≤3.5	≤ 3.5
D	≤ 0.90	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 13 mph	> 80 sec	>5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 3
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION*

RURAL UNDEVELOPED AREAS

FREEWAYS

Lanes	Level of Service A	B	C	D	E
4	21,300	35,300	47,900	56,600	63,000
6	33,100	54,300	73,900	87,400	97,200
8	44,700	73,600	100,000	118,400	131,400

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	2,600	5,300	8,600	13,800	22,300
4	Divided	17,500	28,600	40,800	52,400	58,300
6	Divided	26,200	42,800	61,200	78,600	87,400

PASSING LANE ADJUSTMENTS
(alter corresponding two-lane LOS A-D volumes indicated percent)

Passing Lane Spacing	Adjustment Factors
5 mi.	+25%
10 mi.	+10%

ISOLATED SIGNALIZED INTERSECTIONS

Lanes	Level of Service A	B	C	D	E
2	**	1,900	8,000	10,700	12,100
4	**	2,900	17,400	23,000	25,200
6	**	4,500	27,100	35,500	43,100

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 55 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by directional roadway lanes to determine maximum service volume.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
0-49%	**	**	**	**	6,200
50-84%	**	**	**	**	17,600
85-100%	**	**	3,900	>3,900	***

CITIES OR RURAL DEVELOPED AREAS LESS THAN 5000

FREEWAYS

Lanes	Level of Service A	B	C	D	E
4	21,300	35,300	47,900	56,600	63,000
6	33,100	54,300	73,900	87,400	97,200
8	44,700	73,600	100,000	118,400	131,400

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	2,500	7,200	12,700	17,300	23,500
4	Divided	17,800	28,900	41,800	54,100	61,500
6	Divided	26,800	43,300	62,700	81,200	92,200

INTERRUPTED FLOW ARTERIALS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	2,200	11,000	13,900	14,900
4	Divided	**	5,300	25,500	29,400	31,200
6	Divided	**	8,400	39,400	44,200	46,800

NON-STATE SIGNALIZED ROADWAYS

(signalized intersection analysis)

Lanes	Level of Service A	B	C	D	E
2	**	**	1,900	7,600	10,100

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 45 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	2,800	6,900	>6,900
50-84%	**	2,100	3,500	>3,500	***
85-100%	2,800	4,000	>4,000	***	***

PEDESTRIAN MODE

(Note: Level of service for the pedestrian mode in this table is based on roadway geometric at 45 mph posted speed and traffic conditions, not number of pedestrian using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	4,400	14,200
50-84%	**	**	**	8,000	18,000
85-100%	**	**	9,400	>9,400	***

02/22/02

Source: Florida Department of Transportation
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450

http://www11.myflorida.com/planning/systems/sm/los/default.htm

NON-FREEWAY AND SIGNALIZED INTERSECTION ANALYSES DIVIDED/UNDIVIDED ADJUSTMENTS

(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turn Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 3 (continued)
GENERALIZED ANNUAL AVERAGE DAILY VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION
INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES				
	Freeways	**Highways**			
ROADWAY CHARACTERISTICS	**Class I**				
Area type (ru,rd)		ru	ru	rd	rd
Number of through lanes	4 – 8	2	4 - 6	2	4 - 6
Posted speed (mph)	70	55	55	50	50
Free flow speed (mph)	75	60	60	55	55
Facility length (mi)	7				
Basic segment length (mi)	6				
Interchange spacing per mile	7				
Median (n,y)		n	y	n	y
Left turn lanes (n,y)		y	y	y	y
Terrain (r,l)	l	1	1	1	1
% no passing zone		20		40	
Passing lanes (n,y)		n		n	
TRAFFIC CHARACTERISTICS					
Planning analysis hour factor (K)	0.104	0.098	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.88	0.88	0.895	0.895
Base capacity (pcphpl)		1700	2200	1700	2100
Heavy vehicle percent	9.0	5.0	9.0	4.0	4.0
Local adjustment factor	0.90	0.90	0.90	0.92	0.92

	INTERRUPTED FLOW FACILITIES						
	Isolated Signalized Intersections	**Arterials**		**Non-State Signalized**	**Bicycle**		**Pedestrian**
ROADWAY CHARACTERISTICS		**Class I**			**Class I**		**Class I**
Area type (ru,rd)	ru	rd	rd	rd	ru	rd	rd
Number of through lanes	2 – 6	2	4 – 6	2	2	2	2
Posted speed (mph)		45	45		55	45	45
Free flow speed (mph)		50	50		60	50	50
Median type (n,nr,r)		n	r		n	n	n
Left turns lanes (n,y)	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n.y)					n,50%,y	n,50%,y	n
Outside lane width (n,t,w)					t	t	t
Pavement condition (u,t,d)					t	t	
Sidewalk (n,y)							n,50%,y
Sidewalk roadway separation (a,t,w)							t
Sidewalk roadway protective barrier (n,y)							n
TRAFFIC CHARACTERISTICS							
Planning analysis hour factor (K)	0.098	0.097	0.097	0.097	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.88	0.895	0.895	0.895	0.88	0.895	0.895
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1700	1900	1900
Heavy vehicle percent	5.0	3.0	3.0	1.5	6.0	3.0	3.0
Local adjustment factor	0.90	0.92	0.92	0.92	0.90	0.92	0.92
% turns from exclusive turn lanes	12	12	12	25	0	12	12
CONTROL CHARACTERISTICS							
Signalized intersections per mile		2.0	2.0		0.5	2.0	2.0
Arrival type (1-6)	3	3	3	3	3	3	3
Signal type (a,s,f)	a	s	s	s	a	s	s
Cycle length (C)	60	90	90	60	60	90	90
Effective green ratio (g/C)	0.44	0.44	0.44	0.31	0.44	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		**Highways**						**Isolated Intersections**	**Arterials**	**Non-State Signalized Roadways**	**Bicycle**	**Pedestrian**
Level of Service	Class I		Two-Lane ru	Two-Lane rd	Multilane ru		Multilane rd						
	v/c	Density	v/c	% FFS	v/c	Density	v/c	Density	Control Delay	ATS	Control Delay	Score	Score
A	≤ 0.34	≤ 11	≤ 0.12	> 0.917	≤ 0.30	≤ 11	≥ 0.29	≤ 11	≤ 5 sec	> 42 mph	≤ 5 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	≤ 0.24	> 0.833	≤ 0.49	≤ 18	≥ 0.47	≤ 18	≤10 sec	> 34 mph	≤ 10 sec	≤ 2.5	≤ 2.5
C	≤ 0.76	≤ 26	≤ 0.39	> 0.750	≤ 0.70	≤ 26	≥ 0.68	≤ 26	≤ 15 sec	> 27 mph	≤ 15 sec	≤ 3.5	≤ 3.5
D	≤ 0.90	≤ 35	≤ 0.62	> 0.667	≤ 0.90	≤ 35	≥ 0.88	≤ 35	≤ 20 sec	> 21 mph	≤ 20 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	≤ 1.00	> 0.583	≤ 1.00	≤ 40	≥ 1.00	≤ 41	≤ 40 sec	> 16 mph	≤ 40 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 1.00	≤ 0.583	> 1.00	> 40	< 1.00	> 41	> 40 sec	≤ 16 mph	> 40 sec	> 5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed ru = Rural Undeveloped rd = Rural Developed

TABLE 4 - 4
GENERALIZED PEAK HOUR TWO-WAY VOLUMES FOR FLORIDA'S URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	180	620	1,210	1,720	2,370
4	Divided	1,940	3,140	4,540	5,870	6,670
6	Divided	2,900	4,700	6,800	8,810	10,010

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	400	1,310	1,560	1,610
4	Divided	460	2,780	3,300	3,390	***
6	Divided	700	4,240	4,950	5,080	***
8	Divided	890	5,510	6,280	6,440	***

Class II (2.00 to 4.50 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	180	1,070	1,460	1,550
4	Divided	**	390	2,470	3,110	3,270
6	Divided	**	620	3,830	4,680	4,920
8	Divided	**	800	5,060	6,060	6,360

Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	500	1,200	1,470
4	Divided	**	**	1,180	2,750	3,120
6	Divided	**	**	1,850	4,240	4,690
8	Divided	**	**	2,450	5,580	6,060

Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	490	1,310	1,420
4	Divided	**	**	1,170	2,880	3,010
6	Divided	**	**	1,810	4,350	4,520
8	Divided	**	**	2,460	5,690	5,910

NON-STATE ROADWAYS

Major City/County Roadways

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	870	1,390	1,480
4	Divided	**	**	2,030	2,950	3,120
6	Divided	**	**	3,170	4,450	4,690

Other Signalized Roadways
(signalized intersection analysis)

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	**	450	950	1,200
4	Divided	**	**	1,050	2,070	2,400

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Interchange spacing ≥ 2 mi. apart

Lanes	Level of Service A	B	C	D	E
4	2,310	3,840	5,350	6,510	7,240
6	3,580	5,930	8,270	10,050	11,180
8	4,840	8,020	11,180	13,600	15,130
10	6,110	10,110	14,110	17,160	19,050
12	7,360	12,200	17,020	20,710	23,000

Interchange spacing < 2 mi. apart

Lanes	Level of Service A	B	C	D	E
4	2,050	3,350	4,840	6,250	7,110
6	3,240	5,250	7,600	9,840	11,180
8	4,420	7,160	10,360	13,420	15,240
10	5,600	9,070	13,130	16,980	19,310
12	6,780	10,980	15,890	20,560	23,360

BICYCLE MODE

(**Note**: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	310	1,310	>1,310
50-84%	**	240	390	>390	***
85-100%	300	680	>680	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	600	1,480
50-84%	**	**	**	940	1,800
85-100%	**	210	1,080	>1,080	***

BUS MODE (Scheduled Fixed Route)

(Buses per hour)

(**Note:** Buses per hour shown are only for the **peak hour** in the **single direction** of higher traffic flow.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED
(alter corresponding volume by the indicated percent)

Lanes	Median	Left Turns Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Decrease corresponding two-directional volumes in this table by 40% to obtain the equivalent one directional volume for one-way facilities.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. To convert to annual average daily traffic volumes, these volumes must be divided by an appropriate K factor. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.
**Cannot be achieved using table input value defaults.
***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 4 (continued)
GENERALIZED PEAK HOUR TWO-WAY VOLUMES FOR FLORIDA'S
Urbanized Areas
INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES			
	Freeways		Highways	
ROADWAY CHARACATERISTICS				
Number of through lanes	4 - 12	4 - 12	2	4 - 6
Posted speed (mph)	65	55	50	50
Free flow speed (mph)	70	60	55	55
Basic segment length (mi)	1.5	0		
Interchange spacing per mile	2.5	1		
Median (n,y)			n	y
Left turn lanes (n,y)			y	y
Terrain (r,l)	l	l	l	l
% no passing zone			80	
Passing lanes (n,y)			n	
TRAFFIC CHARACTERISTICS				
Planning analysis hour factor (K)	0.097	0.093	0.095	0.095
Directional distribution factor (D)	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.95	0.925	0.925
Base capacity (pcphpl)			1700	2100
Heavy vehicle percent	6.0	4.0	2.0	2.0
Local adjustment factor	0.98	1.00	1.0	1.0

	INTERRUPTED FLOW FACILITIES																	
	State Arterials												Non-State Roadways			Bicycle	Pedestrian	Bus
ROADWAY CHARACTERISTICS	Class I			Class II			Class III			Class IV			Major City/County		Other Signalized	Class II	Class II	
Number of through lanes	2	4 - 6	8	2	4 – 6	8	2	4 - 6	8	2	4 – 6	8	2	4 - 6	2 - 4	4	4	
Posted speed (mph)	45	50	50	45	45	45	35	35	35	30	30	30	45	45		40	40	
Free flow speed (mph)	50	55	55	50	50	50	40	40	40	35	35	35	50	50		45	45	
Median type (n,nr,r)	n	r	r	n	r	r	n	r	r	n	r	r	n	r		r	r	
Left turn lanes (n,y)	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	
Paved shoulder/bicycle lane (n,y)																n,50%,y	n	
Outside lane width (n,t,w)																t	t	
Pavement condition (u,t,d)																t		
Sidewalk (n,y)																	n,50%,y	n,y
Sidewalk/roadway separation (a,t,w)																	t	
Sidewalk/roadway protective barrier (n,y)																	n	
Obstacle to bus stop (n,y)																		n
TRAFFIC CHARACTERISTICS																		
Planning analysis hour factor (K)	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	
Peak hour factor (PHF)	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Heavy vehicle percent	2.0	2.0	2.0	2.0	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.0	2.0	2.0	
Local adjustment factor	1.0	1.0	0.95	0.98	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.90	0.98	0.98	0.95	0.98	0.98	
% turns from exclusive turn lanes	12	12	12	12	12	12	12	12	12	12	12	12	14	14	16	12	12	
Bus span of service																		15
CONTROL CHARACTERISTICS																		
Signalized intersections per mile	1.5	1.0	1.0	3.0	3.0	3.0	5.0	5.0	5.0	8.0	8.0	8.0	3.0	3.0		3.0	3.0	
Arrival type (1-6)	3	3	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	
Signal type (a,s,f)	a	a	a	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44	

LEVEL OF SERVICE THRESHOLDS

	Freeways				Highways			State Two-Way Arterials				Non-State Roadways		Bicycle	Pedestrian	Bus
Level of	Class III		Class IV		Two-Lane	Multilane		Class I	Class II	Class III	Class IV	Major City/County	Other Signalized			
Service	v/c	Density	v/c	Density	% FFS	v/c	Density	ATS	ATS	ATS	ATS	ATS	Control Delay	Score	Score	Buses per hr.
A	≤ 0.32	≤ 11	≤ 0.29	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 25 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5	> 6
B	≤ 0.53	≤ 18	≤ 0.47	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 19 mph	> 28 mph	≤ 20 sec	≤2.5	≤ 2.5	>4
C	≤ 0.74	≤ 26	≤ 0.68	≤ 26	> 0.750	≤ 0.68	≤ 26	> 21 mph	> 22 mph	> 18 mph	> 13 mph	> 22 mph	≤ 35 sec	≤3.5	≤ 3.5	≥ 3
D	≤ 0.90	≤ 35	≤ 0.88	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 9 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5	≥ 2
E	≤ 1.00	≤ 45	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 7 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5	≥ 1
F	> 1.00	> 45	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 7 mph	≤ 13 mph	> 80 sec	> 5.5	> 5.5	< 1

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 5
GENERALIZED PEAK HOUR TWO-WAY VOLUMES FOR FLORIDA'S AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	180	600	1,130	1,590	2,180
4	Divided	1,790	2,900	4,190	5,420	6,160
6	Divided	2,680	4,340	6,280	8,130	9,240

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	390	1,260	1,490	1,560
4	Divided	440	2,680	3,150	3,290	***
6	Divided	670	4,110	4,730	4,930	***

Class II (2.00 to 4.50 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	1,010	1,390	1,470
4	Divided	**	360	2,340	2,940	3,090
6	Divided	**	580	3,640	4,420	4,650

Class III (more than 4.5 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	480	1,130	1,400
4	Divided	**	**	1,130	2,610	2,960
6	Divided	**	**	1,770	4,040	4,450

NON-STATE ROADWAYS

Major City/County Roadways

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	670	1,300	1,400
4	Divided	**	**	1,570	2,810	2,970
6	Divided	**	**	2,470	4,230	4,460

Other Signalized Roadways
(signalized intersection analysis)

		Level of Service				
Lanes	Divided	A	B	C	D	E
2	Undivided	**	**	430	900	1,150
4	Divided	**	**	990	1,940	2,300

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

	Level of Service				
Lanes	A	B	C	D	E
4	2,350	3,870	5,250	6,220	6,910
6	3,640	5,980	8,110	9,600	10,670
8	4,910	8,090	10,960	12,980	14,440
10	6,180	10,180	13,840	16,380	18,200

BICYCLE MODE

(**Note:** Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine two-way maximum service volumes.)

Paved Shoulder Bicycle Lane Coverage	Level of Service				
	A	B	C	D	E
0-49%	**	180	310	1,310	>1,310
50-84%	**	240	390	>390	***
85-100%	310	680	>680	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometric at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine two-way maximum service volumes.)

	Level of Service				
Sidewalk Coverage	A	B	C	D	E
0-49%	**	**	**	600	1,480
50-84%	**	**	**	940	1,800
85-100%	**	210	1,080	>1,080	***

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED

Lanes	Median	Left Turn Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Decrease corresponding two-directional volumes in this table by 40% to obtain the equivalent one directional volume for one-way facilities.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 – 5 (continued)
GENERALIZED PEAK HOUR TWO-WAY VOLUMES FOR FLORIDA'S
AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES		
	Freeways	**Highways**	
ROADWAY CHARACATERISTICS	**Class II**		
Number of through lanes	4 - 10	2	4 - 6
Posted speed (mph)	70	50	50
Free flow speed (mph)	75	55	55
Basic segment length (mi)	3		
Interchange spacing per mile	4		
Median (n,y)		n	y
Left turn lanes (n,y)		y	y
Terrain (r,l)	l	l	l
% no passing		60	
TRAFFIC CHARACTERISTICS			
Planning analysis hour factor (K)	0.100	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.910	0.910
Base capacity (pcphpl)		1700	2100
Heavy vehicle percent	9.0	4.0	4.0
Local adjustment factor	0.95	0.95	0.95

	INTERRUPTED FLOW FACILITIES										
	State Arterials						**Non-State Roadways**			**Bicycle**	**Pedestrian**
ROADWAY CHARACTERISTICS	**Class I**		**Class II**		**Class III**		**Major City/County**		**Other Signalized**	**Class II**	**Class II**
Number of through lanes	2	4 - 6	2	4 - 6	2	4 - 6	2	4 - 6	2 - 4	4	4
Posted speed (mph)	45	50	45	45	35	35	40	40		40	40
Free flow speed (mph)	50	55	50	50	40	40	45	45		45	45
Median type (n,nr,r)	n	r	n	r	n	r	n	r		r	r
Left turn lanes (n,y)	y	y	y	y	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n,y)										n,50%,y	n
Outside lane width (n,t,w)										t	t
Pavement condition (u,t,d)										t	
Sidewalk (n,y)											n,50%,y
Sidewalk/roadway separation (a,t,w)											t
Sidewalk/roadway protective barrier (n,y)											n
TRAFFIC CHARACTERISTICS											
Planning analysis hour factor (K)	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy vehicle percent	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Local adjustment factor	0.98	0.98	0.95	0.95	0.92	0.92	0.95	0.95	0.92	0.95	0.95
% turns from exclusive turn lanes	12	12	12	12	12	12	14	14	16	12	12
CONTROL CHARACTERISTICS											
Signalized intersections per mile	1.5	1.0	3.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0
Arrival type (1-6)	3	3	4	4	4	4	4	4	3	4	4
Signal type (a,s,f)	a	a	s	s	s	s	s	s	s	s	s
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		**Highways**			**State Two-Way Arterials**			**Non-State Roadways**		**Bicycle**	**Pedestrian**
Level of Service	Class II v/c	Class II Density	Two-Lane % FFS	Multilane v/c	Multilane Density	Class I ATS	Class II ATS	Class III ATS	Major City/County ATS	Other Signalized Control Delay	Score	Score
A	≤ 0.34	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 28 mph	≤ 20 sec	≤2.5	≤ 2.5
C	≤ 0.76	≤ 26	> 0.750	≤ 0.68	≤ 26	> 27 mph	> 22 mph	> 18 mph	> 22 mph	≤ 35 sec	≤3.5	≤ 3.5
D	≤ 0.90	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 13 mph	> 80 sec	>5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 6
GENERALIZED PEAK HOUR TWO-WAY VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION*

RURAL UNDEVELOPED AREAS

FREEWAYS

Lanes	Level of Service A	B	C	D	E
4	2,200	3,670	4,980	5,890	6,550
6	3,440	5,650	7,690	9,090	10,110
8	4,650	7,650	10,400	12,310	13,670

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	220	460	740	1,190	1,920
4	Divided	1,710	2,800	4,000	5,140	5,710
6	Divided	2,570	4,200	6,000	7,710	8,560

PASSING LANE ADJUSTMENTS
(alter corresponding two-lane LOS A-D volumes indicated percent)

Passing Lane Spacing	Adjustment Factors
5 mi.	+25%
10 mi.	+10%

ISOLATED SIGNALIZED INTERSECTIONS

Lanes	Level of Service A	B	C	D	E
2	**	180	780	1,050	1,190
4	**	290	1,700	2,250	2,470
6	**	440	2,660	3,480	4,220

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 55 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by directional roadway lanes to determine maximum service volume.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
0-49%	**	**	**	**	610
50-84%	**	**	**	**	1,720
85-100%	**	**	390	>390	***

CITIES OR RURAL DEVELOPED AREAS LESS THAN 5000

FREEWAYS

Lanes	Level of Service A	B	C	D	E
4	2,220	3,670	4,980	5,890	6,550
6	3,440	5,650	7,690	9,090	10,110
8	4,650	7,650	10,400	12,310	13,670

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	220	630	1,100	1,500	2,040
4	Divided	1,730	2,800	4,060	5,250	5,960
6	Divided	2,600	4,200	6,080	7,870	8,940

INTERRUPTED FLOW ARTERIALS

Lanes	Divided	Level of Service A	B	C	D	E
2	Undivided	**	210	1,070	1,350	1,450
4	Divided	**	520	2,470	2,850	3,020
6	Divided	**	810	3,820	4,290	4,540

NON-STATE SIGNALIZED ROADWAYS

(signalized intersection analysis)

Lanes	Level of Service A	B	C	D	E
2	**	**	180	740	980

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 45 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	270	670	>670
50-84%	**	200	340	>340	***
85-100%	280	390	>390	***	***

PEDESTRIAN MODE

(Note: Level of service for the pedestrian mode in this table is based on roadway geometric at 45 mph posted speed and traffic conditions, not number of pedestrian using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	430	1,370
50-84%	**	**	**	780	1,750
85-100%	**	**	920	>920	***

02/22/02

Source: Florida Department of Transportation
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450

http://www11.myflorida.com/planning/systems/sm/los/default.htm

NON-FREEWAY AND SIGNALIZED INTERSECTION ANALYSES DIVIDED/UNDIVIDED ADJUSTMENTS

(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turn Lanes	Adjustment Factors
2	Divided	Yes	+5%
2	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 6 (continued)
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES				
		Highways			
ROADWAY CHARACTERISTICS	**Freeways**				
Area type (ru,rd)	**Class I**	ru	ru	rd	rd
Number of through lanes	4 - 8	2	4 – 6	2	4 - 6
Posted speed (mph)	70	55	55	50	50
Free flow speed (mph)	75	60	60	55	55
Facility length (mi)	7				
Basic segment length (mi)	6				
Interchange spacing per mile	7				
Median (n,y)		n	y	n	y
Left turn lanes (n,y)		y	y	y	y
Terrain (r,l)	l	1	1	1	1
% no passing zone		20		40	
Passing lanes (n,y)		n		n	
TRAFFIC CHARACTERISTICS					
Planning analysis hour factor (K)	0.104	0.098	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.88	0.88	0.895	0.895
Base capacity (pcphpl)		1700	2200	1700	2100
Heavy vehicle percent	9.0	5.0	9.0	4.0	4.0
Local adjustment factor	0.90	0.90	0.90	0.92	0.92

	INTERRUPTED FLOW FACILITIES						
	Isolated Signalized Intersections	**Arterials**		**Non-State Signalized**	**Bicycle**		**Pedestrian**
ROADWAY CHARACTERISTICS		**Class I**			**Class I**		**Class I**
Area type (ru,rd)	ru	rd	rd	rd	ru	rd	rd
Number of through lanes	2 – 6	2	4 – 6	2	2	2	2
Posted speed (mph)		45	45		55	45	45
Free flow speed (mph)		50	50		60	50	50
Median type (n,nr,r)		n	r		n	n	n
Left turns lanes (n,y)	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n.y)					n,50%,y	n,50%,y	n
Outside lane width (n,t,w)					t	t	t
Pavement condition (u,t,d)					t	t	
Sidewalk (n,y)							n,50%,y
Sidewalk roadway separation (a,t,w)							t
Sidewalk roadway protective barrier (n,y)							n
TRAFFIC CHARACTERISTICS							
Planning analysis hour factor (K)	0.098	0.097	0.097	0.097	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.88	0.895	0.895	0.895	0.88	0.895	0.895
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1700	1900	1900
Heavy vehicle percent	5.0	3.0	3.0	1.5	6.0	3.0	3.0
Local adjustment factor	0.90	0.92	0.92	0.92	0.90	0.92	0.92
% turns from exclusive turn lanes	12	12	12	25	0	12	12
CONTROL CHARACTERISTICS							
Signalized intersections per mile		2.0	2.0		0.5	2.0	2.0
Arrival type (1-6)	3	3	3	3	3	3	3
Signal type (a,s,f)	a	s	s	s	a	s	s
Cycle length (C)	60	90	90	60	60	90	90
Effective green ratio (g/C)	0.44	0.44	0.44	0.31	0.44	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		**Highways**						**Isolated Intersections**	**Arterials**	**Non-State Signalized Roadways**	**Bicycle**	**Pedestrian**
Level of Service	Class I v/c	Class I Density	Two-Lane ru v/c	Two-Lane rd % FFS	Multilane ru v/c	Multilane ru Density	Multilane rd v/c	Multilane rd Density	Control Delay	ATS	Control Delay	Score	Score
A	≤ 0.34	≤ 11	≤ 0.12	> 0.917	≤ 0.30	≤ 11	≥ 0.29	≤ 11	≤ 5 sec	> 42 mph	≤ 5 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	≤ 0.24	> 0.833	≤ 0.49	≤ 18	≥ 0.47	≤ 18	≤10 sec	> 34 mph	≤ 10 sec	≤ 2.5	≤ 2.5
C	≤ 0.76	≤ 26	≤ 0.39	> 0.750	≤ 0.70	≤ 26	≥ 0.68	≤ 26	≤ 15 sec	> 27 mph	≤ 15 sec	≤ 3.5	≤ 3.5
D	≤ 0.90	≤ 35	≤ 0.62	> 0.667	≤ 0.90	≤ 35	≥ 0.88	≤ 35	≤ 20 sec	> 21 mph	≤ 20 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	≤ 1.00	> 0.583	≤ 1.00	≤ 40	≥ 1.00	≤ 41	≤ 40 sec	> 16 mph	≤ 40 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 1.00	≤ 0.583	> 1.00	> 40	< 1.00	> 41	> 40 sec	≤ 16 mph	> 40 sec	> 5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed ru = Rural Undeveloped rd = Rural Developed

TABLE 4 - 7
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	100	340	670	950	1,300
2	Divided	1,060	1,720	2,500	3,230	3,670
3	Divided	1,600	2,590	3,740	4,840	5,500

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	220	720	860	890
2	Divided	250	1,530	1,810	1,860	***
3	Divided	380	2,330	2,720	2,790	***
4	Divided	490	3,030	3,460	3,540	***

Class II (2.00 to 4.50 signalized intersections per mile)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	100	590	810	850
2	Divided	**	220	1,360	1,710	1,800
3	Divided	**	340	2,110	2,570	2,710
4	Divided	**	440	2,790	3,330	3,500

Class III (more than 4.5 signalized intersections per mile and not within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	280	660	810
2	Divided	**	**	650	1,510	1,720
3	Divided	**	**	1,020	2,330	2,580
4	Divided	**	**	1,350	3,070	3,330

Class IV (more than 4.5 signalized intersections per mile and within primary city central business district of an urbanized area over 750,000)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	270	720	780
2	Divided	**	**	650	1,580	1,660
3	Divided	**	**	1,000	2,390	2,490
4	Divided	**	**	1,350	3,130	3,250

NON-STATE ROADWAYS

Major City/County Roadways

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	480	760	810
2	Divided	**	**	1,120	1,620	1,720
3	Divided	**	**	1,740	2,450	2,580

Other Signalized Roadways
(signalized intersection analysis)

Lanes	Divided	Level of Service A	B	C	D	E
1	Undivided	**	**	250	530	660
2	Divided	**	**	580	1,140	1,320

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

Interchange spacing ≥ 2 mi. apart

Lanes	Level of Service A	B	C	D	E
2	1,270	2,110	2,940	3,580	3,980
3	1,970	3,260	4,550	5,530	6,150
4	2,660	4,410	6,150	7,480	8,320
5	3,360	5,560	7,760	9,440	10,480
6	4,050	6,710	9,360	11,390	12,650

Interchange spacing < 2 mi. apart

Lanes	Level of Service A	B	C	D	E
2	1,130	1,840	2,660	3,440	3,910
3	1,780	2,890	4,180	5,410	6,150
4	2,340	3,940	5,700	7,380	8,380
5	3,080	4,990	7,220	9,340	10,620
6	3,730	6,040	8,740	11,310	12,850

BICYCLE MODE

(**Note**: Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	Level of Service A	B	C	D	E
0-49%	**	**	170	720	>720
50-84%	**	130	210	>210	***
85-100%	160	380	>380	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not the number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-49%	**	**	**	330	810
50-84%	**	**	**	520	990
85-100%	**	120	590	>590	***

BUS MODE (Scheduled Fixed Route)
(Buses per hour)

Sidewalk Coverage	Level of Service A	B	C	D	E
0-84%	**	>5	≥4	≥3	≥2
85-100%	>6	>4	≥3	≥2	≥1

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED
(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turns Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE WAY FACILITIES
Increase corresponding volume 20%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly directional volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. To convert to annual average daily traffic volumes, these. volumes must be divided by appropriate D and K factors. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, Pedestrian LOS Model and Transit Capacity and Quality of Service Manual, respectively for the automobile/truck, bicycle, pedestrian and bus modes.
**Cannot be achieved using table input value defaults.
***Not applicable for that level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 – 7 (CONTINUED)
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S URBANIZED AREAS

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES			
	Freeways		Highways	
ROADWAY CHARACATERISTICS	**Class III**	**Class IV**		
Number of directional through lanes	2 - 6	2 - 6	1	2 - 3
Posted speed (mph)	65	55	50	50
Free flow speed (mph)	70	60	55	55
Basic segment length (mi)	1.5	0		
Interchange spacing per mile	2.5	1		
Median (n,y)			n	y
Left turn lanes (n,y)			y	y
Terrain (r,l)	l	l	l	l
% no passing zone			80	
Passing lanes (n,y)			n	
TRAFFIC CHARACTERISTICS				
Planning analysis hour factor (K)	0.097	0.093	0.095	0.095
Directional distribution factor (D)	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.95	0.925	0.925
Base capacity (pcphpl)			1700	2100
Heavy vehicle percent	6.0	4.0	2.0	2.0
Local adjustment factor	0.98	1.00	1.0	1.0

	INTERRUPTED FLOW FACILITIES																	
	State Arterials												Non-State Roadways			Bicycle	Pedestrian	Bus
ROADWAY CHARACTERISTICS	Class I			Class II			Class III			Class IV			Major City/County		Other Signalized	Class II	Class II	
Number of directional through lanes	1	2 - 3	4	1	2-3	4	1	2 - 3	4	1	2 - 3	4	1	2 - 3	1-2	2	2	
Posted speed (mph)	45	50	50	45	45	45	34	35	35	30	30	30	45	45		40	40	
Free flow speed (mph)	50	55	55	50	50	50	40	40	35	35	35	35	50	50		45	45	
Median type (n,nr,r)	n	r	r	n	r	r	n	r	r	n	r	r	n	r		r	r	
Left turn lanes (n,y)	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	
Paved shoulder/bicycle lane (n,y)																n,50%,y	n	
Outside lane width (n,t,w)																t	t	
Pavement condition (u,t,d)																t		
Sidewalk (n,y)																	n,50%,y	n,y
Sidewalk/roadway separation (a,t,w)																	t	
Sidewalk/roadway protective barrier (n,y)																	n	
Obstacle to bus stop (n,y)																		n
TRAFFIC CHARACTERISTICS																		
Planning analysis hour factor (K)	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	0.095	
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	
Peak hour factor (PHF)	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	0.925	
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Heavy vehicle percent	2.0	2.0	2.0	2.0	2.0	2.0	1.5	2.0	2.0	1.5	1.5	1.5	1.5	1.5	1.0	2.0	2.0	
Local adjustment factor	1.0	1.0	0.95	0.98	0.98	0.95	0.95	0.95	0.92	0.92	0.92	0.90	0.98	0.98	0.95	0.98	0.98	
% turns from exclusive turn lanes	12	12	12	12	12	12	12	12	12	12	12	12	14	14	16	12	12	
Bus span of service																		15
CONTROL CHARACTERISTICS																		
Signalized intersections per mile	1.5	1.0	1.0	3.0	3.0	3.0	5.0	5.0	5.0	8.0	8.0	8.0	3.0	3.0		3.0	3.0	
Arrival type (1-6)	3	3	3	4	4	4	4	4	4	4	4	4	4	4	3	4	4	
Signal type (a,s,f)	a	a	a	s	s	s	s	s	s	s	s	s	s	s	s	s	s	
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44	

LEVEL OF SERVICE THRESHOLDS

	Freeways				Highways			State Two-Way Arterials				Non-State Roadways		Bicycle	Pedestrian	Bus
Level of	Class III		Class IV		Two-Lane	Multilane		Class I	Class II	Class III	Class IV	Major City/County	Other Signalized			
Service	v/c	Density	v/c	Density	% FFS	v/c	Density	ATS	ATS	ATS	ATS	ATS	Control Delay	Score	Score	Buses per hr.
A	≤ 0.32	≤ 11	≤ 0.29	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 25 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5	> 6
B	≤ 0.53	≤ 18	≤ 0.47	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 19 mph	> 28 mph	≤ 20 sec	≤ 2.5	≤ 2.5	>4
C	≤ 0.74	≤ 26	≤ 0.68	≤ 26	> 0.750	≤ 0.68	≤ 26	> 27 mph	> 22 mph	> 18 mph	> 13 mph	> 22 mph	≤ 35 sec	≤ 3.5	≤ 3.5	≥ 3
D	≤ 0.90	≤ 35	≤ 0.88	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 9 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5	≥ 2
E	≤ 1.00	≤ 45	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 7 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5	≥ 1
F	> 1.00	> 45	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 7 mph	≤ 13 mph	> 80 sec	> 5.5	> 5.5	< 1

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 8
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS*

UNINTERRUPTED FLOW HIGHWAYS

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	100	330	620	870	1,200
2	Divided	980	1,590	2,300	2,980	3,390
3	Divided	1,470	2,390	3,460	4,470	5,080

STATE TWO-WAY ARTERIALS

Class I (>0.00 to 1.99 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	210	690	820	860
2	Divided	240	1,470	1,730	1,810	***
3	Divided	370	2,260	2,600	2,710	***

Class II (2.00 to 4.50 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	560	760	810
2	Divided	**	200	1,290	1,620	1,700
3	Divided	**	320	2,000	2,430	2,560

Class III (more than 4.5 signalized intersections per mile)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	260	620	770
2	Divided	**	**	620	1,440	1,630
3	Divided	**	**	970	2,220	2,450

NON-STATE ROADWAYS

Major City/County Roadways

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	370	720	770
2	Divided	**	**	870	1,550	1,630
3	Divided	**	**	1,360	2,330	2,450

Other Signalized Roadways
(signalized intersection analysis)

		Level of Service				
Lanes	Divided	A	B	C	D	E
1	Undivided	**	**	230	490	630
2	Divided	**	**	540	1,070	1,270

Source: Florida Department of Transportation 02/22/02
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450
http://www11.myflorida.com/planning/systems/sm/los/default.htm

FREEWAYS

	Level of Service				
Lanes	A	B	C	D	E
2	1,290	2,130	2,890	3,420	3,800
3	2,000	3,290	4,460	5,280	5,870
4	2,700	4,450	6,030	7,140	7,940
5	3,400	5,600	7,610	9,010	10,010

BICYCLE MODE

(**Note:** Level of service for the bicycle mode in this table is based on roadway geometrics at 40 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane	Level of Service				
Coverage	A	B	C	D	E
0-49%	**	100	170	720	>720
50-84%	**	130	210	>210	***
85-100%	170	380	>380	***	***

PEDESTRIAN MODE

(**Note:** Level of service for the pedestrian mode in this table is based on roadway geometric at 40 mph posted speed and traffic conditions, not number of pedestrians using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

	Level of Service				
Sidewalk Coverage	A	B	C	D	E
0-49%	**	**	**	330	810
50-84%	**	**	**	520	990
85-100%	**	120	590	>590	***

ARTERIAL/NON-STATE ROADWAY ADJUSTMENTS

DIVIDED/UNDIVIDED

Lanes	Median	Left Turn Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

ONE-WAY FACILITIES

Increase corresponding volume 20%.

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are hourly two-way volumes for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For automobile/truck modes, volumes greater than level of service D become F because intersection capacities have been reached. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 8 (continued)
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S AREAS TRANSITIONING INTO URBANIZED AREAS OR AREAS OVER 5,000 NOT IN URBANIZED AREAS

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES		
	Freeways	**Highways**	
ROADWAY CHARACATERISTICS	**Class II**		
Number of directional through lanes	2 - 5	1	2 - 3
Posted speed (mph)	70	50	50
Free flow speed (mph)	75	55	55
Basic segment length (mi)	3		
Interchange spacing per mile	4		
Median (n,y)		n	y
Left turn lanes (n,y)		y	y
Terrain (r,l)	l	l	l
% no passing		60	
Passing lanes (n,y)		n	
TRAFFIC CHARACTERISTICS			
Planning analysis hour factor (K)	0.100	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.910	0.910
Base capacity (pcphpl)		1700	2100
Heavy vehicle percent	9.0	4.0	4.0
Local adjustment factor	0.95	0.95	0.95

	INTERRUPTED FLOW FACILITIES										
	State Arterials						**Non-State Roadways**			**Bicycle**	**Pedestrian**
ROADWAY CHARACTERISTICS	**Class I**		**Class II**	**Class III**			**Major City/County**		**Other Signalized**	**Class II**	**Class II**
Number of directional through lanes	1	2 - 3	1	2 - 3	1	2 – 3	1	2 – 3	1 – 2	2	2
Posted speed (mph)	45	50	45	45	35	35	40	40		40	40
Free flow speed (mph)	50	55	50	50	40	40	45	45		45	45
Median type (n,nr,r)	n	r	n	r	n	r	n	r		r	r
Left turn lanes (n,y)	y	y	y	y	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n,y)										n,50%,y	n
Outside lane width (n,t,w)										t	t
Pavement condition (u,t,d)										t	
Sidewalk (n,y)											n,50%,y
Sidewalk/roadway separation (a,t,w)											t
Sidewalk/roadway protective barrier (n,y)											n
TRAFFIC CHARACTERISTICS											
Planning analysis hour factor (K)	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096	0.096
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910	0.910
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Heavy vehicle percent	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Local adjustment factor	0.98	0.98	0.95	0.95	0.92	0.92	0.95	0.95	0.92	0.95	0.95
% turns from exclusive turn lanes	12	12	12	12	12	12	14	14	16	12	12
CONTROL CHARACTERISTICS											
Signalized intersections per mile	1.5	1.0	3.0	3.0	5.0	5.0	3.0	3.0		3.0	3.0
Arrival type (1-6)	3	3	4	4	4	4	4	4	3	4	4
Signal type (a,s,f)	a	a	s	s	s	s	s	s	s	s	s
Cycle length (C)	120	120	120	120	120	120	120	120	120	120	120
Effective green ratio (g/C)	0.44	0.44	0.44	0.44	0.44	0.44	0.41	0.41	0.31	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		**Highways**			**State Two-Way Arterials**			**Non-State Roadways**		**Bicycle**	**Pedestrian**
Level of Service	Class II v/c	Class II Density	Two-Lane % FFS	Multilane v/c	Multilane Density	Class I ATS	Class II ATS	Class III ATS	Major City/County ATS	Other Signalized Control Delay	Score	Score
A	≤ 0.34	≤ 11	> 0.917	≤ 0.29	≤ 11	> 42 mph	> 35 mph	> 30 mph	> 35 mph	≤ 10 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	> 0.833	≤ 0.47	≤ 18	> 34 mph	> 28 mph	> 24 mph	> 28 mph	≤ 20 sec	≤2.5	≤ 2.5
C	≤ 0.76	≤ 26	> 0.750	≤ 0.68	≤ 26	> 27 mph	> 22 mph	> 18 mph	> 22 mph	≤ 35 sec	≤3.5	≤ 3.5
D	≤ 0.90	≤ 35	> 0.667	≤ 0.88	≤ 35	> 21 mph	> 17 mph	> 14 mph	> 17 mph	≤ 55 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	> 0.583	≤1.00	≤ 41	> 16 mph	> 13 mph	> 10 mph	> 13 mph	≤ 80 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 0.583	>1.00	> 41	≤ 16 mph	≤ 13 mph	≤ 10 mph	≤ 13 mph	> 80 sec	>5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed

TABLE 4 – 9
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION*

RURAL UNDEVELOPED AREAS

FREEWAYS

Lanes	A	B	C	D	E
	Level of Service				
2	1,220	2,020	2,740	3,240	3,600
3	1,890	3,110	4,230	5,000	5,560
4	2,560	4,210	5,720	6,770	7,520

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	A	B	C	D	E
		Level of Service				
1	Undivided	120	250	410	650	1,060
2	Divided	940	1,540	2,200	2,830	3,140
3	Divided	1,410	2,310	3,330	4,240	4,710

PASSING LANE ADJUSTMENTS
(alter corresponding two-lane LOS A-D volumes indicated percent)

Passing Lane Spacing	Adjustment Factors
5 mi.	+25%
10 mi.	+10%

ISOLATED SIGNALIZED INTERSECTIONS

Lanes	A	B	C	D	E
	Level of Service				
1	**	100	430	580	650
2	**	160	940	1,240	1,360
3	**	240	1,460	1,910	2,320

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 55 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by directional roadway lanes to determine maximum service volume.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
0-49%	**	**	**	**	340
50-84%	**	**	**	**	950
85-100%	**	**	210	>210	***

CITIES OR RURAL DEVELOPED AREAS LESS THAN 5000

FREEWAYS

Lanes	A	B	C	D	E
	Level of Service				
2	1,220	2,020	2,740	3,240	3,600
3	1,890	3,110	4,230	5,000	5,560
4	2,560	4,210	5,720	6,770	7,520

UNINTERRUPTED FLOW HIGHWAYS

Lanes	Divided	A	B	C	D	E
		Level of Service				
1	Undivided	120	350	600	820	1,120
2	Divided	950	1,540	2,230	2,890	3,280
3	Divided	1,430	2,310	3,350	4,330	4,920

INTERRUPTED FLOW ARTERIALS

Lanes	Divided	A	B	C	D	E
		Level of Service				
1	Undivided	**	120	590	740	800
2	Divided	**	290	1,360	1,570	1,660
3	Divided	**	450	2,100	2,360	2,500

NON-STATE SIGNALIZED ROADWAYS

(signalized intersection analysis)

Lanes	A	B	C	D	E
	Level of Service				
1	**	**	100	410	540

BICYCLE MODE

(Note: Level of service for the bicycle mode in this table is based on roadway geometrics at 45 mph posted speed and traffic conditions, not number of bicyclists using the facility.) (Multiply motorized vehicle volumes shown below by number of directional roadway lanes to determine maximum service volumes.)

Paved Shoulder/ Bicycle Lane Coverage	A	B	C	D	E
	Level of Service				
0-49%	**	**	150	370	>370
50-84%	**	110	180	930	>930
85-100%	150	210	>210	***	***

PEDESTRIAN MODE

(Note: Level of service for the pedestrian mode in this table is based on roadway geometric at 45 mph posted speed and traffic conditions, not number of pedestrian using the facility.) (Multiply motorized vehicle volumes shown by number of directional roadway lanes to determine maximum service volumes.)

Sidewalk Coverage	A	B	C	D	E
	Level of Service				
0-49%	**	**	**	240	760
50-84%	**	**	**	430	960
85-100%	**	**	500	>500	***

02/22/02

Source: Florida Department of Transportation
Systems Planning Office
605 Suwannee Street, MS 19
Tallahassee, FL 32399-0450

http://www11.myflorida.com/planning/systems/sm/los/default.htm

NON-FREEWAY AND SIGNALIZED INTERSECTION ANALYSES DIVIDED/UNDIVIDED ADJUSTMENTS

(alter corresponding volumes by the indicated percent)

Lanes	Median	Left Turn Lanes	Adjustment Factors
1	Divided	Yes	+5%
1	Undivided	No	-20%
Multi	Undivided	Yes	-5%
Multi	Undivided	No	-25%

*This table does not constitute a standard and should be used only for general planning applications. The computer models from which this table is derived should be used for more specific planning applications. The table and deriving computer models should not be used for corridor or intersection design, where more refined techniques exist. Values shown are two-way annual average daily volumes (based on K_{100} factors) for levels of service and are for the automobile/truck modes unless specifically stated. Level of service letter grade thresholds are probably not comparable across modes and, therefore, cross modal comparisons should be made with caution. Furthermore, combining levels of service of different modes into one overall roadway level of service is not recommended. The table's input value defaults and level of service criteria appear on the following page. Calculations are based on planning applications of the Highway Capacity Manual, Bicycle LOS Model, and Pedestrian LOS Model, respectively for the automobile/truck, bicycle and pedestrian modes.
**Cannot be achieved using table input value defaults.
***Not applicable for the level of service letter grade. For bicycle and pedestrian modes, the level of service letter grade (including F) is not achievable, because there is no maximum vehicle volume threshold using table input value defaults.

TABLE 4 - 9 (continued)
GENERALIZED PEAK HOUR DIRECTIONAL VOLUMES FOR FLORIDA'S RURAL UNDEVELOPED AREAS AND CITIES OR DEVELOPED AREAS LESS THAN 5,000 POPULATION

INPUT VALUE ASSUMPTIONS

	UNINTERRUPTED FLOW FACILITIES				
	Freeways	**Highways**			
ROADWAY CHARACTERISTICS	**Class I**				
Area type (ru,rd)		ru	ru	rd	rd
Number of directional through lanes	2 - 4	1	2-3	1	2-3
Posted speed (mph)	70	55	55	50	50
Free flow speed (mph)	75	60	60	55	55
Facility length (mi)	7				
Basic segment length (mi)	6				
Interchange spacing per mile	7				
Median (n,y)		n	y	n	y
Left turn lanes (n,y)		y	y	y	y
Terrain (r,l)	l	1	1	1	1
% no passing zone		20		40	
Passing lanes (n,y)		n		n	
TRAFFIC CHARACTERISTICS					
Planning analysis hour factor (K)	0.104	0.098	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.95	0.88	0.88	0.895	0.895
Base capacity (pcphpl)		1700	2200	1700	2100
Heavy vehicle percent	9.0	5.0	9.0	4.0	4.0
Local adjustment factor	0.90	0.90	0.90	0.92	0.92

	INTERRUPTED FLOW FACILITIES						
	Isolated Signalized Intersections	**Arterials**		**Non-State Signalized**	**Bicycle**		**Pedestrian**
ROADWAY CHARACTERISTICS		**Class I**			**Class I**		**Class I**
Area type (ru,rd)	ru	rd	rd	rd	ru	rd	rd
Number of directional through lanes	1 - 3	1	2 - 3	1	1	1	1
Posted speed (mph)		45	45		55	45	45
Free flow speed (mph)		50	50		60	50	50
Median type (n,nr,r)		n	r		n	n	n
Left turns lanes (n,y)	y	y	y	y	y	y	y
Paved shoulder/bicycle lane (n.y)					n,50%,y	n,50%,y	n
Outside lane width (n,t,w)					t	t	t
Pavement condition (u,t,d)					t	t	
Sidewalk (n,y)							n,50%,y
Sidewalk roadway separation (a,t,w)							t
Sidewalk roadway protective barrier (n,y)							n
TRAFFIC CHARACTERISTICS							
Planning analysis hour factor (K)	0.098	0.097	0.097	0.097	0.098	0.097	0.097
Directional distribution factor (D)	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Peak hour factor (PHF)	0.88	0.895	0.895	0.895	0.88	0.895	0.895
Base saturation flow rate (pcphpl)	1900	1900	1900	1900	1700	1900	1900
Heavy vehicle percent	5.0	3.0	3.0	1.5	6.0	3.0	3.0
Local adjustment factor	0.90	0.92	0.92	0.92	0.90	0.92	0.92
% turns from exclusive turn lanes	12	12	12	25	0	12	12
CONTROL CHARACTERISTICS							
Signalized intersections per mile		2.0	2.0		0.5	2.0	2.0
Arrival type (1-6)	3	3	3	3	3	3	3
Signal type (a,s,f)	a	s	s	s	a	s	s
Cycle length (C)	60	90	90	60	60	90	90
Effective green ratio (g/C)	0.44	0.44	0.44	0.31	0.44	0.44	0.44

LEVEL OF SERVICE THRESHOLDS

	Freeways		**Highways**						**Isolated Intersections**	**Arterials**	**Non-State Signalized Roadways**	**Bicycle**	**Pedestrian**
Level of Service	Class I		Two-Lane ru	Two-Lane rd	Multilane ru		Multilane rd						
	v/c	Density	v/c	% FFS	v/c	Density	v/c	Density	Control Delay	ATS	Control Delay	Score	Score
A	≤ 0.34	≤ 11	≤ 0.12	> 0.917	≤ 0.30	≤ 11	≥ 0.29	≤ 11	≤ 5 sec	> 42 mph	≤ 5 sec	≤ 1.5	≤ 1.5
B	≤ 0.56	≤ 18	≤ 0.24	> 0.833	≤ 0.49	≤ 18	≥ 0.47	≤ 18	≤10 sec	> 34 mph	≤ 10 sec	≤ 2.5	≤ 2.5
C	≤ 0.76	≤ 26	≤ 0.39	> 0.750	≤ 0.70	≤ 26	≥ 0.68	≤ 26	≤ 15 sec	> 27 mph	≤ 15 sec	≤ 3.5	≤ 3.5
D	≤ 0.90	≤ 35	≤ 0.62	> 0.667	≤ 0.90	≤ 35	≥ 0.88	≤ 35	≤ 20 sec	> 21 mph	≤ 20 sec	≤ 4.5	≤ 4.5
E	≤ 1.00	≤ 45	≤ 1.00	> 0.583	≤ 1.00	≤ 40	≥ 1.00	≤ 41	≤ 40 sec	> 16 mph	≤ 40 sec	≤ 5.5	≤ 5.5
F	> 1.00	> 45	≤ 1.00	≤ 0.583	> 1.00	> 40	< 1.00	> 41	> 40 sec	≤ 16 mph	> 40 sec	> 5.5	> 5.5

v/c = Demand to Capacity Ratio % FFS = Percent Free Flow Speed ATS = Average Travel Speed ru = Rural Undeveloped rd = Rural Developed

APPENDIX B

Existing Conditions Technical Memorandum

Parametrix ENGINEERING . PLANNING . ENVIRONMENTAL SCIENCES

TECHNICAL MEMORANDUM

Date:	August 21, 2006
To:	Nazmul Alam
From:	Joshua Johnson, E.I.T.
Subject:	Existing Conditions Traffic Analysis and Year 2030 Baseline Traffic Analysis Assumptions
cc:	Vicki Cummings Kathryn Crawford Vickie Steigner Forest Sutmiller John Perlic, P.E.
Project Number:	554-2951-002
Project Name:	US 101 Regional Circulation Project

The purpose of this technical memo is to quantify the existing traffic conditions for 25 intersections and 13 arterial segments along the US 101/US 12/SR 109 corridors in the Aberdeen/Hoquiam/Cosmopolis vicinity. This memo also includes an evaluation of various studies and historical data to determine future traffic growth. Year 2030 traffic volume recommendations and assumptions are provided at the end of this memorandum and would be used to derive the year 2030 baseline traffic conditions.

INTRODUCTION

The US 101 corridor and surrounding state highways are the major routes through the Cities of Aberdeen and Hoquiam. US 101 and the surrounding facilities connect to the Pacific Ocean beaches, the Western Olympic Peninsula, and I-5. These roadways handle significant volumes of local and pass-through trips during the peak spring and summer seasons. The study area roadways also service a significant amount of truck traffic, with some corridors experiencing over a 10 percent heavy vehicle composition.

Existing Intersection Level of Service Conditions

An intersection level of service (LOS) analysis was conducted for 25 intersections in the study area to determine existing operating conditions. LOS is an estimate of the quality and performance of the transportation system operations. One industry standard for evaluating traffic conditions is based on the Transportation Research Board's methodology outlined in the *Highway Capacity Manual (HCM), Special Report 209* (TRB 2000). Using this methodology, traffic conditions are assessed with respect to the average intersection delay (seconds/vehicle) and uses the letter "A" to describe the least amount of congestion and best operations and the letter "F" for the highest amount of congestion and worst operations. The 2000 HCM level of service ratings and criteria for signalized and unsignalized intersections are shown in Table 1. The LOS reported for two-way stop controlled intersections is the worst control delay among all the intersection approaches and is not representative of overall intersection operations. The Washington State Department of Transportation (WSDOT) LOS standard for all arterial intersections near the project study area is LOS D.

Table 1. Level of Service Ratings for Signalized and Unsignalized Intersections

LOS Rating	Average Delay for Signalized Intersections (seconds/vehicle)	Average Delay for Unsignalized Intersections (seconds/vehicle)
A	0 – 10	0 – 10
B	> 10 – 20	> 10 – 15
C	> 20 – 35	> 15 – 25
D	> 35 – 55	> 25 – 35
E	> 55 – 80	> 35 – 50
F	> 80	> 50

Source: Highway Capacity Manual (TRB 2000).

A total of 25 intersections (20 signalized and 5 unsignalized) were selected for inclusion in the existing conditions analysis. A list of the study intersections is included in Table 2. These intersections are located primarily along the US 101 and US 12 corridors through the cities of Aberdeen and Hoquiam. They encompass the most heavily traveled routes or are along trucking corridors in the study area.

These intersections were analyzed using Trafficware's software program, Synchro 6.0 (build 614). Traffic counts were conducted for a four-hour PM peak period (2:00-6:00 PM) between 2004 and 2006 by the WSDOT Olympic Region traffic operations staff. The existing volumes indicated that the overall peak hour for the study are occurs between 4:30 and 5:30 PM. Therefore, the traffic volumes during this peak hour were used to determine the LOS at the study intersections. The WSDOT annual traffic report indicated that traffic volumes have not increased over the last three years (2004-2006) in the study area. Therefore, 2004 traffic counts were used as existing 2006 traffic volumes. Table 2 summarizes the existing traffic operations at these intersections.

As shown in Table 2, all study intersections are operating at LOS C or better during the PM peak hour with the exception of the three-way stop controlled intersection of State Street and Park Street, which is operating at LOS F for the westbound (State Street) approach. None of the intersections are approaching the WSDOT LOS D threshold on the state highway facilities.

Existing Arterial LOS Analysis

According to the *Highway Capacity Manual* (HCM) 2000 Update, arterial level of service is a function of through-vehicle travel speed and roadway classification along an arterial. The average travel speed is computed from the running times on the urban street and the control delay of through movements at signalized intersections. Arterial LOS, similar to intersection LOS is categorized by six different levels of service denoted by the letters "A" through "F". LOS "A" represents free-flow speeds with minimal control delay at signalized intersections where as LOS "F", represents extremely low travel speeds and intersection congestion is likely at critical signalized locations, with high delays, high volumes and extensive queuing.

This arterial level of service can be used on arterials were control delays are known. Exhibit 15-2 in the *Highway Capacity Manual (2000)* lists urban street LOS criteria based on average travel speed and urban street class. For the existing conditions analysis, this methodology was applied to seven arterial segments within the study area, including:

- Sumner Avenue/Alder Street/Lincoln Street (Emerson Avenue to Wishkah Street)

- Simpson Avenue (Emerson Avenue to 8th Street)
- Simpson Avenue/Park Street (8th Street to Heron Street)
- Wishkah Street (Alder Street to Chehalis Street)
- Heron Street (Park Street to End US 12 Couplet)
- WB US 12 (End US 12 Couplet to Sargent Blvd)
- EB US 12 (End US 12 Couplet to Sargent Blvd)

Table 2. Existing Intersection Level of Service Conditions

Study Intersection	Existing Conditions	
	LOS	Delay (sec/veh)
Signalized Intersections		
Simpson and 5th Avenue	B	18.2
Simpson and 8th Avenue	A	6.8
US 101 (Lincoln) and Emerson Street (SR 109)	A	6.0
US 101 (Lincoln) and 5th Street	A	6.0
Simpson and 30th Street	A	4.4
Sumner and 30th Street	A	2.8
Simpson and Myrtle Street	B	10.5
W Wishkah Street and N Park Street	B	14.3
W Wishkah Street and N Alder Street	A	7.0
W Wishkah Street and L Street	A	4.4
W Wishkah Street and H Street	A	8.7
W Wishkah Street and G Street	B	12.1
W Heron Street and N Park Street	B	12.6
W Heron Street and N Alder Street	A	7.2
W Heron Street and L Street	B	18.7
W Heron Street and H Street	C	26.3
W Heron Street and G Street[2]	C	22.3
US 12 and Chehalis Street	B	19.9
US 12 and Tyler Street	C	20.9
US 101 and SR 105	B	10.8
US 12 and Sargent Blvd[2]	A	5.3
Unsignalized Intersections[1]		
Port Industrial Road and Myrtle Street	C	21.0
State Street and N Park Street[3]	F	56.8
State Street and N Alder Street	C	16.4
5th Avenue and Earley Industrial Way	A	9.9
Industrial Road and 30th Street	B	13.9

1 Reported level of service and delay for unsignalized intersections is for the worst approach, normally a stop controlled minor approach.

2 Signal timings, splits, and offsets are estimated. Level of service and average delay may vary slightly from reported values.

3 The HCM methodology does not allow three-way stop controlled intersections. Reported level of service is for the westbound approach.

For segments where signalized intersection data was not available, Florida's Generalized Level of Service Tables were used to determine planning-level existing levels of service. These tables are based on the HCM 2000 and field data collected on Florida's roadways. This methodology determines the arterial level of service from roadway information, including peak hour directional volumes, number of signalized intersections per mile, and roadway channelization characteristics. This methodology provides planning level estimate of arterial LOS. The Florida Generalized Level of Service Tables are attached in Appendix A. The following six arterial segments were analyzed using Table 4-8 from Appendix A:

- State Street (US 101 Ramps to Park Street)
- Emerson Avenue (SR 109 Spur to Lincoln Street)
- US 101 (Blue Slough Road to SR 105)
- Myrtle Street (Sumner Street to Port Industrial Road)
- Lincoln/Perry Street (Emerson Avenue to SR 109 Spur)
- Port Industrial Road/Bay Road (22nd Street to N Division Road)

As shown in Table 3, Simpson Avenue from Emerson Avenue to 8th Street is the only arterial segment that is currently at the WSDOT level of service D threshold. Intersection control delay through downtown Hoquiam is causing this segment to operate at this level. Other arterial segments are operating at LOS C or better.

Year 2030 Traffic Analysis Evaluation and Assumptions

The following section documents research that was completed to determine feasible traffic growth rates along the US 101 corridor and within the Port of Grays Harbor. Parametrix specifically looked at historical traffic growth rates, residential dwelling unit growth, and employment projections to forecast growth in the study area. Specific growth rates associated with each source and recommendations for the 2030 baseline analysis are provided below.

WSDOT Annual Traffic Report (2002-2005)

Analysis was completed on the 2005 WSDOT annual traffic report to determine historical growth rates along the study corridors. The WSDOT report documents annual average daily traffic (AADT) volumes for the state operated highway system, including actual and estimated AADT volumes for US 101, US 12, and SR 109. Historical growth rates for each state highway within the study area are as follows:

- **US 101 from SR 105 Spur to SR 109 Spur:** Along this corridor, growth has been negligible in the last four years, except between W Market Street (MP 84.78) and Myrtle Street (MP 85.78). Along this segment, growth is occurring at a 2.7 percent annual rate. Other segments along this corridor are showing a 0 percent (flatline) or negative annual growth rate.
- **SR 109 from US 101 to SR 109 Spur:** Over the four-year analysis period, this highway segment is reflecting a zero percent growth rate.
- **US 12 from US 101 to Central Park Drive:** This corridor has been growing at a 1.1 percent annual growth rate. The Wishkah Mall is located along this corridor and economic development in this area is most likely contributing to the increase in traffic volumes. Past Central Park Drive (MP 3.50), growth along this corridor is negligible.

Table 3. Existing Arterial Level of Service Conditions

Operational Level Arterial LOS (HCM Methodology)	Arterial Class	Running Time (s)	Signal Delay (s)	Travel Time (s)	Distance (mi)	Arterial Speed (mph)	Arterial LOS
Sumner Avenue/Alder Street/Lincoln Street (Emerson Avenue to Wishkah Street)	III	421.3	72.6	493.90	3.47	26.9	B
Simpson Avenue/Park Street (10th Street to Heron Street)	III	382.8	28.8	411.60	3.16	26.7	B
Simpson Avenue (Emerson Avenue to 10th Street)	IV	63.8	50.3	114.10	0.35	13.9	C
Wishkah Street (Alder Street to Chehalis Street)	III	148.6	56.7	205.30	1.09	21.7	B
Heron Street (Park Street to End Couplet)	IV	186.7	109.8	296.50	1.12	14.2	C
WB US 12 (End Couplet to Sargent Blvd)	II	119.3	21.3	140.60	1.32	30.2	B
EB US 12 (End Couplet to Sargent Blvd)	II	119.3	20.0	139.30	1.32	26.8	C

Planning Level Arterial LOS (FDOT Methodology)	Signals on Link	Link length (mi)	Signal per mi	Highest Directional Volume	Link LOS
State Street (US 101 Ramps to Park Street)	0	0.47	0.00	375	C
Emerson Avenue (SR 109 Spur to Lincoln Street)[1]	3	1.83	1.64	405	C
US 101 (Blue Slough Road to SR 105)	1	2.49	0.40	475	B
Myrtle Street (Sumner Street to Port Industrial Road)	1	0.45	2.22	189	C
Lincoln/Perry Street (Emerson Avenue to SR 109 Spur)[1]	2	1.36	1.47	585	C
Port Industrial Road/Bay Road (22nd Street to N Division Road)	0	2.20	0.00	529	C

[1]Highest directional volume derived from PM peak hour tube counts

Aberdeen-Hoquiam Corridor Project Year 2020 Traffic Analysis (T-4) November 1998

This study used System 2, a traffic modeling software to develop the 2011 traffic volumes. Based on recommendations from the Transportation Improvement Board in 1997, a 2 percent annual growth rate was applied to the forecasted 2011 traffic volumes to determine the design year 2020 traffic volumes.

Aberdeen-Hoquiam Corridor Project Final Environmental Impact Statement (FEIS) April 2000

As part of the FEIS, the traffic analysis forecasted future traffic volume based on projected pass through traffic associated with tourism and commerce, residential dwelling units, and employment within the study area. The study anticipated a one percent annual increase in residential dwelling units and retail employment in the study area. The non-retail businesses were anticipated to grow slower due to the lack of available land. The south Aberdeen area has the potential to grow at a 3.6 percent growth per year between 1991 and 2011. Overall, the study forecasted traffic to increase by approximately two percent annually, with an increase of 3 to 4 percent in annual through traffic (with recreational traffic to double between 1991 and 2011).

Port Industrial Road Analysis (HDR and CH2MHill 2006)

This study used an annual growth rate of 2% as a conservative estimation of through trips on Port Industrial Road with in the Port of Grays Harbor. A trip generation and distribution analysis was completed as part of this study. It assumed that existing unbuilt land uses would be fully built out by the year 2025. Traffic was distributed to Port Industrial Road via the port access points. If the port is fully built out by 2025, a 5 to 5.5 percent annual increase in volume is expected on Port Industrial Road, which would result in car and truck volumes to increase by approximately 250-300 percent.

Grays Harbor Growth and Development (Vicki Cummings, GHCOG)

Based on information provided from the Grays Harbor Council of Governments (GHCOG), housing and employment is anticipated to grow over the next few years in communities in the study area as well as communities outside of the Aberdeen/Hoquiam/Cosmopolis study area. Preliminary projections indicate that over 1,000 new jobs may be added in the cities of Hoquiam, Aberdeen, and Cosmopolis. Furthermore, these cities are anticipating approximately 900 new residential dwelling units to accommodate growth. Growth is expected outside of the study area which would result in an increase in through trips. The cities of Westport and Ocean Shores are growing at record levels with tourism acting as the primary economic driver.

RECOMMENDED YEAR 2030 BASELINE TRAFFIC GROWTH

Based on the review of these sources and conversations with WSDOT, the future 2030 baseline transportation network would utilize two different growth rates. Pass-through volumes on the major highways would be grown at a 2 percent annual growth rate to capture anticipated growth within and outside of the study area. Although this level of growth has not been historically seen over the last few years, the 2 percent annual background growth would provide a conservative growth estimate and would adequately capture traffic volumes forecasted from pipeline projects and an increase in through trips from growth in surrounding communities. Furthermore, forecasted traffic volumes and trip distribution patterns identified in the Port Industrial Road analysis would be applied to the 2030 baseline network, further refining forecasted growth within the Port of Gray Harbor and on Port Industrial Road.

APPENDIX C

2006 Existing Conditions Synchro Summary Level of Service Sheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0		4.0	4.0				4.0
Lane Util. Factor					0.95		0.95	0.95				1.00
Frt					1.00		1.00	1.00				0.86
Flt Protected					1.00		0.95	0.96				1.00
Satd. Flow (prot)					3361		1603	1613				1611
Flt Permitted					1.00		0.95	0.96				1.00
Satd. Flow (perm)					3361		1603	1613				1611
Volume (vph)	0	0	0	0	1092	2	394	17	0	0	0	7
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	0	0	0	0	1227	2	443	19	0	0	0	8
RTOR Reduction (vph)	0	0	0	0	0	0	170	170	0	0	0	8
Lane Group Flow (vph)	0	0	0	0	1229	0	57	65	0	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	7%	7%	2%	2%	2%
Parking (#/hr)					0							
Turn Type							Perm					custom
Protected Phases					2			4				
Permitted Phases							4					3
Actuated Green, G (s)					26.6		8.1	8.1				0.7
Effective Green, g (s)					27.6		9.1	9.1				1.7
Actuated g/C Ratio					0.55		0.18	0.18				0.03
Clearance Time (s)					5.0		5.0	5.0				5.0
Vehicle Extension (s)					3.0		3.0	3.0				3.0
Lane Grp Cap (vph)					1841		289	291				54
v/s Ratio Prot					c0.37							
v/s Ratio Perm							0.04	0.04				c0.00
v/c Ratio					0.67		0.20	0.22				0.00
Uniform Delay, d1					8.1		17.6	17.6				23.5
Progression Factor					1.00		1.00	1.00				1.00
Incremental Delay, d2					0.9		0.3	0.4				0.0
Delay (s)					9.1		17.9	18.0				23.6
Level of Service					A		B	B				C
Approach Delay (s)		0.0			9.1			18.0			23.6	
Approach LOS		A			A			B			C	

Intersection Summary

HCM Average Control Delay	11.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0			4.0	
Lane Util. Factor					0.95			0.95			0.95	
Frt					1.00			1.00			0.89	
Flt Protected					1.00			0.99			1.00	
Satd. Flow (prot)					3490			3378			2995	
Flt Permitted					1.00			0.89			1.00	
Satd. Flow (perm)					3490			3033			2995	
Volume (vph)	0	0	0	12	831	21	17	154	0	0	85	229
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	0	12	866	22	18	160	0	0	89	239
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	97	0
Lane Group Flow (vph)	0	0	0	0	899	0	0	178	0	0	231	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	1%	1%	1%	2%	2%	2%
Parking (#/hr)								0			0	
Turn Type				Perm			Perm					
Protected Phases					4			2			2	
Permitted Phases				4			2					
Actuated Green, G (s)					51.3			9.7			9.7	
Effective Green, g (s)					51.8			10.2			10.2	
Actuated g/C Ratio					0.74			0.15			0.15	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					3.0			3.0			3.0	
Lane Grp Cap (vph)					2583			442			436	
v/s Ratio Prot											c0.08	
v/s Ratio Perm					0.26			0.06				
v/c Ratio					0.35			0.40			0.53	
Uniform Delay, d1					3.2			27.1			27.7	
Progression Factor					1.33			1.03			1.00	
Incremental Delay, d2					0.3			0.6			1.2	
Delay (s)					4.6			28.4			28.8	
Level of Service					A			C			C	
Approach Delay (s)		0.0			4.6			28.4			28.8	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	13.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						0.95			0.95	
Frt		1.00						0.95			1.00	
Flt Protected		1.00						1.00			0.99	
Satd. Flow (prot)		3343						3238			3402	
Flt Permitted		1.00						1.00			0.89	
Satd. Flow (perm)		3343						3238			3066	
Volume (vph)	112	1137	10	0	0	0	0	52	23	15	76	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	120	1223	11	0	0	0	0	56	25	16	82	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	23	0	0	0	0
Lane Group Flow (vph)	0	1354	0	0	0	0	0	58	0	0	98	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Parking (#/hr)		0						0			0	
Turn Type	Perm									Perm		
Protected Phases		4						2			2	
Permitted Phases	4									2		
Actuated Green, G (s)		54.7						6.3			6.3	
Effective Green, g (s)		55.2						6.8			6.8	
Actuated g/C Ratio		0.79						0.10			0.10	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		2636						315			298	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.40									c0.03	
v/c Ratio		0.51						0.19			0.33	
Uniform Delay, d1		2.6						29.1			29.5	
Progression Factor		1.00						1.00			0.60	
Incremental Delay, d2		0.7						0.3			0.5	
Delay (s)		3.3						29.3			18.2	
Level of Service		A						C			B	
Approach Delay (s)		3.3			0.0			29.3			18.2	
Approach LOS		A			A			C			B	

Intersection Summary

HCM Average Control Delay	5.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0			4.0	4.0
Lane Util. Factor					0.95			1.00			1.00	1.00
Frt					1.00			1.00			1.00	0.85
Flt Protected					1.00			1.00			1.00	1.00
Satd. Flow (prot)					3352			1690			1710	1615
Flt Permitted					1.00			0.99			1.00	1.00
Satd. Flow (perm)					3352			1680			1710	1615
Volume (vph)	0	0	0	13	1116	18	12	359	0	0	48	257
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	0	14	1187	19	13	382	0	0	51	273
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	0	62
Lane Group Flow (vph)	0	0	0	0	1218	0	0	395	0	0	51	211
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	0%	0%	0%
Parking (#/hr)					0			0			0	
Turn Type				Perm			Perm					Perm
Protected Phases					4			2			2	
Permitted Phases				4			2					2
Actuated Green, G (s)					43.1			17.9			17.9	17.9
Effective Green, g (s)					43.6			18.4			18.4	18.4
Actuated g/C Ratio					0.62			0.26			0.26	0.26
Clearance Time (s)					4.5			4.5			4.5	4.5
Vehicle Extension (s)					3.0			3.0			3.0	3.0
Lane Grp Cap (vph)					2088			442			449	425
v/s Ratio Prot											0.03	
v/s Ratio Perm					0.36			c0.24				0.13
v/c Ratio					0.58			0.89			0.11	0.50
Uniform Delay, d1					7.8			24.9			19.6	21.9
Progression Factor					0.43			1.00			1.00	1.00
Incremental Delay, d2					1.1			19.9			0.1	0.9
Delay (s)					4.5			44.8			19.7	22.8
Level of Service					A			D			B	C
Approach Delay (s)		0.0			4.5			44.8			22.3	
Approach LOS		A			A			D			C	

Intersection Summary

HCM Average Control Delay	15.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0	4.0		4.0	
Lane Util. Factor		1.00			1.00			1.00	1.00		1.00	
Frt		1.00			0.99			1.00	0.85		0.97	
Flt Protected		1.00			1.00			0.97	1.00		0.97	
Satd. Flow (prot)		1770			1844			1761	1538		1748	
Flt Permitted		0.99			0.99			0.85	1.00		0.82	
Satd. Flow (perm)		1749			1825			1536	1538		1472	
Volume (vph)	10	313	4	14	406	29	9	7	23	30	7	12
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	11	337	4	15	437	31	10	8	25	32	8	13
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	21	0	11	0
Lane Group Flow (vph)	0	352	0	0	482	0	0	18	4	0	42	0
Heavy Vehicles (%)	7%	7%	7%	2%	2%	2%	5%	5%	5%	2%	2%	2%
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		2			2			4			4	
Permitted Phases	2			2			4		4	4		
Actuated Green, G (s)		43.9			43.9			8.2	8.2		8.2	
Effective Green, g (s)		44.4			44.4			8.7	8.7		8.7	
Actuated g/C Ratio		0.73			0.73			0.14	0.14		0.14	
Clearance Time (s)		4.5			4.5			4.5	4.5		4.5	
Vehicle Extension (s)		3.0			3.0			3.0	3.0		3.0	
Lane Grp Cap (vph)		1271			1326			219	219		210	
v/s Ratio Prot												
v/s Ratio Perm		0.20			c0.26			0.01	0.00		c0.03	
v/c Ratio		0.28			0.36			0.08	0.02		0.20	
Uniform Delay, d1		2.9			3.1			22.7	22.5		23.1	
Progression Factor		1.00			1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.1			0.2			0.2	0.0		0.5	
Delay (s)		3.0			3.3			22.9	22.6		23.6	
Level of Service		A			A			C	C		C	
Approach Delay (s)		3.0			3.3			22.7			23.6	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	5.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	61.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0						4.0				
Lane Util. Factor	1.00	0.95						0.95				
Frt	1.00	1.00						1.00				
Flt Protected	0.95	1.00						1.00				
Satd. Flow (prot)	1752	3323						3459				
Flt Permitted	0.95	1.00						1.00				
Satd. Flow (perm)	1752	3323						3459				
Volume (vph)	93	809	11	0	0	0	0	336	8	0	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	101	879	12	0	0	0	0	365	9	0	0	0
RTOR Reduction (vph)	50	1	0	0	0	0	0	3	0	0	0	0
Lane Group Flow (vph)	51	890	0	0	0	0	0	371	0	0	0	0
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	4%	4%	4%	2%	2%	2%
Parking (#/hr)		0										
Turn Type	Perm											
Protected Phases		4						2				
Permitted Phases	4											
Actuated Green, G (s)	17.5	17.5						9.4				
Effective Green, g (s)	18.5	18.5						10.4				
Actuated g/C Ratio	0.50	0.50						0.28				
Clearance Time (s)	5.0	5.0						5.0				
Vehicle Extension (s)	3.0	3.0						3.0				
Lane Grp Cap (vph)	878	1666						975				
v/s Ratio Prot		c0.27						c0.11				
v/s Ratio Perm	0.03											
v/c Ratio	0.06	0.53						0.38				
Uniform Delay, d1	4.7	6.3						10.7				
Progression Factor	1.00	1.00						1.00				
Incremental Delay, d2	0.0	0.3						0.2				
Delay (s)	4.8	6.6						10.9				
Level of Service	A	A						B				
Approach Delay (s)		6.4			0.0			10.9			0.0	
Approach LOS		A			A			B			A	

Intersection Summary

HCM Average Control Delay	7.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	36.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBR	WBR2	SEL2	SEL	SWL	SWR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0		4.0	4.0		4.0
Lane Util. Factor	0.88		0.91	0.91		0.88
Frt	0.85		1.00	1.00		0.85
Flt Protected	1.00		0.95	0.95		1.00
Satd. Flow (prot)	2656		1535	3070		2656
Flt Permitted	1.00		0.23	0.54		1.00
Satd. Flow (perm)	2656		365	1739		2656
Volume (vph)	753	3	475	685	0	287
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	930	4	586	846	0	354
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	934	0	293	1139	0	354
Heavy Vehicles (%)	7%	7%	7%	7%	7%	7%
Turn Type			Perm			custom
Protected Phases	2			2 4		
Permitted Phases			2 4			4
Actuated Green, G (s)	36.8		83.4	83.4		34.6
Effective Green, g (s)	38.8		83.4	83.4		36.6
Actuated g/C Ratio	0.47		1.00	1.00		0.44
Clearance Time (s)	6.0					6.0
Vehicle Extension (s)	2.5					2.5
Lane Grp Cap (vph)	1236		365	1739		1166
v/s Ratio Prot	0.35					
v/s Ratio Perm			c0.80	0.66		0.13
v/c Ratio	0.76		0.80	0.65		0.30
Uniform Delay, d1	18.4		0.0	0.0		15.1
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	2.6		11.7	0.8		0.1
Delay (s)	20.9		11.7	0.8		15.3
Level of Service	C		B	A		B
Approach Delay (s)	20.9			3.0	15.3	
Approach LOS	C			A	B	

Intersection Summary

HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	0.0
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0		4.0	4.0	
Lane Util. Factor		0.95						1.00		0.95	0.95	
Frt		1.00						0.95		1.00	1.00	
Flt Protected		1.00						1.00		0.95	0.96	
Satd. Flow (prot)		2879						1417		1681	1361	
Flt Permitted		1.00						1.00		0.95	0.96	
Satd. Flow (perm)		2879						1417		1681	1361	
Volume (vph)	7	361	11	0	0	0	0	42	24	433	44	0
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	7	384	12	0	0	0	0	45	26	461	47	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	24	0	0	0	0
Lane Group Flow (vph)	0	400	0	0	0	0	0	47	0	276	232	0
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		40						20			20	
Turn Type	Perm									Split		
Protected Phases		6						8		7	7	
Permitted Phases	6											
Actuated Green, G (s)		18.9						5.6		32.0	32.0	
Effective Green, g (s)		19.4						6.1		32.5	32.5	
Actuated g/C Ratio		0.28						0.09		0.46	0.46	
Clearance Time (s)		4.5						4.5		4.5	4.5	
Vehicle Extension (s)		3.0						3.0		3.0	3.0	
Lane Grp Cap (vph)		798						123		780	632	
v/s Ratio Prot								c0.03		0.16	c0.17	
v/s Ratio Perm		0.14										
v/c Ratio		0.50						0.38		0.35	0.37	
Uniform Delay, d1		21.2						30.2		12.0	12.1	
Progression Factor		1.00						1.00		1.00	1.00	
Incremental Delay, d2		0.5						2.0		1.3	1.6	
Delay (s)		21.7						32.2		13.3	13.8	
Level of Service		C						C		B	B	
Approach Delay (s)		21.7			0.0			32.2			13.5	
Approach LOS		C			A			C			B	

Intersection Summary

HCM Average Control Delay	18.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	37.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0							4.0	4.0	4.0	
Lane Util. Factor		0.95							1.00	0.95	0.95	
Frt		1.00							0.86	1.00	1.00	
Flt Protected		1.00							1.00	0.95	1.00	
Satd. Flow (prot)		2887							1289	1681	1416	
Flt Permitted		1.00							1.00	0.95	1.00	
Satd. Flow (perm)		2887							1289	1681	1416	
Volume (vph)	0	854	15	0	0	0	0	0	27	272	192	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	899	16	0	0	0	0	0	28	286	202	0
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	24	185	0	0
Lane Group Flow (vph)	0	913	0	0	0	0	0	0	4	101	202	0
Heavy Vehicles (%)	2%	6%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		40							20		20	
Turn Type									custom	Split		
Protected Phases		6							8	7	7	
Permitted Phases												
Actuated Green, G (s)		27.8							9.5	19.2	19.2	
Effective Green, g (s)		28.3							10.0	19.7	19.7	
Actuated g/C Ratio		0.40							0.14	0.28	0.28	
Clearance Time (s)		4.5							4.5	4.5	4.5	
Vehicle Extension (s)		3.0							3.0	3.0	3.0	
Lane Grp Cap (vph)		1167							184	473	399	
v/s Ratio Prot		c0.32							c0.00	0.06	c0.14	
v/s Ratio Perm												
v/c Ratio		0.78							0.02	0.21	0.51	
Uniform Delay, d1		18.2							25.8	19.2	21.1	
Progression Factor		1.09							1.00	1.00	1.00	
Incremental Delay, d2		4.9							0.2	1.0	4.5	
Delay (s)		24.7							26.0	20.3	25.6	
Level of Service		C							C	C	C	
Approach Delay (s)		24.7			0.0			26.0			22.5	
Approach LOS		C			A			C			C	

Intersection Summary

HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	50.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	14	12	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0	4.0					4.0	4.0		4.0	
Lane Util. Factor		0.95	1.00					0.95	0.95		1.00	
Frt		1.00	0.85					0.89	0.85		1.00	
Flt Protected		1.00	1.00					1.00	1.00		0.97	
Satd. Flow (prot)		2893	1300					1571	1504		1811	
Flt Permitted		1.00	1.00					1.00	1.00		0.74	
Satd. Flow (perm)		2893	1300					1571	1504		1378	
Volume (vph)	16	1014	66	0	0	0	0	25	161	39	30	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	17	1090	71	0	0	0	0	27	173	42	32	0
RTOR Reduction (vph)	0	0	9	0	0	0	0	57	57	0	0	0
Lane Group Flow (vph)	0	1107	62	0	0	0	0	51	35	0	74	0
Heavy Vehicles (%)	6%	6%	6%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Parking (#/hr)		40	20									
Turn Type	Split		Perm						Perm	Perm		
Protected Phases	6	6						4			8	
Permitted Phases			6						4	8		
Actuated Green, G (s)		54.0	54.0					7.0	7.0		7.0	
Effective Green, g (s)		54.5	54.5					7.5	7.5		7.5	
Actuated g/C Ratio		0.78	0.78					0.11	0.11		0.11	
Clearance Time (s)		4.5	4.5					4.5	4.5		4.5	
Vehicle Extension (s)		3.0	3.0					3.0	3.0		3.0	
Lane Grp Cap (vph)		2252	1012					168	161		148	
v/s Ratio Prot		c0.38						0.03				
v/s Ratio Perm			0.05						0.02		c0.05	
v/c Ratio		0.49	0.06					0.30	0.22		0.50	
Uniform Delay, d1		2.8	1.8					28.8	28.6		29.5	
Progression Factor		0.24	0.18					1.00	1.00		1.00	
Incremental Delay, d2		0.7	0.1					1.0	0.7		2.6	
Delay (s)		1.4	0.4					29.9	29.2		32.1	
Level of Service		A	A					C	C		C	
Approach Delay (s)		1.3			0.0			29.6			32.1	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	6.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		1.00						0.93			1.00	
Flt Protected		1.00						1.00			0.98	
Satd. Flow (prot)		3351						1597			1606	
Flt Permitted		1.00						1.00			0.82	
Satd. Flow (perm)		3351						1597			1352	
Volume (vph)	21	1100	17	0	0	0	0	24	23	24	26	0
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	22	1134	18	0	0	0	0	25	24	25	27	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	22	0	0	0	0
Lane Group Flow (vph)	0	1173	0	0	0	0	0	27	0	0	52	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	0%	0%	0%	4%	4%	4%
Parking (#/hr)		0						0			0	
Turn Type	Perm									Perm		
Protected Phases		4						2			6	
Permitted Phases	4									6		
Actuated Green, G (s)		51.4						4.7			4.7	
Effective Green, g (s)		51.9						5.2			5.2	
Actuated g/C Ratio		0.80						0.08			0.08	
Clearance Time (s)		4.5						4.5			4.5	
Vehicle Extension (s)		3.0						3.0			3.0	
Lane Grp Cap (vph)		2672						128			108	
v/s Ratio Prot								0.02				
v/s Ratio Perm		0.35									c0.04	
v/c Ratio		0.44						0.21			0.48	
Uniform Delay, d1		2.1						28.0			28.7	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.1						0.8			3.4	
Delay (s)		2.2						28.9			32.0	
Level of Service		A						C			C	
Approach Delay (s)		2.2			0.0			28.9			32.0	
Approach LOS		A			A			C			C	

Intersection Summary

HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	65.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	47.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0			4.0	
Lane Util. Factor		0.95						1.00			1.00	
Frt		0.99						0.92			1.00	
Flt Protected		1.00						1.00			0.98	
Satd. Flow (prot)		3335						1711			1621	
Flt Permitted		1.00						1.00			0.70	
Satd. Flow (perm)		3335						1711			1160	
Volume (vph)	14	1112	60	0	0	0	0	75	114	73	77	0
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	16	1308	71	0	0	0	0	88	134	86	91	0
RTOR Reduction (vph)	0	4	0	0	0	0	0	33	0	0	0	0
Lane Group Flow (vph)	0	1391	0	0	0	0	0	189	0	0	177	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	3%	3%
Parking (#/hr)		0									0	
Turn Type	Perm									Perm		
Protected Phases		2						4			4	
Permitted Phases	2									4		
Actuated Green, G (s)		31.2						12.4			12.4	
Effective Green, g (s)		31.2						12.4			12.4	
Actuated g/C Ratio		0.60						0.24			0.24	
Clearance Time (s)		4.0						4.0			4.0	
Vehicle Extension (s)		2.5						3.0			3.0	
Lane Grp Cap (vph)		2017						411			279	
v/s Ratio Prot								0.11				
v/s Ratio Perm		0.42									c0.15	
v/c Ratio		0.69						0.46			0.63	
Uniform Delay, d1		6.9						16.7			17.6	
Progression Factor		1.00						1.00			1.00	
Incremental Delay, d2		0.9						0.8			4.7	
Delay (s)		7.8						17.6			22.2	
Level of Service		A						B			C	
Approach Delay (s)		7.8			0.0			17.6			22.2	
Approach LOS		A			A			B			C	

Intersection Summary

HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	51.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									4.0	
Lane Util. Factor		0.95									0.95	
Frt		1.00									1.00	
Flt Protected		1.00									1.00	
Satd. Flow (prot)		3111									2595	
Flt Permitted		1.00									1.00	
Satd. Flow (perm)		3111									2595	
Volume (vph)	0	1045	21	0	0	0	0	0	0	18	307	0
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	1201	24	0	0	0	0	0	0	21	353	0
RTOR Reduction (vph)	0	1	0	0	0	0	0	0	0	0	8	0
Lane Group Flow (vph)	0	1224	0	0	0	0	0	0	0	0	366	0
Heavy Vehicles (%)	0%	4%	10%	2%	2%	2%	2%	2%	2%	0%	19%	0%
Parking (#/hr)		20									40	
Turn Type										Perm		
Protected Phases		4									2	
Permitted Phases										2		
Actuated Green, G (s)		39.9									21.1	
Effective Green, g (s)		40.4									21.6	
Actuated g/C Ratio		0.58									0.31	
Clearance Time (s)		4.5									4.5	
Vehicle Extension (s)		3.0									3.0	
Lane Grp Cap (vph)		1795									801	
v/s Ratio Prot		c0.39										
v/s Ratio Perm											0.14	
v/c Ratio		0.68									0.46	
Uniform Delay, d1		10.3									19.5	
Progression Factor		0.78									1.46	
Incremental Delay, d2		1.9									0.4	
Delay (s)		9.9									28.7	
Level of Service		A									C	
Approach Delay (s)		9.9			0.0			0.0			28.7	
Approach LOS		A			A			A			C	

Intersection Summary

HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0				4.0		4.0				
Lane Util. Factor	0.95	0.95				1.00		0.95				
Frt	1.00	1.00				0.86		0.96				
Flt Protected	0.95	0.97				1.00		1.00				
Satd. Flow (prot)	1618	1671				1277		2562				
Flt Permitted	0.95	0.97				1.00		1.00				
Satd. Flow (perm)	1618	1671				1277		2562				
Volume (vph)	892	205	0	0	0	20	0	312	123	0	0	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	959	220	0	0	0	22	0	335	132	0	0	0
RTOR Reduction (vph)	257	45	0	0	0	22	0	56	0	0	0	0
Lane Group Flow (vph)	424	453	0	0	0	0	0	411	0	0	0	0
Heavy Vehicles (%)	6%	4%	2%	0%	0%	3%	0%	13%	19%	2%	2%	2%
Parking (#/hr)						20		40				
Turn Type	Perm					custom						
Protected Phases		2						4				
Permitted Phases	2					3						
Actuated Green, G (s)	39.7	39.7				0.9		17.4				
Effective Green, g (s)	40.2	40.2				0.0		17.9				
Actuated g/C Ratio	0.57	0.57				0.00		0.26				
Clearance Time (s)	4.5	4.5				3.0		4.5				
Vehicle Extension (s)	3.0	3.0				2.0		3.0				
Lane Grp Cap (vph)	929	960				0		655				
v/s Ratio Prot								c0.16				
v/s Ratio Perm	0.26	0.27										
v/c Ratio	0.46	0.47				0.00		0.63				
Uniform Delay, d1	8.6	8.7				35.0		23.1				
Progression Factor	1.07	0.19				1.00		1.00				
Incremental Delay, d2	1.2	1.2				0.0		1.9				
Delay (s)	10.4	2.9				35.0		25.0				
Level of Service	B	A				C		C				
Approach Delay (s)		7.2			35.0			25.0			0.0	
Approach LOS		A			C			C			A	

Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0				
Lane Util. Factor		1.00			1.00			0.91				
Frt		1.00			0.99			1.00				
Flt Protected		0.98			1.00			1.00				
Satd. Flow (prot)		1463			1631			4886				
Flt Permitted		0.83			1.00			1.00				
Satd. Flow (perm)		1241			1631			4886				
Volume (vph)	15	20	0	0	149	17	31	1200	6	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	16	21	0	0	157	18	33	1263	6	0	0	0
RTOR Reduction (vph)	0	0	0	0	9	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	37	0	0	166	0	0	1302	0	0	0	0
Heavy Vehicles (%)	0%	3%	0%	0%	16%	5%	5%	6%	0%	0%	0%	0%
Parking (#/hr)		20										
Turn Type	Perm						Perm					
Protected Phases		4			4			2				
Permitted Phases	4						2					
Actuated Green, G (s)		9.7			9.7			51.3				
Effective Green, g (s)		10.2			10.2			51.8				
Actuated g/C Ratio		0.15			0.15			0.74				
Clearance Time (s)		4.5			4.5			4.5				
Vehicle Extension (s)		3.0			3.0			3.0				
Lane Grp Cap (vph)		181			238			3616				
v/s Ratio Prot					c0.10							
v/s Ratio Perm		0.03						0.27				
v/c Ratio		0.20			0.70			0.36				
Uniform Delay, d1		26.3			28.4			3.2				
Progression Factor		1.09			1.00			0.74				
Incremental Delay, d2		0.6			8.5			0.2				
Delay (s)		29.2			37.0			2.6				
Level of Service		C			D			A				
Approach Delay (s)		29.2			37.0			2.6			0.0	
Approach LOS		C			D			A			A	

Intersection Summary

HCM Average Control Delay	7.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0				
Lane Util. Factor		1.00			0.95	0.95		0.91				
Frt		1.00			0.97	0.85		0.99				
Flt Protected		0.98			1.00	1.00		1.00				
Satd. Flow (prot)		1462			1715	1504		4521				
Flt Permitted		0.84			1.00	1.00		1.00				
Satd. Flow (perm)		1258			1715	1504		4521				
Volume (vph)	85	136	0	0	77	107	49	1271	79	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	89	143	0	0	81	113	52	1338	83	0	0	0
RTOR Reduction (vph)	0	0	0	0	13	37	0	9	0	0	0	0
Lane Group Flow (vph)	0	232	0	0	89	55	0	1464	0	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	6%	6%	6%	2%	2%	2%
Parking (#/hr)		20						20				
Turn Type	Perm					Perm	Perm					
Protected Phases		4			4			2				
Permitted Phases	4					4	2					
Actuated Green, G (s)		20.0			20.0	20.0		41.5				
Effective Green, g (s)		20.5			20.5	20.5		41.5				
Actuated g/C Ratio		0.29			0.29	0.29		0.59				
Clearance Time (s)		4.5			4.5	4.5		4.0				
Lane Grp Cap (vph)		368			502	440		2680				
v/s Ratio Prot					0.05							
v/s Ratio Perm		c0.18				0.04		0.32				
v/c Ratio		0.63			0.18	0.12		0.55				
Uniform Delay, d1		21.5			18.5	18.2		8.6				
Progression Factor		0.98			1.00	1.00		1.89				
Incremental Delay, d2		7.6			0.8	0.6		0.8				
Delay (s)		28.8			19.2	18.7		17.0				
Level of Service		C			B	B		B				
Approach Delay (s)		28.8			19.0			17.0			0.0	
Approach LOS		C			B			B			A	

Intersection Summary

HCM Average Control Delay	18.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0						4.0	4.0			
Lane Util. Factor		0.91						0.95	1.00			
Frt		1.00						1.00	0.85			
Flt Protected		0.99						1.00	1.00			
Satd. Flow (prot)		4576						3065	1242			
Flt Permitted		0.99						1.00	1.00			
Satd. Flow (perm)		4576						3065	1242			
Volume (vph)	111	619	0	0	0	0	0	1299	352	0	0	0
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	117	652	0	0	0	0	0	1367	371	0	0	0
RTOR Reduction (vph)	0	17	0	0	0	0	0	0	55	0	0	0
Lane Group Flow (vph)	0	752	0	0	0	0	0	1367	316	0	0	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	6%	4%	2%	2%	2%
Parking (#/hr)		20						20	20			
Turn Type	Perm								Perm			
Protected Phases		4						2				
Permitted Phases	4								2			
Actuated Green, G (s)		26.5						35.0	35.0			
Effective Green, g (s)		26.5						35.5	35.5			
Actuated g/C Ratio		0.38						0.51	0.51			
Clearance Time (s)		4.0						4.5	4.5			
Lane Grp Cap (vph)		1732						1554	630			
v/s Ratio Prot								c0.45				
v/s Ratio Perm		0.16							0.25			
v/c Ratio		0.43						0.88	0.50			
Uniform Delay, d1		16.2						15.3	11.4			
Progression Factor		0.97						1.67	2.11			
Incremental Delay, d2		0.7						6.2	2.3			
Delay (s)		16.5						31.7	26.3			
Level of Service		B						C	C			
Approach Delay (s)		16.5			0.0			30.6			0.0	
Approach LOS		B			A			C			A	

Intersection Summary

HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0				
Lane Util. Factor					0.95			0.95				
Frt					0.94			1.00				
Flt Protected					1.00			1.00				
Satd. Flow (prot)					3254			2943				
Flt Permitted					1.00			1.00				
Satd. Flow (perm)					3254			2943				
Volume (vph)	0	0	0	0	521	387	67	1253	0	0	0	0
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	0	0	0	537	399	69	1292	0	0	0	0
RTOR Reduction (vph)	0	0	0	0	28	0	0	6	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	908	0	0	1355	0	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	3%	5%	4%	4%	4%	2%	2%	2%
Parking (#/hr)								40				
Turn Type							Perm					
Protected Phases					4			2				
Permitted Phases							2					
Actuated Green, G (s)					24.0			37.0				
Effective Green, g (s)					24.5			37.5				
Actuated g/C Ratio					0.35			0.54				
Clearance Time (s)					4.5			4.5				
Lane Grp Cap (vph)					1139			1577				
v/s Ratio Prot					c0.28							
v/s Ratio Perm								0.46				
v/c Ratio					0.80			0.86				
Uniform Delay, d1					20.5			14.0				
Progression Factor					1.00			1.16				
Incremental Delay, d2					5.8			3.4				
Delay (s)					26.4			19.5				
Level of Service					C			B				
Approach Delay (s)		0.0			26.4			19.5			0.0	
Approach LOS		A			C			B			A	

Intersection Summary

HCM Average Control Delay	22.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3343	1145	1245	3343	1262	1129
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3343	1145	1245	3343	1262	1129
Volume (vph)	1239	32	8	718	54	32
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1347	35	9	780	59	35
RTOR Reduction (vph)	0	10	0	0	0	31
Lane Group Flow (vph)	1347	25	9	780	59	4
Heavy Vehicles (%)	8%	41%	45%	8%	43%	43%
Turn Type		Perm	Prot			Prot
Protected Phases	2		1		4	4
Permitted Phases		2		Free		
Actuated Green, G (s)	54.4	54.4	1.4	79.5	9.0	9.0
Effective Green, g (s)	55.9	55.9	2.0	79.5	9.6	9.6
Actuated g/C Ratio	0.70	0.70	0.03	1.00	0.12	0.12
Clearance Time (s)	5.5	5.5	4.6		4.6	4.6
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	2351	805	31	3343	152	136
v/s Ratio Prot	c0.40		0.01		c0.05	0.00
v/s Ratio Perm		0.02		c0.23		
v/c Ratio	0.57	0.03	0.29	0.23	0.39	0.03
Uniform Delay, d1	5.9	3.6	38.1	0.0	32.2	30.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.0	5.1	0.2	1.6	0.1
Delay (s)	6.2	3.6	43.2	0.2	33.9	30.9
Level of Service	A	A	D	A	C	C
Approach Delay (s)	6.1			0.7	32.8	
Approach LOS	A			A	C	

Intersection Summary

HCM Average Control Delay	5.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	12	12	13	12	12	12	12	12	12	12	12
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95			1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.91			0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.98			0.97	
Satd. Flow (prot)	1727	3311		1727	3343		1665	1564			1751	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	0.98			0.97	
Satd. Flow (perm)	1727	3311		1727	3343		1665	1564			1751	
Volume (vph)	24	1418	96	50	1005	0	203	8	103	48	18	23
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	25	1477	100	52	1047	0	211	8	107	50	19	24
RTOR Reduction (vph)	0	3	0	0	0	0	0	50	0	0	13	0
Lane Group Flow (vph)	25	1574	0	52	1047	0	153	123	0	0	80	0
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	3%	3%	3%	2%	2%	2%
Turn Type	Prot			Prot			Split			Split		
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases												
Actuated Green, G (s)	6.6	68.0		7.5	68.9		14.0	14.0			9.5	
Effective Green, g (s)	6.6	69.0		7.5	69.9		15.0	15.0			10.5	
Actuated g/C Ratio	0.06	0.58		0.06	0.59		0.13	0.13			0.09	
Clearance Time (s)	4.0	5.0		4.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)	2.5	3.5		2.5	3.5		3.5	3.5			3.5	
Lane Grp Cap (vph)	97	1936		110	1980		212	199			156	
v/s Ratio Prot	0.01	c0.48		0.03	c0.31		c0.09	0.08			c0.05	
v/s Ratio Perm												
v/c Ratio	0.26	0.81		0.47	0.53		0.72	0.62			0.51	
Uniform Delay, d1	53.4	19.4		53.3	14.3		49.5	48.8			51.3	
Progression Factor	0.74	0.53		1.00	1.00		1.00	1.00			1.00	
Incremental Delay, d2	0.9	3.3		2.3	1.0		11.8	5.9			3.3	
Delay (s)	40.6	13.6		55.7	15.3		61.3	54.7			54.6	
Level of Service	D	B		E	B		E	D			D	
Approach Delay (s)		14.1			17.2			57.8			54.6	
Approach LOS		B			B			E			D	

Intersection Summary

HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	118.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	12	12	12	12	12	12	12	12
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0			4.0	
Lane Util. Factor		0.95		1.00	0.95		0.95	0.95			1.00	
Frt		1.00		1.00	1.00		1.00	0.99			0.98	
Flt Protected		1.00		0.95	1.00		0.95	0.96			0.97	
Satd. Flow (prot)		3327		1727	3342		1681	1672			1762	
Flt Permitted		0.95		0.95	1.00		0.95	0.96			0.97	
Satd. Flow (perm)		3165		1727	3342		1681	1672			1762	
Volume (vph)	4	1101	34	26	956	2	329	8	17	16	4	4
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	5	1295	40	31	1125	2	387	9	20	19	5	5
RTOR Reduction (vph)	0	1	0	0	0	0	0	3	0	0	5	0
Lane Group Flow (vph)	0	1339	0	31	1127	0	213	200	0	0	24	0
Heavy Vehicles (%)	8%	8%	8%	8%	8%	8%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Prot			Split			Split		
Protected Phases		2		1	6		3	3		4	4	
Permitted Phases	2											
Actuated Green, G (s)		72.0		5.1	81.1		17.1	17.1			4.8	
Effective Green, g (s)		73.0		5.1	82.1		18.1	18.1			5.8	
Actuated g/C Ratio		0.62		0.04	0.70		0.15	0.15			0.05	
Clearance Time (s)		5.0		4.0	5.0		5.0	5.0			5.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0			3.0	
Lane Grp Cap (vph)		1958		75	2325		258	256			87	
v/s Ratio Prot				0.02	c0.34		c0.13	0.12			c0.01	
v/s Ratio Perm		c0.42										
v/c Ratio		0.68		0.41	0.48		0.83	0.78			0.28	
Uniform Delay, d1		14.9		55.0	8.2		48.4	48.0			54.1	
Progression Factor		1.00		1.05	0.53		1.00	1.00			1.00	
Incremental Delay, d2		2.0		3.1	0.6		18.9	13.9			1.7	
Delay (s)		16.8		61.1	5.0		67.4	62.0			55.8	
Level of Service		B		E	A		E	E			E	
Approach Delay (s)		16.8			6.5			64.7			55.8	
Approach LOS		B			A			E			E	

Intersection Summary

HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	118.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.0	4.0						4.0	
Lane Util. Factor				0.91	0.91						0.91	
Frt				1.00	1.00						0.99	
Flt Protected				0.95	0.98						1.00	
Satd. Flow (prot)				1264	3269						4414	
Flt Permitted				0.95	0.98						1.00	
Satd. Flow (perm)				1264	3269						4414	
Volume (vph)	0	0	0	305	274	0	0	0	0	0	1187	59
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	0	332	298	0	0	0	0	0	1290	64
RTOR Reduction (vph)	0	0	0	28	28	0	0	0	0	0	7	0
Lane Group Flow (vph)	0	0	0	150	424	0	0	0	0	0	1347	0
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	2%	2%	2%	5%	5%	5%
Parking (#/hr)				20							40	
Turn Type				Split								
Protected Phases				4	4						2	
Permitted Phases												
Actuated Green, G (s)				24.0	24.0						37.0	
Effective Green, g (s)				24.5	24.5						37.5	
Actuated g/C Ratio				0.35	0.35						0.54	
Clearance Time (s)				4.5	4.5						4.5	
Lane Grp Cap (vph)				442	1144						2365	
v/s Ratio Prot				0.12	c0.13						c0.31	
v/s Ratio Perm												
v/c Ratio				0.34	0.37						0.57	
Uniform Delay, d1				16.8	17.0						10.9	
Progression Factor				0.71	0.69						1.00	
Incremental Delay, d2				1.3	0.6						1.0	
Delay (s)				13.1	12.4						11.9	
Level of Service				B	B						B	
Approach Delay (s)		0.0			12.6			0.0			11.9	
Approach LOS		A			B			A			B	

Intersection Summary

HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0									4.0	
Lane Util. Factor		0.95									0.91	
Frt		0.98									1.00	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		2947									4391	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		2947									4391	
Volume (vph)	0	254	40	0	0	0	0	0	0	345	1042	0
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	0	273	43	0	0	0	0	0	0	371	1120	0
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	0	0	85	0
Lane Group Flow (vph)	0	298	0	0	0	0	0	0	0	0	1406	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%	5%	5%
Parking (#/hr)		40									40	
Turn Type										Perm		
Protected Phases		8									2	
Permitted Phases										2		
Actuated Green, G (s)		23.0									38.0	
Effective Green, g (s)		23.5									38.5	
Actuated g/C Ratio		0.34									0.55	
Clearance Time (s)		4.5									4.5	
Lane Grp Cap (vph)		989									2415	
v/s Ratio Prot		c0.10										
v/s Ratio Perm											0.32	
v/c Ratio		0.30									0.58	
Uniform Delay, d1		17.2									10.4	
Progression Factor		1.00									0.56	
Incremental Delay, d2		0.8									0.9	
Delay (s)		18.0									6.7	
Level of Service		B									A	
Approach Delay (s)		18.0			0.0			0.0			6.7	
Approach LOS		B			A			A			A	

Intersection Summary

HCM Average Control Delay	8.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0						4.0	
Lane Util. Factor		1.00			1.00						0.91	
Frt		0.98			1.00						1.00	
Flt Protected		1.00			0.98						0.99	
Satd. Flow (prot)		1831			1822						4568	
Flt Permitted		1.00			0.84						0.99	
Satd. Flow (perm)		1831			1566						4568	
Volume (vph)	0	98	14	54	68	0	0	0	0	123	979	29
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	103	15	57	72	0	0	0	0	129	1031	31
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	110	0	0	129	0	0	0	0	0	1187	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	5%	5%	5%
Parking (#/hr)											20	
Turn Type				Perm						Perm		
Protected Phases		4			4						2	
Permitted Phases				4						2		
Actuated Green, G (s)		20.0			20.0						41.5	
Effective Green, g (s)		20.5			20.5						41.5	
Actuated g/C Ratio		0.29			0.29						0.59	
Clearance Time (s)		4.5			4.5						4.0	
Lane Grp Cap (vph)		536			459						2708	
v/s Ratio Prot		0.06										
v/s Ratio Perm					c0.08						0.26	
v/c Ratio		0.21			0.28						0.44	
Uniform Delay, d1		18.6			19.1						7.8	
Progression Factor		1.00			0.92						0.10	
Incremental Delay, d2		0.9			1.5						0.5	
Delay (s)		19.5			19.1						1.3	
Level of Service		B			B						A	
Approach Delay (s)		19.5			19.1			0.0			1.3	
Approach LOS		B			B			A			A	

Intersection Summary

HCM Average Control Delay	4.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0						4.0	4.0
Lane Util. Factor					1.00						0.91	0.91
Frt					1.00						0.93	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					1320						2506	1400
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					1320						2506	1400
Volume (vph)	0	0	0	26	142	0	0	0	0	20	318	721
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	0	28	151	0	0	0	0	21	338	767
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	105	146
Lane Group Flow (vph)	0	0	0	0	179	0	0	0	0	0	576	299
Heavy Vehicles (%)	2%	2%	2%	64%	5%	2%	2%	2%	2%	0%	13%	5%
Parking (#/hr)					20						40	
Turn Type				Perm						Perm		Perm
Protected Phases					4						2	
Permitted Phases				4						2		2
Actuated Green, G (s)					14.4						46.6	46.6
Effective Green, g (s)					14.9						47.1	47.1
Actuated g/C Ratio					0.21						0.67	0.67
Clearance Time (s)					4.5						4.5	4.5
Vehicle Extension (s)					3.0						3.0	3.0
Lane Grp Cap (vph)					281						1686	942
v/s Ratio Prot												
v/s Ratio Perm					0.14						0.23	0.21
v/c Ratio					0.64						0.34	0.32
Uniform Delay, d1					25.1						4.9	4.8
Progression Factor					0.79						0.34	1.44
Incremental Delay, d2					3.8						0.5	0.8
Delay (s)					23.7						2.2	7.7
Level of Service					C						A	A
Approach Delay (s)		0.0			23.7			0.0			4.3	
Approach LOS		A			C			A			A	

Intersection Summary

HCM Average Control Delay	7.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	45.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)					4.0			4.0			4.0	
Lane Util. Factor					0.95			1.00			1.00	
Frt					1.00			1.00			0.94	
Flt Protected					1.00			0.97			1.00	
Satd. Flow (prot)					3324			1618			1778	
Flt Permitted					1.00			0.96			1.00	
Satd. Flow (perm)					3324			1602			1778	
Volume (vph)	0	0	0	31	1206	5	17	7	0	0	10	9
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	0	0	33	1283	5	18	7	0	0	11	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	0	0	1321	0	0	25	0	0	21	0
Heavy Vehicles (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	0%	0%	0%
Parking (#/hr)					0			0				
Turn Type				Perm			Perm					
Protected Phases					8			2			6	
Permitted Phases				8			2					
Actuated Green, G (s)					67.2			3.1			3.1	
Effective Green, g (s)					67.7			3.6			3.6	
Actuated g/C Ratio					0.85			0.05			0.05	
Clearance Time (s)					4.5			4.5			4.5	
Vehicle Extension (s)					3.0			3.0			3.0	
Lane Grp Cap (vph)					2838			73			81	
v/s Ratio Prot											0.01	
v/s Ratio Perm					0.40			c0.02				
v/c Ratio					0.47			0.34			0.26	
Uniform Delay, d1					1.4			36.7			36.6	
Progression Factor					1.00			1.00			1.00	
Incremental Delay, d2					0.1			2.8			1.7	
Delay (s)					1.5			39.5			38.3	
Level of Service					A			D			D	
Approach Delay (s)		0.0			1.5			39.5			38.3	
Approach LOS		A			A			D			D	

Intersection Summary

HCM Average Control Delay	2.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0		
Lane Util. Factor	1.00			0.95		
Frt	1.00			1.00		
Flt Protected	0.95			1.00		
Satd. Flow (prot)	1770			3505		
Flt Permitted	0.95			1.00		
Satd. Flow (perm)	1770			3505		
Volume (vph)	49	0	0	1085	0	0
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	53	0	0	1179	0	0
RTOR Reduction (vph)	43	0	0	0	0	0
Lane Group Flow (vph)	10	0	0	1179	0	0
Heavy Vehicles (%)	2%	2%	3%	3%	2%	2%
Turn Type						
Protected Phases	3 8			1 2 5		
Permitted Phases						
Actuated Green, G (s)	11.4			43.7		
Effective Green, g (s)	11.9			44.7		
Actuated g/C Ratio	0.18			0.69		
Clearance Time (s)						
Vehicle Extension (s)						
Lane Grp Cap (vph)	326			2425		
v/s Ratio Prot	c0.01			c0.34		
v/s Ratio Perm						
v/c Ratio	0.03			0.49		
Uniform Delay, d1	21.6			4.6		
Progression Factor	1.00			1.00		
Incremental Delay, d2	0.0			0.7		
Delay (s)	21.6			5.3		
Level of Service	C			A		
Approach Delay (s)	21.6			5.3	0.0	
Approach LOS	C			A	A	

Intersection Summary

HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	12	12
Total Lost time (s)			4.0	4.0	4.0	
Lane Util. Factor			1.00	1.00	0.95	
Frt			1.00	1.00	0.99	
Flt Protected			0.95	1.00	1.00	
Satd. Flow (prot)			1694	1845	3468	
Flt Permitted			0.42	1.00	1.00	
Satd. Flow (perm)			748	1845	3468	
Volume (vph)	0	0	556	529	440	34
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	0	579	551	458	35
RTOR Reduction (vph)	0	0	0	0	6	0
Lane Group Flow (vph)	0	0	579	551	487	0
Heavy Vehicles (%)	2%	2%	3%	3%	3%	3%
Turn Type			D.P+P			
Protected Phases			5	1 2 3	6 3	
Permitted Phases			6 3			
Actuated Green, G (s)			45.8	50.3	24.1	
Effective Green, g (s)			46.8	50.8	24.6	
Actuated g/C Ratio			0.72	0.79	0.38	
Clearance Time (s)			4.5			
Vehicle Extension (s)			0.2			
Lane Grp Cap (vph)			867	1451	1321	
v/s Ratio Prot			c0.23	c0.30	0.14	
v/s Ratio Perm			c0.25			
v/c Ratio			0.67	0.38	0.37	
Uniform Delay, d1			3.9	2.1	14.4	
Progression Factor			0.63	0.04	1.00	
Incremental Delay, d2			1.4	0.7	0.1	
Delay (s)			3.9	0.7	14.5	
Level of Service			A	A	B	
Approach Delay (s)	0.0			2.4	14.5	
Approach LOS	A			A	B	

Intersection Summary

HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	64.6	Sum of lost time (s)	17.8
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	SEL	SET	SER	NWL	NWT	NWR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	18	0	3	0	5	4	2	370	2	2	209	155
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	21	0	3	0	6	5	2	425	2	2	240	178
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	771	766	329	679	854	426	418			428		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	771	766	329	679	854	426	418			428		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	93	100	100	100	98	99	100			100		
cM capacity (veh/h)	311	334	717	351	285	609	1152			1143		

Direction, Lane #	SE 1	NW 1	NE 1	NE 2	SW 1	SW 2
Volume Total	24	10	2	428	2	418
Volume Left	21	0	2	0	2	0
Volume Right	3	5	0	2	0	178
cSH	339	373	1152	1700	1143	1700
Volume to Capacity	0.07	0.03	0.00	0.25	0.00	0.25
Queue Length 95th (ft)	6	2	0	0	0	0
Control Delay (s)	16.4	14.9	8.1	0.0	8.2	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	16.4	14.9	0.0		0.0	
Approach LOS	C	B				

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	SEL	SER	NEL	NET	SWT	SWR
Lane Configurations						
Sign Control	Free			Stop	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	294	20	1	83	218	9
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	330	22	1	93	245	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)	351					
pX, platoon unblocked						
vC, conflicting volume	0		804	672	683	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0		804	672	683	0
tC, single (s)	4.1		7.1	6.5	6.5	6.3
tC, 2 stage (s)						
tF (s)	2.2		3.5	4.0	4.0	3.4
p0 queue free %	79		99	69	17	99
cM capacity (veh/h)	1604		80	301	295	1065

Direction, Lane #	SE 1	NE 1	SW 1
Volume Total	353	94	255
Volume Left	330	1	0
Volume Right	22	0	10
cSH	1604	292	304
Volume to Capacity	0.21	0.32	0.84
Queue Length 95th (ft)	19	34	180
Control Delay (s)	7.4	23.1	56.8
Lane LOS	A	C	F
Approach Delay (s)	7.4	23.1	56.8
Approach LOS		C	F

Intersection Summary			
Average Delay	27.5		
Intersection Capacity Utilization	36.2%	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		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	16	305	2	8	434	87	3	5	28	31	2	14
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	324	2	9	462	93	3	5	30	33	2	15
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	554			327			901	931	326	917	886	508
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	554			327			901	931	326	917	886	508
tC, single (s)	4.2			4.2			7.1	6.5	6.2	7.2	6.6	6.3
tC, 2 stage (s)												
tF (s)	2.3			2.3			3.5	4.0	3.3	3.6	4.1	3.4
p0 queue free %	98			99			99	98	96	85	99	97
cM capacity (veh/h)	982			1169			248	262	720	225	267	545

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	344	563	38	50
Volume Left	17	9	3	33
Volume Right	2	93	30	15
cSH	982	1169	514	275
Volume to Capacity	0.02	0.01	0.07	0.18
Queue Length 95th (ft)	1	1	6	16
Control Delay (s)	0.6	0.2	12.6	21.0
Lane LOS	A	A	B	C
Approach Delay (s)	0.6	0.2	12.6	21.0
Approach LOS			B	C

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	46.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	271	380	23	9	2
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	298	418	25	10	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	443				735	430
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	443				735	430
tC, single (s)	4.2				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.3				3.5	3.3
p0 queue free %	100				97	100
cM capacity (veh/h)	1081				389	629

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	301	443	12
Volume Left	3	0	10
Volume Right	0	25	2
cSH	1081	1700	418
Volume to Capacity	0.00	0.26	0.03
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.1	0.0	13.9
Lane LOS	A		B
Approach Delay (s)	0.1	0.0	13.9
Approach LOS			B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	NBL2	NBL	NBR	SEL	SER	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations											
Sign Control		Free		Free			Stop			Stop	
Grade		0%		0%			0%			0%	
Volume (veh/h)	37	0	2	0	0	0	29	47	2	30	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
Hourly flow rate (vph)	44	0	2	0	0	0	34	55	2	35	0
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	0			2		106	89	0	161	88	1
vC1, stage 1 conf vol											
vC2, stage 2 conf vol											
vCu, unblocked vol	0			2		106	89	0	161	88	1
tC, single (s)	4.2			4.1		7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)											
tF (s)	2.3			2.2		3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100		100	96	95	100	95	100
cM capacity (veh/h)	1554			1620		819	773	1076	726	783	1089

Direction, Lane #	NB 1	SE 1	NE 1	SW 1
Volume Total	46	0	89	38
Volume Left	44	0	0	2
Volume Right	2	0	55	0
cSH	1554	1700	936	779
Volume to Capacity	0.03	0.00	0.10	0.05
Queue Length 95th (ft)	2	0	8	4
Control Delay (s)	7.0	0.0	9.3	9.9
Lane LOS	A		A	A
Approach Delay (s)	7.0	0.0	9.3	9.9
Approach LOS			A	A

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	14.4%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix F

US 101 Regional Circulation Project Collision Analysis

US 101 Regional Circulation Project Collision Analysis

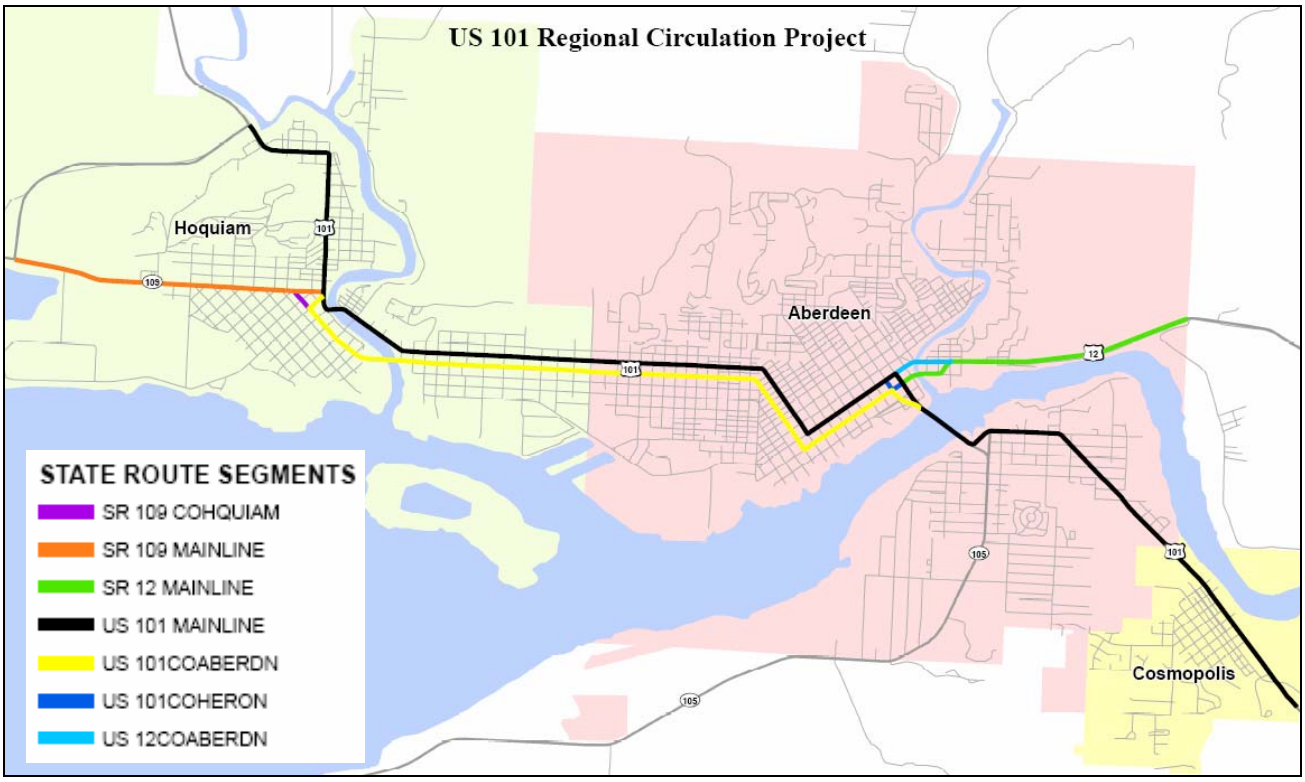
US 101 Milepost 80.40 – 89.02
US 101 Aberdeen Couplet Milepost 87.49 – 91.66
US 101 Heron Couplet Milepost 83.75 – 83.88
US 12 Milepost 0.00 – 1.76
US 12 Aberdeen Couplet Milepost 0.33 – 0.68
SR 109 Milepost 0.00 – 1.79
SR 109 Hoquiam Couplet Milepost 0.14 – 0.29

Prepared by: Yvette Liufau, WSDOT Transportation Planning

Date: August 20, 2006

Project Limits

An analysis was performed of accidents that occurred within the US 101 Regional Circulation Project limits. The project limits are US 101 from Blue Slough Road in Cosmopolis to the US 101/SR 109 Spur (east end) in Hoquiam. The area of the project also includes a segment of US 12 from Sargent Boulevard to US 101 in Aberdeen, and a segment of SR 109 from US 101 to the SR 109 Spur (west end) in Hoquiam. Collision data used in the analysis is from January 1, 2003, to December 31, 2005. The study area has several areas in which the highway splits apart into two separate one-way alignments. The one-way alignment where the milepost increases becomes the "Mainline", and the one-way alignment where the milepost decreases becomes the "Couplet".



Under 23 United States Code-Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT, or any jurisdictions involved in the data.

Methodology

The collision data was organized by state route number and then analyzed to determine the most common types of collisions, the contributing factors, and the severity of incidents. To establish a pattern of traffic collisions within the study area, the increase in number of crashes on particular days of the week, times of day and months within the year is an essential part of the analysis. The rate of collisions helps determine highways that need safety improvements. Calculating the collision rate is important so that highways are compared equally whether they differ in length or amount of traffic on them. The collision, injury and fatality rates were calculated using the number of collisions multiplied by one million, then divided by the length of roadway section multiplied by the Annual Average Daily Traffic (AADT) multiplied by 365 days.

Collision History

The history of collisions helps to determine areas within the project limits, which could be a potential hazard. Within this timeframe, there were a total of 892 crashes on US 101, 128 crashes on US 12, and 44 crashes on SR 109. The common contributing factors of incidents that occurred were drivers following too closely and drivers not granting right-of-way. The most common types of collisions occurring are hitting the side of a vehicle at an angle, rear end and sideswipe crashes. This is consistent with behavior seen along corridors that are congested as well as corridors that allow on-street parking.

Table 1 summarizes the three most common types of crashes that have occurred over the past 3 years on US 101, US 12 and SR 109 within the study area. They are rear end collisions, followed by striking an object and then sideswiping another vehicle. The type of collision typically corresponds with the severity of the incident. For example, if the vehicles involved are traveling opposite directions, the severity of the incident could be disabling or fatal. When vehicles are traveling the same direction, the severity of collision most often is property damage only or possible injury. The number of crashes a year by severity is summarized in Tables 2, 3 and 4.

Table 1 2003-2005 Type of Collision

US 101	Number of Crashes
Struck side at angle	351
Rear end	287
Sideswipe	148
US 12	
Rear End	63
Struck side at angle	37
Sideswipe	10
SR 109	
Rear end	26
Struck side at angle	5
Sideswipe	5

Under 23 United States Code-Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT, or any jurisdictions involved in the data.

Table 2 US 101 Collision History – Severity

	2003	2004	2005
Fatal Collisions	1	0	1
Disabling Injury Collisions	4	1	5
Evident Injury Collisions	21	15	20
Possible Injury Collisions	66	58	63
Property Damage Only Collisions	201	190	242
Total Collisions	**293**	**264**	**331**

Table 3 US 12 Collision History – Severity

	2003	2004	2005
Fatal Collisions	0	0	0
Disabling Injury Collisions	0	2	1
Evident Injury Collisions	4	4	3
Possible Injury Collisions	8	11	11
Property Damage Only Collisions	32	24	27
Total Accidents	**44**	**41**	**42**

Table 4 SR 109 Collision History – Severity

	2003	2004	2005
Fatal Collisions	0	0	0
Disabling Injury Collisions	0	1	0
Evident Injury Collisions	2	0	0
Possible Injury Collisions	2	1	3
Property Damage Only Collisions	12	11	12
Total Accidents	**16**	**13**	**15**

Table 5 is the 2004 Average Statewide Collision Rate by Functional Class that applies to the type of routes located within the project limits. Table 6 contains the collision, injury and fatality rates.

Table 5 2004 Average Statewide Collision Rate per Million Vehicle Miles

Functional Class	Collision Rate	Injury Rate	Fatality Rate
Urban Principal Arterial (U1)	2.36	0.90	0.65
Urban Minor Arterial (U2)	2.90	1.09	1.03

Under 23 United States Code-Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT, or any jurisdictions involved in the data.

Table 6 Project Area Collision Rate per Million Vehicle Miles

	Collision Rate	Injury Rate	Fatality Rate
US 101 Mainline (U1)	**4.56**	**1.18**	0.00
US 101 Aberdeen Couplet (U1)	**7.10**	**2.29**	**3.46**
US 101 Heron Couplet (U1)	0.56	0.00	0.00
US 12 Mainline (U1)	2.03	0.72	0.00
US 12 Aberdeen Couplet (U1)	**2.59**	0.82	0.00
SR 109 Mainline (U2)	**3.00**	0.63	0.00
SR 109 Hoquiam Couplet (U2)	0.20	0.00	0.00

The US 101 Mainline collision and injury rates are higher than the statewide average for Urban Principal Arterial (U1) routes. The US 101 Aberdeen Couplet shows collision, injury and fatality rates are three times higher than the statewide average. The collision rate on US 12 Aberdeen Couplet and SR 109 Mainline is slightly higher than the statewide average.

Looking at a section of highway as a corridor can sometimes provide information, so additional analysis of the US 101 Mainline only from Milepost 83.75 to 87.66 westbound determined the collision rate increased significantly from 4.56 to 6.09, and the injury rate increased from 1.18 to 1.49. In this segment there were 86 entering at angle collisions, 40 of which involved vehicles running a red light. For the US 101 Aberdeen Couplet segment that runs eastbound, there were 128 entering at angle collisions, with 46 involving vehicles running a red light. “G” Street, “H” Street and Alder Street intersections on US 101 Mainline showed the highest number of red light violations. It was also determined that Heron Street and “L” Street intersections of the US 101 Aberdeen Couplet had the highest number.

The most common times during the day which crashes occurred were 12:00 to 1:00 p.m. and 4:00 to 5:00 p.m. US 101 Mainline and US 101 Aberdeen Couplet showed an increase in the number of collisions during the 2:00 to 3:00 p.m. and 4:00 to 5:00 p.m. timeframe. Most incidents occurred on a Friday.

Fatalities

There were 2 fatalities on the US 101 Aberdeen Couplet during the study period. One occurred on December 5, 2003, at Milepost 87.78. A pedestrian was struck by a vehicle while crossing at mid block. The incident happened at 7:15 p.m., and there was standing water on the roadway. The second fatality occurred on October 28, 2005, at Milepost 88.00. A vehicle struck the bridge guardrail. The incident happened at 8:41 a.m., and the roadway was wet.

Under 23 United States Code-Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT, or any jurisdictions involved in the data.

High Accident Locations and Pedestrian Accident Locations

High Accident Locations

High Accident Locations (HAL) are a section of highway less than ¼ of a mile in length where the collision history has been compared with similar highway sections, and the number of crashes is significantly higher than average. Collisions are analyzed every 2 years. In the 2005-2007 and the 2007-2009 Biennium there are 11 HALs on US 101 and 2 HALs on US 12.

High Accident Locations on US 101

- US 101 Milepost 83.61 to 83.82
- US 101 Milepost 83.68 to 84.16
- US 101 Milepost 83.86 to 84.16
- US 101 Milepost 84.23 to 84.50
- US 101 Milepost 84.24 to 84.43
- US 101 Aberdeen Couplet Milepost 90.57 to 90.96
- US 101 Aberdeen Couplet Milepost 90.70 to 90.92
- US 101 Aberdeen Couplet Milepost 91.13 to 91.51
- US 101 Aberdeen Couplet Milepost 91.20 to 91.56
- US 101 Southbound on ramp Milepost 0.24 to 0.31

High Accident Locations on US 12

- US 12 Milepost 0.00 to 0.16 (Northbound)
- US 12 Aberdeen Couplet Milepost 0.61 to 0.68 (Southbound)

Pedestrian Accident Locations

A Pedestrian Accident Location (PAL) is a section of highway less than a ¼ mile in length where a six-year analysis of crash data indicates that the section has had four collisions within a 0.1 mile segment. In the 2005-2007 and the 2007-2009 Biennium there are 2 PALs on US 101 and 1 PAL on US 12.

Pedestrian Accident Locations on US 101 and US 12

- US 101 Milepost 83.68 to 83.80
- US 101 Milepost 83.72B to 83.80
- US 12 Aberdeen Couplet Milepost 0.61 to 0.68

Conclusion

The analysis of collision data suggests congestion and on-street parking contribute to crashes within the study area. The US 12 and SR 109 routes seem to have a mix of local and tourist traffic given the increase of collisions in the afternoon and on Fridays. The data also shows a peak in the number of incidents happening during the summer months. The collision data on US 101 differs from US 12 and SR 109 because most crashes occur in the Aberdeen downtown vicinity from 11:00 am to 4:00 pm, which resembles local traffic shopping in town. Another factor was that August was the month with the lowest number of collisions.

Under 23 United States Code-Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT, or any jurisdictions involved in the data.

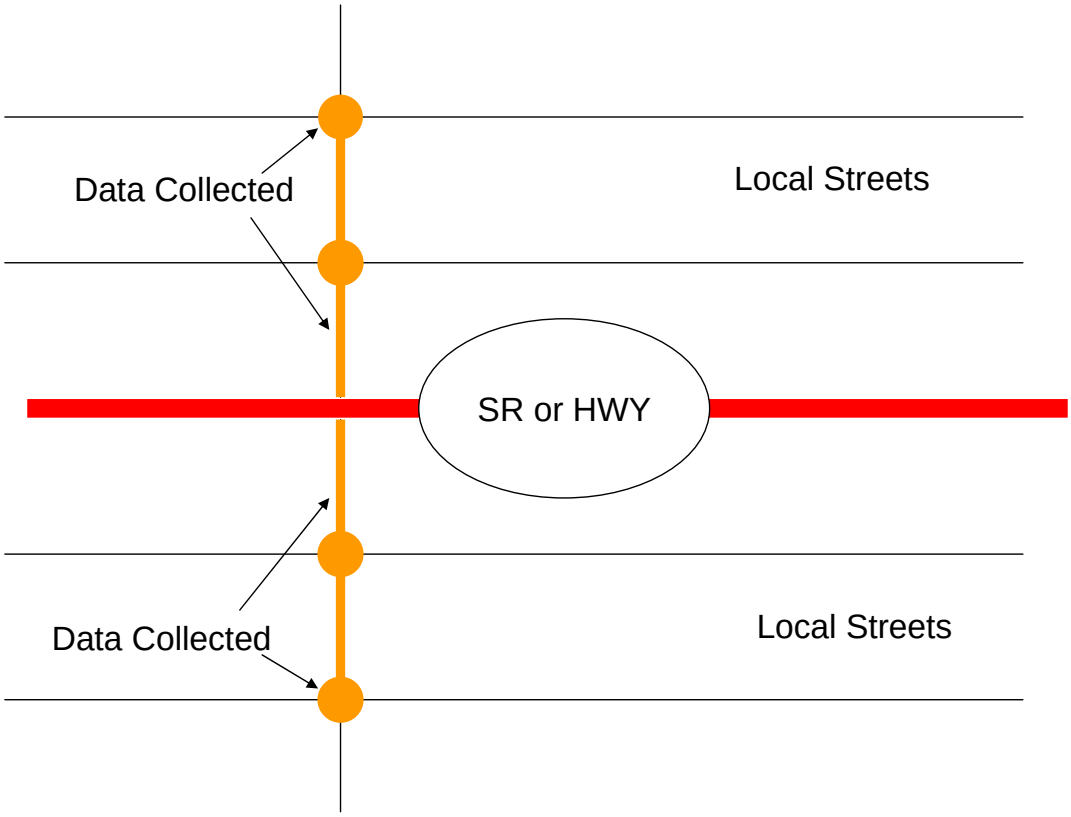
US 101 Regional Circulation Project

Local Collision Data Adjacent to
US 101, US 12, and SR 109.
January 1, 2003 – December 31, 2005

Study Area

An analysis was performed of accidents that occurred within the US 101 Regional Circulation Project limits. The project limits are US 12 from Sargent Boulevard to US 101 through the City of Aberdeen to the SR 109 spur, and also extending south on US 101 to Blue Slough Road in the City of Cosmopolis.

Local collision data was distributed from the WSDOT Traffic Data Office. Data was sorted to analyze accidents at locations two intersections out on all local streets that intersect US 101, US 12, and SR 109. See sample diagram below.



Under 23 United State Code - Section 409, This data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT or the State of Washington.

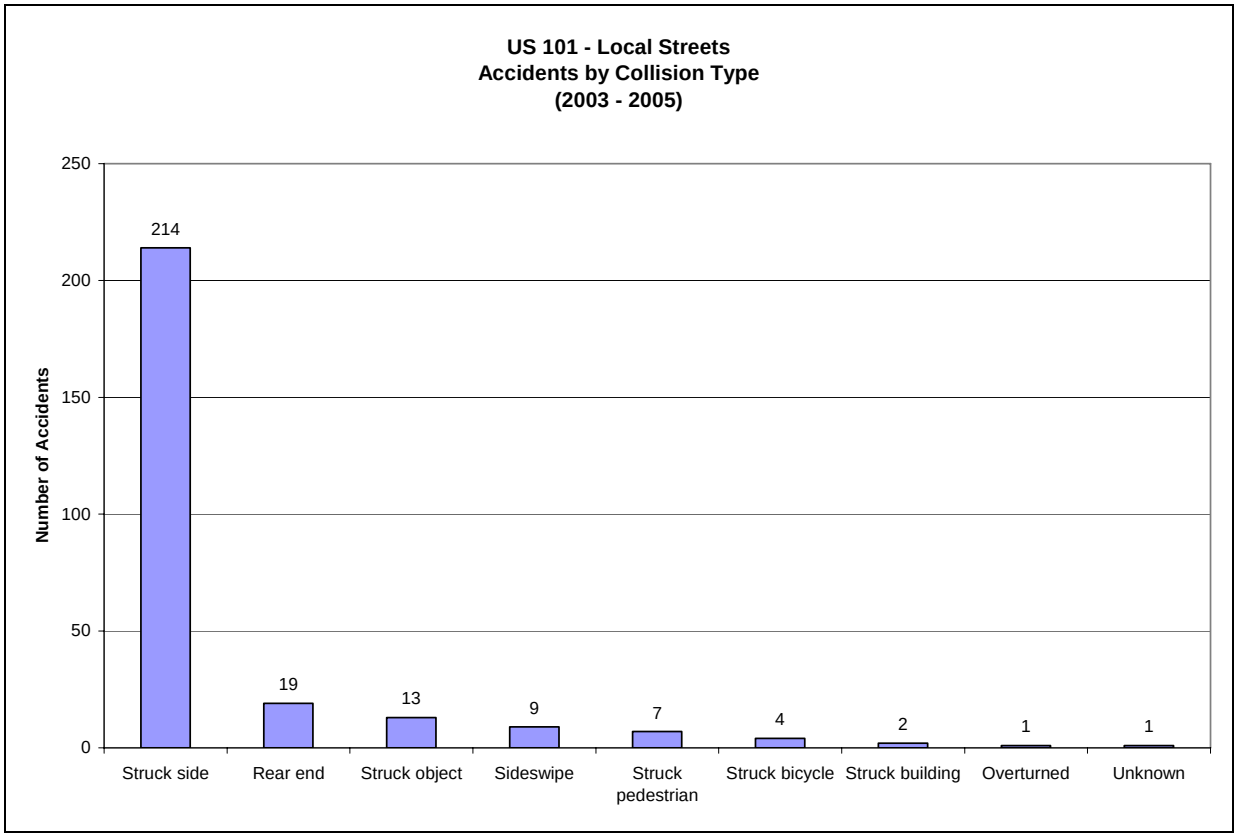
Data

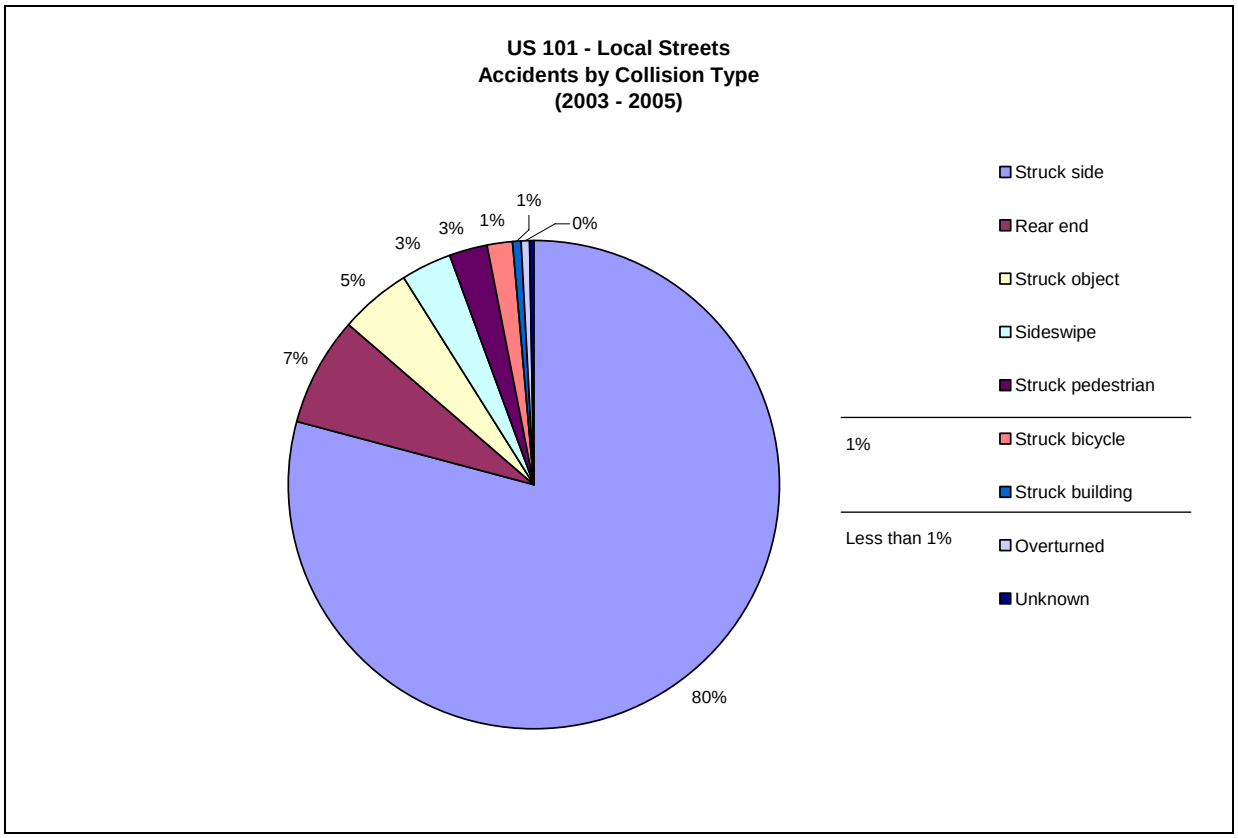
Table 1
Type of Collision: 2003 - 2005

US 101	Number of Accidents
Struck side	214
Rear end	19
Struck object	13
Sideswipe	9
Struck pedestrian	7
Struck bicycle	4
Struck building	2
Overturned	1
Unknown	1
US 101 subtotal	*270*
US 12	
Struck side	13
Rear end	7
Sideswipe	2
Struck pedestrian	1
US 12 subtotal	*23*
SR 109	
Struck side	25
Rear end	1
SR 109 subtotal	*26*
Total by Type of Collision	**319**

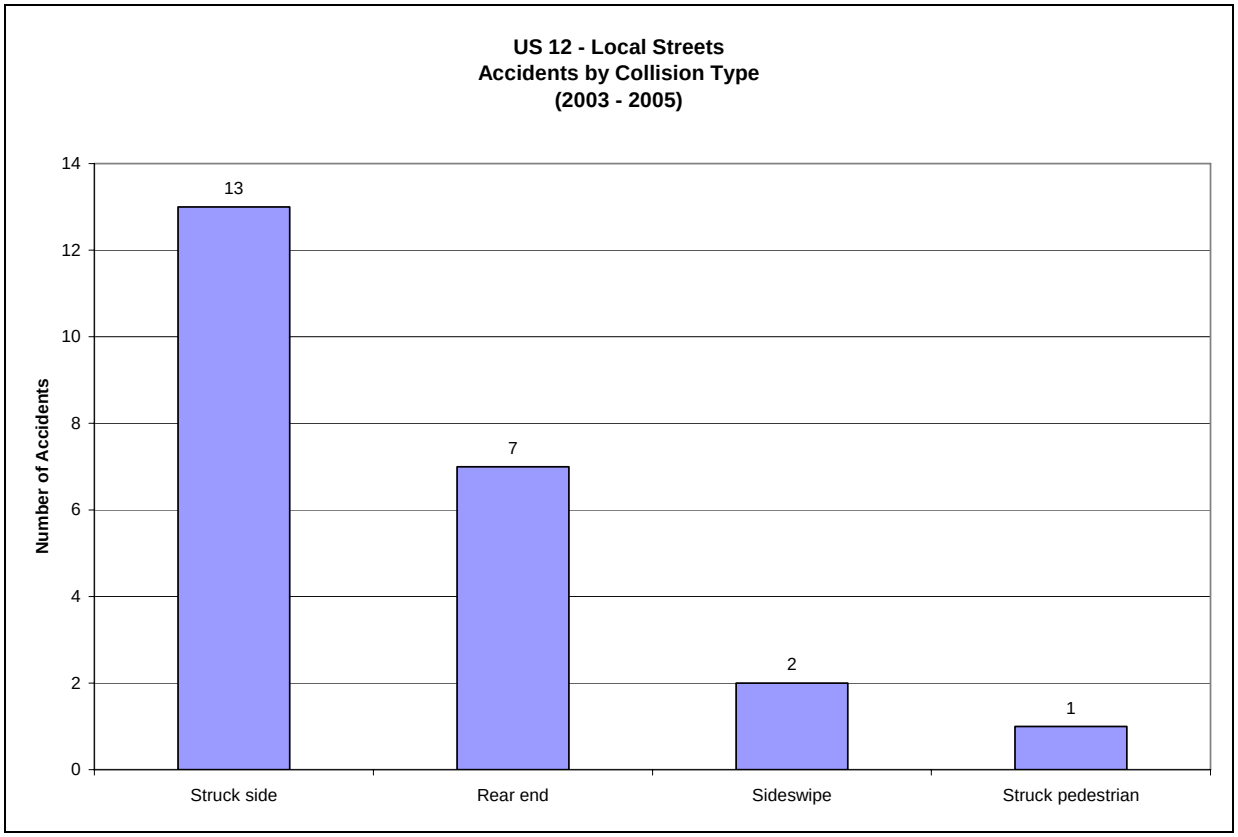
Table 1: 319 collisions were reported between January 2003 and December 2005 on local streets adjacent to US 101, US12, and SR 109. 252 of the collisions were 'Struck side', 79.0%. 8 reported collisions were 'Struck pedestrian', 2.5%.

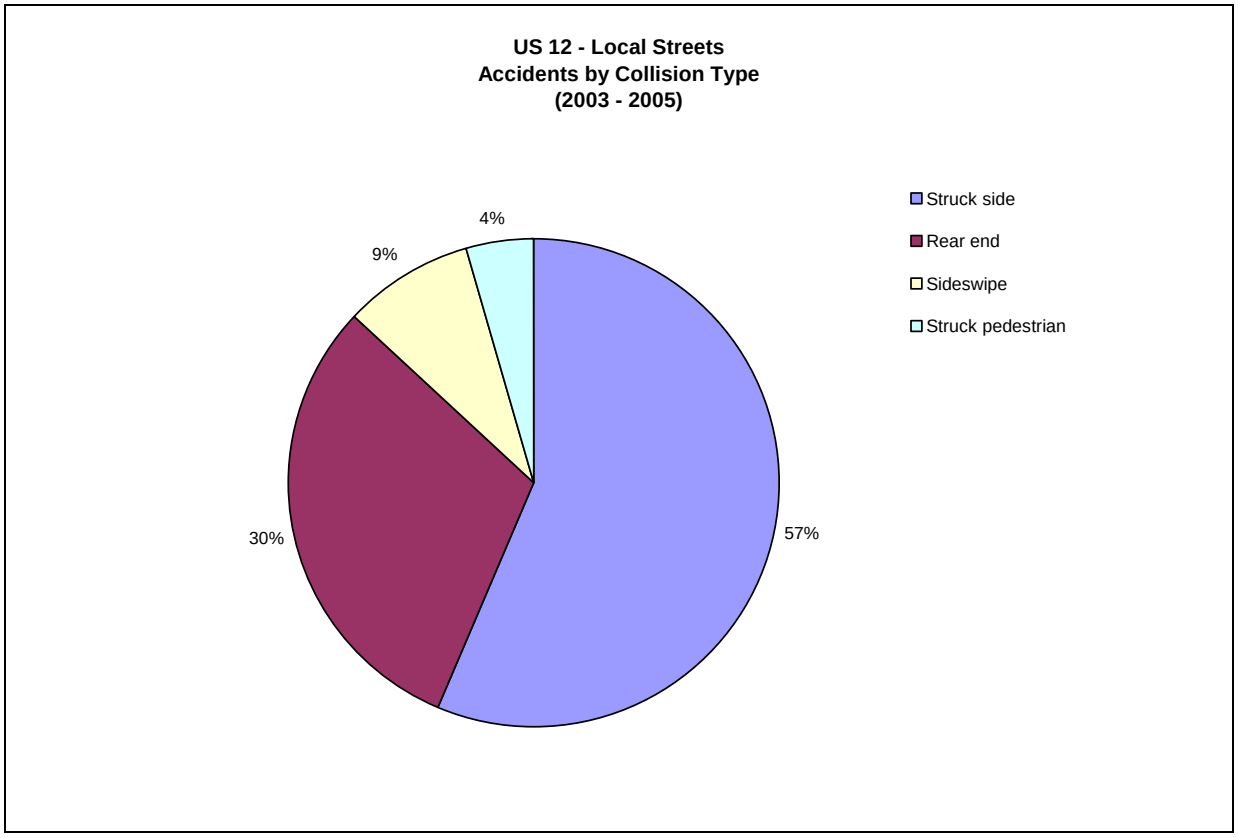
Accidents by Collision Type: US 101



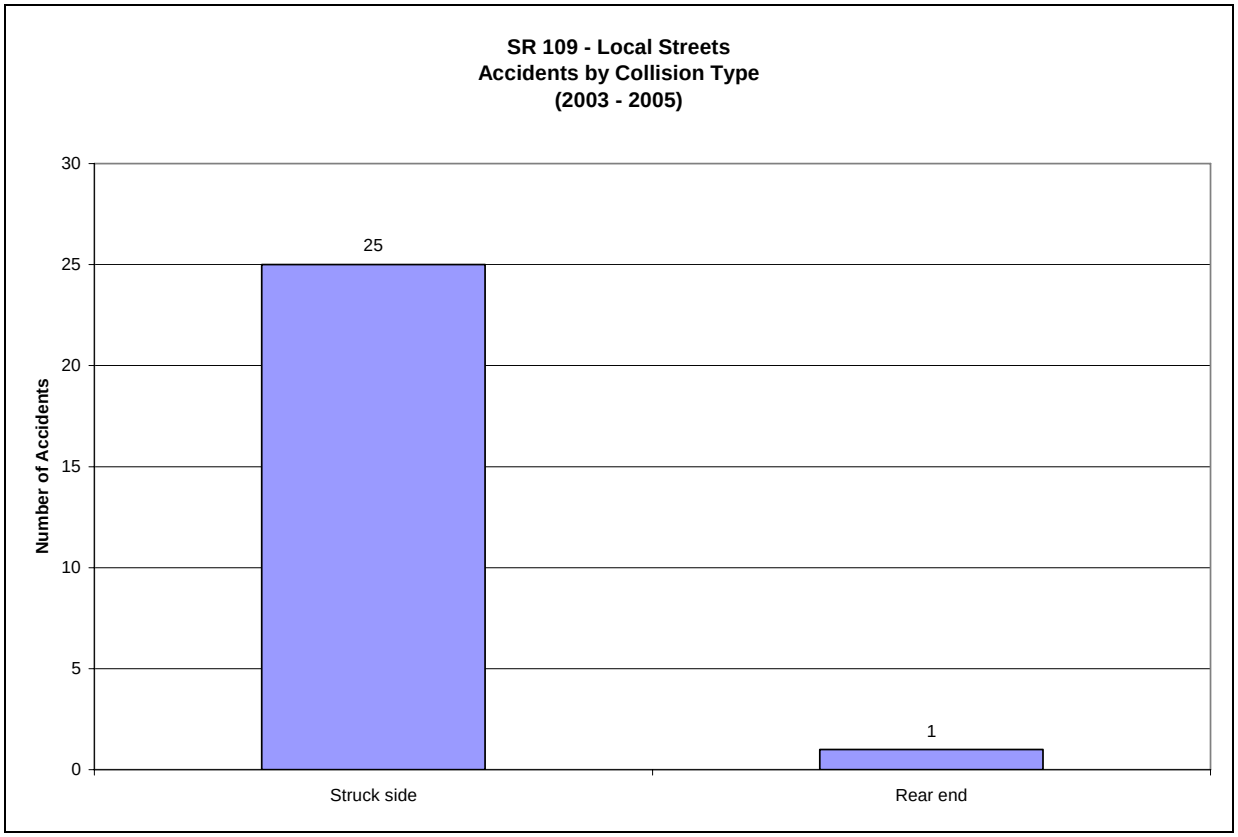


Accidents by Collision Type: US 12





Accidents by Collision Type: SR 109



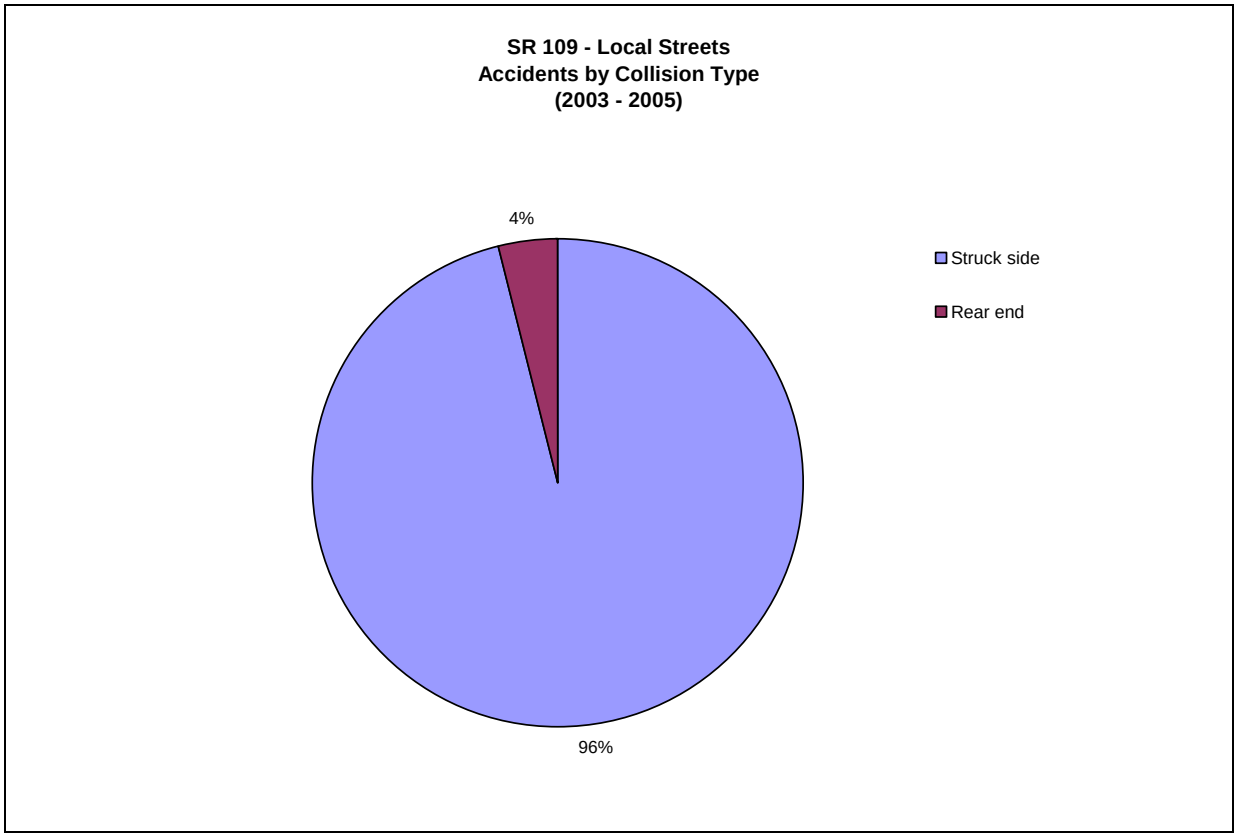
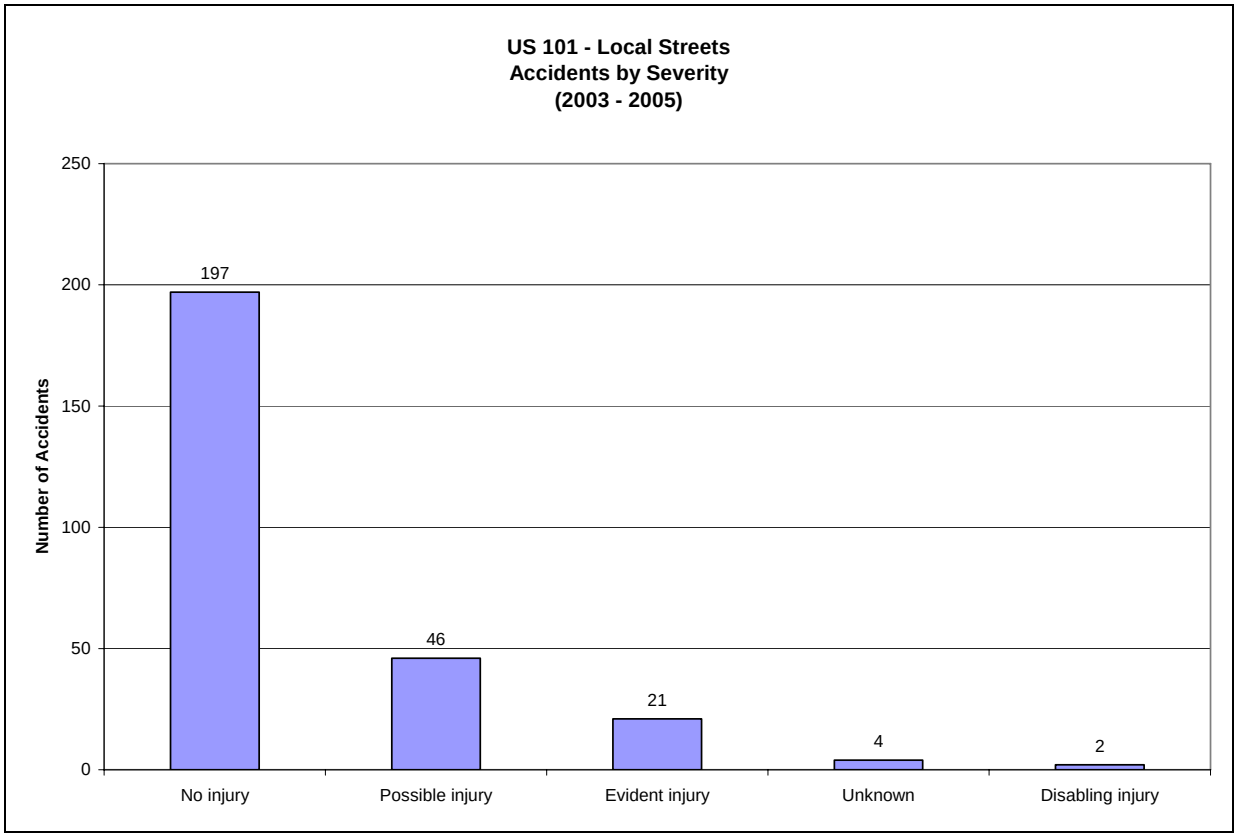


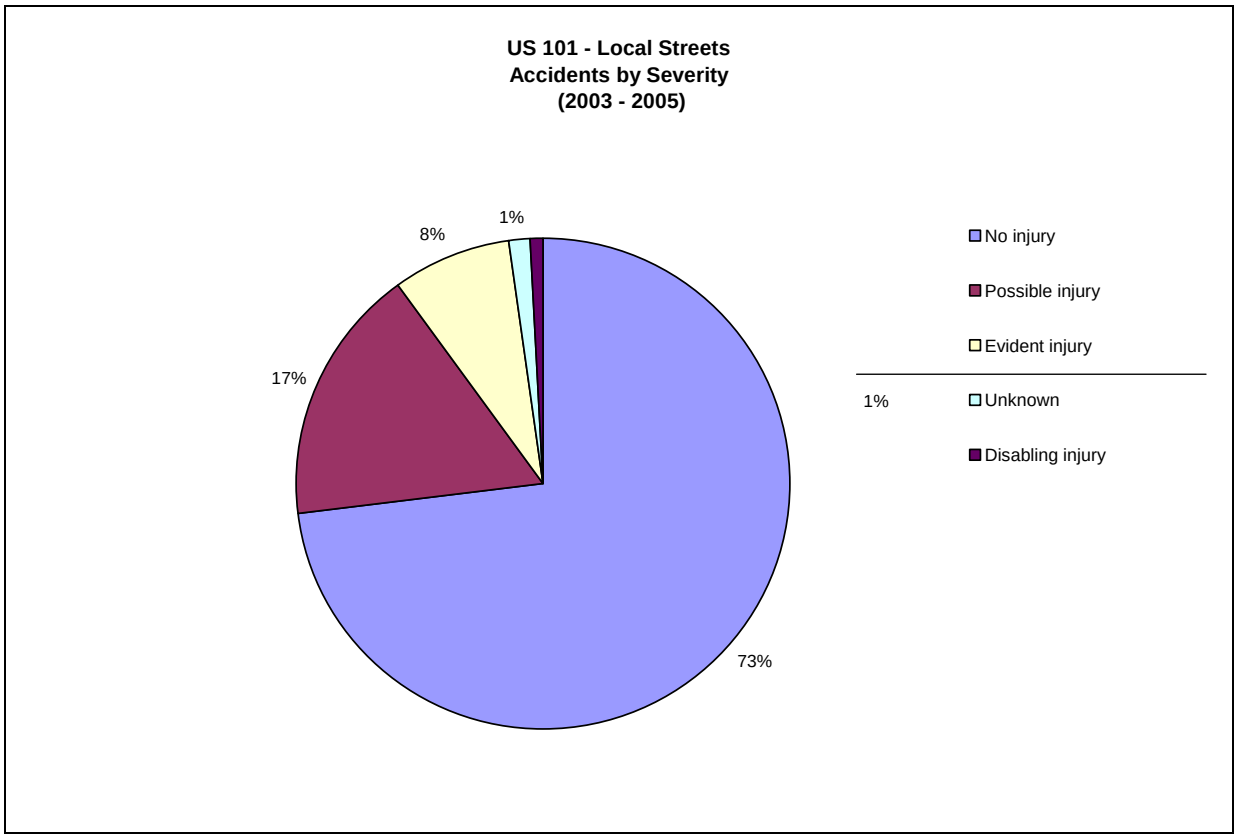
Table 2
Accidents by Severity: 2003 - 2005

US 101	Number of Accidents
No injury	197
Possible injury	46
Evident injury	21
Unknown	4
Disabling injury	2
US 12	
No injury	17
Possible injury	3
Evident injury	2
Disabling injury	1
SR 109	
No injury	18
Possible injury	6
Evident injury	1
Unknown	1

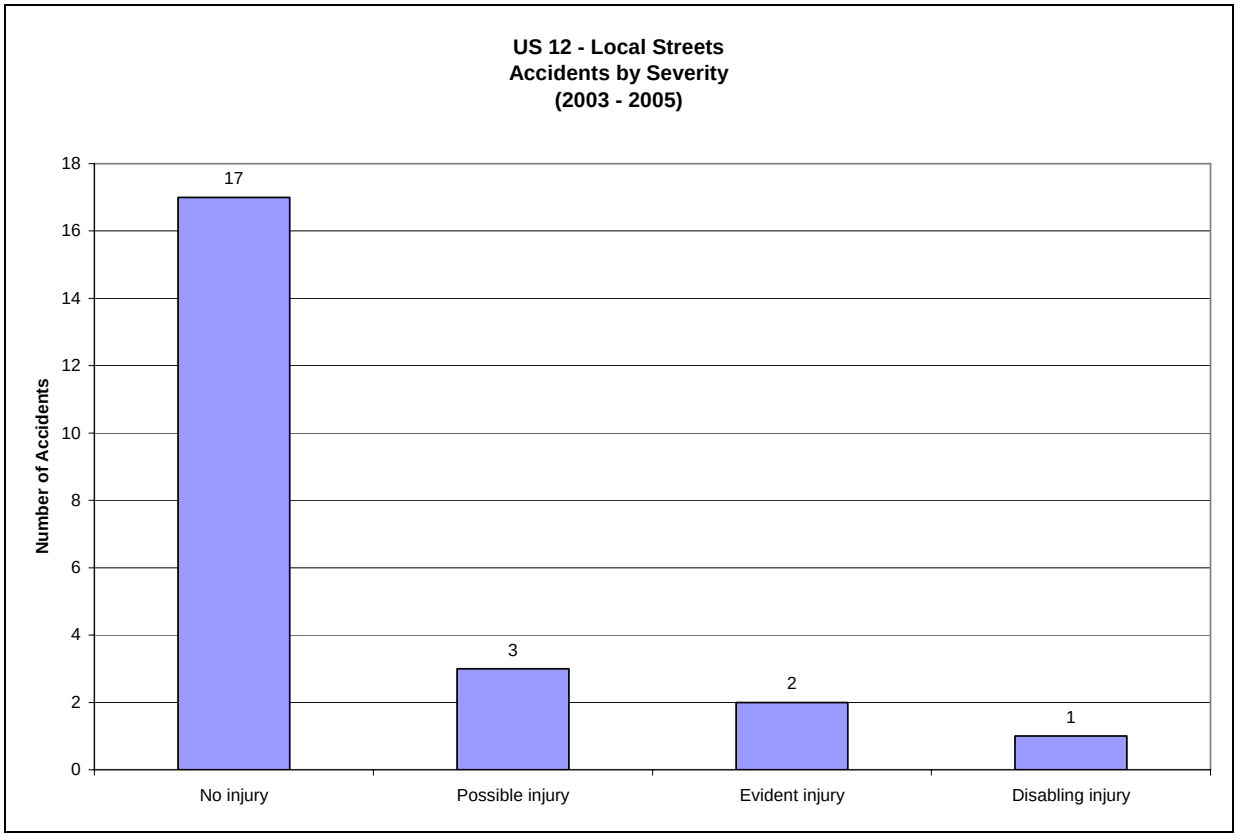
Table 2: 232 of the 319 collisions reported between January 2003 and December 2005 on local streets adjacent to US 101, US12, and SR 109, had 'No injury', 72.7%. 24 collisions had 'Evident injury', 7.5%, and 3 collisions had a 'Disabling injury', less than 1%. No fatalities were reported.

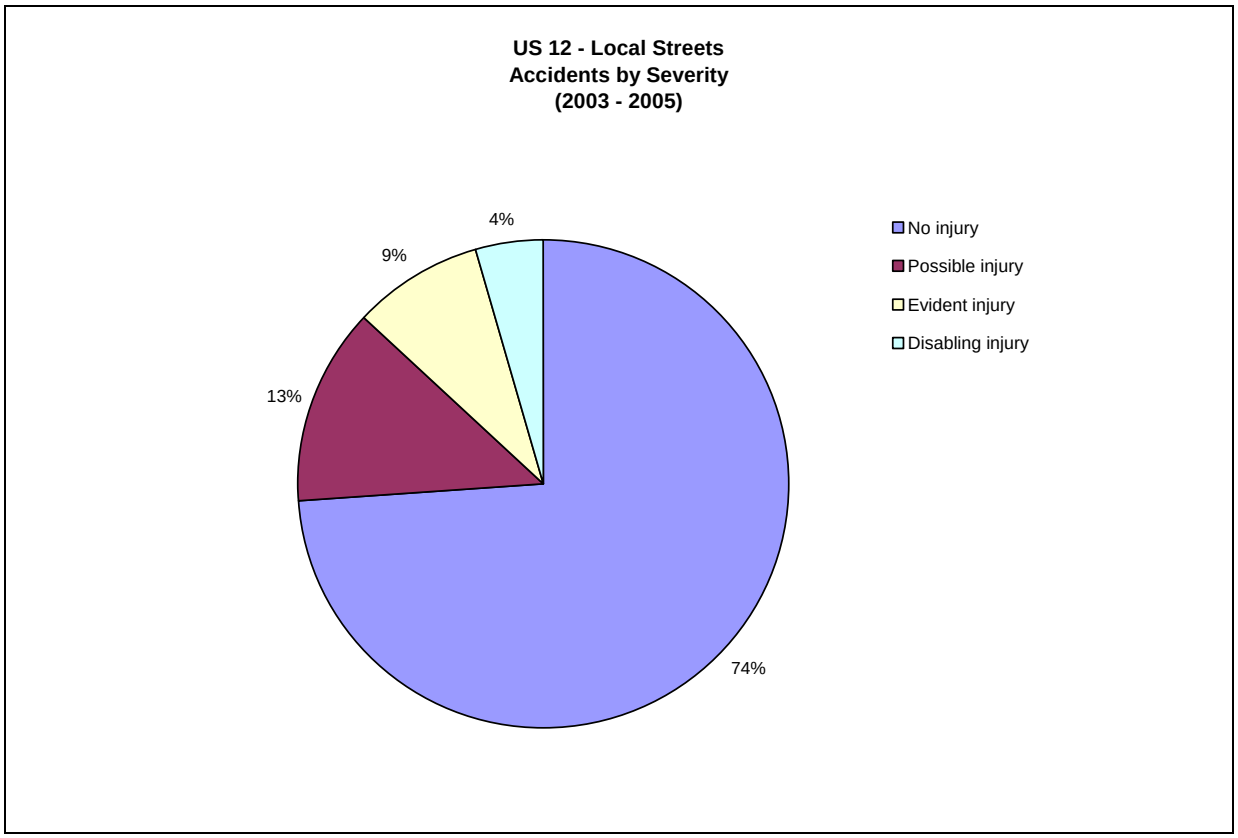
Accidents by Severity: US 101



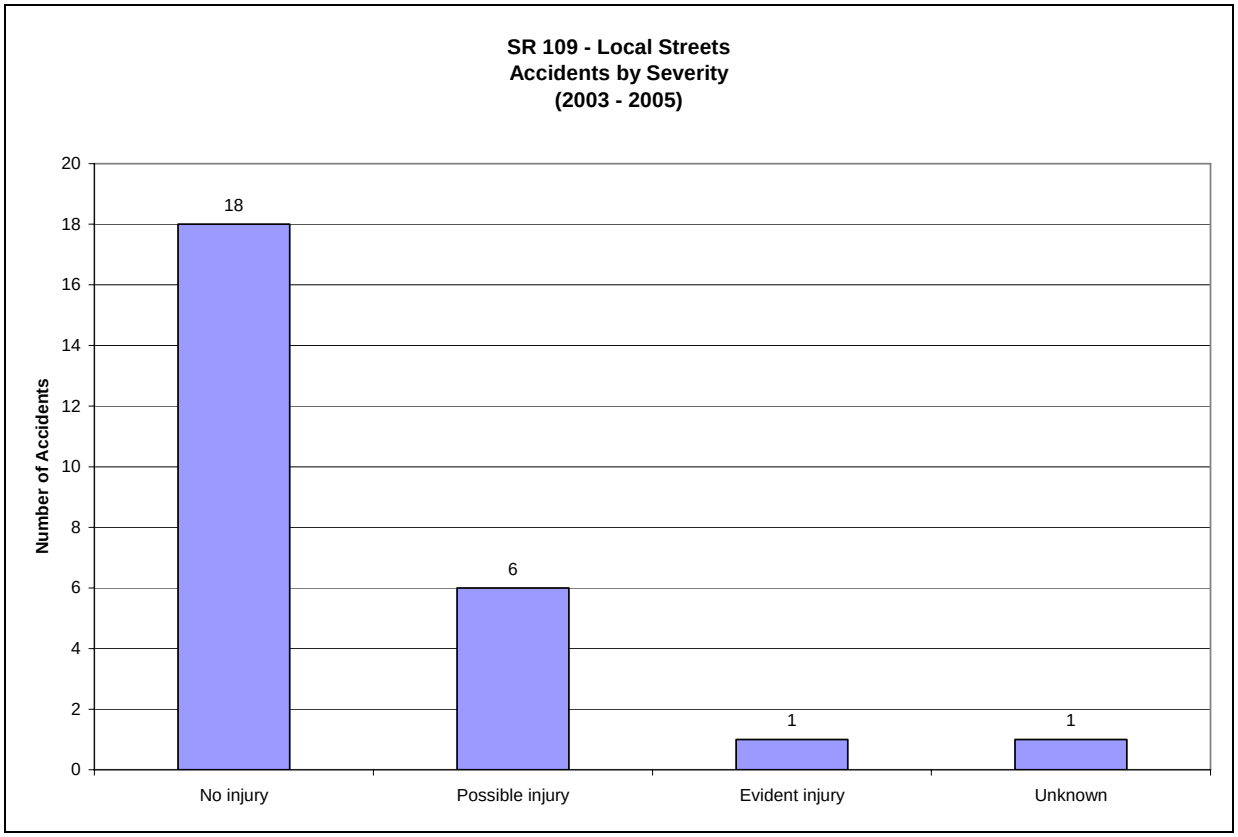


Accidents by Severity: US 12





Accidents by Severity: SR 109



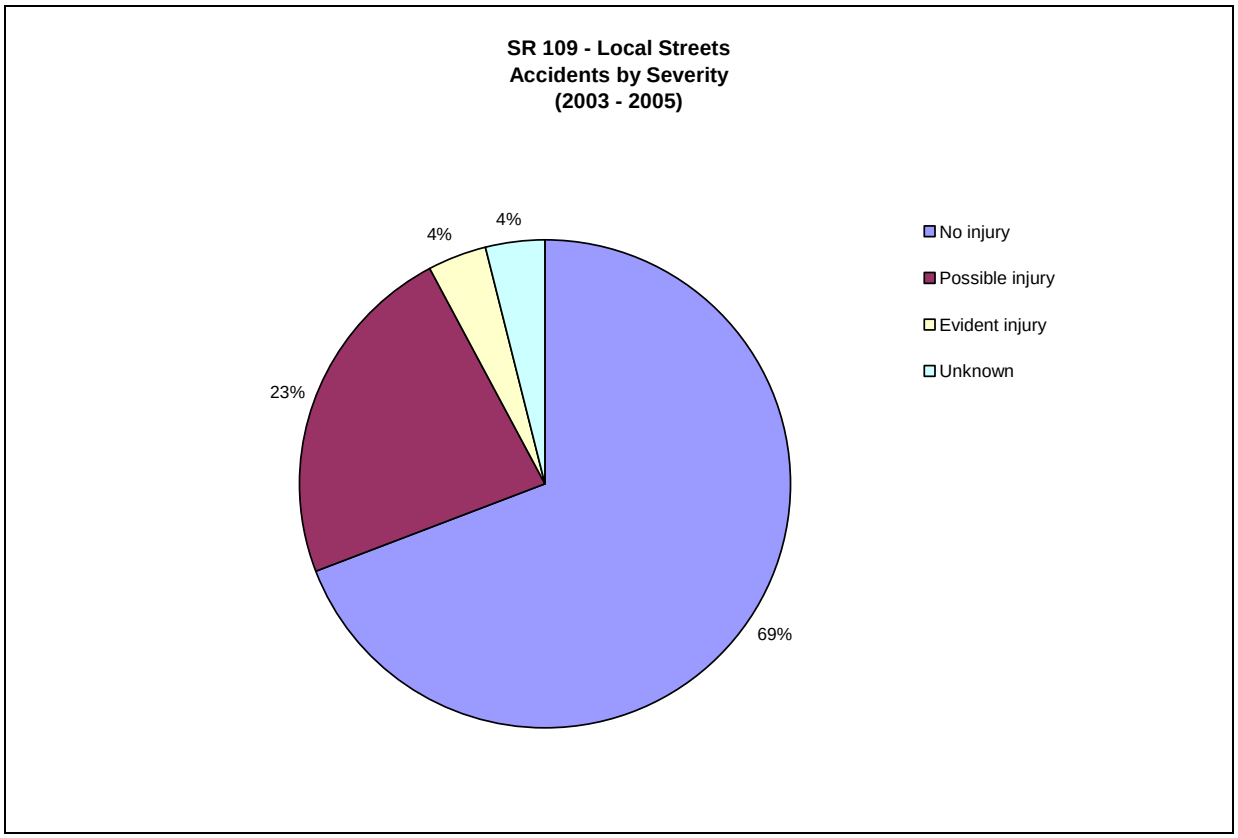
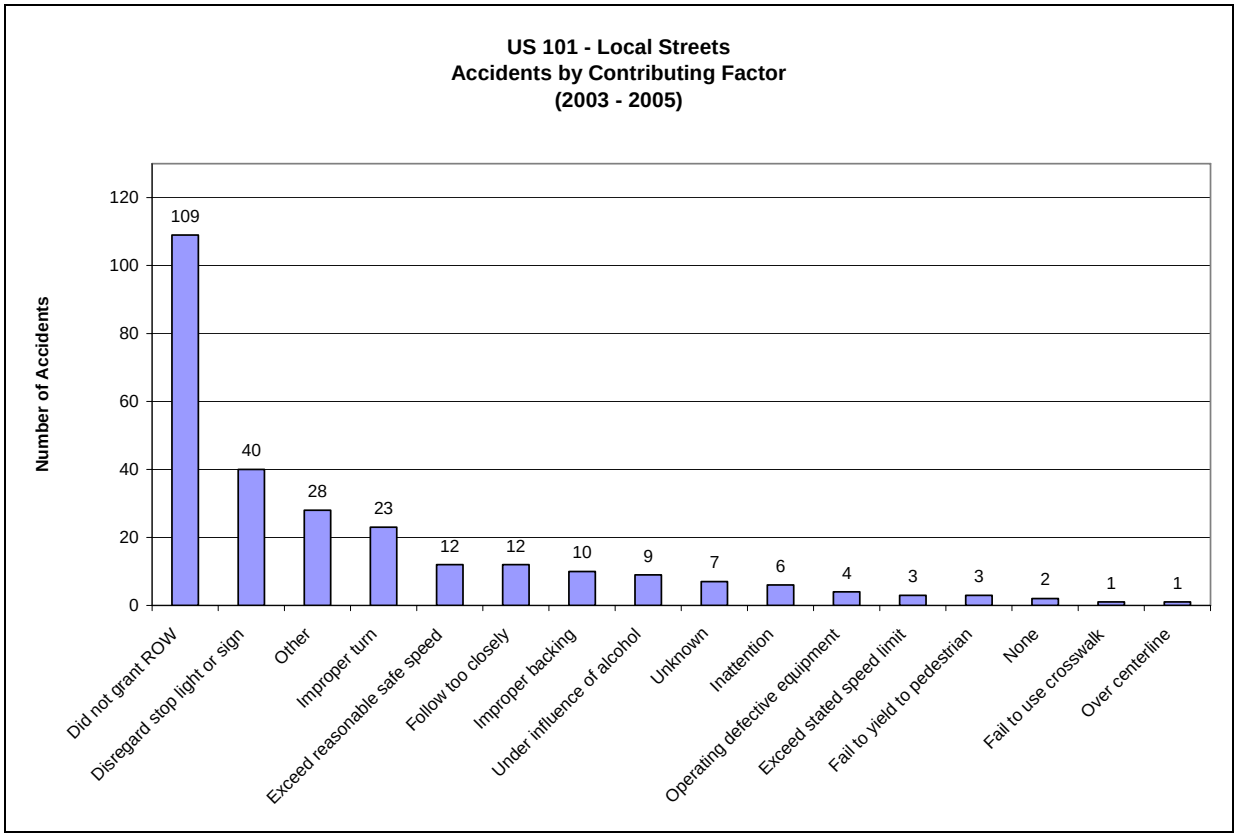


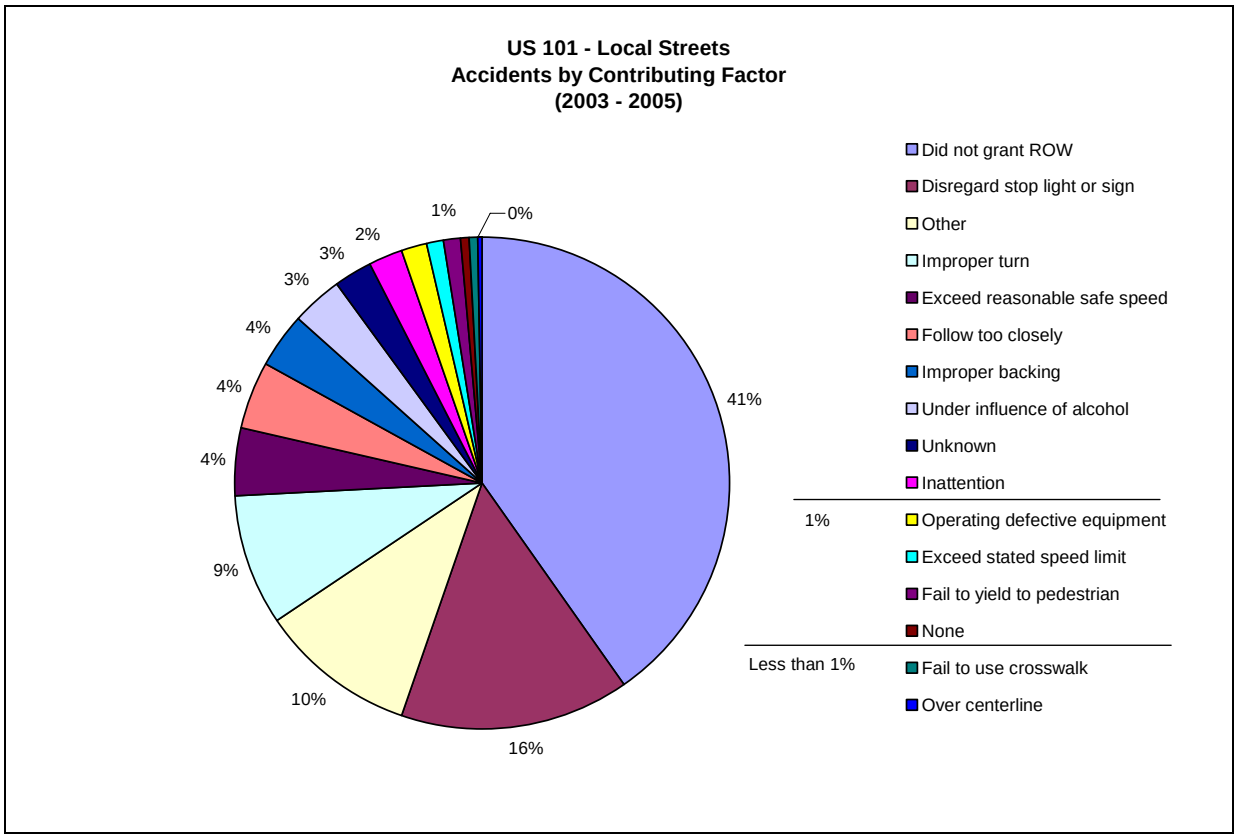
Table 3
Accidents by Contributing Factor: 2003 - 2005

US 101	Number of Accidents
Did not grant ROW	109
Disregard stop light or sign	40
Other	28
Improper turn	23
Exceed reasonable safe speed	12
Follow too closely	12
Improper backing	10
Under influence of alcohol	9
Unknown	7
Inattention	6
Operating defective equipment	4
Exceed stated speed limit	3
Fail to yield to pedestrian	3
None	2
Fail to use crosswalk	1
Over centerline	1
US 12	
Did not grant ROW	10
Exceed reasonable safe speed	3
Inattention	2
None	2
Disregard stop light or sign	1
Follow too closely	1
Improper backing	1
Improper turn	1
Operating defective equipment	1
Under influence of drugs	1
SR 109	
Did not grant ROW	12
Other	5
Inattention	4
Disregard stop light or sign	2
Unknown	2
Follow too closely	1

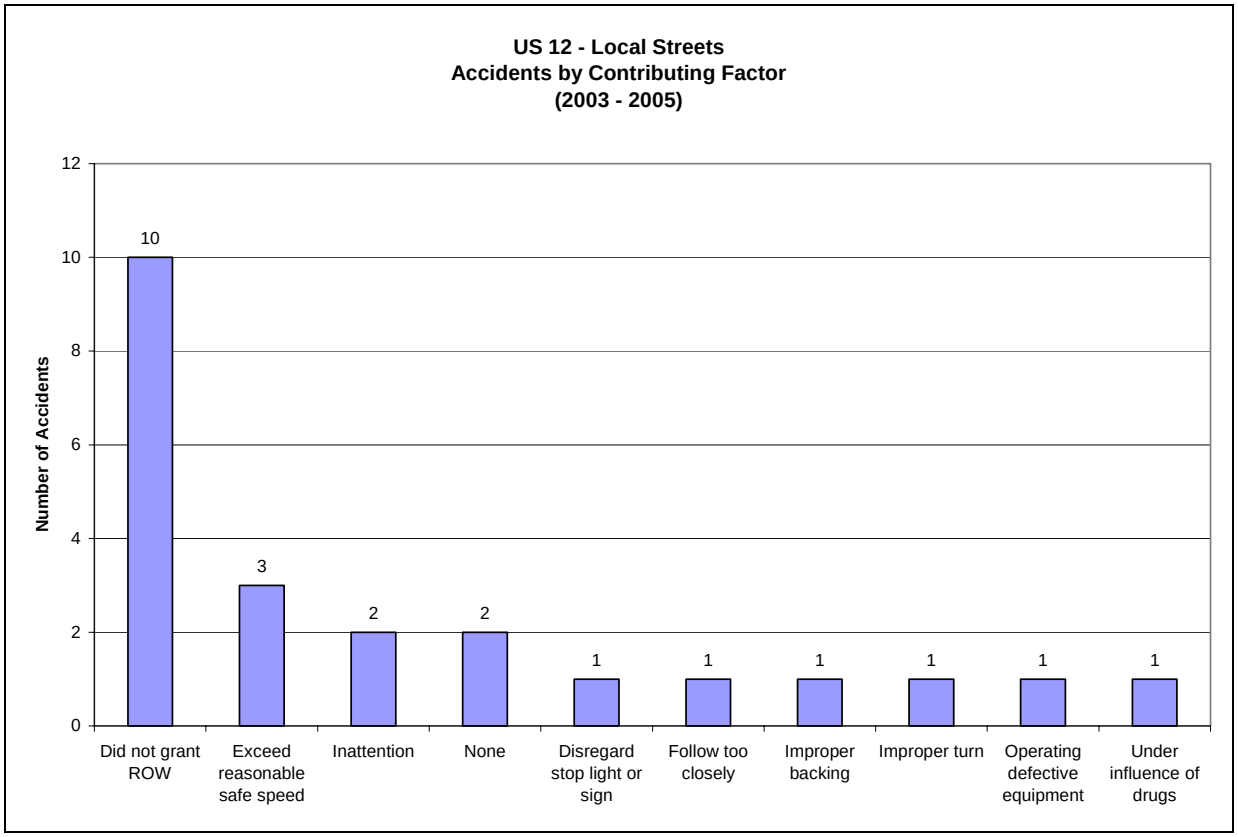
Table 3: 131 of the 319 collisions reported between January 2003 and December 2005 on local streets adjacent to US 101, US12, and SR 109, the contributing factor was ‘Did not grant right-of-way’, 41.1%. The next highest recorded contributing factor was ‘Disregard stop light or sign’ at 43 accidents, 13.5%. 9 reported ‘Under influence of alcohol’, 2.8%, and 8 ‘Fail to yield to pedestrian’ & 1 ‘Under influence of drugs, both less than 1%.

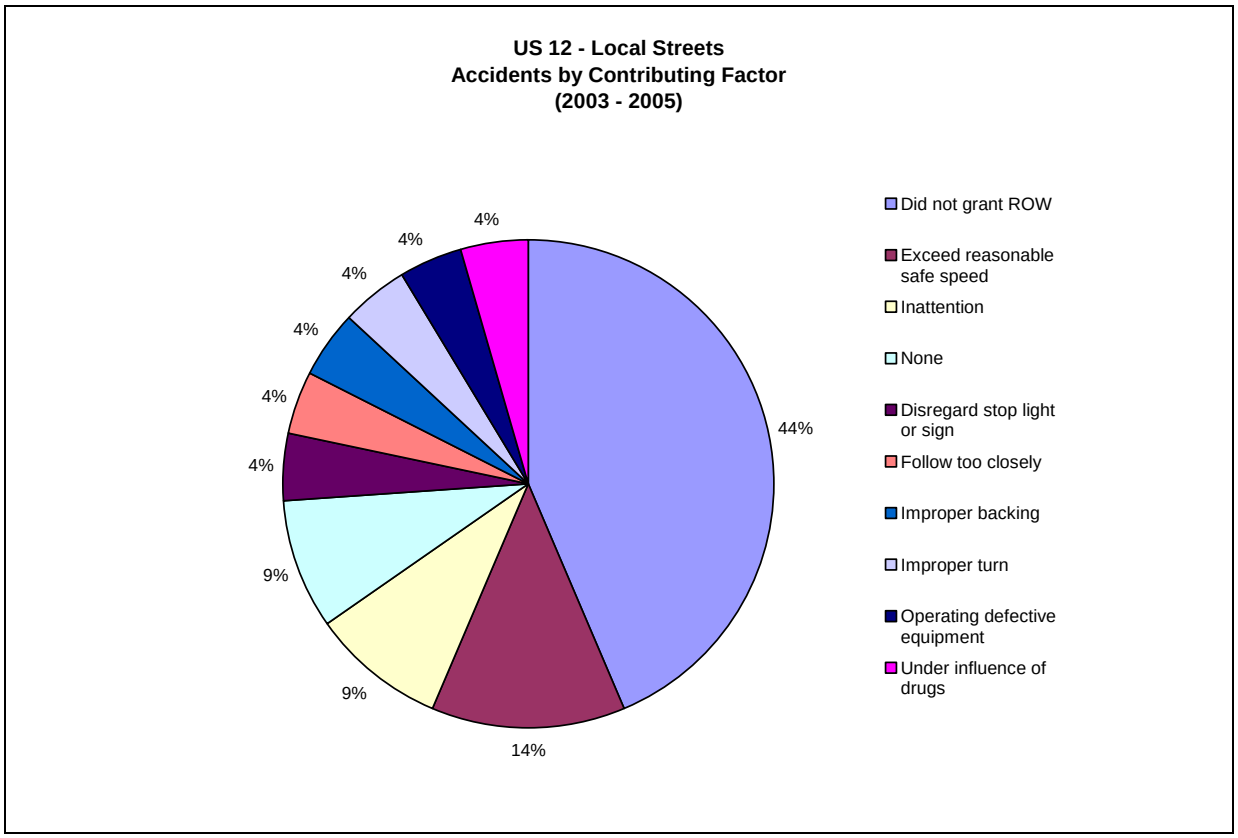
Accidents by Contributing Factor: US 101



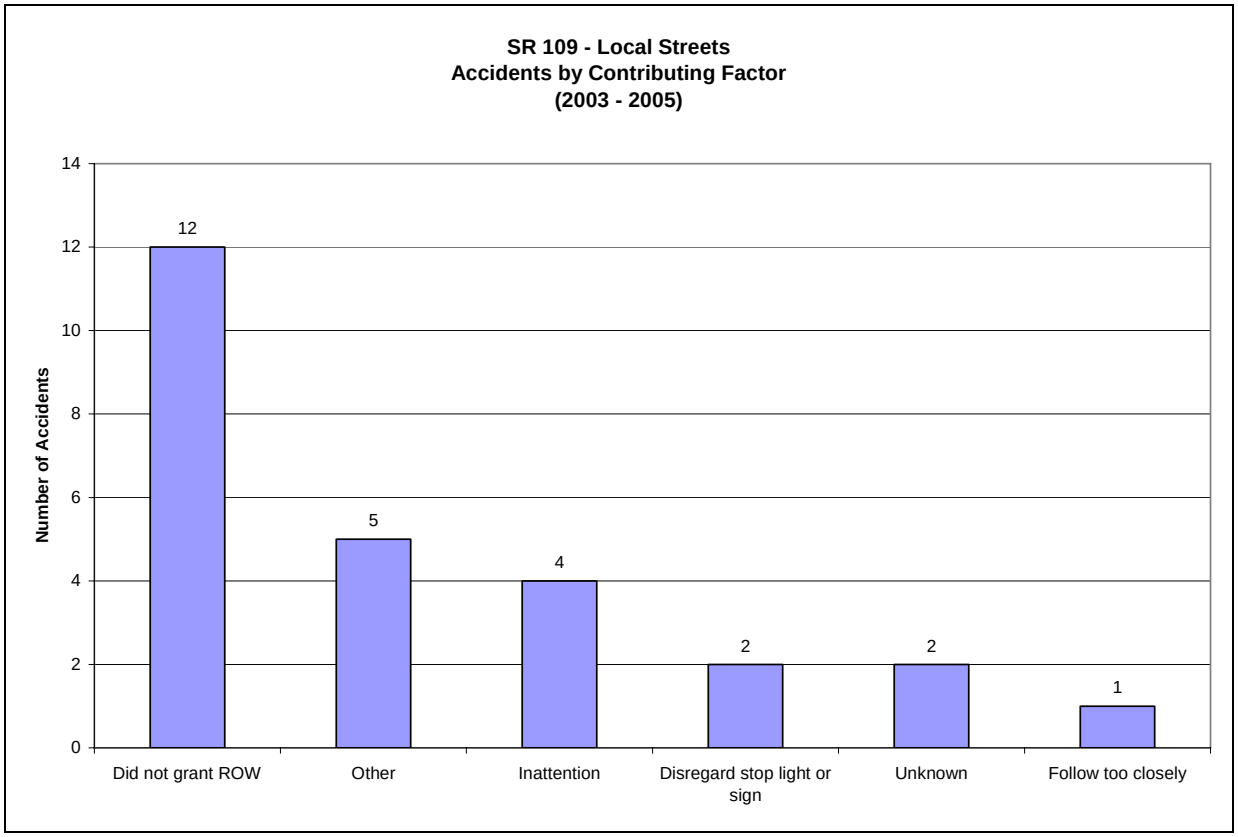


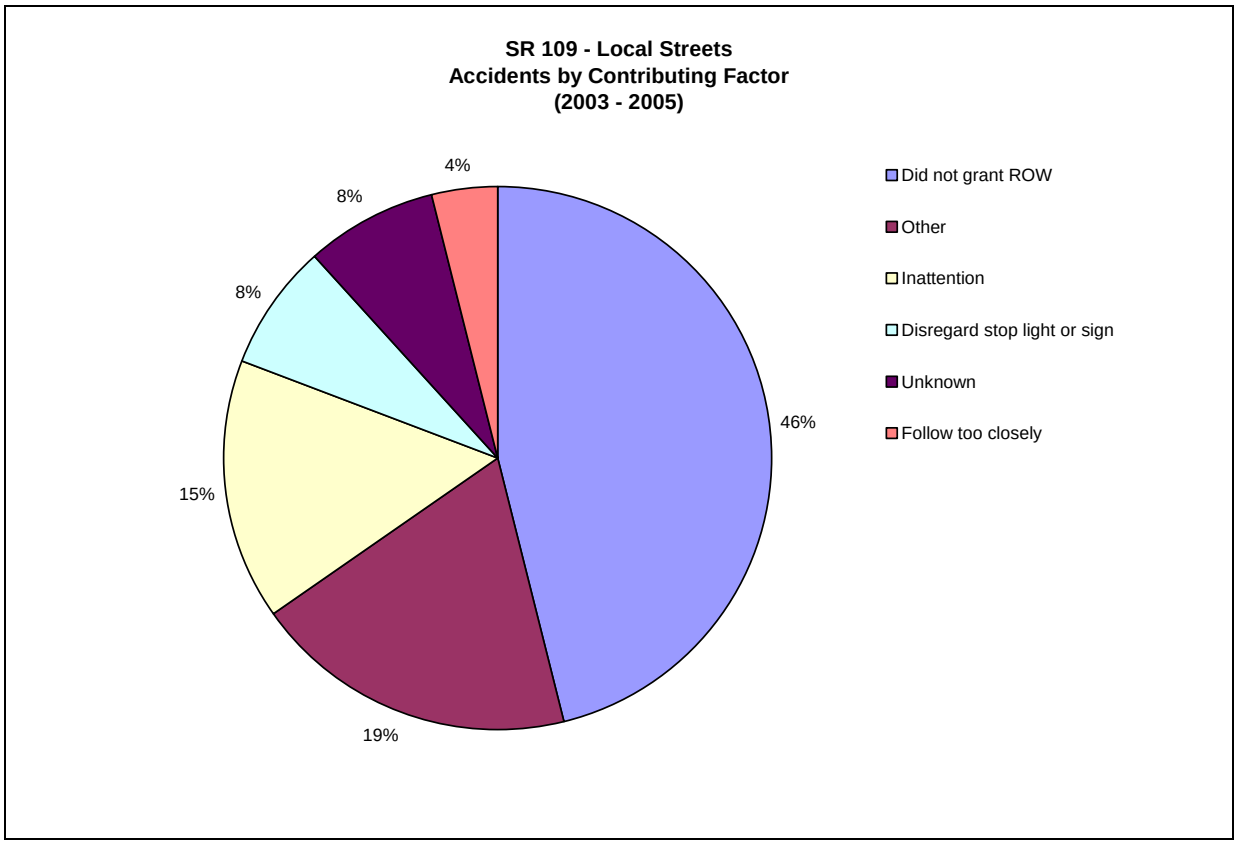
Accidents by Contributing Factor: US 12



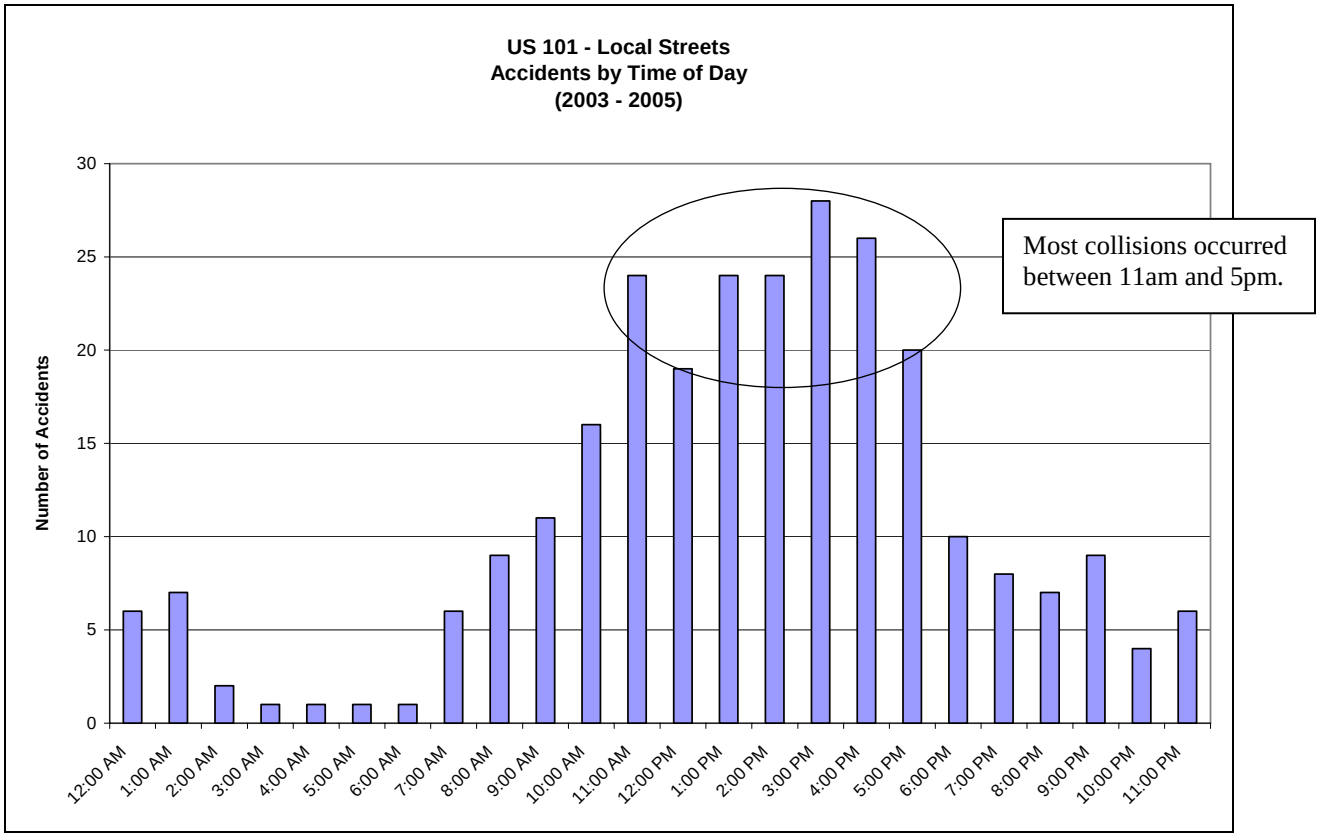


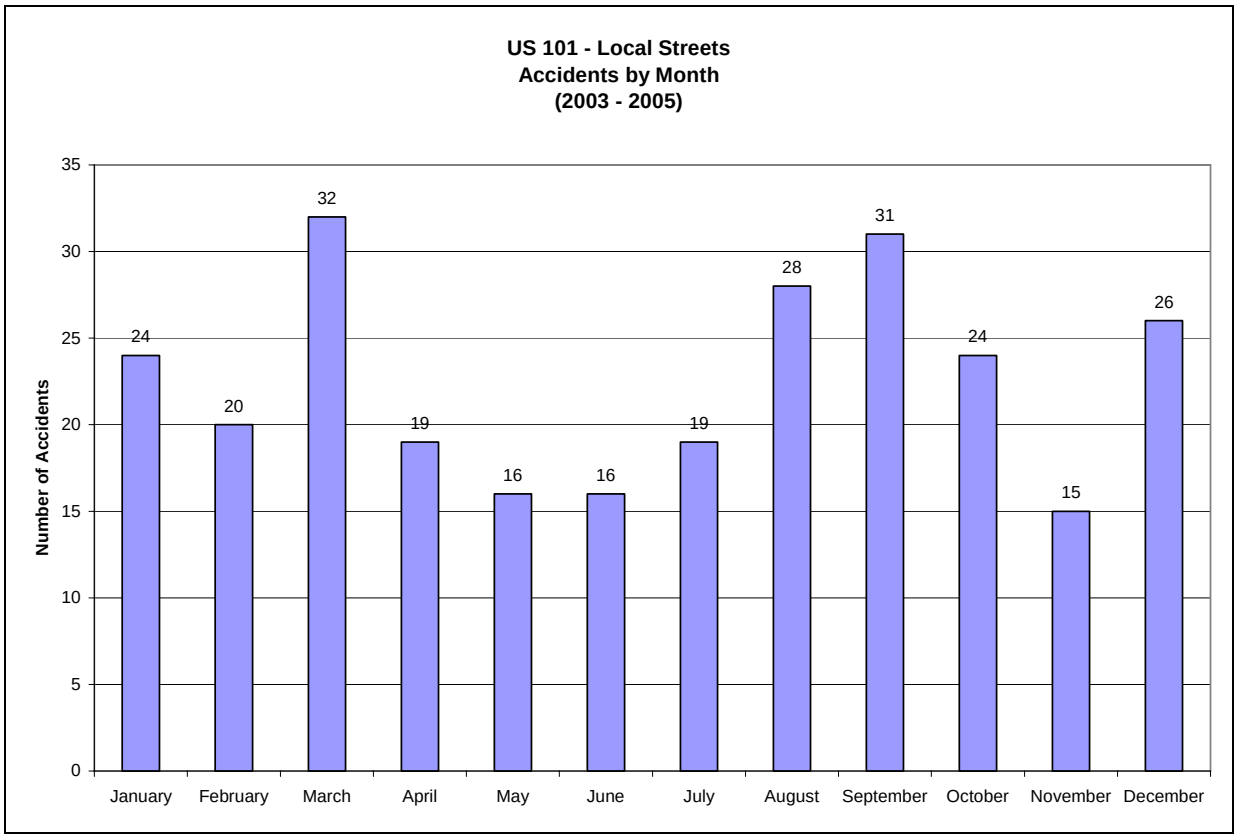
Accidents by Contributing Factor: SR 109





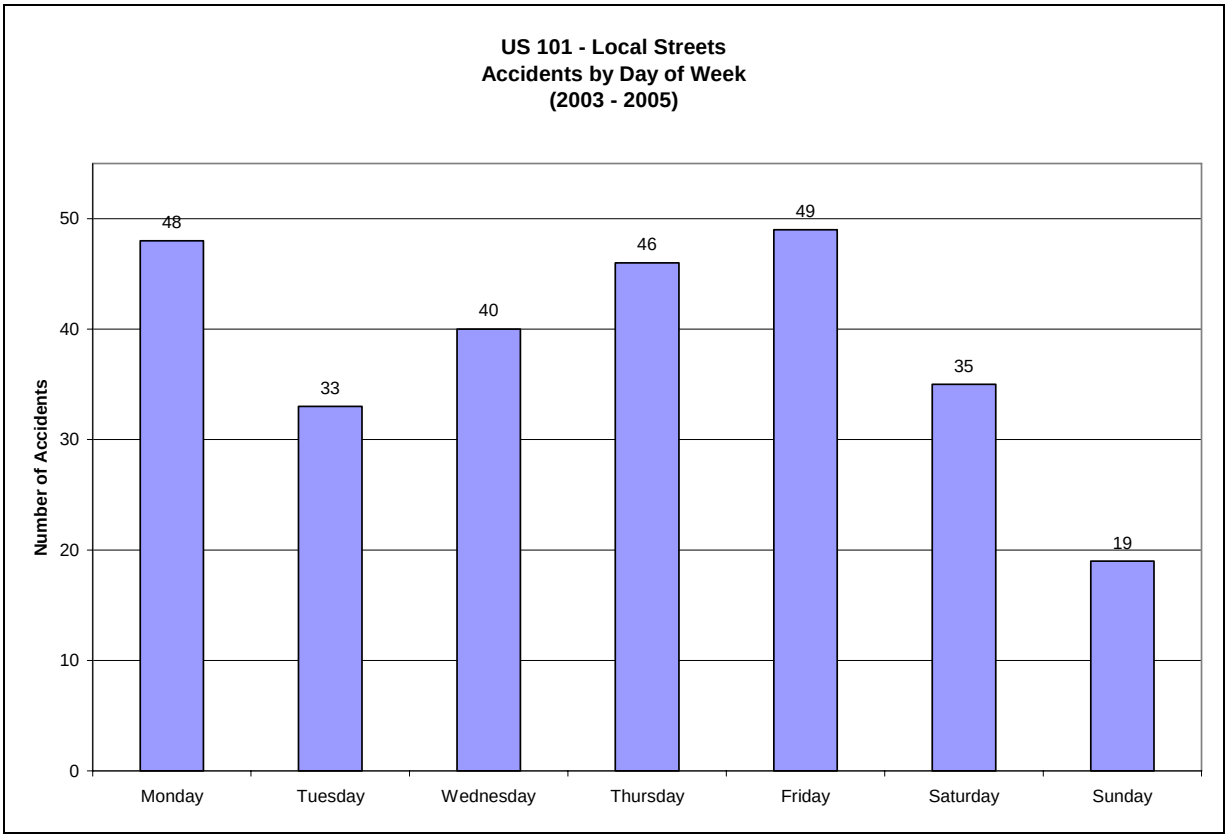
Accidents by Time of Day and Month: US 101 [a]





[b] Not enough records have been collected on US 12 & SR 109 to supply statistically significant monthly, day of week, or time of day data.

Accidents by Day of Week: US 101[b]



[b] Day of week data was calculated in Microsoft Excel translating the recorded accident date. The accuracy of this data cannot be verified.

High Accident Locations

High accident locations on local streets adjacent to US 101, US 12, and SR 109, were analyzed with GIS. The number of accidents by severity were input into a GIS layer and then analyzed.

Table 4
High Accident *Intersections*
6 or more reported accidents
2003 - 2006

Hwy	Intersection	Number of Accidents	Injury Type
101	Broadway & 1st	1	Evident
		5	Possible
		5	None
	Broadway & 1st	**11**	
101	Broadway & Market	2	Evident
		2	Possible
		6	None
	Broadway & Market	**10**	
101	Market & L Street	1	Evident
		1	Possible
		6	None
	Market & L Street	**8**	
101	Market & H Street	1	Possible
		6	None
	Market & H Street	**7**	
12	F & 1st Street	2	Evident
		2	Possible
		4	None
	F & 1st Street	**8**	

Table 4: 5 street intersections experienced 6 or more traffic accidents between January 1, 2003 and December 31, 2005. 4 of the 5 locations were on US 101 and 1 on US 12. All locations are related to the Aberdeen downtown core.

Broadway & 1st: Broadway is a through street that serves residential neighborhoods and limited professional services north of 1st Street, leading directly into downtown and to US 101. There is a stop light, and banking facilities and offices on each of the street corners. Broadway is 4 lanes at 1st street. 1st Street is a local alternative route to US 101.

Broadway & Market: Similar to 1st Street, the intersection of Market and has a stop light and banking facilities and offices on each of the street corners. At the north side of Market, Broadway has 4 lanes, at the south side, 2 lanes. There is a right turn only lane from Broadway heading west onto Market. Broadway is a through street that serves residential neighborhoods and limited professional services north of 1st Street, leading directly into downtown and to US 101. Market Street has commercial, professional, and local government services and is also a local alternative route to US 101.

Market & L Street: L Street serves an alternative route to Broadway for residential neighborhoods on the hillside and north of 1st street. This intersection does not have a stop light. L Street is wider and other residential streets heading north/south into the neighborhood. The Street terminates to the south in the Safeway parking lot. There are no stop lights between 1st and Wishkah on L Street. There are services, a parking lot, and small apartment house at this intersection. Market is four lanes wide with street parking on both sides, there is limited visibility crossing Market at L Street.

Market & H Street: This intersection provides a means of heading to US 101 South over the Chehalis River. H Street is one way heading south to US 101 between Market and Wishkah (south side of this intersection). There is a stop light at this intersection and banking, retail, a police station, and other services. H Street is one access street to the Aberdeen High School campus.

F & 1st Street: The intersection of F and 1st Street is 2 blocks north of US 12; this intersection has a stop light. There is a convenience store, 2 apartment buildings and a restaurant on this corner. F Street also provides access to the Aberdeen High School campus, is a through street for residential neighborhoods north of 1st Street (Arnold hill), and to a limited medical professional buildings. It provides local access to US 12 heading east or west.

Table 5
High Accident Streets
US 101 - ABERDEEN Locations
6 or more reported accidents
2003 - 2006

Street	Number of Accidents	Injury Type
Aberdeen		
Broadway - 1st to Wishkah	3	Evident
	7	Possible
	14	None
Broadway - 1st to Wishkah	**24**	
G Street - 1st to Wishkah	1	Evident
	4	Possible
	10	None
G Street - 1st to Wishkah	**15**	
H Street - 1st to Wishkah	2	Possible
	11	None
H Street - 1st to Wishkah	**13**	
K Street - 1st to Wishkah	1	Evident
	8	None
	1	Unknown
K Street - 1st to Wishkah	**10**	
I Street - 1st to Wishkah	1	Evident
	2	Possible
	6	None
I Street - 1st to Wishkah	**9**	
M Street - 1st to Wishkah	1	Evident
	7	None
	1	Unknown
M Street - 1st to Wishkah	**9**	
1st Street - Alder to Jefferson	3	Possible
	4	None
1st Street - Alder to Jefferson	**7**	
Market - Alder to Jefferson	1	Possible
	5	None
Market - Alder to Jefferson	**6**	

Table 5: High accident streets, with 6 or more recorded accidents totaled 8 locations in Aberdeen.

Broadway - 1st to Wishkah: Broadway is a through street that serves residential neighborhoods and limited professional services north of 1st Street, leading directly into downtown and US 101. There are stop lights at both 1st and Market on Broadway heading to US 101. Between 1st and Market streets, Broadway is 4 lanes. At the intersection of Market and Broadway, heading south, there is a right turn

only lane to head west onto Market. Broadway between Market and Wishkah is 2 lanes with a center planting strip, and angle in parking on each side. Broadway is a mixed commercial street.

G Street - 1st to Wishkah: G Street extends US 101 North after it crossed over the Chehalis River. G is one way between Wishkah and Market and two-way from Market to 1st Street. There is a stop light at Market Street and no stop light at 1st Street. A credit union on the corner of G and Market (one way portion) is the location of accidents at the alley way. The transit station is at the intersection of Wishkah and G Streets. G Street is mixed commercial. It provides access to the Aberdeen High School campus.

H Street - 1st to Wishkah: H Street provides a means of heading to US 101 South over the Chehalis River. H Street is one-way heading south between Market and Wishkah Streets. It is two way from Market to 1st Street. There is a stop light on Market and no stop light on 1st Street. It is also another access street to the Aberdeen High School campus. The street is mixed commercial with the Aberdeen police station at the intersection of H and Market Streets.

K Street - 1st to Wishkah: K Street provides an alternative route to Broadway for the residential neighborhoods on the hillside and north of 1st street. There is a stop light at Market and no stop light on 1st street. The Aberdeen US Post Office is on the corner of K and 1st Streets. K Street is limited commercial. Two blocks north of 1st on K Street is McDermoth grade school.

I Street - 1st to Wishkah: There is a stop light at Market and no stop light on 1st street. Aberdeen City Hall and Timberland Regional Library branch is on the corner of Market & I Street. I Street is mixed commercial.

M Street - 1st to Wishkah: M Street provides a route to US 101 from neighborhoods north of 1st Street. There are no stop lights on M Street, even at US 101. Franklin park, ball field and playfield is on M Street between 1st and Market Streets. There are limited commercial, services, and small apartment building on M Street.

1st Street - Alder to Jefferson: First Street is a local alternative route to US 101. There is a stop light where 1st meets US 101, with a right turn only lane. A filling station is on the corner of 1st and US 101

1st Street is two lanes with limited left turn lanes, and on street parking on both side. There are two stop lights, one at Broadway and one on F Streets. There can be limited visibility crossing 1st Street due to it being very wide and the presence of parked vehicles on the street.

Market - Alder to Jefferson: Market Street is a local alternative route to US 101. There is a stop light where Market meets US 101 at Alder. Between Jefferson and US 101, there is commercial with limited residential on this section of Market Street.

Market Street has four lanes with street parking on both sides. There are numerous stop lights on Market Street and commercial, professional, and local government services. There can be limited visibility crossing Market Street due to it being extremely wide and the presence of parked vehicles on the street.

Table 6
High Accident Streets
US 101 - MYRTLE STREET & HOQUIAM Locations
6 or more reported accidents
2003 - 2006

Street	Number of Accidents	Injury Type
Myrtle - Pacific to Simpson	1	Evident
	1	Possible
	4	None
Myrtle - Pacific to Simpson	**6**	
Hoquiam		
7th Street - K to Simpson	2	Possible
	6	None
7th Street - K to Simpson	**8**	
24th Street - Pacific to Simpson	1	Evident
	2	Possible
	3	None
24th Street - Pacific to Simpson	**6**	

Table 6: High accident streets, with 6 or more recorded accidents, totaled 2 locations in Hoquiam. Myrtle Street, which separates the cities of Aberdeen and Hoquiam, is also high accident street.

Myrtle - Pacific to Simpson: Myrtle Street separates the cities of Aberdeen and Hoquiam. It also provides access to Port Industrial Road, the industrial area, which is a local alternative route to US 101. There are stop signs on Aberdeen and Pacific crossing at Myrtle. Myrtle is a mix of residential and commercial with a high traffic generating shopping center on the corner of Myrtle and Pacific Streets.

7th Street - K to Simpson: 7th Street in Hoquiam is a local commercial street with retail, profession services, the transit station, historic theater, community services organization halls, and Timberland Regional Library branch. There is a stop sign at both the corners of K and J Streets on 7th. The south side of 7th street has angle in parking.

24th Street - Pacific to Simpson: 24th is a residential street with limited commercial and a small apartment complex. It provides access to Bay Ave as an alternative to US 101, although 22nd and 23rd Streets are the more frequently used as a pass through streets. There are no stop signs on 24th Street or the cross streets at Aberdeen and Pacific.

Table 7
High Accident Streets
US 12 & SR 109
6 or more reported accidents
2003 - 2006

Hwy	Street	Number of Accidents	Injury Type
12	F Street - 1st to Wishkah	3	Evident
		4	Possible
		6	None
	F Street - 1st to Wishkah	**13**	
109	L Street - 2nd to Emerson	2	Possible
		4	None
	L Street - 2nd to Emerson	**6**	

Table 7: US 12 and SR 109 each had one high accident street with more than 6 recorded accidents.

F Street - 1st to Wishkah: F Street provides local access to US 12 heading east or west. F Street is the last street where traffic can merge onto US 12 heading east, at Heron. There is no traffic signal at this corner, providing a bypass route to US 101. The intersection of F and Market Streets is a five way intersection with three traffic signals (where Fuller Way comes off the Wishkah bridge heading west). F Street also provides access to the Aberdeen High School campus, is a through street for residential neighborhoods north of 1st Street (Arnold hill), and limited medical professional buildings. There are mixed commercial and a city green space on F Street. There is a right turn only lane onto US 12 heading west from north F Street. Stops lights are on 1st and Market Street.

L Street - 2nd to Emerson: L is an angled street off SR 109. There is a convenience store and a small apartment complex on the corner of L and SR 109 and the street leads into a residential neighborhood. There is one stop sign on the east side 1st Street at the intersection of L, but not on the west side. There are no stop signs on L Street or at where L intersects with 2nd Street. There is a church on the corner of 2nd and L Street.

US 101 Regional Circulation Project

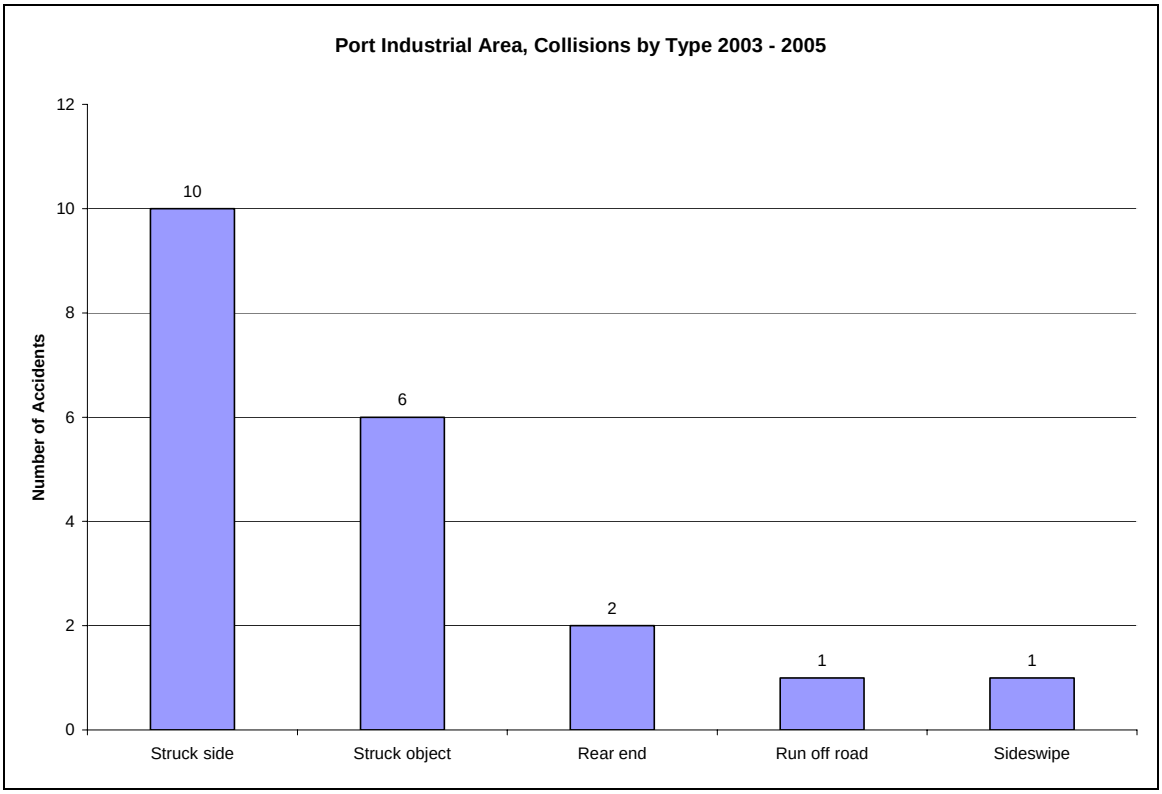
Local Collision Data
Port Industrial Area
January 1, 2003 – December 31, 2005

Study Area

Area Limits at West: Bay Ave at 22nd in Hoquiam, limits at East Wishkah & Heron Streets at Monroe in Aberdeen.

Table 1: Collisions by Type 2003 - 2005

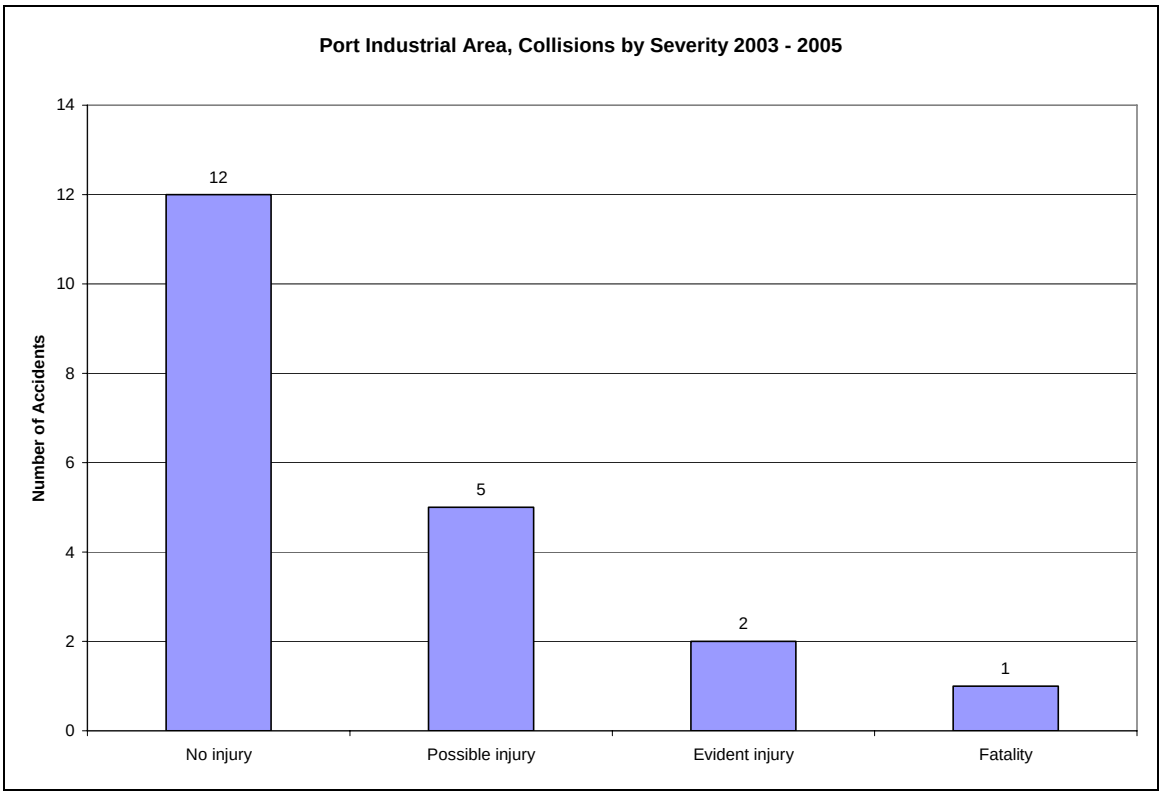
Collision Type	Number of Accidents	Percent
Struck side	10	50%
Struck object	6	30%
Rear end	2	10%
Run off road	1	5%
Sideswipe	1	5%
Total	**20**	**100%**



Under 23 United State Code - Section 409, This data cannot be used in discovery or as evidence at trial in any action for damages against the WSDOT or the State of Washington.

Table 2: Collisions by Severity 2003 - 2005

Severity	Number of Accidents	Percent
No injury	12	60%
Possible injury	5	25%
Evident injury	2	10%
Fatality	1	5%
Total	**20**	**100%**



The single Fatality Statistics:

Feb. 2005, 3:06 p.m. road was wet

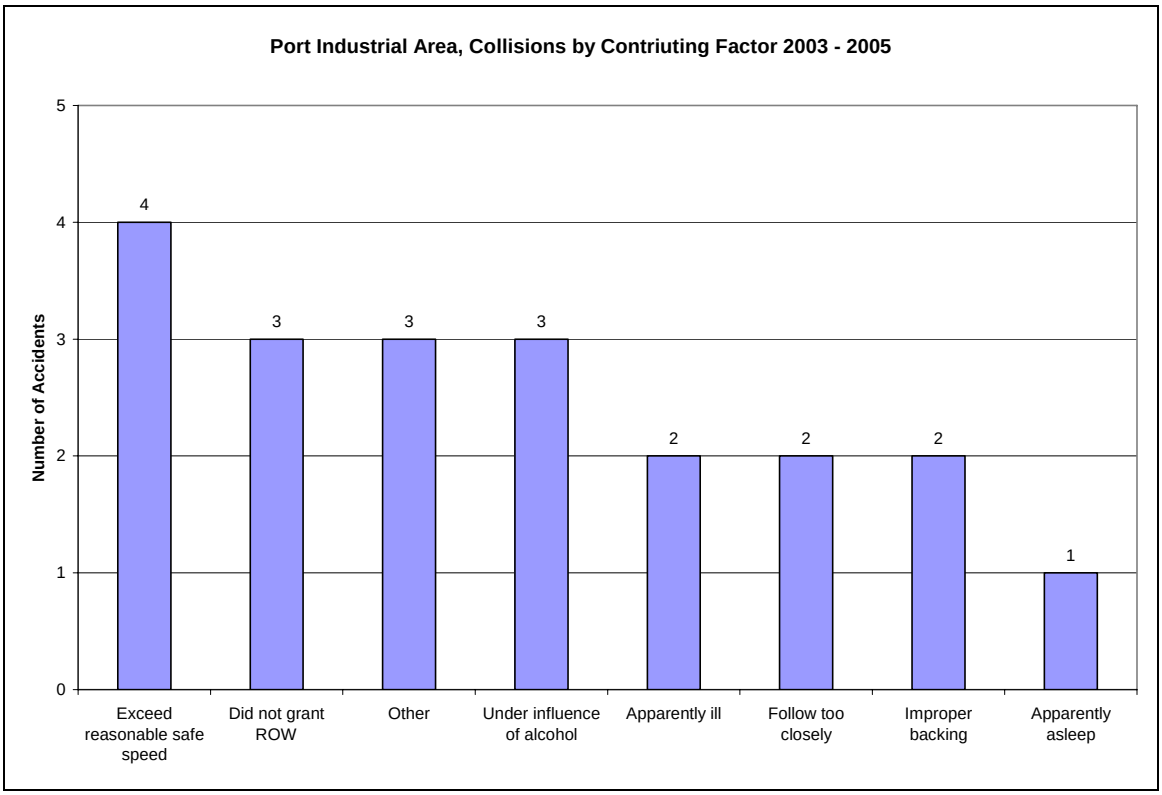
Vehicle 1 Contributing Circumstance: Improper Passing

Collision Type: From opposite direction - both going straight - sideswipe

Vehicle 2 Contributing Circumstance: None

Table 3: Collisions by Contributing Factor

Contributing Factor	Number of Accidents	Percent
Exceed reasonable safe speed	4	20%
Did not grant ROW	3	15%
Other	3	15%
Under influence of alcohol	3	15%
Apparently ill	2	10%
Follow too closely	2	10%
Improper backing	2	10%
Apparently asleep	1	5%
Total	**20**	**100%**



Appendix G

Past Study Summary Sheets

US 101 Regional Circulation Project

A

Study: WA State Highway System Plan 2003 – 2022

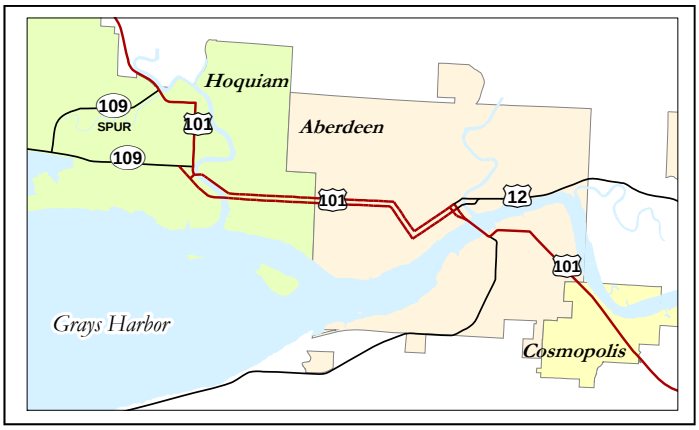
Completed: February 2002

Purpose:

The Washington State Highway System Plan is an element of the Washington Transportation Plan. It is a comprehensive assessment of existing and projected 20 year deficiencies on the Washington State highway system.

- Forecasts future transportation needs.
- Specifies objectives and supporting action strategies.
- Serves as the basis for capital investment goals and strategies.

Study Area



Study area is Washington State. For this project, focus on US 101, US 12, and SR 109.

Recommendations:

Congestion Related Recommendations:

- US 12. US 101 to Wishkah Mall (Tyler Street) High level bridge over the Wishkah River, US 101/US 12 Interchange.
- US 101. SR 105 to Chehalis River Bridge Vicinity, needs further study to determine intersection improvements.
- US 101. Between South "G" and "H" Streets, acquire site west of center for direct access to "H" Street in Aberdeen.
- US 101. Hoquiam River Crossing. Two-Lane High-Level Hoquiam River Crossing with Half Diamond Interchange. Fixed span bridge connecting Bay Ave. to Earley Industrial Way (*from the* Aberdeen-Hoquiam Corridor EIS Phase 1).
- US 101. Alignment of US 101 from Hoquiam River Crossing to SR 109. Four lane facility via 5th Street extension, Airport Way and West Adams to SR 109 (*from the* Aberdeen-Hoquiam Corridor EIS Phase 2, excluding US 12).

Access Management Recommendation:

- US 12. South of Fleet Street to Aberdeen East of City Limits. Purchase of access rights, proposed full.

Safety Recommendation:

- US 101. 16th Street to Aberdeen Couplet. Cross-section improvements, shoulder and lane widening.

Heritage Corridor Recommendation:

- SR 109. Hoquiam to Queets. Develop Corridor Management Plan.

US 101 Regional Circulation Project

B

Study: A Highway *between* the Bays, A Management Plan for the State Route 105 Corridor

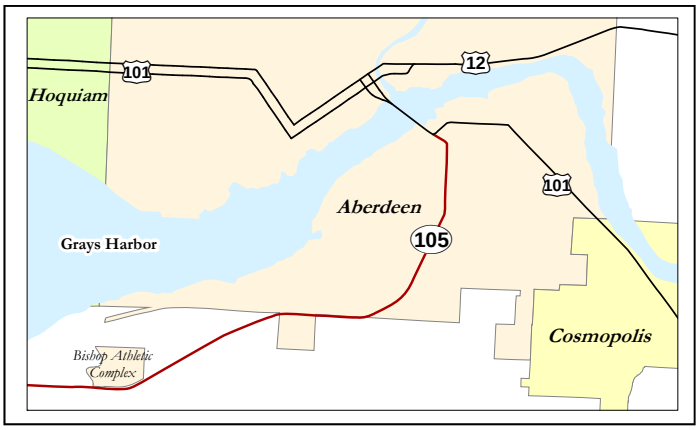
Completed: December 1998

Purpose:

The Corridor Management Plan encourages voluntary partnerships for enhancement projects. It does not increase state or federal involvement in local land use decisions.

Promote coordination between corridor residents, communities, and agencies in making decisions about important corridor issues.

Study Area



State Route 105. For this project focus is on 105 in the Aberdeen vicinity.

Recommendations:

- Boone Spur to US 101. Realign junction.
- Calhoun Road vicinity to Coolidge Road. Potential realignment or guardrail installation.
- Provide SR 105 directional signing from US 101 and US 12, various locations around Aberdeen and Cosmopolis.
- Aberdeen Landing and the Grays Harbor Historic Seaport. Visitor information center, restrooms, interpretative displays and activities.
- Aberdeen Sports Park. Develop parking, restrooms, visitor information kiosk, interpretation. Could include shore access for bird watching and estuary interpretation.

US 101 Regional Circulation Project

C

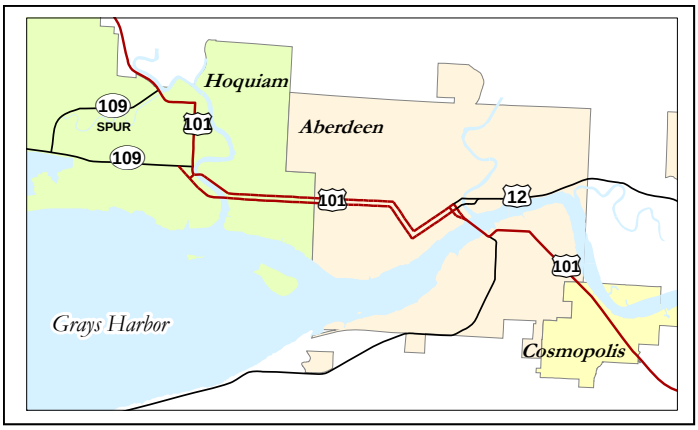
Study: The Washington Coastal Corridor, US 101 Corridor Master Plan

Completed: March 1997

Purpose:

The Coastal Corridor is the US 101 right-of-way as it runs between the coastline and the Olympic Mountains, around the Olympic Peninsula to the southern reaches of Puget Sound. The central goal of the Master Plan is to facilitate a world-class traveling experience while balancing the needs of communities and the general public who rely on the Corridor.

Study Area



US 101 in Washington. This project focuses on the portions of US 101 in Aberdeen, Hoquiam, and Cosmopolis.

Recommendations:

- Interpretative strategies such as kiosks, interpretive pull outs and signs directing travelers to museums, lighthouses, historic homes and businesses.
- Enhance vegetation where the highway passes through developed areas such as Aberdeen, Hoquiam, and Cosmopolis.

US 101 Regional Circulation Project

D

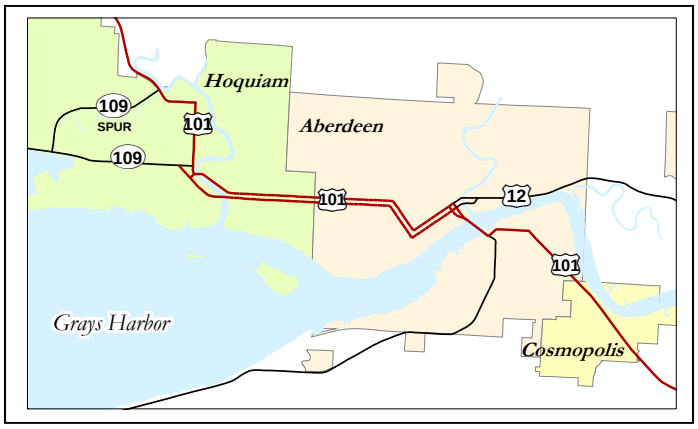
Study: US 101 – US 12 to SR 109
Hoquiam/Aberdeen, WA Feasibility Report

Completed: October 1992

Purpose:

The purpose of this report is to explore an alternative corridor of US 101 around and through the cities of Hoquiam and Aberdeen, as first identified in the 1971 Grays Harbor Area Transportation Study.

Study Area



SR 109 Spur and Emerson Ave (SR 109) in Hoquiam to the intersection of South Tyler Street and US 12 in East Aberdeen.

Recommendations:

Minor Improvements

- Provide inter-jurisdictional signal coordination between Hoquiam and Aberdeen, and also south of the Chehalis River Bridge.
- Connect State Street to Port Industrial Rd to remove trucks from the Aberdeen central business district.
- Restrict bridge openings between 7-9 AM and 4-6 PM except for emergencies.
- Improve signing and striping along the state routes and truck routes to improve motorist's guidance.
- Provide raised channelization along Lincoln Street South of Emerson Ave to improve traffic operations.
- Finalize design of minor geometric improvements along the existing state and truck routes.
- Conduct a parking needs inventory or study concerning possible parking restrictions along portions of US 101.

Major Improvements

- Build a new high-level bridge over the Hoquiam River with access at 'N' Street and Bay Avenue.
- Construct a new, limited access roadway from the Alder Street/State Street intersection to Emerson Avenue, at least 5 intermediate signalized access points.
- Remove the 'G' and 'H' Street ramps, and construct a new low-level US 101/US 12 interchange.
- Provide limited access on State Street between the Chehalis River Bridge ramps and Alder/State Street intersection.
- Incorporate the provision for drainage of floodwaters into roadway design.
- Provide for noise barriers on new highway construction.

US 101 Regional Circulation Project

E

Study: Aberdeen-Hoquiam Corridor Project
Final Environmental Impact Statement

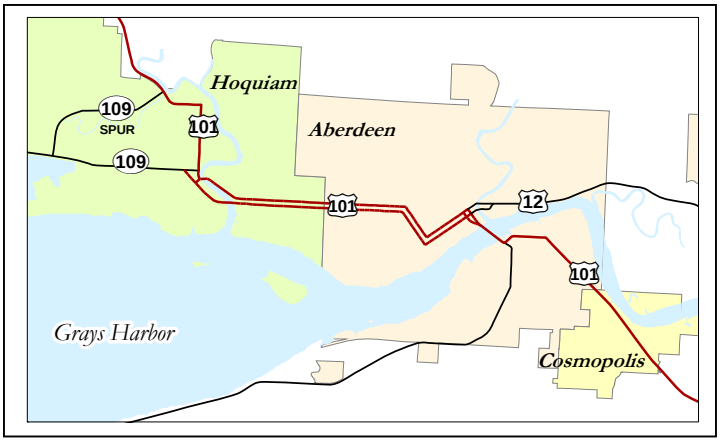
Completed: April 2000

Purpose:

Improvements are needed in the Aberdeen-Hoquiam area for existing highway routes US 12, US 101, and SR 109. Operational conflicts involving truck, local, and tourist traffic occur causing traffic congestion and delays.

The purpose of the US 101 Aberdeen-Hoquiam Corridor project is to evaluate and recommend appropriate transportation improvements which would best provide a more functional, safe and efficient transportation corridor through the Cities of Aberdeen and Hoquiam.

Study Area



US 101 from US 12 in Aberdeen to SR 109/SR 109 Spur in Hoquiam.

Recommendations:

The preferred alternative recommends an alignment for a new four-lane facility with high level structures over the Wishkah and Hoquiam Rivers through the cities of Aberdeen and Hoquiam.

Segment 1 alignment begins along US 12 at the South Fleet Street intersection, crosses over the Wishkah River on a new high fixed span bridge proving a high level of clearance over the river, completes the US 101/US 12 interchange, and continues along State Street.

Segment 2 alignment continues to a fairly direct connection from State Street (at Washington St.) to Wishkah Street (at East Terminal Way), connects to a new alignment along the railroad right-of-way, and then continues to Bay Ave.

Segment 3 alignment follows Bay Avenue, crosses over the Hoquiam River on a new high fixed span bridge, continues along a new alignment south of the railroad, connects to Earley Industrial Way, and continues to 5th Street.

Segment 4 alignment follows the 5th Street Extension and Airport Way to a new alignment north of Airport Way and west of Adams Street, continues on the new alignment and connects to SR 109 east of Paulson Road, follows SR 109, and terminates at the SR 109/ SR 109 Spur junction.

Projects identified for Phase I include:

- Hoquiam River Bridge construction (Segment 3).
- State Street alignment (Segment 2).
- Construct bus pullouts on existing US 101 route, provide bike racks on busses, lift equipped busses and transit center improvements.
- Institute ride-sharing programs and/or staggered work hours to reduce commute time congestion.

US 101 Regional Circulation Project

F

Study: Port Industrial Road Strategic Analysis

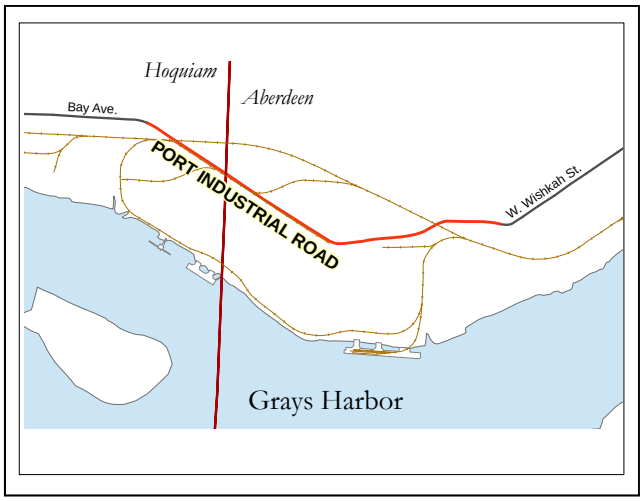
Completed: March 2006

Purpose:

The purpose of the Strategic Analysis is to improve safety and mobility by identifying roadway deficiencies related to access and competing users; rail, truck, freight, and local traffic on Port Industrial Road.

Over the next 20 years 75 percent of the intersections along the Port Industrial Road corridor will exceed reasonable congestion standards. This degree of congestion will have significant impacts on the marketability and viability of the Port of Grays Harbor to maintain a profitable port, as well as significant impacts on the safety and mobility of vehicle travel in, around, and through the corridor.

Study Area



The study area extends from the railroad tracks to the north, 28th Street to the west, East Terminal Way/Jefferson Street to the east, and Grays Harbor to the south.

Recommendations:

Short-term *(Number 1 recommended alternative)*

- Additional left-turn pockets on Port Industrial Road at Industrial Way and Jeffries Street.
- Right turn pockets on Port Industrial Road at Commerce Street and Myrtle Street.
- Side streets that require left turn pockets at Port Industrial Road include Myrtle Street and Commerce Street.

The short-term projects can be built in three phases or grouped into one project (Third Lane Project) and constructed as funds become available and traffic increases warrant.

Long-Term

- Intelligent Transportation System (ITS) technology. With the approach of a train, identified by electronic devices upstream of the study area, drivers could be informed with electronic changeable message signs of the imminent train and diverted before reaching the problem area.
- Rail Relocation. Beginning just east of Port Industrial Road on the east end of the study area, and ending in the vicinity of the existing rail crossing near 30th Street. The railroad would be relocated south of Port Industrial Road, such that an at-grade crossing at both ends of the study would be completely eliminated.
- Grade-separation. The grade-separation of the existing rail line and Port Industrial Road at one or both existing rail crossings. It is estimated that Port Industrial Road would need to begin elevation approximately 1000 to 1500 feet before and after the railroad. This alternative would have a significant negative impact on access to Port Industrial Road within the grade separated limits.

US 101 Regional Circulation Project

G

Study: Route Development Plan US 12
City of Aberdeen to Grand Mound

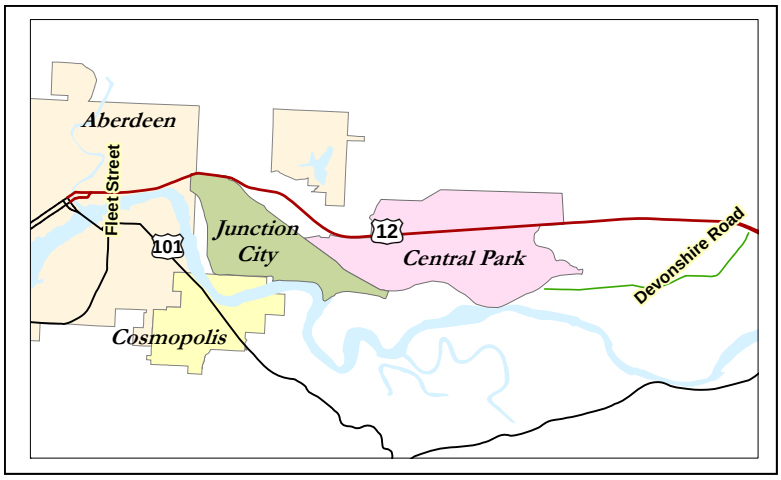
Completed: April 1999

Purpose:

The purpose of the US 12 RDP is to identify strategies for improving existing and future deficiencies on US 12.

The RDP also serves as a planning tool to be used by local and regional agencies when planning for transportation and land uses along US 12 and by WSDOT for developing highway projects.

Study Area



US 12 from Aberdeen to Grant Mound. For this project focus is on the portion of US 12 between Fleet Street and Devonshire Road.

Recommendations:

US 12 between Fleet Street and Devonshire Road:

- Control access points on US 12 by reducing the number of private driveways and public intersections, and constructing frontage roads.
- Provide consistent roadway shoulder widths to meet 4' median barrier on inside lane and 10' shoulders on outside.
- Provide effective signing to direct travelers to and from their destinations using alternate routes, where feasible.
- Support travel demand management strategies such as encouraging people to walk, bicycle, carpool or use transit options.
- Possible future traffic signal candidates: Sargent Blvd, Lake Aberdeen Rd/Central Park Dr, Karjala Rd *or* Solki Rd, Pioneer Rd, Deer Park Rd, Clemons Rd.
- Identified high accident corridors:
  - Tyler Street vicinity to Central Park/Aberdeen Lake Road. Proposed strategies includes cross section/geometric improvements and grade separation.
  - Linkshire Drive vicinity to Bryrwood Drive vicinity. Proposed strategies include cross section/geometric improvements, access and operational improvements.
  - Clemons Road vicinity to Montesano West City Limits vicinity. Proposed strategies include construct interchange (Clemons Road) grade separation, geometric improvements and frontage roads.

US 101 Regional Circulation Project

H

Project: Washington State Department of Transportation Projects

Completed: No information

Purpose:

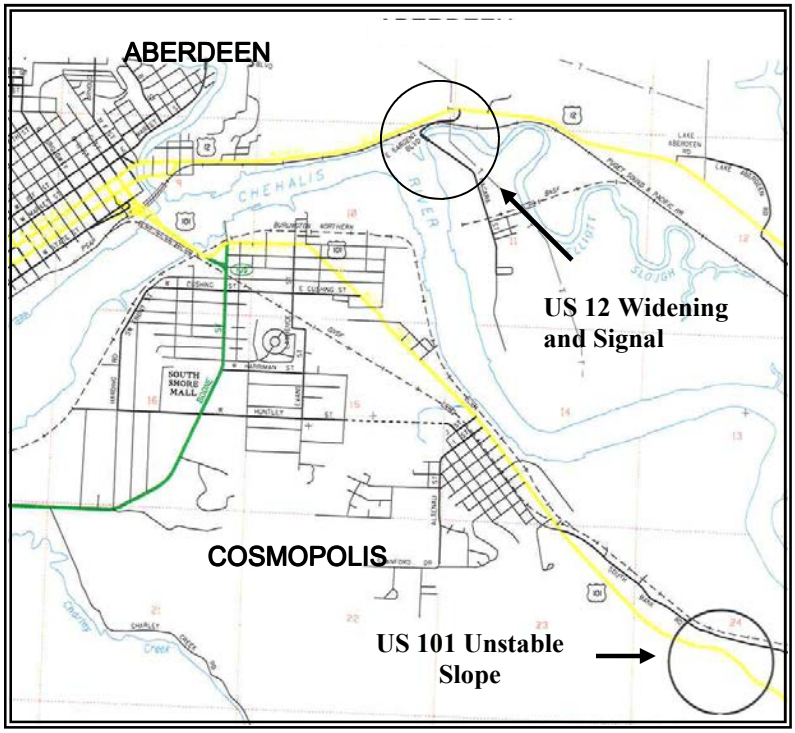
US 12 Sargent Boulevard Intersection Widening and Signal Project

Channelization and signalization. This project proposes to reconstruct Sargent Boulevard intersection and control US 12 traffic at the intersection to provide safer traffic movement.

US 101 Unstable Slope Milepost 79.4

This project proposes to repair an area of unstable hillside. Further investigation of the rocks and soil is required to determine the best way to stop the landslides.

Study Areas



Recommendations:

US 12 Sargent Boulevard Intersection Widening and Signal Project

- Widen US 12 five feet to the north to enlarge the acceleration lane and revise the turn-lane onto Sargent Boulevard.
- Install traffic signals controlling US 12 eastbound, traffic entering from Sargent Boulevard and traffic entering Sargent Boulevard from US 12.

US 101 Unstable Slope Milepost 79.4

- The recommendation is to drill borings near the base of the US 101 roadway embankment and at a location down slope of the power line easement and that inclinometers and piezometers be installed at each location to measure movement and water levels.
- Based on geological testing, the solutions might include installing horizontal drains to remove excess water from the slope, constructing a wall near the top of the embankment, or both.

US 101 Regional Circulation Project

I

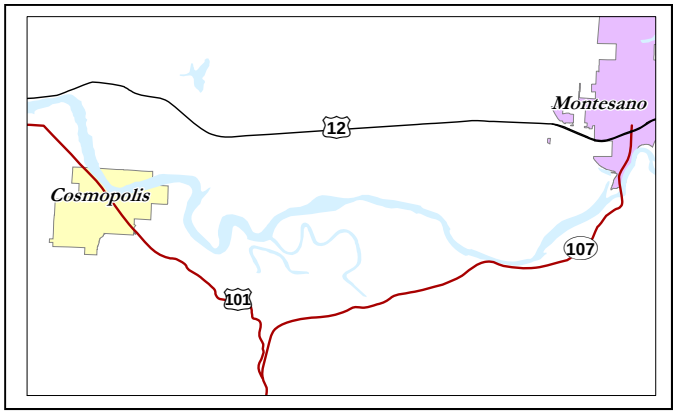
Study: Route Development Plan SR 107 and US 101

Completed: October 1997

Purpose:

A viable alternative is needed for travelers, intermodal transfer and shipment of freight heading to and from destinations south of Grays Harbor such as Cosmopolis, Westport or Raymond. The purpose of the RDP is to provide a detailed analysis of potential improvements to SR 107 and US 101.

Study Area



SR 107 and 5 mile segment of US 101, between Montesano and Cosmopolis.

Recommendations:

- US 101 Cosmopolis south city limits to north city limits. Convert parking lanes into added through lanes, creating two lanes in each direction.
- SR 107 Lempie Road Vicinity to Blue Slough Road Vicinity. Realign horizontal and vertical curves, widen lanes and shoulders, add westbound passing lane.
- SR 107 Blue Slough Road Vicinity to Preachers Slough Road Vicinity. Realign horizontal and vertical curves, widen lanes and shoulders, add slow vehicle turn out.
- SR 107 Preachers Slough Road Vicinity to Minkler Road Vicinity. Widen lanes and shoulders, realign horizontal curves.
- SR 107 Minkler Road Vicinity to Boat Launch Road Vicinity. Widen lanes and shoulders, improve intersection, bridge replacement or parallel structure.
- SR 107 Boat Launch Road Vicinity to Vicinity US 12. Widen lanes and shoulders, realign roadway, and replace two timber trestle bridges.

Appendix H

Cost Estimate Report

Cost Estimate Report

US 101 Regional Circulation Project

December 2006

Grays Harbor, Washington

Prepared for:

Grays Harbor Council of Governments
115 South Wooding Street
Aberdeen, Washington 98520

Washington State Department of Transportation
Olympic Region
5720 Capitol Boulevard
Tumwater, Washington 98501

Prepared by:

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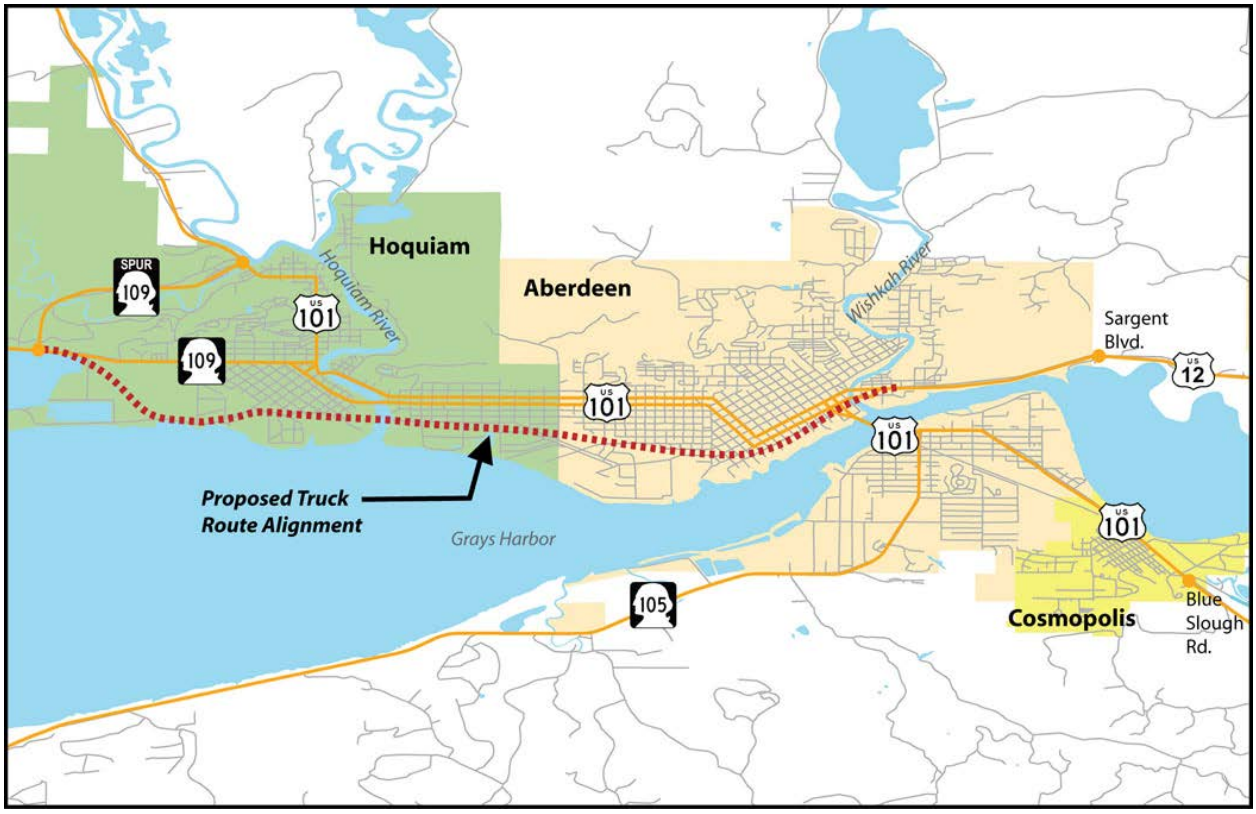
Background and Cost Summary

As a product from the Washington State 2006 Supplemental Budget (SSB6241), this report presents a cost analysis of several regional projects in the Aberdeen, Hoquiam, and Cosmopolis region (**see Figure 1**). The purpose of the legislative funding is to begin implementation of an improved transportation circulation plan near the cities of Aberdeen, Hoquiam, and Cosmopolis.

Figure 1

Vicinity Map



The Washington State Department of Transportation (WSDOT) and the Grays Harbor Council of Governments (GHCOG) provided leadership and formed the US 101 Regional Circulation Project – Stakeholder Committee, comprised of representatives of agencies in the area. The committee identified and prioritized a list of transportation projects that could be initiated and undertaken in the immediate future.

The original list of projects and ranking are included in **Appendix A**. The purpose of this report is to describe the top ten priority projects and their costs for design and construction and the associated costs of each with consideration of the following:

1. Right-of-way, Acquisition, and Relocation Costs
2. Roadway Construction Costs

3. Bridge Construction Costs
4. Preliminary Engineering and Design (including all environmental documentation)
5. Construction Management
6. Contingencies
7. Sales Tax (8.3%)
8. Estimated costs are in 2006 dollars
9. All improvements will follow WSDOT design standards

The top ten projects and their related costs are included in **Table 1**.

The following projects are representative of the components comprising the full truck route alternative. Funding for reevaluation of the NEPA Environmental Impact Statement (EIS) (priority 1a) and funding for environmental documentation (priority 1b) must be completed prior to segment construction as indicated in the "Grays Harbor County Stakeholder Committee Project Priority List." The west-to-east delineation is for orientation purposes only. Segment phasing will be determined through reevaluation of the NEPA EIS; early engineering, including phasing analysis; and environmental documentation.

Table 1

Project Cost Summary

		Included In			
1. Truck Route Alternative	**Item Cost**	**West Quarter**	**Half Quarter**	**East Quarter**	**Full Quarter**
1a. Reevaluation of the NEPA EIS; Early Engineering Including Phasing Analysis	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000
1b. Environmental Documentation	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000
SR 109 Spur Junction to SR 109 at Paulson Road	$3,600,000	$3,600,000			$3,600,000
New Alignment from Paulson Road to Fifth Street	$18,900,000	$18,900,000			$18,900,000
New Alignment from Fifth Street along the Railroad to Tenth Street	$5,700,000	$5,700,000			$5,700,000
New Hoquiam River Bridge	$136,000,000	$136,000,000			$136,000,000
22nd and 23rd Streets to 30th Street	$16,100,000		$16,100,000		$16,100,000
New Alignment from 30th Street to Port Industrial Road	$10,500,000		$10,500,000	$8,000,000	$10,500,000
Port Industrial Road Improvements*	$3,600,000	$3,600,000			
Port Industrial Road to Wishkah Street	$900,000		$900,000	$900,000	$900,000
New Alignment from Wishkah Street to State Street	$9,700,000		$9,700,000	$9,700,000	$9,700,000
State Street from Park Street to South K Street	$2,600,000		$2,600,000	$2,600,000	$2,600,000
US 101 / US 12 Connection	$40,000,000		$40,000,000	$40,000,000	$40,000,000
New Wishkah River Bridge	$134,000,000		$134,000,000	$134,000,000	$134,000,000
	TOTAL COST	**$175,800,000**	**$221,800,000**	**$198,800,000**	**$386,000,000**

Note: Estimates have been adjusted from estimates in Appendix E (Cost Estimate Backup) to account for early engineering and phasing analysis.

*See Project No. 4.

Table 1

Project Cost Summary

2. Intelligent Transportation System (changeable message signs, photo enforcement, etc.)		
TOTAL COST		**$9,280,500**
3. Tri-City Operation Improvements		
City of Aberdeen		
Wishkah and Heron Streets – Road Widening	$1,644,000	
Heron Street and Park Street Intersection	$79,000	
Wishkah Street and Alder Street Intersection	$67,000	
First Street and Alder Street Intersection	$43,000	
Oak Street and Simpson Avenue Intersection	$300,000	
Activate Traffic Actuation System	$32,000	
Replace Span Wire Signal System (L, Wishkah, Heron, Alder, Park, and First Streets)	$1,800,000	
Sidewalk Improvements Along State Routes to Meet ADA Standards	$1,292,000	
Extend Bulb-Out Project on Wishkah and Heron Streets to L Street	$547,000	
Intersection Improvements, South Aberdeen Fire Station	$104,000	
Subtotal	**$5,908,000**	**$5,908,000**
City of Cosmopolis		
US 101 Center Turn Lane Between Lions Park and Blue Slough Road	$506,000	
US 101 Sidewalk Construction Between First Street and H Street	$1,329,000	
Install Left-Turn Pocket at Mill Creek Pedestrian Link Bike Trail Entrance; US 101 and First Street	$200,000	
Subtotal	**$2,029,000**	**$2,029,000**
City of Hoquiam		
US 101 N/Lincoln Street and Sixth Street Intersection	$250,000	
East Simpson Avenue (US 101) and Seventh Street Streetscape, Pedestrian and Economic Development	$350,000	
Central Business District ADA Ramp Improvements	$300,000	
Riverside Bridge and Approaches Signage and Lighting	$150,000	
Simpson Avenue Bridge Approach Improvements	$450,000	
Spencer Street and Simpson Avenue Intersection Improvements	$450,000	
Subtotal	**$1,950,000**	**$1,950,000**
TOTAL COST	**$9,887,000**	**$9,887,000**
4. Improve Port Industrial Road		
TOTAL COST		**$3,598,000**
5. Cosmopolis Downtown Revitalization		
TOTAL COST		**$1,329,000**
6. Rail Car Storage Yard East of Aberdeen		
TOTAL COST		**$4,300,000**

Table 1

Project Cost Summary

7.	**Replace Existing Hoquiam Bridges**		
	High-Level Bridges	$153,626,000	
	Low-Level Bridges	$140,716,000	
	TOTAL COST	**$294,342,000**	**$294,342,000**
8.	**Relocate Rail Line South of Port Industrial Road to Eliminate All At-Grade Crossings**		
	TOTAL COST		**$8,140,000**
9.	**Complete Seismic Upgrades to Area Bridges**		
	TOTAL COST		**$20,000,000**
10.	**Alternate Access to Wishkah Mall and Relocate Rail**		
	Phase I	$500,000	
	Phase II	$3,500,000	
	TOTAL COST	**$4,000,000**	**$4,000,000**

1. Truck Route Alternative

The Truck Route Alternative proposed in this cost analysis includes an update of the cost estimate to the 2000 Aberdeen-Hoquiam Corridor Environmental Impact Statement Preferred Alternative. It consists of the full route and three portions of the full corridor improvement project. The original environmental impact study area is located along the US 101 Corridor, which runs through the cities of Aberdeen and Hoquiam in Grays Harbor County. This report calls the project the US 101 Truck Route Alternative.

The Preferred Alternative emerged from the 1971 Grays Harbor Area Transportation Study, which recommended a US 101 "Central Alternate Corridor" to reduce competition between trucks, local, and tourist traffic on the US 101 couplet. The Central Alternate Corridor was updated in 1991 with the US 101-US 12 to SR 109, Hoquiam/Aberdeen Washington Feasibility Study. The 1991 study solidified corridor location and in 1993; a formal NEPA/SEPA Environmental Impact Statement (EIS) analysis was initiated. Proposed alternatives were developed and a Record of Decision (ROD) for a Preferred Alternative IV A/B was approved in 2002.

The Truck Route Alternative alignment is included in **Figure 2.** The Truck Route Alternative segments are included in **Figure 2.**

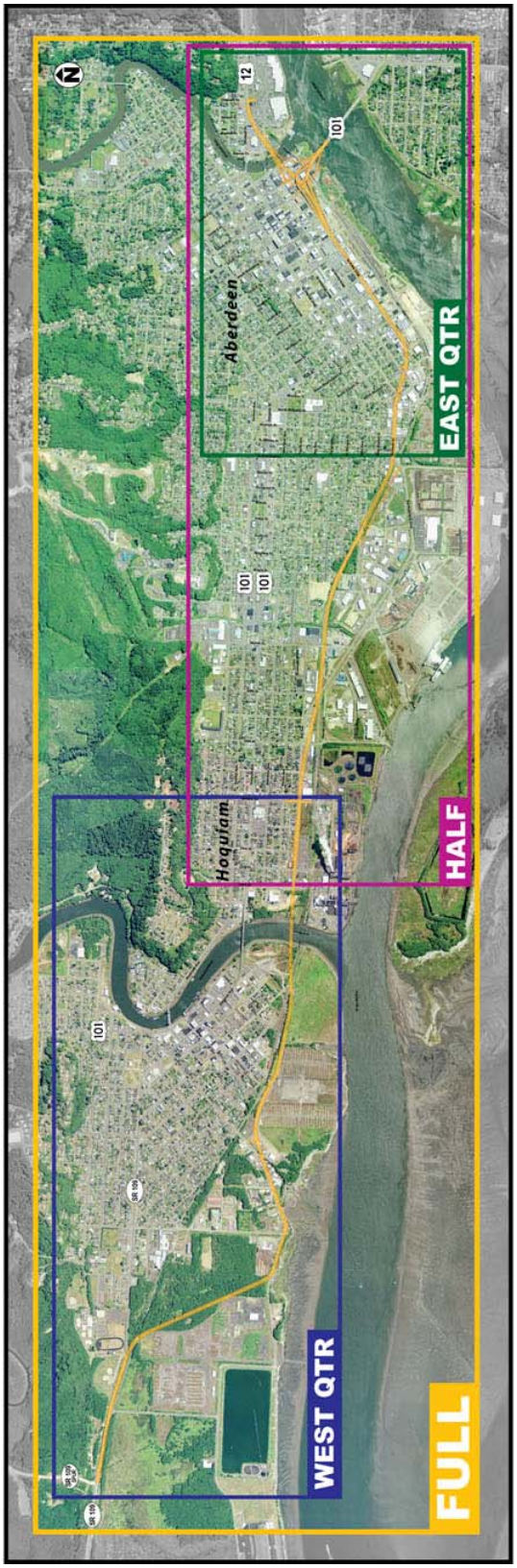
No further action has been taken on the project. The Federal Highway Administration (FHWA) has established criteria stating that if no action is taken on a project within three years after approval of a ROD, a written reevaluation must be submitted to FHWA to determine whether the EIS is still valid. If it is not valid, a supplemental EIS may be required.

The Stakeholder Committee decided that the most efficient approach to handle the reevaluation of the EIS would be to group this initial task with an early engineering and a project phasing analysis. The Stakeholder Committee felt that it is essential to evaluate the sequence of construction of the full US 101 Truck Route Alternative during the phasing of construction in order to maximize project benefits, possibly over several years. Results of project early engineering would make available to a value engineering team necessary data, design concepts, impacts, and benefits in order to produce a project phasing recommendation. Accordingly, as a contingency to the results of this initial task, a NEPA Supplemental EIS is included.

The Preferred Alternative improves circulation patterns for US 12, US 101 and SR 109 in the Aberdeen-Hoquiam area by removing truck traffic from the downtown areas. The Preferred Alternative addresses concerns by providing a four-lane limited access roadway and new bridges along what is currently a truck bypass route.

Design Standards and Constructibility Issues are included in **Appendix B.** Detailed cost analysis is included in **Appendix E.**

The Truck Route Alternative would be a four-lane facility that would extend from the SR 109 Junction easterly on SR 109. It would then proceed along a new alignment to the south and east with high level bridges over the Hoquiam River and Wishkah River before connecting with US 12.



FULL

High-level Wishkah River Bridge; US 101 / SR 12 connection; State St.; new route to north of railroad (in Aberdeen); high level Hoquiam River Bridge; new route north and parallel to railroad (in Hoquiam) to SR 109.

Requires update of the EIS.

WEST QUARTER

High-level Hoquiam River crossing; continues along a new alignment along the railroad; connects to SR 109 east of Paulson Road, follows SR 109 and terminated at the SR 109/SR 109 Spur junction.

Requires update of the EIS.

HALF

High-level Wishkah Bridge; US 101 / SR 12 connection; new route North of railroad in Aberdeen to 22/23 St. (No new Hoquiam River Bridge).

Requires update of the EIS.

EAST QUARTER

High-level Wishkah Bridge; US 101 / SR 12 connection; connect State Street to Port Industrial Road; Port Industrial Road improvements.

Requires update of the EIS.

Proposed Truck Route

Figure 2
Truck Route Alternative – Full, West Quarter, East Quarter, and Half

The Truck Route Alternative segments for the West Quarter, East Quarter, and Half are broken down in the following segments. Individual projects are not prioritized, but are listed from west to east for clarity. Cost for each segment is also included.

West Quarter:

- SR 109 Spur Junction to SR 109 at Paulson Road
- New Alignment from Paulson Road to Fifth Street
- New Alignment from Fifth Street along the Railroad
- New Hoquiam River Bridge

Half, Including East Quarter:

- 22nd and 23rd Streets to 30th Street
- New Alignment from 30th Street to Port Industrial Road
- Port Industrial Road to Wishkah Street

East Quarter:

- Port Industrial Road Improvements (included as Project No. 4)
- New Alignment from Wishkah Street to State Street
- State Street from Park Street to South K Street
- New Wishkah River Bridge
- US 101 / US 12 Connection

SR 109 Spur Junction to SR 109 at Paulson Road

The Truck Route Alternative alignment would follow the existing roadway alignment and would be widened to WSDOT design standards for vehicles, bicycles, and pedestrians.

Table 2

Segment 1:
SR 109 Spur Junction to SR 109 at Paulson Road
Estimated Cost

Item	Cost
Right-of-Way	$270,000
Roadway Construction	$2,036,335
Preliminary Engineering	$461,267
Construction Management	$230,633
Contingencies	$345,950
Sales Tax	$277,567
TOTAL COST	**$3,621,753**

New Alignment from Paulson Road (SR 109) to Fifth Street

The four-lane Truck Route Alternative described in the 2000 Aberdeen-Hoquiam Corridor EIS would continue southeasterly on new alignment to Airport Way where it would follow Airport Way to the intersection of Earley Industrial Way and Fifth Street. Intersection improvements would occur at Paulson Street, Adams Street, Second Street, and Fifth Street.

The Stakeholder Committee discussed the possibility of recommending that the new alignment follow the existing railroad tracks from near Emerson Avenue south-easterly to Earley Industrial Way. During the reevaluation of the 2000 Aberdeen-Hoquiam Corridor EIS, this alternative to the approved alignment would be assessed.

Table 3

Segment 2: Paulson Road (SR 109) to Fifth Street Estimated Cost

Item	Cost
Right-of-Way	$2,304,000
Roadway Construction	$9,731,444
Preliminary Engineering	$2,407,089
Construction Management	$1,203,544
Contingencies	$1,805,317
Sales Tax	$1,448,466
TOTAL COST	**$18,899,859**

New Alignment from Fifth Street Along the Railroad to Tenth Street

The four-lane alignment would follow Earley Industrial Way in an easterly direction to approximately Tenth Street where it would connect to the new high-level Hoquiam River fixed-span bridge.

Table 4

Segment 3: Fifth Street Along Railroad to Tenth Street Estimated Cost

Item	Cost
Right-of-Way	$660,000
Roadway Construction	$2,981,474
Preliminary Engineering	$728,295
Construction Management	$364,147
Contingencies	$546,221
Sales Tax	$438,251
TOTAL COST	**$5,718,389**

New Hoquiam River Bridge

A new Hoquiam River Bridge would be a high-level fixed-span structure over the Hoquiam River. The bridge structure would begin at approximately Tenth Street from Earley Industrial Way, rising as it follows along the alignment of Bay Avenue. It would cross over the Hoquiam River before touching down on Bay Avenue near Ontario Street. **See Figure 3**.

The approach structures will need to be elevated because the minimum navigation channel vertical clearance required by the US Coast Guard is 75 feet and the minimum navigational channel horizontal clearance is 125 feet. The approach structures needed on both sides of the bridge to elevate the roadway this high would be approximately 1,500 feet long on each side of the new bridge. Similarly, the minimum railroad vertical clearance is 23.5 feet with minimum horizontal clearance of 18 feet. The existing railroad alignment would cross under the new roadway alignment at a high 80-degree skew on the western side of the Hoquiam River, making it almost parallel to the new bridge. In order to provide the required vertical clearance for the railroad, the western side of the new bridge would be 600 feet longer than previously estimated.

Table 5

Segment 4: New Hoquiam River Bridge Estimated Cost

Item	Cost
Right-of-Way	$2,720,000
Roadway Construction	$2,424,000
Bridge Construction	$81,652,164
Preliminary Engineering	$17,359,233
Construction Management	$8,679,616
Contingencies	$13,019,425
Sales Tax	$10,445,918
TOTAL COST	**$136,300,356**

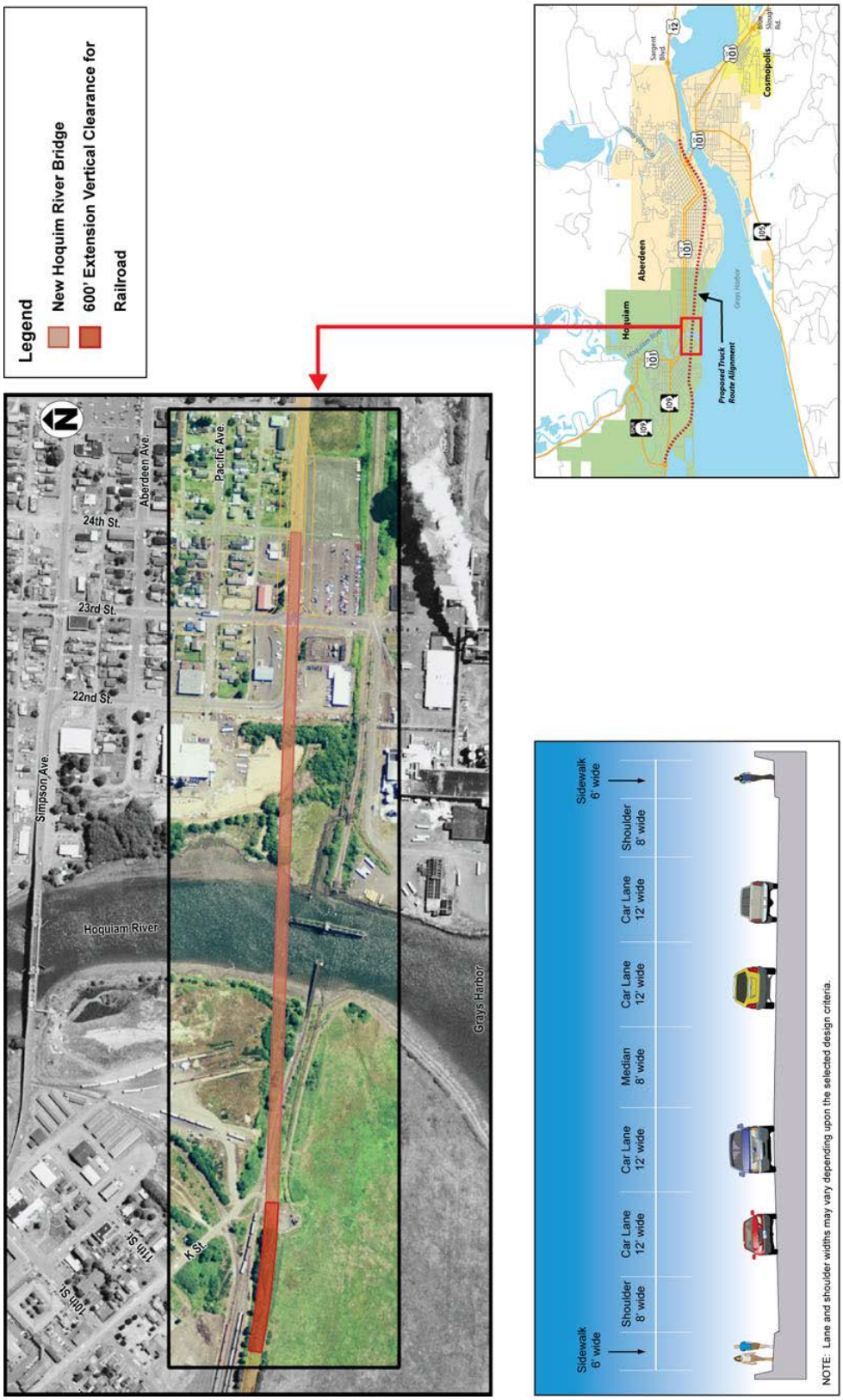


Figure 3
New Hoquiam River Bridge

22nd and 23rd Streets to 30th Street

The Truck Route Alternative alignment follows existing Bay Avenue to the east. Roadway improvements along the Truck Route Alternative at this location would include connections to 22nd Street and 23rd Street parallel to the Hoquiam River Bridge. There would also be improved intersections at Ontario Street, 28th Street, and 30th Street. Connections to other cross streets would be closed.

Table 6

Segment 5: 22nd and 23rd Streets to 30th Street Estimated Cost

Item	Cost
Right-of-Way	$5,396,184
Roadway Construction	$4,865,745
Preliminary Engineering	$2,052,386
Construction Management	$1,026,193
Contingencies	$1,539,289
Sales Tax	$1,235,023
TOTAL COST	**$16,114,819**

New Alignment from 30th Street to Port Industrial Road

From the Bay Avenue and 30th Street Intersection, the Truck Route Alternative alignment follows along the north side of the railroad tracks where the rail line would be realigned to the south. The rail line remains in the existing railroad right-of-way.

Table 7

Segment 6: 30th Street to Port Industrial Road Estimated Cost

Item	Cost
Right-of-Way	$100,000
Roadway Construction	$6,582,415
Preliminary Engineering	$1,336,483
Construction Management	$668,242
Contingencies	$1,002,362
Sales Tax	$804,229
TOTAL COST	**$10,493,731**

Port Industrial Road to Wishkah Street

The four-lane Truck Route Alternative extends easterly from the Port Industrial Road and E. Terminal Way intersection along existing Wishkah Street to the vicinity of the Wishkah Street and Division Street Intersection. The Wishkah Street and Division Street intersection would be reconstructed.

Table 8

Segment 7: Port Industrial Road to Wishkah Street Estimated Cost

Item	Cost
Right-of-Way	$0
Roadway Construction	$575,877
Preliminary Engineering	$115,175
Construction Management	$57,588
Contingencies	$86,381
Sales Tax	$69,307
TOTAL COST	**$904,328**

New Alignment from Wishkah Street to State Street

Referred to as the "State Street Connection," the Truck Route Alternative alignment begins at the Division Street intersection and continues along a new alignment in a southeasterly direction before connecting to State Street at Park Street. Several streets would be terminated and cul-de-sacs would be constructed. **See Figure 4.**

Table 9

Segment 8: Wishkah Street to State Street Estimated Cost

Item	Cost
Right-of-Way	$2,165,000
Roadway Construction	$4,025,000
Preliminary Engineering	$1,238,000
Construction Management	$619,000
Contingencies	$928,500
Sales Tax	$744,967
TOTAL COST	**$9,720,467**

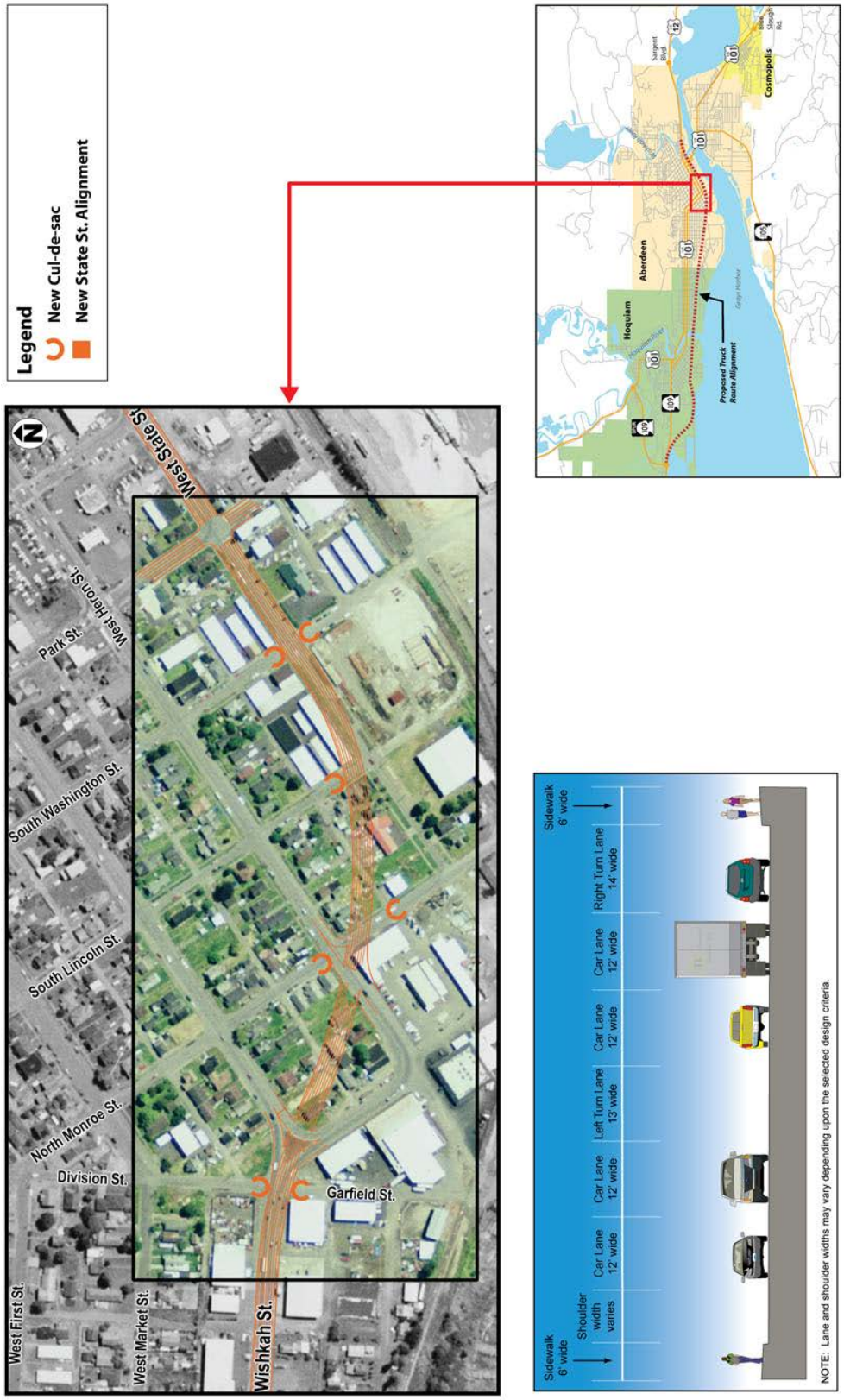


Figure 4
State Street to Wishkah Street Connection

State Street from Park Street to South K Street

The Truck Route Alternative would continue along the existing State Street alignment to the vicinity of South K Street where it would connect to the west end of the new Wishkah River Bridge.

Table 10

Segment 9: Park Street to South K Street Estimated Cost

Item	Cost
Right-of-Way	$20,000
Roadway Construction	$1,627,560
Preliminary Engineering	$329,512
Construction Management	$164,756
Contingencies	$247,134
Sales Tax	$198,284
TOTAL COST	**$2,587,246**

US 101 / US 12 Connection

The proposed interchange ramps for US 101 and US 12 would connect US 12 to and from the east to US 101 to and from the south. The West to South Connection Ramp (from east US 12 to south US 101) would begin east of the Wishkah River, cross the river, curve south over the Wishkah Bridge, and connect to the southwest side of the existing Chehalis River Bridge. The North-to-East Connection Ramp (from south US 101 to east US 12) would begin near the northeast corner of the existing Chehalis Bridge, curve east crossing the Wishkah River at a similar profile as the Wishkah Bridge and tie into the structure just east of the Wishkah River. **See Figure 5.**

Table 11

US 101 / US 12 Connection Estimated Cost

Item	Cost
Right-of-Way	$696,000
Roadway Construction	$1,627,000
Bridge Construction	$23,737,000
Preliminary Engineering	$5,212,000
Construction Management	$2,606,000
Contingencies	$3,909,000
Sales Tax	$2,162,980
TOTAL COST	**$39,949,980**

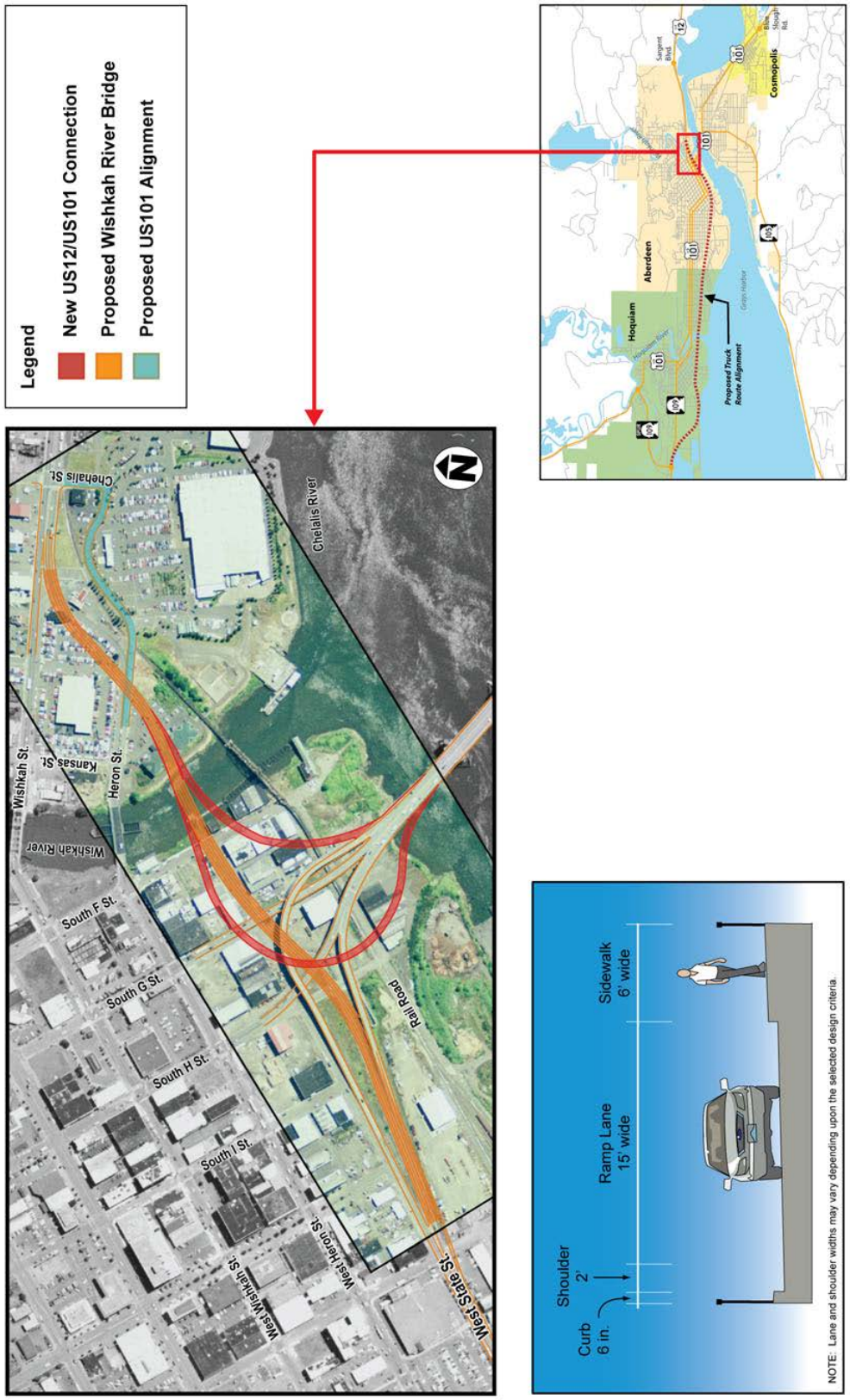


Figure 5
US 12 / US 101 Connection

New Wishkah River Bridge

The Wishkah Bridge would be a fixed span structure for the east-west connection over the Wishkah River. The bridge structure would begin near South K Street, and would pass over F Street, G Street, and H Street, and continue across the Wishkah River before touching down on US 12 near Chehalis Street. The new structure would pass over the existing ramps connecting State Street to US 101.
See Figure 6.

The minimum navigation channel vertical clearance required by the US Coast Guard is 75 feet, and the minimum navigational channel horizontal clearance is 125 feet. The approach structures needed on both sides of the bridge to elevate the roadway this high would be approximately 1,500 feet long on each side of the new bridge.

Table 12

Segment 10: New Wishkah River Bridge Estimated Cost

Item	Cost
Right-of-Way	$7,809,000
Roadway Construction	$2,026,000
Bridge Construction	$75,298,784
Preliminary Engineering	$17,026,757
Construction Management	$8,513,378
Contingencies	$12,770,068
Sales Tax	$10,245,851
TOTAL COST	**$133,689,838**

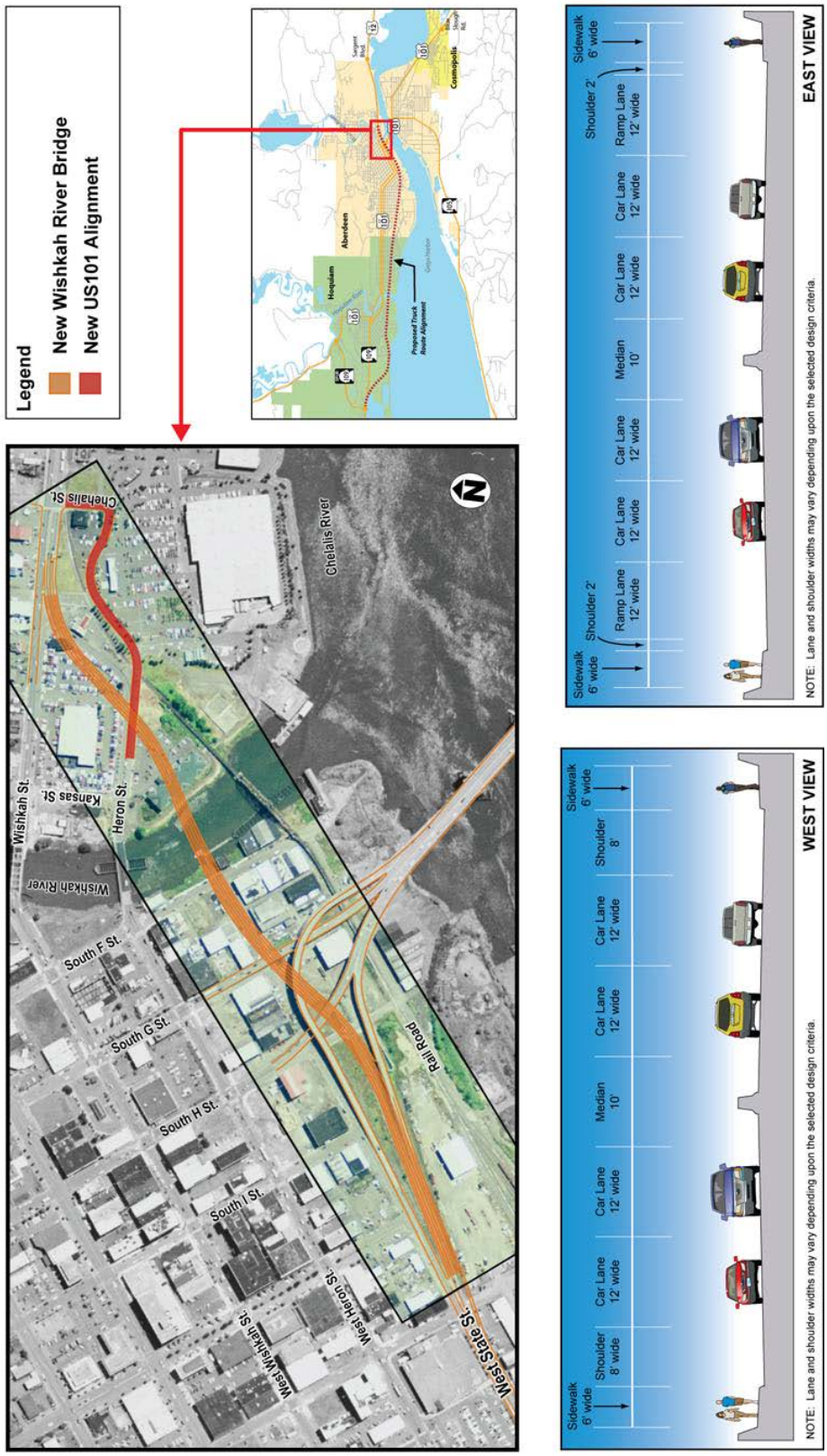


Figure 6
Wishkah River Bridge

2. Intelligent Transportation System

Considerable congestion occurs in Aberdeen, Hoquiam, and Cosmopolis on the state highways linking these communities during bridge opening, train crossings, and high-travel periods to and from the ocean beaches. In addition, there are critical high-accident intersections where apparent traffic violations occur. Recommended operation improvements to help alleviate the congestion and accident problem include the installation of Intelligent Transportation Systems (ITS) at strategic locations. Strategies include installation of Variable Message Signs (VMS) or Highway Advisory Radio to alert travelers of potential or existing problem areas so that they can take alternate routes to avoid the problem area. Recommended traffic accident reduction strategy would include installation of Photo Detection Cameras at critical accident locations to identify traffic regulation violators' license plate identification.

- Variable Message Signs (VMS)
- Closed Circuit Television (CCTV)
- Highway Advisory Radio (HAR)
- Data Station
- Roadway Weather Information System (RWIS)
- Photo Detection Cameras

The recommendations for this ITS project include a planning phase analysis where actual locations and configurations would be confirmed upon further analysis during final design. Specific locations for installation of ITS and Photo Detection Cameras would be determined by WSDOT.

Table 13

ITS (Intelligent Transportation System) Estimated Cost

Item	Cost
Right-of-Way	$139,000
Roadway Construction Costs	$6,190,000
Preliminary Engineering	$616,000
Construction Management	$611,000
Contingencies	$1,210,300
Sales Tax	$514,000
TOTAL COST	**$9,280,300**

3. Tri-City Operational Improvements

The cities of Aberdeen, Hoquiam, and Cosmopolis have identified several operational improvement projects for which they recommend funding consideration. The following operational improvement elements were presented by the cities of Aberdeen, Cosmopolis, and Hoquiam. Some suggested improvements were omitted because they either have been completed or are planned or under construction. Some other suggested improvements need to be examined to determine if they merit consideration. **See Figure 7** for project locations.

City of Aberdeen

- Wishkah and Heron Streets from F Street to L Street – Widen the roadway for 2 feet on each side to reduce side friction and conflicts with the parked cars
- Heron and Park Streets – Widen intersection to improve truck turning movements
- Wishkah Street and Alder Street Intersection – Widen intersection to improve truck turning movements
- First and Alder Streets – Widen right turn to make movement easier and encourage more traffic to use First Street
- Oak Street and Simpson Avenue – Improve intersection operations to increase capacity and safety
- Activate the traffic actuation system for the new signals to allow more green time on the state routes when there is no traffic on the side streets
- L, Wishkah, Heron, Alder, Park, and First Streets – Replace the old span wire signal system on L Street at Wishkah and Heron Streets and on Alder and Park Streets at Market and First Streets to improve signal efficiency with traffic actuation signals
- Provide continuous sidewalks along the state routes and upgrade crossings to meet ADA requirements at the intersections
- Wishkah and Heron Streets – Extend bulb-out project one block to L Street on Wishkah and Heron Streets to improve pedestrian crossings
- Intersection improvements, South Aberdeen Fire Station

City of Cosmopolis

- Center turn lane between Lions Park and Blue Slough Road (part of the downtown revitalization project, WSDOT Aberdeen Project Engineer Office design)
- Completion of sidewalk project, along US 101 from First Street to H Street (part of the downtown revitalization project)
- Install left-turn pocket at the Mill Creek Pedestrian Link bike trail entrance at US 101 and First Street

City of Hoquiam

- US 101 N/Lincoln Street and Sixth Street – The current design has access issues and is confusing to tourists heading to Ocean Shores or the Olympic Peninsula or trying to access downtown Hoquiam. Citizens have suggested many changes to this area including installing a roundabout or total redesign with right-of-way acquisition.
- East Simpson Avenue (US 101) and Seventh Street – City is requesting improvements for pedestrian safety, streetscape, and economic development
- SR 109 (Simpson Avenue) and Spencer Street – Pedestrian and access improvements
- Simpson Avenue Bridge – Approach improvements
- ADA Ramp Improvement in central business district
- Riverside Bridge – Improve signage and lighting; sidewalk leading to bridge

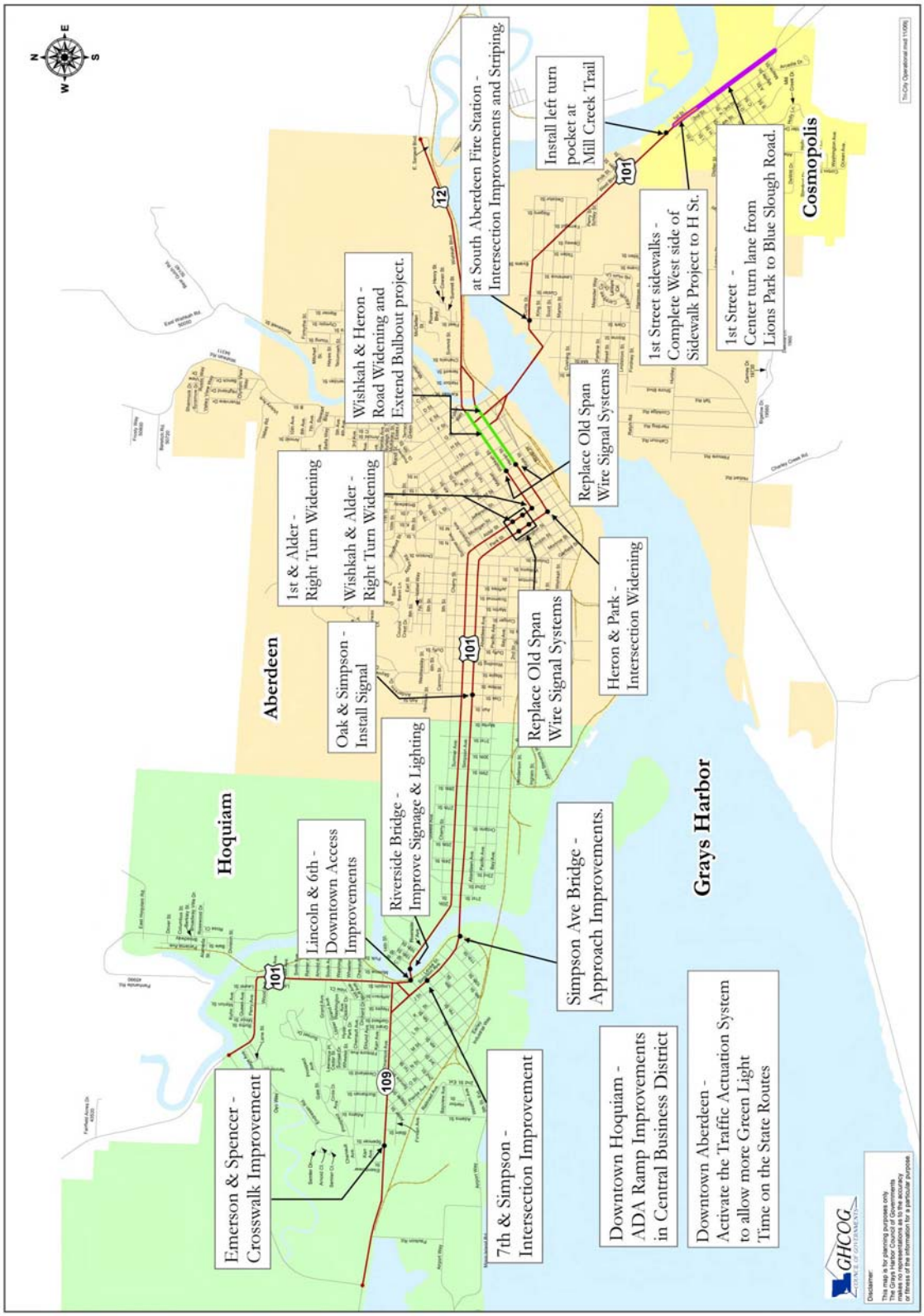


Figure 7
Tri-City Operational Improvements

Project Details

City of Aberdeen

a. Wishkah and Heron Streets – Road Widening

This project is a continuation of street improvements already completed in downtown Aberdeen along Wishkah and Heron Streets between F Street and L Street, including L Street and K Street between Wishkah and Heron Streets. The project would remove the existing curb, gutter, and sidewalk. This project would construct new curb, gutter, and sidewalk so that on-street parking would be 2 feet wider to allow greater room for parking and safer traffic flow. As part of this project, all intersection crosswalks in the project area would be made ADA compliant. **See Figure 8**.

Figure 8

Heron Street – Existing Condition

Table 14

Wishkah and Heron Streets – Road Widening Estimated Cost

Item	Cost
Roadway Construction Costs	$1,046,671
Preliminary Engineering	$209,334
Construction Management	$104,667
Contingencies	$157,001
Sales Tax	$125,967
TOTAL COST	**$1,643,640**

b. Heron Street and Park Street Intersection

The left turn from southbound Park Street onto eastbound Heron Street has an inadequate radius for trucks and other traffic in both turn lanes. The rear wheels of trucks making the turn in the right lane jump the curb onto the sidewalk. Trucks making the turn in the right lane cross over into the left lane. This project would increase the turning radius from 25 feet to 50 feet, thereby correcting this deficiency. This improvement would include some right-of-way acquisition, moving or upgrading the old span wire signals, a fire hydrant, replacement of catch basins, reconstructing the sidewalk, curb and gutter, and new striping. **See Figure 9.**

Figure 9

Heron Street and Park Street Intersection – Existing Condition

Table 15

Heron Street and Park Street Intersection Estimated Cost

Item	Cost
Right-of-Way	$10,000
Roadway Construction Costs	$40,018
Preliminary Engineering	$10,004
Construction Management	$5,002
Contingencies	$7,503
Sales Tax	$6,020
TOTAL COST	**$78,546**

c. Wishkah Street and Alder Street Intersection

The right turn from westbound Wishkah Street to turn north on Alder Street has an inadequate radius for trucks and other traffic in both turn lanes. The rear wheels of trucks making the turn in the right lane jump the curb. Trucks making the turn in the left lane breach the right lane. This project would increase the turning radius from 25 feet to 50 feet, thereby correcting this deficiency. This improvement would include some right-of-way acquisition, moving or replacement of the old span wire signals, replacement of catch basins, reconstructing the sidewalk, curb and gutter, and new striping. In addition, traffic on the dedicated right-turn lane sometimes tries to go straight ahead instead of turning. This project would also include placement of a raised curb barrier and directional signing at the west end of the intersection to alleviate the problem. **See Figure 10**.

Figure 10

Wishkah Street and Alder Street Intersection – Existing Condition

Table 16

Wishkah Street and Alder Street Intersection Estimated Cost

Item	Cost
Right-of-Way	$10,000
Roadway Construction Costs	$32,818
Preliminary Engineering	$8,564
Construction Management	$4,282
Contingencies	$6,423
Sales Tax	$5,153
TOTAL COST	**$67,239**

d. First Street and Alder Street Intersection

Vehicles traveling westbound on First Street that need to turn right onto northbound Alder Street cannot see oncoming Alder Street traffic approaching without hazardously proceeding partway into the northbound lane of traffic. This project would improve the intersection by constructing a dedicated right-turn lane where there is presently poor sight distance. The project would increase the turning radius for the right-turn lane from 35 feet to 50 feet, allowing the turning traffic to merge easily and safely. This project would require minor right-of-way acquisition, replacement or upgrading of the span wire signal, new catch basin, and drainage, reconstructing the sidewalk, curb, and gutter, and new striping. **See Figure 11.**

Figure 11

First Street and Alder Street Intersection – Existing Condition

Table 17

First Street and Alder Street Intersection Estimated Cost

Item	Cost
Right-of-Way	$10,000
Roadway Construction Costs	$17,152
Preliminary Engineering	$5,430
Construction Management	$2,715
Contingencies	$4,073
Sales Tax	$3,268
TOTAL COST	**$42,638**

e. Oak Street and Simpson Avenue Intersection

Traffic at the Oak Street and Simpson Avenue intersection has increased, and improvements are needed to increase capacity and safety. Alleviation of the traffic congestion related to the hospital and a safe crossing for pedestrians are desired.

Estimated Cost: $300,000

f. Activate Traffic Actuation System

Traffic loops along state routes were not connected when they were installed because the city knew the loops would need to be removed during scheduled roadway work at numerous intersections downtown. This project would activate the loops so that traffic on state routes is allowed more green time when there is no traffic on side streets.

Estimated Cost: $32,000

g. Replace Span Wire Signal System

This project would replace the old span wire signal system to improve signal efficiency with the traffic actuation system. Signals recommended for the upgrade are on L Street at Wishkah and Heron Streets, and on Alder and Park Streets at Market and First Streets. **See Figure 12**.

Estimated Cost: $1,800,000

Figure 12

Existing Wire Span Signal

h. Sidewalk Improvements Along State Routes to Meet ADA Standards

This project would install 96 new ADA-accessible ramps, upgrade 144 ramps, and complete sidewalks along all state routes in Aberdeen. Completion of this project would bring the city into compliance with current ADA requirements for all curbed intersections.

Table 18

Sidewalk Improvements Along State Routes to Meet ADA Standards Estimated Cost

Item	Cost
Roadway Construction Costs	$822,841
Preliminary Engineering	$164,568
Construction Management	$82,284
Contingencies	$123,426
Sales Tax	$99,029
TOTAL COST	**$1,292,149**

i. Extend Bulb-Out Project on Wishkah and Heron Streets to L Street

This project would extend the city's bulb-out project one block on Wishkah and Heron Streets to improve pedestrian crossings and safety.

Table 19

Extend Bulb-out Project on Wishkah and Heron Streets to L Street Estimated Cost

Item	Cost
Roadway Construction Costs	$348,647
Preliminary Engineering	$69,729
Construction Management	$34,865
Contingencies	$52,297
Sales Tax	$41,960
TOTAL COST	**$547,498**

j. Intersection Improvements on US 101 at South Aberdeen Fire Station

This project improves the turning radius for fire truck movement at the SR 105 Spur at US 101, presently hindered by the tight turning radius at this location. Project elements would include minor right-of-way, relocation of a light pole, curb, gutter and sidewalk, patching, driveway reconstruction and re-striping.

Table 20

Intersection Improvements on US 101 at South Aberdeen Fire Station Estimated Cost

Item	Cost
Right-of-Way	$10,000
Roadway Construction Costs	$55,911
Preliminary Engineering	$13,182
Construction Management	$6,591
Contingencies	$9,887
Sales Tax	$7,932
TOTAL COST	**$103,503**

City of Cosmopolis

a. US 101 Center Turn Lane between Lions Park and Blue Slough Road

This project would add a center turn lane through downtown Cosmopolis along US 101 for approximately one mile. Currently, vehicles turning left must wait in a lane of traffic on US 101. The project would increase safety and efficiency. This project requires widening of US 101 and removal of a portion of the existing sidewalk. Repair of US 101 through Cosmopolis is funded by USDOT for 2008. **See Figure 13**.

Estimated Cost: $500,000

Figure 13

US 101 Center Turn Lane

b. US 101 Sidewalk Construction Between First Street and H Street

This project would complete the Cosmopolis sidewalk project. On the west side of US 101, the sidewalk would be extended approximately 300 feet south of C Street. On the east side of US 101, a new sidewalk would be constructed from First Street to H Street, a distance of over one mile. **See Figure 14**.

Estimated Cost: $1,329,000

Figure 14
US 101 Sidewalk Construction

c. Install Left-Turn Pocket at Mill Creek Pedestrian Link Bike Trail Entrance

Currently, vehicles turning left into the park at US 101 and First Street must boldly stop in traffic and wait for oncoming traffic to pass. This project would install a much-needed left-turn pocket for these vehicles, reducing the hazard. In order to construct this turning lane, some real estate will be required to widen the roadway. **See Figure 15**.

Estimated Cost: $200,000

Figure 15
Site of Park Entrance

City of Hoquiam

a. US 101 N/Lincoln Street and Sixth Street Intersection

This intersection is extremely confusing for motorists and pedestrians alike.

The intersection of US 101 N/Lincoln Street and Sixth Street is dangerous and confusing. One pedestrian was killed at this location just a few years ago. Traffic crossing the Riverside Bridge must turn right abruptly after crossing the bridge and choose the correct position for either SR 109 or US 101. The current design is confusing to tourists heading to Ocean Shores or the Olympic Peninsula or trying to access downtown Hoquiam. Citizens have suggested many changes to this area including installing a roundabout or total redesign with right-of-way acquisition. This project would fund a study to determine what potential solutions exist for fixing the problem at this intersection. **See Figures 16 and 17.**

Estimated Cost: $250,000

Figure 16

Sixth Street at Lincoln Street Intersection

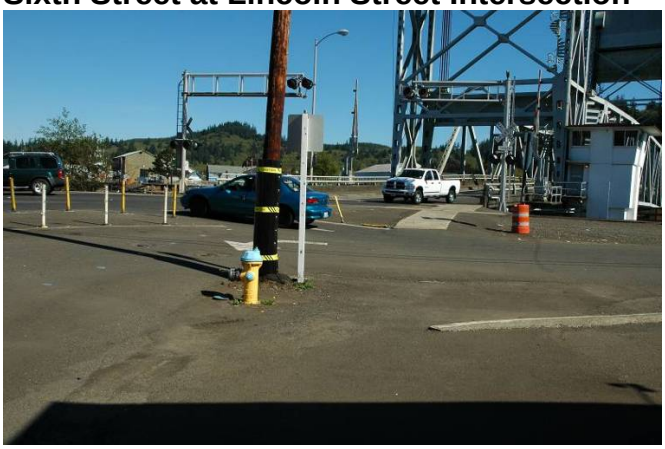


Figure 17

Sixth Street and Lincoln Street Intersection

b. East Simpson Avenue (US 101) and Seventh Street Streetscape; Pedestrian and Economic Development

The intersection of East Simpson Avenue (US 101) and Seventh Street is at the heart of downtown Hoquiam, and adjacent to a specialized retirement facility and the library. None of the four crosswalks here meet ADA requirements. Current conditions are such that persons in wheelchairs must move off the curb into the street in order for vehicles to recognize their need to cross the street. This project would reconstruct this intersection with new sidewalks, landscaping, and ADA-compliant ramps. **See Figure 18**.

Estimated Cost: $350,000

Figure 18

Seventh Street Sidewalk

Existing Condition

Existing Condition

c. Central Business District ADA Ramp Improvements

Downtown Hoquiam needs more than 75 ADA-compliant ramps at intersections. This project would upgrade downtown intersection ramps to bring them into ADA compliance.

Estimated Cost: $300,000

d. Riverside Bridge and Approaches, Signage, and Lighting

The walkway from downtown to historic Riverside Bridge is missing a one-block section. In addition, the bridge lighting needs improvement for safety and aesthetic purposes. This project would complete the missing portion of the riverside walkway in downtown Hoquiam, install signing for pedestrians, and provide improved lighting on Riverside Bridge.

Estimated Cost: $150,000

e. US 101 Simpson Avenue Bridge Approach

US 101 E/Simpson Avenue at the base of the Simpson Avenue Bridge was the site of a rollover fatality last year. The curved, sloped approach has poor sight distance. This project would modify the approach ramp to correct the problem.

Estimated Cost: $450,000

f. SR 109, Spencer Street, and Simpson Avenue Intersection Improvements

SR 109 and Spencer Street is an un-signalized intersection with high vehicle and pedestrian use. The high school and the middle school are at this location, with a popular fast-food restaurant across SR 109. The City of Hoquiam and the school district have requested the following improvements to the intersection to alleviate the problem:

- Improve pedestrian paths by installing additional curb and sidewalk out to the high school and along Spencer Street.
- Improve the radius at the intersection of Spencer Street to better accommodate the school buses.
- Install a signal at Spencer Street to provide adequate gaps for buses to enter the highway and a safe pedestrian crossing for schoolchildren.

Estimated Cost: $450,000

4. Improve Port Industrial Road

The Port Industrial Road Improvement Project was developed from the Grays Harbor Council of Governments (GHCOG) Strategic Analysis Report on Port Industrial Road (March 2006). The GHCOG analyzed traffic problems and growth and operations concerns in the Port Industrial Road area and made several recommendations.

The report recommends several improvements along and adjacent to Port Industrial Road. Most of the improvements would involve the addition of a traffic signal, turn lanes, and sidewalks, and adding left-turn pockets on specific side streets. **See Figure 19**.

Most crucial are the proposed installation of traffic signals at the Myrtle Street and Commerce Street intersections.

Mobility would be enhanced by allowing through traffic to move uninterrupted along the corridor. Proposed improvements would include pavement overlay, left-turn pockets at Port Industrial Road at Industrial Way and Jeffries Street, right-turn pockets at Port Industrial Road at Commerce Street and Myrtle Street, and left-turn pockets at Myrtle Street and Commerce Street onto Port Industrial Road. A center two-way left-turn lane (TWLTL) along the entire corridor, drainage, and utility relocation are also included.

Table 21

Improve Port Industrial Road Estimated Cost

Item	Cost
Roadway Construction Costs	$2,203,000
Preliminary Engineering	$550,875
Construction Management	$330,500
Contingencies	$330,500
Sales Tax	$182,825
TOTAL COST	**$3,597,600**

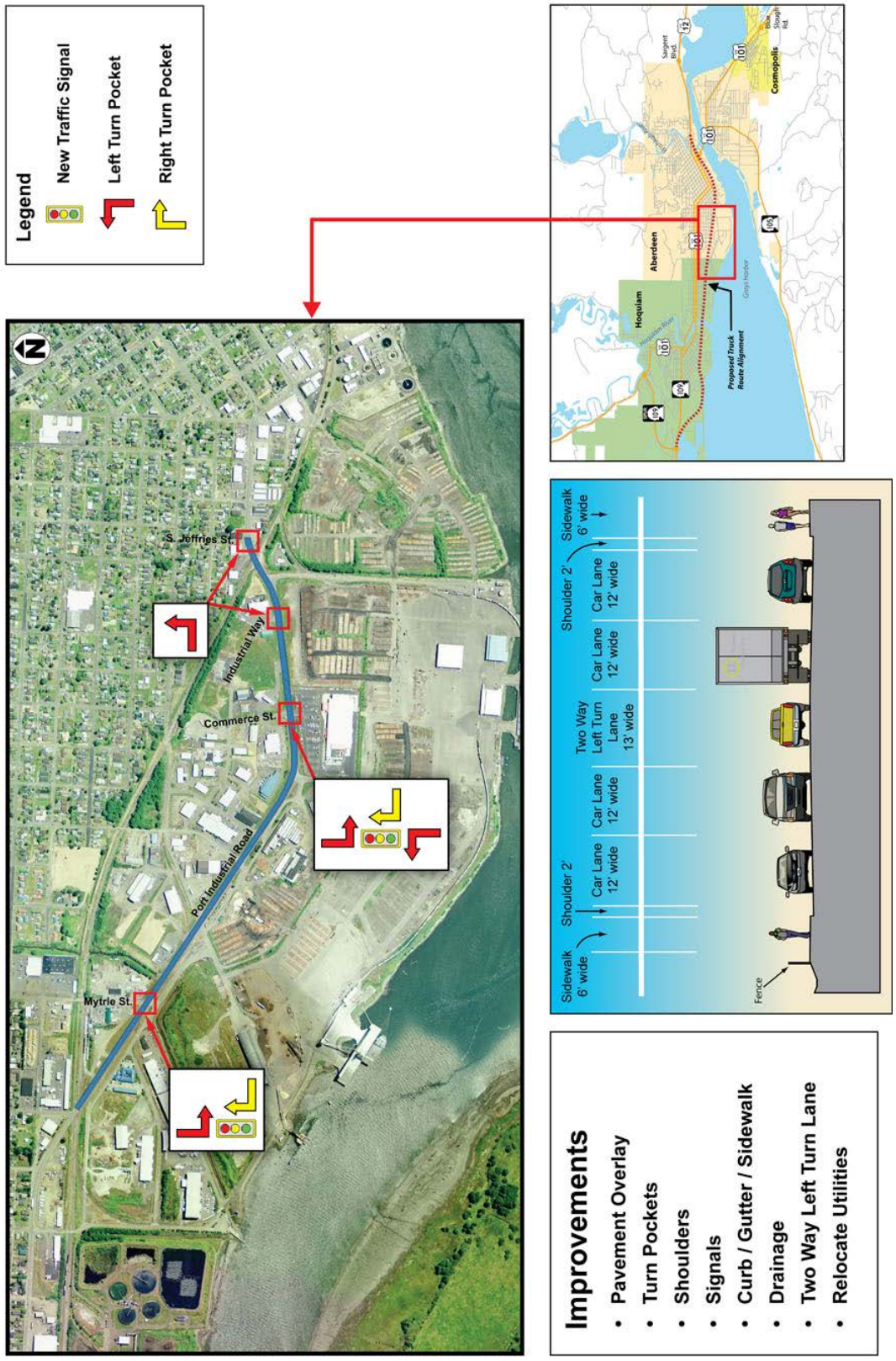


Figure 19
Port Industrial Road Improvements

5. Cosmopolis Downtown Revitalization

Construction of the Cosmopolis Downtown Revitalization project was partially completed in 2001. The current project would complete the improvements through the downtown area of Cosmopolis by replacing the aged sidewalks and adding streetlights, ADA ramps at intersections, planting strips, benches, and refuse receptacles, and under grounding utilities. Existing project improvements cover the west side only of US 101 from near City Hall at C Street to F Street. To complete the project, the improvements on the west side of US 101 would be extended approximately 300 feet south of C Street, and extended north from F Street to H Street. In addition, the Cosmopolis Downtown Revitalization project would construct the same improvements on the east side of US 101 where no new improvements have been completed.

The Cosmopolis Downtown Revitalization project is closely interlinked with the Tri-City Operational Improvements project. Because the Tri-City Operational Improvements project would widen US 101 for the construction of the proposed two-way center-turn lane project, the Cosmopolis Downtown Revitalization project construction should occur at the same time to avoid conflicting improvements during or after construction. See **Figure 20**.

Estimated Cost: $1,329,000

Figure 20

US 101 Sidewalk Construction

Existing, Unimproved Section

Completed Section

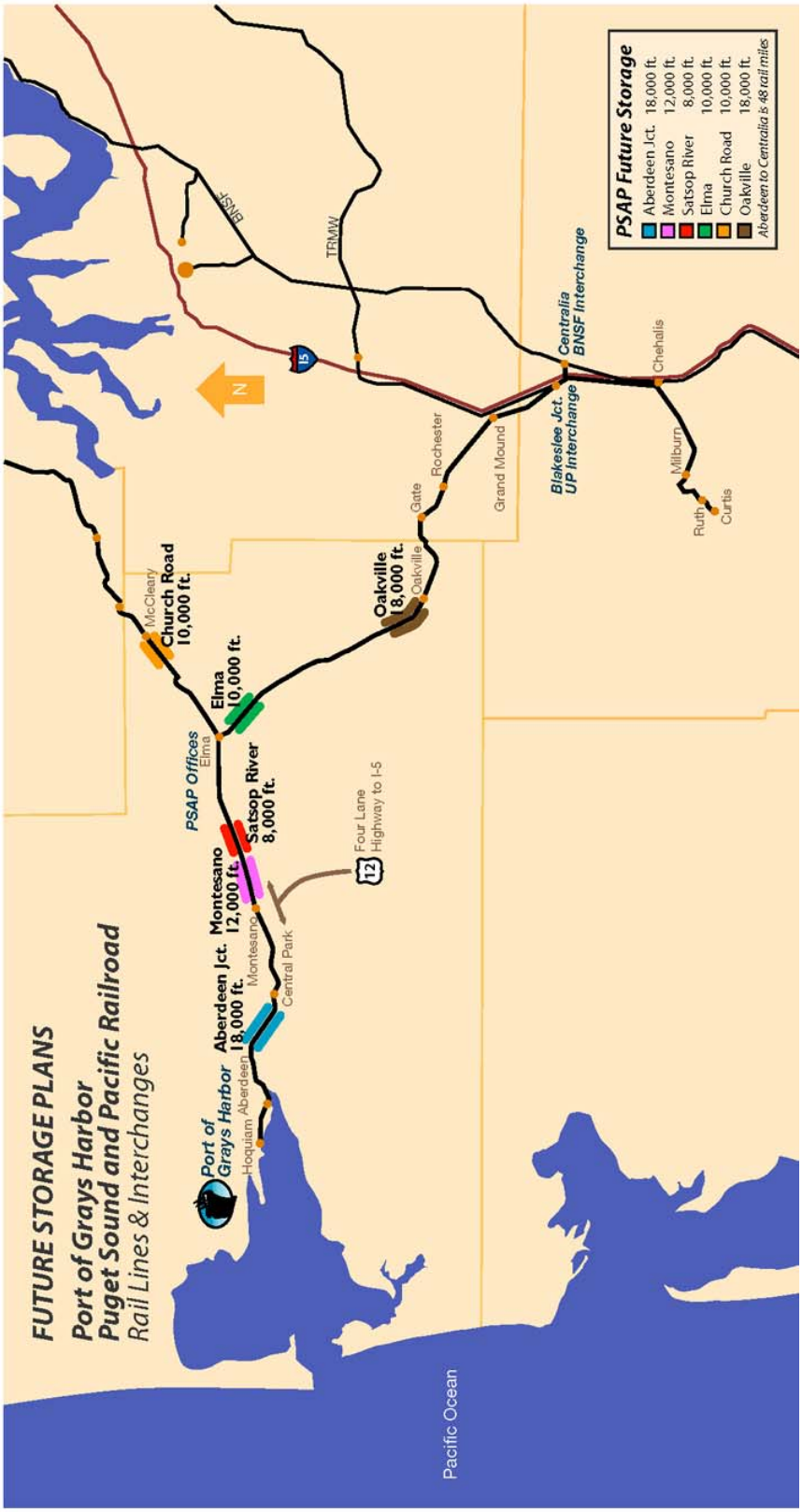
6. Rail Car Storage Yard East of Aberdeen

The Port of Grays Harbor has estimated a need to have approximately 18,000 feet of sidings at Aberdeen Junction, just east of Aberdeen to relieve rail congestion and minimize conflicts with autos and pedestrians in the downtown area. Two sidings, approximately 9,000 feet in length, would hold a unit train for passing large trains outside of town, reducing congestion in town. Estimated construction cost is about $1 Million per mile according to the Port of Grays Harbor. **See Figure 21.**

Table 22

Rail Car Storage Yard East of Aberdeen Estimated Cost

Item	Cost
Railroad Construction Costs	$3,400,000
Preliminary Engineering	$138,800
Construction Management	$138,800
Contingencies	$340,200
Sales Tax	$282,200
TOTAL COST	**$4,300,000**



This map is for illustrative purposes only. Storage yard locations have not been identified. Further study is needed.

Figure 21
Future Storage Plans

7. Replace Existing Hoquiam Bridges

This project would improve safety and traffic circulation at the SR 109 and US 101 intersection and improve the operational costs of the existing bridges. Various alignments could be considered to improve operational characteristics. Two specific options include the replacement of the bridges with high-level fixed-span single or twin bridges or the replacement of the bridges with a low-level bridge at the existing locations. **See Figure 22, page 41**.

High-Level Fixed-Span Crossing

The high-level fixed-span Simpson Avenue Bridge would be a minimum of 3,100 feet long to obtain a navigational clearance of 75 feet over the Hoquiam River. The parallel Sumner Avenue to Levee Street Bridge would be approximately 3,400 feet long because of the longer span across the river. There would be adjacent property and business affects on both sides of the river that would affect property costs and access at 22nd and 23rd Streets.

Table 23
High-Level Fixed-Span Crossing Estimated Cost

Item	Cost
Westbound	
Right-of-Way	$5,000,000
Roadway Construction Costs	$1,420,610
Bridge Construction Costs	$39,682,500
Preliminary Engineering	$9,220,622
Construction Management	$4,610,311
Contingencies	$6,915,467
Sales Tax	$5,548,509
Subtotal	**$72,398,000**
Eastbound	
Right-of-Way	$5,000,000
Roadway Construction Costs	$1,420,610
Bridge Construction Costs	$43,395,000
Preliminary Engineering	$9,963,122
Construction Management	$4,981,561
Contingencies	$7,472,342
Sales Tax	$5,995,309
Subtotal	**$78,728,000**
Environmental Impact Statement	$3,000,000
TOTAL COST	**$153,626,000**

Low-Level Movable-Span Crossing

Replacing the existing bridges with low-level movable bridges would have fewer business affects, but would continue to have the traffic operational issues at the west end of the Riverside Bridge. There would be greater permit issues with the Coast Guard and natural resource agencies with a low-level movable structure.

Table 24

Low-Level Movable-Span Crossing Estimated Cost

Item	Cost
Westbound	
Right-of-Way	$0
Roadway Construction Costs	$360,000
Bridge Construction Costs	$37,320,000
Preliminary Engineering	$7,536,000
Construction Management	$3,768,000
Contingencies	$5,598,000
Sales Tax	$4,530,000
Subtotal	**$59,112,000**
Eastbound	
Right-of-Way	$0
Roadway Construction Costs	$360,000
Bridge Construction Costs	$49,695,000
Preliminary Engineering	$10,011,000
Construction Management	$5,006,000
Contingencies	$7,508,000
Sales Tax	$6,024,000
Subtotal	**$78,604,000**
Environmental Impact Statement	$3,000,000
TOTAL COST	**$140,716,000**

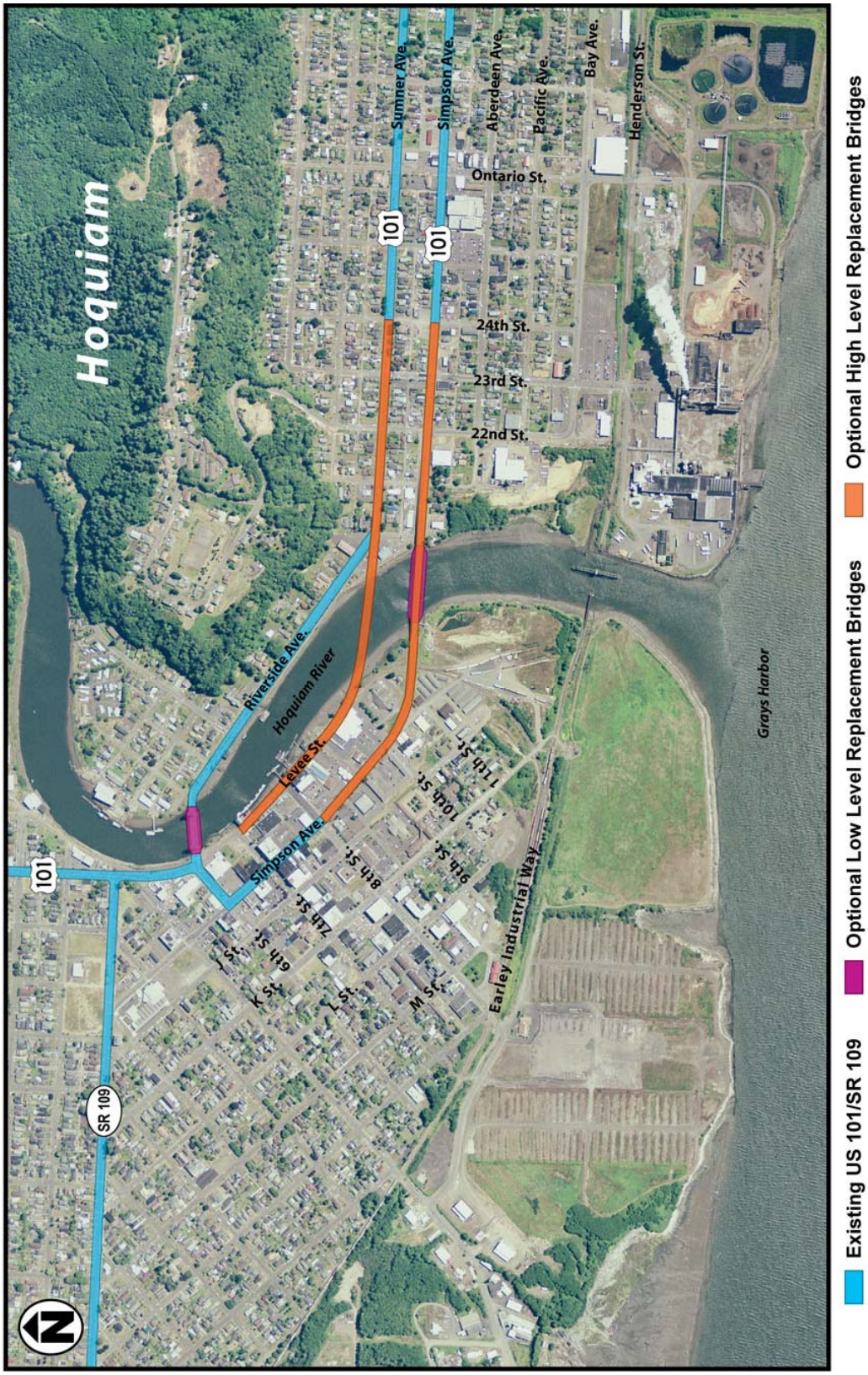


Figure 22
Replace Existing Hoquiam Bridges

8. Relocate Rail Line South of Port Industrial Road – Eliminate All At-Grade Crossings

This project would relocate the existing rail line between the vicinity of the Port Industrial Road and East Terminal Way intersection and 30th Street. The railroad would be relocated south of Port Industrial Road, thus eliminating the at-grade crossing at each end. The relocation would likely occur around the south side of the new Home Depot development.

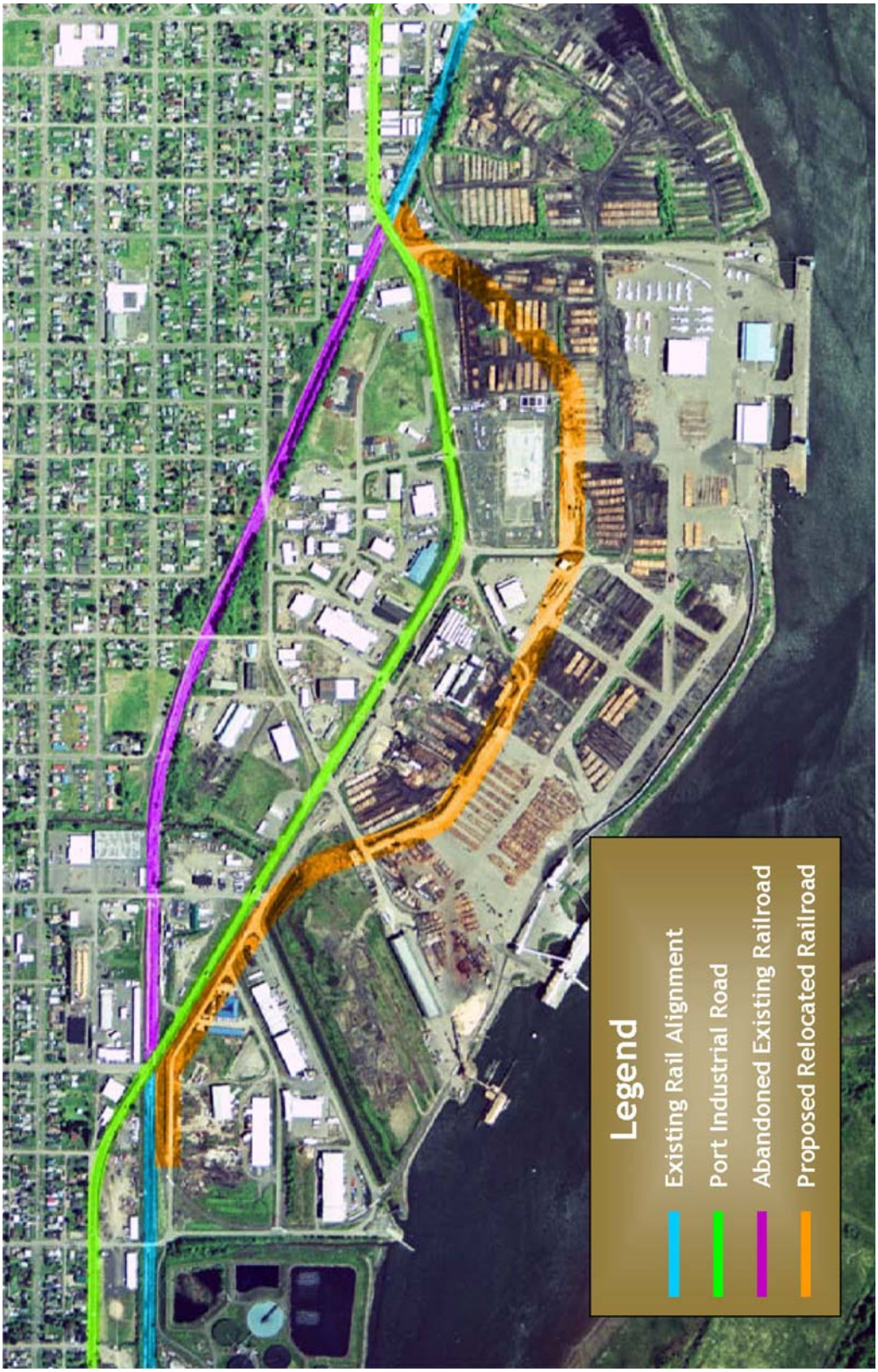
The alignment of the relocation would be adjusted during the design phase of this project. Alternatives to the new location of the tracks, particularly near the Weyerhaeuser property, would be evaluated at that time. **See Figure 23**.

This realignment also has the benefit of abandoning the existing railroad that currently travels through residential property.

Table 25

Relocate Rail Line South of Port Industrial Road Estimated Cost

Item	Cost
Construction Costs (including right-of-way)	$6,205,000
Preliminary Engineering	$245,000
Construction Management	$245,000
Contingencies	$931,000
Sales Tax	$515,000
Subtotal	**$8,141,000**



Source: Port Industrial Road Strategic Analysis

Figure 23
Rail Realignment Improvement

9. Complete Seismic Upgrades to Area Bridges

The regional highway system in the tri-city area is connected by five aging bridges, two of which require funding for seismic upgrades. Completion of this project is necessary to maintain access to regional hospitals, and fire and police protection in the event of a natural disaster.

Heron Street Bridge over the Wishkah River seismic upgrade includes strengthening the center pier foundation with drilled shafts—$10 million.

Chehalis River Bridge seismic upgrade includes strengthening the two-bascule pier foundations with drilled shafts—$10 million.

Estimated Cost: $20,000,000

10. Alternate Access to Wishkah Mall and Relocate Rail

This project would modify the access to Wishkah Mall to reduce congestion and accidents and improve the overall safety of this corridor. Relocating the railroad is not considered feasible at this stage of analysis due to the severe effects that would be created at the park, trail, the esplanade system along the harbor, and effects to the harbor and estuarine environment. **See Figure 24, page 47.** It is recommended that the project be completed in two phases.

Phase 1: Wishkah Mall Access

There are presently seven access points to and from Wishkah Mall from US 12, which is a five-lane highway with a two-way left-turn lane. Accident rates are high due to the multiple access points to the mall. It is recommended that the two existing signalized intersections be retained and synchronized for timing. It is also recommended that the US 12 access at the west end of the mall be retained, the two access points between the signals be right turn in and right turn out only, and the last access point at Fleet Street be a right turn only out of the mall. Internal circulation of the mall access road system would be modified to improve circulation and storage lane capacity at the signals. As an added circulation improvement strategy, it is recommended that the East Aberdeen Rail Storage yard (Sidings) at Aberdeen Junction be constructed so that trains entering the Port of Grays Harbor area can be scheduled to use the track adjacent to the mall during off-peak auto-traffic times going to or leaving the mall. The two-way left-turn lane would be retained for access to businesses on the north side of US 12.

Phase 2: Business Access North of US 12

A management access study of traffic is recommended that would include the following provisions:

At the two synchronized intersections, access would be provided to an access road on the north side of the businesses.

Access to businesses from US 12 would be consolidated and be right-turn-in and right-turn-out only. The two-way left-turn lane would be eliminated.

Table 26

Alternate Access to Wishkah Mall and Relocate Rail Estimated Cost

Item	Cost
Phase I: Wishkah Mall Access	
Construction Costs	$314,000
Feasibility Study	$83,300
Preliminary Engineering	$63,000
Construction Management	$31,000
Contingencies	$47,000
Sales Tax	$38,000
Subtotal	**$576,300**
Phase II: Business Access North of US 12	
Right-of-Way	$1,506,400
Construction Costs	$579,600
Feasibility Study	$166,700
Preliminary Engineering	$417,000
Construction Management	$209,000
Contingencies	$313,000
Sales Tax	$272,000
Subtotal	**$3,463,700**
TOTAL COST	**$4,040,000**

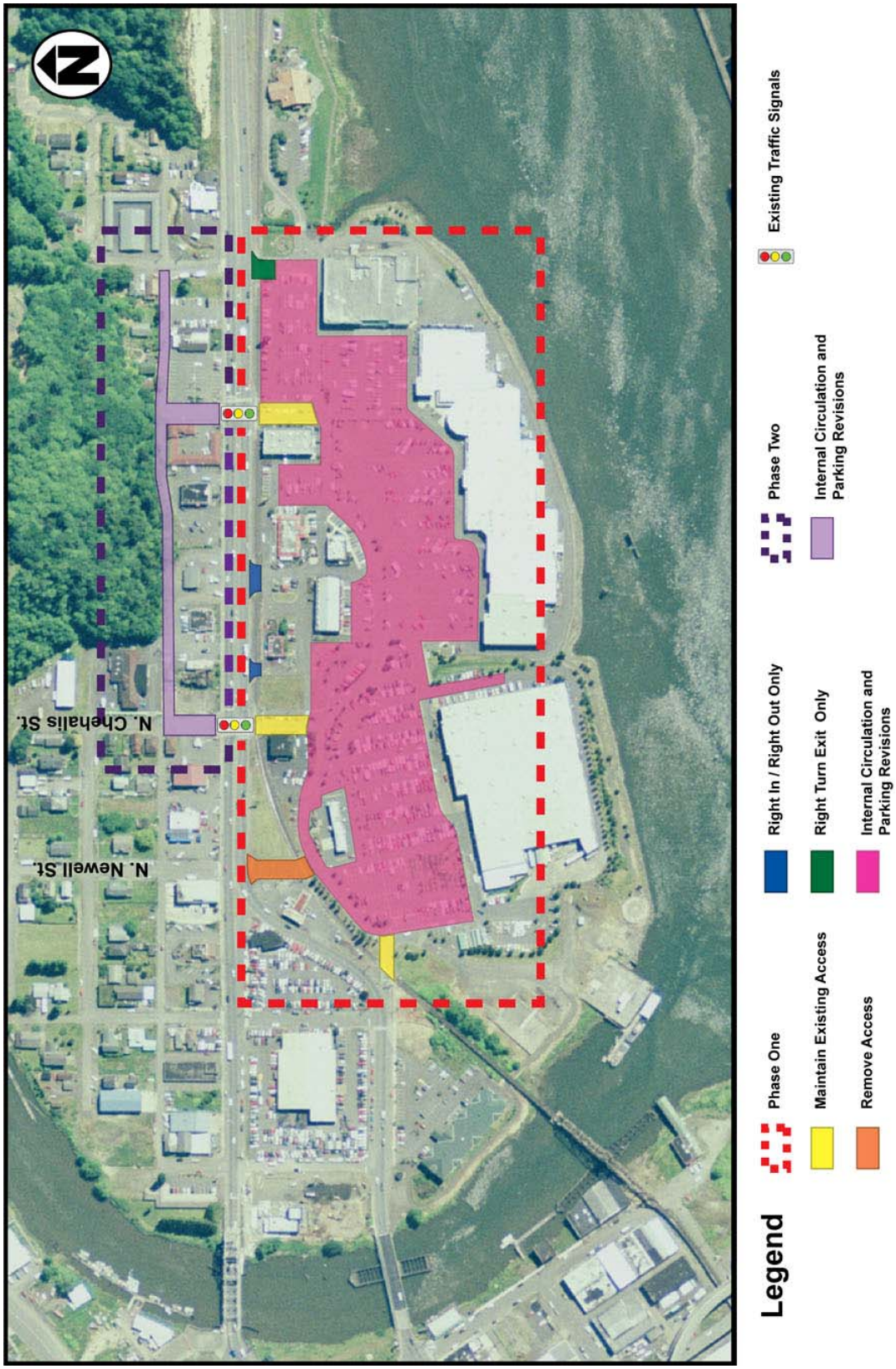


Figure 24
Alternate Access to Wishkah Mall

APPENDICES

Appendix A – Project List and Ranking

Appendix B – Design Standards Technical Memorandum

Appendix C – Aberdeen-Hoquiam Environmental Impact Statement Update Technical Memorandum

Appendix D – References

Appendix E – Cost Estimate Backup

Appendix A. Project List and Ranking

US 101 Regional Circulation Project

Cost Estimate Report

US 101 Regional Circulation Project
Grays Harbor County Stakeholder Committee Project Priority List

1. Full Truck Route Alternative - $386M

The Stakeholder Committee has identified the Full Truck Route as the top priority project. As an alternative to funding the entire Truck Route, the Stakeholder Committee recommends moving forward with the project in increments and pledges their support to carry forward this process. Their recommendation is as follows:

1a. Funding for re-evaluation of the NEPA EIS - re-evaluation of the EIS is needed to begin any construction. Funding for early engineering, including phasing analysis - $5M

1b. Funding for environmental documentation, based on results of phasing analysis - $3M

1c. Funding for Preliminary Engineering and Construction of Truck Route segments based on phasing analysis results - $4M to $378M

(Priority 1a and 1b must be done first.)

Maintenance Priority
Seismic Improvements - $20M

The regional highway system in the tri-city area is connected by five aging bridges, two of which require funding for seismic upgrades. Completion of this project is necessary to maintain access to regional hospitals, and fire and police protection in the event of a natural disaster.. The estimated costs for these repairs are listed below:

- Chehalis River Bridge- $10M
- Wishkah River (Heron Street Bridge) - $10M

2. Tri-City Operational Improvements - $10M

The Tri-City Operational Improvements project provides more than 20 needed and visible improvements that can be implemented in the short term. The Stakeholder Committee recommends full funding for this project.

3. Wishkah Mall Access Improvements - $4M

To alleviate identified traffic problems caused by access issues at this regional destination, the Stakeholder Committee recommends funding the project in two phases.

3a. Funding for emergency vehicle access, turning movement and access revisions, signal interconnection, and re-striping the internal parking area - $500k.

3b. Funding includes an investigation of constructing an alternative access road on the north side of US12. The project would include public involvement, right of way acquisition, preliminary engineering and construction - $3.5M

4. Intelligent Transportation Systems (ITS) - $9M

This project would install changeable message signs, photo enforcement cameras, closed circuit television, and Highway Advisory Radio. Actual locations and configurations would be determined during design.

5. Improve Port Industrial Road - $4M

This project would improve capacity, traffic flow and safety by providing right and left turn lanes at key intersections and other improvements as identified in the Port Industrial Road Strategic Analysis.

GHCOG COUNCIL OF GOVERNMENTS

October 27, 2006

Washington State Department of Transportation

GHCOG COUNCIL OF GOVERNMENTS

Washington State Department of Transportation

US 101 Regional Circulation Project
Full Truck Route Alternative Project Addendum

The following projects are representative of the components comprising the full truck route alternative. Priority 1a (funding for re-evaluation of the NEPA EIS) and 1b (funding for environmental documentation) must be completed prior to segment construction as indicated in the 'Grays Harbor County Stakeholder Committee Project Priority List'. The West to East delineation is for orientation purposes only. Segment phasing will be determined through re-evaluation of the NEPA-EIS, early engineering including phasing analysis, and environmental documentation.

Full Truck Route Project

1a. Re-evaluation of the NEPA EIS; early engineering including phasing analysis	$5.0M
1b. Environmental documentation	$3.0M

Segments from West to East	Estimated Cost
SR 109 Spur Junction to SR109 at Paulson Road	$3.6M
New Alignment from Paulson Road to 5th Street	$18.9M
New Alignment from 5th Street along the Railroad	$5.7M
New Hoquiam River Bridge	$136.0M
22nd/23rd Streets to 30th Street	$16.1M
New Alignment from 30 Street to Port Industrial Road	$10.5M
Port Industrial Road to Wishkah Street	$0.9M
New Alignment from Wishkah Street to State Street	$9.7M
State Street from Park Street to S. K Street	$2.6M
New Wishkah River Bridge	$134.0M
US 101/SR12 Connection	$40.0M
Total	**$378.0M**

GHCOG COUNCIL OF GOVERNMENTS

October 30, 2006

Washington State Department of Transportation

GHCOG COUNCIL OF GOVERNMENTS

Washington State Department of Transportation

PRIORITY RANKING LIST
(summary-unweighted)

I.D. #	PROJECT DESCRIPTION	GOAL 1: Promote Regional Solutions	GOAL 2: Promote Economic Vitality and Growth	GOAL 3: Multimodal Solutions: Freight, Rail, Transit, and Pedestrian	OVERALL AVERAGE	RANK	TOTAL COST
B	TRUCK ROUTE ALTERNATIVE						
	Truck Route Alternative (Full)	★★★★	★★★	★★★★	★★★★	1	$386 M
	Truck Route Alternative (West Quarter)	★★★	★★★	★★★	★★★	4	$169 M
	Truck Route Alternative (Half)	★★★	★★	★★★	★★★	5	$217 M
	Truck Route Alternative (East Quarter)	★★	★★	★★★	★★	9	$193 M
D	ITS (CHANGEABLE MESSAGE SIGNS, PHOTO ENFORCEMENT, ETC.)	★★★	★★★★	★★★	★★★	2	$9 M
A	TRI-CITY OPERATION IMPROVEMENTS	★★★★	★★★	★★★	★★★	3	$10 M
F	IMPROVE PORT INDUSTRIAL ROAD	★★★	★★★	★★	★★★	5	$4 M
K	COSMOPOLIS DOWNTOWN REVITALIZATION	★★	★★★★	★★★	★★★	5	$2 M
L	RAIL CAR STORAGE YARD EAST OF ABERDEEN	★★★	★★★	★★	★★★	5	$4 M
N	REPLACE EXISTING HOQUIAM BRIDGES	★★★	★★	★★★	★★★	10	$154 M
U	RELOCATE RAIL LINE SOUTH OF PORT INDUSTRIAL RD TO ELIMINATE ALL AT-GRADE CROSSINGS	★★★	★★★	★★	★★★	11	$8 M
Y	COMPLETE SEISMIC UPGRADES TO AREA BRIDGES	★★★★	★★★	★★	★★★	12	$20 M
M	ALTERNATE ACCESS TO WISHKAH MALL & RELOCATE RAIL	★★★	★★	★★	★★	13	$4 M
C	DIRECTIONAL SIGNING	★★★	★★★	★	★★	14	
E	SARGENT BLVD SIGNAL AND CHANNELIZATION PHASE II	★★	★★★	★★	★★	14	

PRIORITY RANKING LIST
(summary-unweighted)

I.D. #	PROJECT DESCRIPTION	GOAL 1: Promote Regional Solutions	GOAL 2: Promote Economic Vitality and Growth	GOAL 3: Multimodal Solutions: Freight, Rail, Transit, and Pedestrian	OVERALL AVERAGE	RANK	TOTAL COST
T	GRAYS HARBOR REGIONAL TRANSPORTATION PLANNING MODEL	★★	★★★	★	★★	16	
W	PROVIDE INTER-JURISDICTIONAL SIGNAL COORDINATION BETWEEN HOQUIAM AND ABERDEEN	★★	★★★	★	★★	17	
X	REMOVE BICYCLE HAZARDS	★	★★★	★★	★★	17	
AB	WIDEN EMERSON AVENUE	★★★	★★	★★	★★	17	
I	INSTALL SIGNAL AT F ST AND HERON	★	★★	★★	★★	20	
R	WIDEN STATE STREET TO MONROE AND WIDEN MONROE AND LINCOLN FROM STATE TO WISHKAH	★★	★★	★	★★	20	
H	STUDY PROPOSAL TO REROUTE US 101 TRAFFIC IN HOQUIAM	★★	★★★	★	★★	22	
AA	STUDY USE OF MARKET STREET AS 4-LANE ROADWAY FEEDING INTO TRUCK ROUTE	★	★★	★★	★★	22	
S	WIDEN INTERSECTION OF G ST AND HERON TO IMPROVE RIGHT-TURN MOVEMENT	★	★★	★★	★★	24	
G	PARKING STUDY	★★	★★★	★	★★	24	
Z	CHEHALIS/US 12 INTERSECTION REALIGNMENT AND CHANNELIZATION FROM HARBOR ST TO CHEHALIS ST	★★	★★	★	★★	26	

Appendix B. Design Standards Technical Memorandum

US 101 Regional Circulation Project Cost Estimate Report

Cost Estimate Report

TECHNICAL MEMORANDUM

Design Standard Technical Memo

Date:	**8/7/2006**	**Re:**	**US Highway 101 Regional Circulation Project**
			Update of the Design Standard for Aberdeen-Hoquiam Corridor Project
To:	**Nazmul Alam**		
Firm:	**WSDOT**		
From:	**Bernie Chaplin**		
e-mail:	**bernie@xltech.com**		

I. Introduction

This memorandum summarizes the updated Design Criteria associated with the Corridor Preferred Alternative IV A/B identified in the 2000 EIS Aberdeen-Hoquiam Corridor Project. The study area is located along the US 101 Corridor, which runs through the Cities of Aberdeen and Hoquiam in Grays Harbor County.

The Preferred Alternative emerged from the 1971 Grays Harbor Area Transportation Study which recommended a US 101 "Central Alternate Corridor" to reduce competition between trucks, local and tourist traffic on US 101 couplet. The Central Alternate Corridor was updated in 1991 with the SR 101-SR 12 to SR 109, Hoquiam/Aberdeen Washington Feasibility Study. The 1991 study solidified the corridor location and in 1993 a formal NEPA/SEPA Environmental Impact Statement (EIS) was initiated. Proposed alternatives were developed and a Record of Decision (ROD) for a Preferred Alternative IV A/B was approved in 2002.

The primary purpose of the Preferred Alternative is to improve circulation patterns for US 12, US 101 and SR 109 in the Aberdeen-Hoquiam area by removing truck traffic from the downtown areas. The Preferred Alternative addresses concerns by providing a four-lane managed access roadway and new bridges along what is in essence a current truck by-pass route.

II. Roadway Criteria

Design criteria for the alternatives evaluated in the EIS was based on the Final Constructability/Phasing/Funding Report prepared in December 1996. This memorandum includes the results of a comparison and reassessment of the original design criteria with current WSDOT policy and procedures. Table 1-3 detail the design criteria for roadway corridor.

After consultation with Leroy Patterson and Forrest Sutmiller of WSDOT Olympic Region Transportation Planning Office, the roadway classification was updated to include UM/A-3 to provide a Truck Route for incoming/outgoing freight traffic from the

Port of Grays Harbor. The UM/A-3 classification is used for managed access in an urban environment. If the corridor is designated in the future as an alternate route for US 101, the P-6 classification design standards are maintained in Tables 1-3 for reference.

The criteria used in developing the roadway sections was obtained from WSDOT Design Manual, Sections 440, 620, 630, 640, 910, 920, 1420, and 1435. The general requirements associated with UM/A-3 and P-6 are:

- Concrete barriers between opposing lanes.
- 4:1 Max side slopes in areas without barriers
- Left turn lanes at intersections
- At-grade intersections approximately every ½ mile

Table 1 Roadway Criteria - General

Description	*US 101*/US 12*/SR 109*	*Central Alternate Corridor Truck Route*	*Ramps*	*City Streets & Front Roads*
Highway Class	P-6	UM/A-3	UM/A-3	
Design Year	2030	2030	2030	2030
Design Vehicle	WB-67	WB-67	WB-67	WB-67
Level of Service				
Desirable Design Speed	60 mph	45 mph	40 mph	40 mph
Minimum Design Speed	30 mph	45 mph	30 mph	30 mph

*National Highway System classification must meet full design standards.

Table 2 – Roadway Criteria - Clearances

Description	*US 101*/US 12*/SR 109*	*Central Alternate Corridor Truck Route*	*Ramps*	*City Streets & Front Roads*
Stopping Sight Distance	570 ft	360 ft		
Vertical Clearance				
Roadways	16.5 ft	16.5 ft	16.5 ft	16.5 ft
Railroad	23.5 ft	23.5 ft	23.5 ft	23.5 ft
Vertical Clearance MLLW				
Wishkah River	65 ft	65 ft	65 ft	
Hoquiam River	75 ft	75 ft	75 ft	
Horizontal Clearance				
Wishkah River	125 ft	125 ft	125 ft	
Hoquiam River	125 ft	125 ft	125 ft	

*National Highway System classification must meet full design standards.

Table 3 – Roadway Criteria – Geometrics

Based on the roadway classification and projected 2030 traffic volumes, roadway and bridge sections are in Attachment 1a.

Description	*US 101*/US 12*/SR 109*	*Central Alternate Corridor Truck Route*	*Ramps*	*City Streets & Front Roads*
Travel Lane Width	12 ft	12 ft	15 ft	12 ft
Shoulder Width (curbed ≤ 6")				
Right of Traffic	8 ft	8 ft	--	
Left of Traffic	8 ft	8 ft	--	
Shoulder Width (non curbed)				
Right of Traffic	8 ft	8 ft	8 ft	
Left of Traffic	8 ft	8 ft	2 ft	
Shy – Right of Traffic				2 ft
Shy – Left of Traffic				1 ft
Median Width	10 ft	2 ft	--	
TWLTL		13 ft	--	
Min. Turning Radii @ Inter.	100 ft	100 ft		50 ft
Sidewalk Width	6 ft	6 ft	6 ft	6 ft
Bicycle Lane Width	5 ft		--	5 ft
Roadway Cross Slope	2%	2%	2%	2%
Shoulder Cross Slope	2%	2%	2%	2%
Vertical Alignment				
Max Grade Desirable	5%	5%	3%	6%
Maximum Grade	8%	8%	7%	9%
Minimum Grade	0.30%	0.30%	0.30%	0.30%
Horizontal Alignment				
Max Superelevation	0.06 ft/ft	0.06 ft/ft	0.06 ft/ft	0.04 ft/ft

*National Highway System classification must meet full design standards

III. Bicycle/Pedestrian Design Criteria

The design criteria for pedestrian facilities are detailed in Table 4. Bicycle facilities are not being addressed within the corridor since its primary purpose is to serve as a truck route. Bicycles are accommodated along the current US-101 alignment.

Table 4 – Pedestrian Facilities

Description	*Criterion*
Minimum Sidewalk Width	6 feet
Maximum Desirable Grade	5%
Cross Slope of Sidewalk	2%

IV. Bridge Design Criteria

a. Codes and Specifications

The bridges, walls, and other transportation structures shall be designed in accordance with the applicable AASHTO and WSDOT Specifications, the primary documents of which include the following:

- AASHTO LRFD Bridge Design Specifications, US Units, Currently 3rd Edition 2005 and 2006 Interims
- AASHTO Guide Specifications for Design and Construction of Segmental Concrete Bridges, 2nd Edition and 2003 Interim
- AASHTO Guide Specifications for Horizontally Curved Steel Girder Highway Bridges 2003 and 2006 Interim
- WSDOT LRFD Bridge Design Manual July 2005
- WSDOT Specifications for Road, Bridge, and Municipal 2006
- WSDOT Amendments to the Specifications and General Special Provisions

b. Design Loads

- Dead Load Concrete — 160 lb/cu ft.
- Dead Load Steel — 490 lb/cu ft
- Live Load — HL-93
- Earth Pressure — (Refer to Geotechnical Report)
- Earthquake Load — (Refer to Geotechnical Report)
- Vessel Collision Load — (Refer to Waterway Usage Report)
- Steel Thermal Load — Temperature range 0 degrees to 120 degrees
- Concrete Thermal Load — Temperature range 20 degrees to 100 degrees

c. Materials – Structural Steel

The steel girders shall be low alloy steel AASHTO M 270 Grade 50, with portions of the flanges, as needed, fabricated from low alloy steel AASHTO M 270 Grade HPS 70, and with secondary members fabricated from AASHTO M 270 Grade 36 steel, when appropriate. High strength bolts shall be AASHTO M 164.

d. Materials – Concrete

The concrete for roadway decks shall be Concrete Class 4000D, the concrete for shafts, cast in place piles, and seals shall be Concrete Class 4000P, and all other cast in place concrete shall be Concrete Class 4000. The compressive strength of concrete in prestressed concrete girders shall be f'c=8.5ksi.

e. Materials – Reinforcing Steel

The steel reinforcing bars shall be ASTM A 615 Grade 60, epoxy coated reinforcing bars shall be used in the top and bottom mats in the roadway deck slab. The pre stressing strands shall be 0.6in diameter low relaxation strands, AASHTO M 203 Grade 270.

f. Bridge Cross Sections

Bridge Cross sections are located in Attachment 1b

V. Access Control

The Access Control for the Central Alternative Corridor allows through truck traffic to by-pass the Aberdeen-Hoquiam central business district while still maintaining key access points. Managed access will provide at grade intersections approximately every ½ mile. These intersections will be strategically located at areas of high traffic use. Based on the Access Control Classification System[1] the Central Alternate Corridor is a Class 3. Class 3 is defined as moderate speeds, moderate volumes, short trips serving intercity, intercity, & intercommunity travel; balance between land access and mobility; used when land-use is less than maximum build-out, but development potential is high.

[1] WSDOT Design Manual, Section 1435, December 2003

Appendix C. Aberdeen-Hoquiam Environmental Impact Statement Update Technical Memorandum

US 101 Regional Circulation Project Cost Estimate Report

Cost Estimate Report

exeltech

MEMO

Date: 9/8/2006

Re: **US 101 Regional Circulation Project**
NEPA Reevaluation Cost Estimate

To: **Nazmul Alam**

Firm: **WSDOT**

From: **Bernie Chaplin**

e-mail: **bernie@xltech.com**

The purpose of this memo is to provide a cost estimate for a review and reevaluation of environmental changes that have occurred since *Aberdeen-Hoquiam Corridor Project Final Environmental Impact State (EIS)* was approved in 2002. This analysis is based on the assumption that the project termini and design are the same as the original FEIS.

I. Background and Current Status

The *Aberdeen-Hoquiam Corridor Project Final EIS* was developed to establish a new transportation corridor and enhance the existing transportation system for highway routes US 12, US 101 and SR 109 through the cities of Aberdeen and Hoquiam in Grays Harbor County, WA. The major goals associated with this project include:

- Improve safety, geometrics, signalization and signage
- Improve the trucking access to Port of Grays Harbor and other industrial facilities
- Create necessary infrastructure for the long-term stimulus of industrial diversification and international trade
- Accommodate tourist and other through traffic by providing a direct, clearly marked route and enhance access to the Olympic peninsula, ocean beaches and historic/recreational/cultural aspects of Grays Harbor County.

The original FEIS evaluated three build alternatives and one no build alternative. The selected Preferred Alternative is a four-lane facility with high level structures over the Wishkah and Hoquiam Rivers. A FEIS was published in April 2000 and a Record of Decision (ROD) was signed in 2002. Since the signing of the ROD in 2002, no further steps have been taken (including procurement of funding) to advance the project.

II. Regulatory Framework

The original EIS was prepared to comply with both state and federal environmental regulations. Any subsequent changes to the project scope or associated impacts will need to comply with both NEPA and SEPA.

NEPA regulation 23 CFR §771.129 (b) requires a written reevaluation of the FEIS when major steps to advance the project have not been made within three years from a NEPA Administrative Decision. The purpose of the reevaluation is to determine whether the contents of the *Aberdeen-Hoquiam Corridor Project FEIS* are still valid, up-to-date, and complete. The written reevaluation must address the extent of all changes related to the project design or environmental conditions. If the NEPA reevaluation identifies a new or increased significant adverse environmental impact then a Supplemental EIS must be prepared. The preparation, circulation and filing requirements for a Supplemental EIS are the same as for the original EIS, although a scoping process is not required.

SEPA has no specific requirements for reevaluation. The reevaluation for SEPA will be completed by fulfilling and adopting NEPA requirements.

III. Potential Changes to Affected Environment and Cost Estimate

The affected environment involves land-use; the social, economic, visual quality, biological and physical environments; flood plains and hazardous materials. Since the original FEIS discipline evaluations and reports were performed in 1994-1996, an updated professional review of the current conditions is needed.

Based on the historic documentation and a preliminary review of study area's existing conditions (using WSDOT reevaluation form; **see Appendix A**), each factor has been organized into critical and non-critical categories for review and update. Critical elements will require a more rigorous and in-depth review (including field visits) of conditions and impacts; the final deliverable will be in a report format. Non-critical elements identify areas where the historic information is adequate and a limited update is required; the final deliverable will be in a technical memorandum format. The costs outlined in this memo are focused strictly on the preparation of a reevaluation of the existing EIS and the original design for the Preferred Alternative.

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Table 1 identifies the costs of reviewing and updating the Critical Environmental Elements:

Critical Elements	
ENVIRONMENTAL ELEMENT	COST
Hazardous Waste (Geology and Soils)	$20,000
Biology (Vegetation/Wildlife/Habitat/Threatened and Endangered Species/Wetlands)	$30,000
Biological Assessment Update and Section 7 Consultation (Endangered Species Act compliance)	$40,000
Land Use (Prime and Unique Farmlands/Floodplains)	$10,000
Relocations, Disruptions and Displacements	$20,000
Socio-Economic Development (Environmental Justice)	$30,000
Traffic Analysis (Bicycle and Pedestrians)	$30,000
Historical and Archeological and Section 106	$40,000
TOTAL	$220,000

Table 2 identifies the costs of reviewing and updating the Non-Critical Environmental Elements:

Non-Critical Elements	
ENVIRONMENTAL ELEMENT	COST
Air Quality	$2500
Visual Quality	$5000
Noise/Vibration	$7000
Public Services and Utilities	$10000
Water Quality	$15,000
TOTAL	$39,500

Table 3 identifies the costs of updating and documenting the Reevaluation of FEIS:

Update/Reevaluation of EIS	
ENVIRONMENTAL TASK	COST
Review/Reevaluation Environmental Discipline Reports and Memos	$5,000
Preliminary Design	$80,000
Regulatory Agency Coordination and Consultation	$15,000
NEPA Reevaluation Document	$10,000
Public Involvement	$20,000
Project Management	$30,000
TOTAL	$160,000

TOTAL COST FOR FEIS REVALUATION $419,500

IV. Potential Need for Supplemental EIS

The results of the reevaluation for the *Aberdeen-Hoquiam Corridor Project Final EIS* may reveal to the FHWA that a supplemental EIS needs be prepared so that they have the best possible information to make any necessary substantive changes in their decisions regarding the project. If the reevaluation shows that there are significant new circumstances or information relevant to environmental concerns and bearing on the project or its impacts, a supplemental EIS may be required. Additionally, if there are substantial changes to the alignment of the Truck Route from that presented in the original EIS, then a supplemental EIS may be required. For instance, if the alignment on the west end of the project changes to follow the rail line instead Earley Industrial Way and 5th Street, the FHWA may conclude that this is a substantial change that could affect their decision, and that a supplemental EIS is warranted. Similarly, changes to the alignment or project impacts at the east end of the project that are substantial could trigger FHWA to require a supplemental EIS. The cost to prepare a supplemental EIS would be approximately $3 million, depending on the complexity of changes or new information and conditions.

ESTIMATED TOTAL COST FOR SUPPLEMENTAL EIS, IF NEEDED $3,000,000

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V. Summary

The written review and reevaluation of the *Aberdeen-Hoquiam Corridor Project Final EIS* would be based on the original design and must address all current environmental regulatory requirements. The reevaluation process should focus on only the areas where environmental conditions or project design changes have occurred. If no new significant impacts are identified, then a WSDOT Environmental Reevaluation/Consultation Form to the FEIS will fulfill the NEPA/SEPA requirements. If new significant impacts are identified, a Supplemental EIS and public review will be required. If new design elements are identified that do not affect the independent utility of the original project, each can be addressed as independent NEPA/SEPA actions.

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Appendix A

ENVIRONMENTAL AREAS FOR POSSIBLE CHANGED CONDITIONS WHICH MAY AFFECT THE ORIGINAL FEIS.

1)	THREATENED or ENDANGERED SPECIES Comment: Critical. The original Biology Report and Biological Assessment are over 10 years old. A complete update of both is required.
2)	PRIME and UNIQUE FARMLAND Comment: Non-Critical. Review and reevaluation of this area will occur with an update of Land Use impacts.
3)	WETLANDS Comment: Critical. Wetland delineations are over 10 years old. Review and reevaluation will be addressed in the Biology Report and BA.
4)	FLOODPLAINS Comment: Non-Critical. Review and reevaluation of this area will occur with an update of Land Use impacts.
5)	HAZARDOUS WASTE SITES Comment: Critical. Given the industrial history associated with the study area and improvements in hazardous waste database development and access, it is recommended that a Level 1 Hazardous Waste site assessment be conducted. This review and reevaluation will include an update on geology and soils.
6)	HISTORIC or ARCHAEOLOGICAL SITES Comment: Critical. New WSDOT protocols and procedures re: Section 106 reporting and compliance have changed since the original EIS was published in 2000.
7)	4(f) LANDS Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
8)	6(f) LANDS Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
9)	WILD and SCENIC RIVERS Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
10)	COASTAL BARRIERS Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
11)	COASTAL ZONE Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.

Source: Washington Department of Transportation Environmental Procedures Manual. Exhibit 411-12. Environmental Reevaluation/Consultation Form (NEPA).

SPECIFIC ENVIRONMENTAL FACTORS FOR POSSIBLE CHANGED CONDITIONS THAT MAY AFFECT THE ORIGINAL FEIS.

1)	AIR QUALITY Comment: Non-Critical. The project is not located in a Non-Attainment area.
2)	NOISE Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
3)	LAND USE Comment: Critical. Hoquiam is in-process of updating the City's Comprehensive Plan. A reevaluation of the Preferred Alternative is needed to address the corridor's compatibility and impact on the revised long-range land use plans.
4)	TRAFFIC or TRANSPORTATION Comment: Critical. A recent updated Traffic Analysis to the original FEIS is in-process.
5)	DISPLACEMENT (Business and Residential) Comment: Critical. A new 87 room hotel is now located in the Preferred Alternate corridor.
6)	ECONOMIC GROWTH and DEVELOPMENT Comment: Critical. In the past several years, there have been major changes in Grays Harbor County's socio-economic growth trends. A recent Grays Harbor Port Industrial Study is now available. An Environmental Justice review and reevaluation will be included with this report.

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7)	WATER QUALITY Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS
8)	VISUAL QUALITY Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
9)	NATURAL RESOURCES and ENERGY Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
10)	PUBLIC SERVICES and UTILITIES Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
11)	VEGETATION and WILDLIFE Comment: Critical. The original Biology Report and Biological Assessment are over 10 years old. A complete update of both is required.
12)	RECREATION Comment: Non-Critical. The preliminary review indicated that no major changes have occurred since the original FEIS.
13)	SOCIAL IMPACTS Comment: Critical. In the past several years, there have been major changes in Grays Harbor socio-economic growth trends. This review and reevaluation will be combined with the economic growth and development report.

Source: Washington Department of Transportation Environmental Procedures Manual. Exhibit 411-12. Environmental Reevaluation/Consultation Form (NEPA).

Appendix D. References

US 101 Regional Circulation Project Cost Estimate Report

Cost Estimate Report

Appendix D – References

AASHTO Publications Catalog. August 2006. http://www.wsdot.wa.gov/fasc/EngineeringPublications/

Sverdrup Civil, Inc. on behalf of WSDOT. December 1996. Aberdeen-Hoquiam Corridor Project – Final Constructibility/Phasing/Funding Report.

WSDOT. April 2000. Aberdeen-Hoquiam Corridor Project – Final Environmental Impact Statement.

WSDOT Contract Bid Tabulation Database. August 2005–August 2006. Available at: http://www.wsdot.wa.gov/biz/contaa/BIDTAB/

WSDOT Design Manual. Spring 2006. Available at: http://www.wsdot.wa.gov/eesc/design/policy/DesignPolicy.htm

WSDOT Publications Catalog. August 2006. Available at: http://www.wsdot.wa.gov/fasc/EngineeringPublications/

WSDOT Olympic Region Transportation Planning Office. August 2006. Personal communication (conversations with LeRoy Patterson, T. J. Nedrow, and Forest Sutmiller regarding Design Criteria for Central Alternate Corridor).

WSDOT Olympic Region Project Office. August 7, 2006. Personal communication (meeting with John Hart, Project Engineer, regarding the history and current issues involving the Aberdeen-Hoquiam Corridor Project EIS).

WSDOT Real Estate Services. August 2006. Personal communication (conversation regarding real estate market inflation in Grays Harbor County).

Appendix E. Cost Estimate Backup

US 101 Regional Circulation Project

Cost Estimate Report

GHCOG
COUNCIL OF GOVERNMENTS

Washington State
Department of Transportation

Cost Estimate Report

US 101 Regional Circulation Project

Cost Estimate Backup

December 2006

Grays Harbor, Washington

Prepared for:

Washington State Department of Transportation
Olympic Region
5720 Capitol Boulevard
Tumwater, Washington 98501

Grays Harbor Council of Governments
115 South Wooding Street
Aberdeen, Washington 98520

Prepared by:

Exeltech Consulting, Inc.
2590 Willamette Drive NE, Suite 101
Lacey, Washington 98516
(360) 357-8289

E1.
TRUCK ROUTE

US 101 Regional Circulation Project

13-Nov-06

Projects

Truck Route:		**West Quarter**	**Half**	**East Quarter**	**Full**
Re-evaluation of NEPA-EIS	$5,000,000	$5,000,000	$5,000,000	$5,000,000	$5,000,000
Environmental Documentation	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000
SR 109 Spur Junction to SR109 at Paulson Road	$3,622,000	$3,622,000			$3,622,000
New Alignment from Paulson Road to 5th	$18,900,000	$18,900,000			$18,900,000
New Alignment from 5th Street Along the Railroad to 10th Street	$5,718,000	$5,718,000			$5,718,000
New Hoquiam River Bridge	$136,300,000	$136,300,000			$136,300,000
22nd/23rd Streets to 30th Street	$16,115,000	$0	$16,115,000		$16,115,000
30th Street to Wishkah	$10,494,000		$10,494,000		$10,494,000
Port Industrial Road Improvement (short term)	$3,567,000			$3,567,000	
Port Industrial Road to Wishkah Street	$904,000		$904,000	$904,000	$904,000
Wishkah Street to State Street	$9,720,000		$9,720,000	$9,720,000	$9,720,000
State Street from Park Street to South K Street	$2,587,000		$2,587,000	$2,587,000	$2,587,000
US 101/SR12 Connection	$39,950,000		$39,950,000	$39,950,000	$39,950,000
Wishkah River Bridge	$133,690,000		$133,690,000	$133,690,000	$133,690,000
	Total Cost	$172,540,000	$221,460,000	$198,418,000	$386,000,000

SR 109 to Paulson
Right-of-Way

Right-of-Way Costs					
Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total
	Land @ $2 / SF	135000.0	$270,000	$0	$270,000
Subtotal					$270,000
Hazard Materials Investigations					$0
Relocation Allocation (Estimate at 50% of the value of the buildings)					$0
				Total	**$270,000**

SR 109 to Paulson
Roadway Construction

Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$150,840	$150,840	
Demolition	Est.	1.00	$0	$0	
Hazardous Materials	Est.	1.00	$25,000	$25,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Embankment (Ton)	Ton	31,685.00	$23	$728,755	Gravel borrow 3' by 1600', 115' wide
Embankment Compaction (CY)	CY	20,700.00	$4	$82,800	
Drainage (Est.)	Est.	1.00	$150,000	$150,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 800 total length and 30000cf detention pond)
Surfacing (Ton)	Ton	11,792.00	$20	$235,840	Assume 15" CSBC. 88' width and 1600' length
Pavement (Ton)	Ton	8,025.00	$60	$481,500	Assume 9" HMA, 88' width and 1600' length
Illumination (Est.)	LS	1.00	$35,000	$35,000	Illumination at 1 intersection (SR 109 Spur)
Signing / Signals	LS	0.00	$250,000	$0	
Utilities (Est.)	Est.	1.00	$20,000	$20,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$30,000	$30,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$96,600	$96,600	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$2,036,335**	

Assumptions:
Roadway width
using150' wide ROW
88' pavement including
8' shoulder
Total Length - 1600'

SR 109 to Paulson
Cost Summary
Total

Right of Way, Acquisition & Relocation Costs		$270,000
Roadway Construction Costs		$2,036,335
	Construction Subtotal*	$2,306,335
Preliminary Engineering & Design (20% of Construction Subtotal)		$461,267
	Subtotal*	$2,767,602
Construction Management (10% of Construction Subtotal)		$230,633
	Subtotal*	$2,998,235
Contingencies (15% of Construction Subtotal)		$345,950
	Subtotal*	$3,344,185
Sales Tax (8.3%)		$277,567
	Total*	**$3,621,753**

Paulson to 5th
Right-of-Way

Right-of-Way Costs Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total
	Land @ $2 / SF	1152000.0	$2,304,000	$0	$2,304,000
Subtotal					$2,304,000
Hazard Materials Investigations					$0
Relocation Allocation (Estimate at 50% of the value of the buildings)					$0
				Total	**$2,304,000**

Paulson to 5th
Roadway Construction

Roadway Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$720,848	$720,848	
Demolition	Est.	1.00	$50,000	$50,000	Include disposal of debris
Hazardous Materials	Est.	1.00	$150,000	$150,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Embankment (Ton)	Ton	152,087.00	$23	$3,498,001	Gravel borrow 3' by 7680', 115' wide
Embankment Compaction (CY)	CY	98,133.00	$4	$392,532	
Drainage (est.)	Est.	1.00	$200,000	$200,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 2000 total length) and no detention pond (discharge into tidal water)
Surfacing (Ton)	Ton	56,602.00	$20	$1,132,040	Assume 15" CSBC. 88' width and 7680' length
Pavement (Ton)	Ton	38,523.00	$60	$2,311,380	Assume 9" HMA, 88' width and 7680' length
Illumination (Est.)	LS	4.00	$35,000	$140,000	Illumination at 4 intersection (Adams, Airport, Emerson and Paulson Road)
Signing / Signals	LS	2.00	$250,000	$500,000	2 signalized intersections (Adams and Emerson)
Utilities (Est.)	Est.	1.00	$75,000	$75,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$100,000	$100,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$461,643	$461,643	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$9,731,444**	

Assumptions:
Roadway width
using150' wide ROW
88' pavement including
8' shoulder
Total Length - 7680'

Paulson to 5th
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$2,304,000
Roadway Construction Costs		$9,731,444
	Construction Subtotal*	$12,035,444
Preliminary Engineering & Design (20% of Construction Subtotal)		$2,407,089
	Subtotal*	$14,442,532
Construction Management (10% of Construction Subtotal)		$1,203,544
	Subtotal*	$15,646,077
Contingencies (15% of Construction Subtotal)		$1,805,317
	Subtotal*	$17,451,393
Sales Tax (8.3%)		$1,448,466
	Total*	**$18,899,859**

5th Along Railroad
Right-of-Way

Right-of-Way Costs Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total
	Land @ $2 / SF	330000.0	$660,000	$0	$660,000
Subtotal					$660,000
Hazard Materials Investigations					$0
Relocation Allocation (Estimate at 50% of the value of the buildings)					$0
				Total	**$660,000**

5th Along Railroad
Roadway Construction

Roadway Construction Cost Estimate Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$220,850	$220,850	
Demolition	Est.	0.00		$0	
Hazardous Materials	Est.	1.00	$50,000	$50,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals (21 potentially contaminated sites)
Embankment (Ton)	Ton	50,828.00	$23	$1,169,044	Gravel borrow 3.5' by 2200', 115' wide
Embankment Compaction (CY)	CY	32,796.00	$4	$131,184	
Drainage (Est.)	Est.	1.00	$100,000	$100,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 1000 total length) and no detention pond (discharge into tidal water)
Surfacing (Ton)	Ton	16,214.00	$20	$324,280	Assume 15" CSBC. 88' width and 2200' length
Pavement (Ton)	Ton	8,828.00	$60	$529,680	Assume 9" HMA, 88' width and 2200' length
Illumination (Est.)	LS	1.00	$35,000	$35,000	Illumination at 1 intersection (5th Street)
Signing / Signals	LS	1.00	$250,000	$250,000	1 signalized intersections (5th Street)
Utilities (Est.)	Est.	1.00	$20,000	$20,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$10,000	$10,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$141,436	$141,436	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$2,981,474**	

Assumptions:
Roadway width using150' wide ROW

88' pavement including 8' shoulder
Total Length - 2200'

5th Along Railroad
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$660,000
Roadway Construction Costs		$2,981,474
	Construction Subtotal*	$3,641,474
Preliminary Engineering & Design (20% of Construction Subtotal)		$728,295
	Subtotal*	$4,369,769
Construction Management (10% of Construction Subtotal)		$364,147
	Subtotal*	$4,733,916
Contingencies (15% of Construction Subtotal)		$546,221
	Subtotal*	$5,280,137
Sales Tax (8.3%)		$438,251
	Total*	**$5,718,389**

New Hoquiam River Bridge
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$2,720,000
Roadway Construction Costs		$2,424,000
Bridge Construction Costs		$81,652,164
	Construction Subtotal*	$86,796,164
Preliminary Engineering & Design (20% of Construction Subtotal)		$17,359,233
	Subtotal*	$104,155,397
Construction Management (10% of Construction Subtotal)		$8,679,616
	Subtotal*	$112,835,013
Contingencies (15% of Construction Subtotal)		$13,019,425
	Subtotal*	$125,854,438
Sales Tax (8.3%)		$10,445,918
	Total*	**$136,300,356**

22nd / 23rd to 30th
Right-of-Way

Right-of-Way Costs						
Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total	Partial Value
051202300700	Commercial Land w/ building	40300.0	$100,750	$273,000	$373,750	
051202200700	Commercial Land w/ building	19720.0	$49,300	$194,000	$243,300	
051202201000	Commercial Land	13000.0	$32,500	$0	$32,500	
051202201200	Commercial Land w/ building	6500.0	$16,250	$203,000	$219,250	
055205501000	Residential w/ Single family units	20034.0	$46,078	$29,125	$75,203	
055205501300	Residential w/ Single family units	12600.0	$28,980	$39,060	$68,040	
055205501500	Residential w/ Single family units	6300.0	$14,490	$17,255	$31,745	
055205501600	Commercial w/ Multi-Units	12600.0	$28,980	$211,020	$240,000	
055205501800	Commercial w/ 2-4 units	6300.0	$14,490	$105,510	$120,000	
055205401700	Residential w/ Single family units	6300.0	$14,490	$80,525	$95,015	
055205401600	Residential w/ Single family units	6300.0	$14,490	$51,970	$66,460	
055205401500	Residential w/ Single family units	6300.0	$14,490	$64,955	$79,445	
055205401400	Residential w/ Single family units	6300.0	$14,490	$45,885	$60,375	
055205401300	Residential w/ Single family units	6300.0	$14,490	$34,790	$49,280	
055205401201	All Other residential Not Elsewhere Coded	5600.0	$12,880	$0	$12,880	
055205401102	All Other residential Not Elsewhere Coded	630.0	$500	$0	$500	
055205401101	All Other residential Not Elsewhere Coded	5670.0	$13,041	$0	$13,041	
055205400900	Commercial Land w/ single family residence	6820.7	$26,000	$49,795	$75,795	
055205400300	Commercial Land w/ single family residence	15000.0	$37,500	$56,540	$94,040	
055205301200	Commercial Land w/ Other Retail Trade	19550.0	$48,875	$0	$48,875	
055205302000	Residential w/ Single family units	6300.0	$14,490	$47,330	$61,820	
055205302100	Residential w/ Single family units	6300.0	$14,490	$25,040	$39,530	
055205302200	Residential w/ Single family units	6300.0	$14,490	$44,540	$59,030	
055205302300	Residential w/ Single family units	6300.0	$14,490	$50,605	$65,095	
055205302400	Residential w/ Single family units	6300.0	$14,490	$41,690	$56,180	
055205302500	Residential w/ Single family units	6300.0	$14,490	$30,890	$45,380	
'055205302700	Residential w/ Single family units	11340.0	$26,082	$37,080	$63,162	

22nd / 23rd to 30th
Right-of-Way

Right-of-Way Costs						
Parcel Number	**Property Use**	**Area (FT2)**	**Land Value**	**Building Value**	**Total**	**Partial Value**
055205600100	Industrial Land	21780.0	$43,560	$0	$43,560	
055205601600	Industrial Land	3.27 Acres	$284,684	$0	$284,684	$36,000
055205801001	Commercial Land	No Record	$500	$0	$500	
055205801100	Commercial Land	11925.0	$23,850	$0	$23,850	
055205800900	Commercial Land	7260.0	$14,520	$0	$14,520	
055205800600	Commercial Land	18150.0	$36,300	$0	$36,300	
055205800500	Commercial Land	6050.0	$12,100	$0	$12,100	
055205800400	Commercial Land w/ Warehouse etc.	11374.0	$22,748	$40,000	$62,748	
055205800100	Commercial Land	11616.0	$23,232	$0	$23,232	
055205900200	Industrial Land w/ Building	2.99 Acres	$260,576	$276,000	$536,576	$96,000
055205900100	Commercial w/ Building not classified	6050.0	$12,100	$494,000	$506,100	
052206600800	Commercial Land w/ Warehouse etc.	33300.0	$66,600	$80,000	$146,600	
052206600100	Commercial Land	33300.0	$66,600	$0	$66,600	
052207900000	Commercial Land w/ Warehouse etc.	2.67 Acres	$232,320	$0	$232,320	$144,000
Subtotal					$4,379,381	
Hazard Materials Investigations (Estimated)					$150,000	
Relocation Allocation (Estimate at 50% of the value of the buildings)					$866,803	
Partial Take Value Adjustment					-$777,580	
				Total	**$5,396,184**	

22nd / 23rd to 30th
Roadway Construction

Roadway Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$360,426	$360,426	
Demolition	Est.	1.00	$150,000	$150,000	Include disposal of debris (15 buildings)
Hazardous Materials	Est.	1.00	$200,000	$200,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Embankment (Ton)	Ton	47,527.00	$23	$1,093,121	Gravel borrow 4.5' by 2000', 92' wide
Embankment Compaction (CY)	CY	30,667.00	$4	$122,668	
Drainage (Est.)	Est.	1.00	$250,000	$250,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 800 total length) and detention pond (35,000 cuff capacity)
Surfacing (Ton)	Ton	23,350.00	$20	$467,000	Assume 15" CSBC. 68' width and 4100' length
Pavement (Ton)	Ton	15,892.00	$60	$953,520	Assume 9" HMA, 68' width and 4100' length
Curb / Sidewalks	SY	5,467.00	$30	$164,010	6"curb and 6'-0" Sidewalk along both sides of roadway
Illumination (Est.)	LS	3.00	$35,000	$105,000	Illumination at 3 intersections (28th, Ontario and 23rd)
Signing / Signals	LS	2.00	$250,000	$500,000	2 signalized intersections (Ontario and 23rd Streets)
Utilities (Est.)	Est.	1.00	$150,000	$150,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$200,000	$200,000	Establish and maintain detour routes, flagging, construction signing,
Environmental	Est.	1.00	$150,000	$150,000	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$4,865,745**	

Assumptions:
Roadway width using 80' wide ROW
68' pavement & 2-6' sidewalk
Total Length - 4100'

22nd / 23rd to 30th Cost Summary Total	
Right-of-Way, Acquisition & Relocation Costs	$5,396,184
Roadway Construction Costs	$4,865,745
Construction Subtotal*	$10,261,928
Preliminary Engineering & Design (20% of Construction Subtotal)	$2,052,386
Subtotal*	$12,314,314
Construction Management (10% of Construction Subtotal)	$1,026,193
Subtotal*	$13,340,506
Contingencies (15% of Construction Subtotal)	$1,539,289
Subtotal*	$14,879,796
Sales Tax (8.3%)	$1,235,023
Total*	**$16,114,819**

30th to Wishkah
Right-of-Way

Right-of-Way Costs					
Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total
	Build within Existing Railroad ROW				
	30th Intersection				$0
					$100,000
Subtotal					$100,000
Hazard Materials Investigations					$0
Relocation Allocation					$0
				Total	**$100,000**

30th to Wishkah
Roadway Construction

Roadway Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$487,586	$487,586	
Demolition	Est.	1.00	$120,000	$120,000	Include disposal of debris (17 buildings)
Hazardous Materials	Est.	1.00	$100,000	$100,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Embankment (Ton)	Ton	56,252.00	$23	$1,293,796	Gravel borrow 2.5' by 4900', 80' wide
Embankment Compaction (CY)	CY	36,296.00	$4	$145,184	
Drainage (Est.)	Est.	1.00	$400,000	$400,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 1200 total length) and detention pond (70,000 cuff capacity)
Surfacing (Ton)	Ton	27,905.00	$20	$558,100	Assume 15" CSBC. 68' width and 4900' length
Pavement (Ton)	Ton	18,992.00	$60	$1,139,520	Assume 9" HMA, 68' width and 4900' length
Curb / Sidewalks	SY	6,533.00	$30	$195,990	6"curb and 6'-0" Sidewalk along both sides of roadway
Illumination (Est.)	LS	3.00	$35,000	$105,000	Illumination at 3 intersections (Haight St., Myrtle St., and 30th St.)
Signing / Signals	LS	2.00	$250,000	$500,000	2 signalized intersections (Haight St and 30th St.)
Utilities (Est.)	Est.	1.00	$100,000	$100,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$150,000	$150,000	Establish and maintain detour routes, flagging, construction signing
Rail Relocation	LF	4,900.00	$200	$980,000	Rail Alignment Cost Per Appendix L
Environmental	Est.	1.00	$307,239	$307,239	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$6,582,415**	

Assumptions:
Roadway width using existing 120' wide Railroad ROW
68' pavement & 2-6' sidewalk
Total Length - 4900'

30th to Wishkah
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$100,000
Roadway Construction Costs		$6,582,415
	Construction Subtotal	$6,682,415
Preliminary Engineering & Design (20% of Construction Subtotal)		$1,336,483
	Subtotal	$8,018,898
Construction Management (10% of Construction Subtotal)		$668,242
	Subtotal	$8,687,140
Contingencies (15% of Construction Subtotal)		$1,002,362
	Subtotal	$9,689,502
Sales Tax (8.3%)		$804,229
	Total	**$10,493,731**

Port Industrial Road – Total
Cost Summary

Roadway Construction Costs		$2,533,513
	Construction Subtotal*	$2,533,513
Preliminary Engineering & Design (20% of Construction Subtotal)		$506,703
	Subtotal*	$3,040,216
Construction Management (10% of Construction Subtotal)		$253,351
	Subtotal*	$3,293,567
Contingencies (15% of Construction Subtotal)		$0 (Already Added)
	Subtotal*	$3,293,567
Sales Tax (8.3%)		$273,366
	Total*	**$3,566,933**

PROJECT# 0000000026648 10/9/2006

PHASE 1
PRELIMINARY COST ESTIMATE
Port Industrial Road – 1

Project Title - Port of Grays Harbor
Location - Grays Harbor
Owner - Port of GH
Estimate by - Bradley J. Shea, P.E. HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$105,000	$ 105,000
0025	CLEARING AND GRUBBING	ACRE	-	$10,000.00	$ -
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	1	$15,000.00	$ 15,000
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$ -
0160	SAW CUTTING	L.F.	-	$2.00	$ -
		Total this section:			**$120,000**
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	2,790	$15.00	$ 41,850
0421	GRAVEL BORROW INCL. HAUL	C.Y.	1,346	$35.00	$ 47,110
0470	EMBANKMENT COMPACTION	C.Y.	2,790	$4.00	$ 11,160
		Total this section:			**$100,120**
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	-	$1,750.00	$ -
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$ -
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	-	$60.00	$ -
		Total this section:			**$0**
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	1,047	$45.00	$ 47,115
5120	CRUSHED SURFACING TOP COURSE	TON	432	$45.00	$ 19,440
		Total this section:			**$66,555**
	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$ 100	$1.00	$ 100
		Total this section:			**$100**
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	6,510	$75.00	$ 488,250
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$ -
		Total this section:			**$488,250**
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	-	$3,000.00	$ -
6490	EROSION/WATER POLLUTION CONTROL	EST.	$ 1.00	$5,000.00	$ 5,000
		Total this section:			**$5,000**
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	-	$15.00	$ -
6806	PAINT LINE	L.F.	-	$1.30	$ -
6817	PAINTED WIDE LINE	L.F.	-	$1.50	$ -
6856	PLASTIC CROSSWALK LINE	S.F.	-	$15.00	$ -
6858	PLASTIC STOP LINE	L.F.	-	$20.00	$ -
6860	PLASTIC TRAFFIC ARROW	EACH	-	$60.00	$ -
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$10,000.00	$ 10,000
6979	TRAFFIC CONTROL LABOR	HR	650	$75.00	$ 48,750

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
6972	TRAFFIC CONTROL SUPERVISOR	HR	350	$75.00	$ 26,250
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	-		$ -
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	-		$ -
	Total this section:				**$85,000**
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$ 5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$ -
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$ -
7055	CEMENT CONC. SIDEWALK	S.Y.	-	$20.00	$ -
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$ -
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$ -
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$ -
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$ -
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$ -
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$ -
6243	ADJUST VALVE BOX	EACH	-	$200.00	$ -
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$ -
	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$ -
7715	FORCE ACCOUNT	EST.	$ 40,000.00	$1.00	$ 40,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$ 1,500
	Total this section:				**$46,500**
Subtotal Construction					**$911,525**
Contingency (15%)					$136,729

Estimated Total Project Cost		**$1,048,254**

PROJECT# 0000000026648 10/9/2006

PHASE 2
PRELIMINARY COST ESTIMATE
Port Industrial Road – 2

Project Title - Port of Grays Harbor Phase 2
Location - Grays Harbor
Owner - Port of GH
Estimate by - Bradley J. Shea, P.E. HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$50,000	$ 50,000
0025	CLEARING AND GRUBBING	ACRE	-	$10,000.00	$ -
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	-	$15,000.00	$ -
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$ -
0160	SAW CUTTING	L.F.	-	$2.00	$ -
		Total this section:		**$50,000**	
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	-	$15.00	$ -
0421	GRAVEL BORROW INCL. HAUL	C.Y.	-	$35.00	$ -
0470	EMBANKMENT COMPACTION	C.Y.	-	$4.00	$ -
		Total this section:		**$0**	
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	-	$1,750.00	$ -
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$ -
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	-	$60.00	$ -
		Total this section:		**$0**	
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	-	$45.00	$ -
5120	CRUSHED SURFACING TOP COURSE	TON	-	$45.00	$ -
		Total this section:		**$0**	
	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$ -	$1.00	$ -
		Total this section:		**$0**	
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	-	$75.00	$ -
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$ -
		Total this section:		**$0**	
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	-	$3,000.00	$ -
6490	EROSION/WATER POLLUTION CONTROL	EST.	$ 1.00	$5,000.00	$ 5,000
		Total this section:		**$5,000**	
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	-	$15.00	$ -
6806	PAINT LINE	L.F.	100	$1.30	$ 130
6817	PAINTED WIDE LINE	L.F.	300	$1.50	$ 450
6856	PLASTIC CROSSWALK LINE	S.F.	400	$15.00	$ 6,000
6858	PLASTIC STOP LINE	L.F.	240	$20.00	$ 4,800
6860	PLASTIC TRAFFIC ARROW	EACH		$60.00	$ -
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$10,000.00	$ 10,000
6979	TRAFFIC CONTROL LABOR	HR	150	$75.00	$ 11,250
6972	TRAFFIC CONTROL SUPERVISOR	HR	70	$75.00	$ 5,250

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	1	$250,000.00	$ 250,000
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	1	$250,000.00	$ 250,000
	Total this section:				**$537,880**
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$ 5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$ -
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$ -
7055	CEMENT CONC. SIDEWALK	S.Y.	-	$20.00	$ -
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$ -
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$ -
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$ -
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$ -
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$ -
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$ -
6243	ADJUST VALVE BOX	EACH	-	$200.00	$ -
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$ -
	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$ -
7715	FORCE ACCOUNT	EST.	$ 40,000.00	$1.00	$ 40,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$ 1,500
	Total this section:				**$46,500**
Subtotal Construction					**$639,380**
Contingency (15%)					$95,907

Estimated Total Project Cost		**$735,287**

PROJECT# 0000000026648 10/9/2006

PHASE 3
PRELIMINARY COST ESTIMATE
Port Industrial Road – 3

Project Title - Port of Grays Harbor Phase 3
Location - Grays Harbor
Owner - Port of GH
Estimate by - Bradley J. Shea, P.E. HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$50,000	$ 50,000
0025	CLEARING AND GRUBBING	ACRE	0.8	$5,000.00	$ 3,750
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	1	$10,000.00	$ 10,000
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$ -
0160	SAW CUTTING	L.F.	6,675	$2.00	$ 13,350
		Total this section:		**$77,100**	
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	-	$15.00	$ -
0421	GRAVEL BORROW INCL. HAUL	C.Y.	-	$35.00	$ -
0470	EMBANKMENT COMPACTION	C.Y.	-	$4.00	$ -
		Total this section:		**$0**	
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	22	$1,750.00	$ 38,500
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$ -
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	2,500	$60.00	$ 150,000
		Total this section:		**$188,500**	
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	-	$45.00	$ -
5120	CRUSHED SURFACING TOP COURSE	TON	225	$45.00	$ 10,125
		Total this section:		**$10,125**	
	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$ -	$1.00	$ -
		Total this section:		**$0**	
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	1,375	$75.00	$ 103,125
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$ -
		Total this section:		**$103,125**	
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	1.0	$3,000.00	$ 3,000
6490	EROSION/WATER POLLUTION CONTROL	EST.	$ 1.00	$5,000.00	$ 5,000
		Total this section:		**$8,000**	
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	6,676	$15.00	$ 100,140
6806	PAINT LINE	L.F.	-	$1.30	$ -
6817	PAINTED WIDE LINE	L.F.	-	$1.50	$ -
6856	PLASTIC CROSSWALK LINE	S.F.	-	$15.00	$ -
6858	PLASTIC STOP LINE	L.F.	-	$20.00	$ -
6860	PLASTIC TRAFFIC ARROW	EACH		$60.00	$ -
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$5,000.00	$ 5,000
6979	TRAFFIC CONTROL LABOR	HR	500	$75.00	$ 37,500
6972	TRAFFIC CONTROL SUPERVISOR	HR	200	$75.00	$ 15,000

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	-	$250,000.00	$ -
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	-	$250,000.00	$ -
	Total this section:				**$157,640**
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$ 5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$ -
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$ -
7055	CEMENT CONC. SIDEWALK	S.Y.	4,058	$20.00	$ 81,160
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$ -
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$ -
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$ -
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$ -
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$ -
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$ -
6243	ADJUST VALVE BOX	EACH	-	$200.00	$ -
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$ -
	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$ -
7715	FORCE ACCOUNT	EST.	$ 20,000.00	$1.00	$ 20,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$ 1,500
	Total this section:				**$107,660**
Subtotal Construction					**$652,150**
Contingency (15%)					$97,823

Estimated Total Project Cost		**$749,973**

Port Industrial Road to Wishkah
Right-of-Way

Right-of-Way Costs					
Parcel Number	**Property Use**	**Area (FT2)**	**Land Value**	**Building Value**	**Total**
Assumed no ROW required					
					$0
Subtotal					$0
Hazard Materials Investigations					$0
Relocation Allocation (Estimate at 50% of the value of the buildings)					$0
				Total	**$0**

Port Industrial Road to Wishkah
Roadway Construction

Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$42,658	$42,658	
Demolition	Est.	1.00	$35,000	$35,000	Sidewalk, Curb and Gutter, Pavement etc.
Drainage (est.)	Est.	1.00	$35,000	$35,000	Relocation and Adjustment
Surfacing (Ton)	Ton	3,417.00	$20	$68,340	Assume 6" CSBC. 68' width and 1500' length
Pavement (Ton)	Ton	3,876.00	$60	$232,560	Assume 6" HMA, 68' width and 1500' length
Curb / Sidewalks	SY	1,000.00	$30	$30,000	6"curb and 6'-0" Sidewalk along both sides of roadway
Utilities (Est.)	Est.	1.00	$35,000	$35,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$70,000	$70,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$27,319	$27,319	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$575,877**	

Assumptions:
Roadway width
using existing 80'
wide ROW
68' pavement and
2-6' sidewalk
Total Length - 1500'

Port Industrial Road to Wishkah
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$0
Roadway Construction Costs		$575,877
	Construction Subtotal*	$575,877
Preliminary Engineering & Design (20% of Construction Subtotal)		$115,175
	Subtotal*	$691,052
Construction Management (10% of Construction Subtotal)		$57,588
	Subtotal*	$748,639
Contingencies (15% of Construction Subtotal)		$86,381
	Subtotal*	$835,021
Sales Tax (8.3%)		$69,307
	Total*	**$904,328**

State Street Connection
Right-of-Way

Right-of-Way Costs					
Parcel Number	Property Use	Area (FT2)	Land Value	Building Value	Total
029407200200	Household, Single Family	6263.2	$13,650	$109,330	$122,980
029407200300	Household, Single Family	6349.0	$13,650	$31,465	$45,115
029407200400	Household, Single Family	6537.0	$13,650	$69,805	$83,455
029407200600	Household, Single Family	8931.7	$19,110	$31,845	$50,955
029407201200	Household, Multi-Unit	6348.6	$26,000	$55,250	$81,250
011000601301	Residential Bare Land	6955.2	$12,863	$0	$12,863
011000601100	Residential Bare Land	6506.2	$14,679	$0	$14,679
029407200500	Residential Bare Land	6106.8	$13,650	$0	$13,650
029407201100	Industrial Land	6245.9	$26,000	$0	$26,000
029407100702	Commercial Land w/ single family residence	2770.4	$10,800	$6,520	$17,320
029407600200	Commercial Land w/ single family residence	6390.1	$26,000	$7,820	$33,820
029407600300	Commercial Land w/ single family residence	6514.7	$26,000	$63,705	$89,705
029407201000	Commercial Land w/ single family residence	6691.0	$26,000	$23,785	$49,785
029407600400	Commercial Land w/ single family residence	6259.3	$26,000	$19,990	$45,990
029407200900	Commercial Land w/ single family residence	6595.6	$26,000	$35,465	$61,465
029407600500	Commercial Land w/ single family residence	6557.7	$26,000	$36,395	$62,395
029407601200	Commercial Land w/ single family residence	6904.6	$26,000	$83,080	$109,080
029407600600	Commercial Land w/ single family residence	6820.7	$26,000	$49,795	$75,795
029407601100	Commercial Land w/ single family residence	6674.3	$26,000	$32,200	$58,200
029407600900	Contract Construction Services	13208.1	$52,000	$100,000	$152,000
029407700900	Miscellaneous Services	20140.6	$78,000	$167,000	$245,000
Subtotal					$1,451,502
Hazard Materials Investigations (Prorated estimate based on 1996 Aberdeen - Hoquiam Corridor Study by number of sites)					$252,000
Relocation Allocation (Estimate at 50% of the value of the buildings)					$461,725
				Total	**$2,165,227**

State Street Connection
Roadway Construction

Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$298,183	$298,183	
Demolition	Est.	1.00	$120,000	$120,000	Include disposal of debris (17 buildings)
Hazardous Materials	Est.	1.00	$140,000	$140,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals (21 potentially contaminated sites)
Embankment (Ton)	Ton	43,920.80	$23	$1,010,178	Gravel borrow 4.5' by 0.35 miles, 92' wide
Embankment Compaction (CY)	Ton	28,336.00	$4	$113,344	
Drainage (Est.)	Est.	1.00	$350,000	$350,000	Collection system, bioswales (2' deep, 2' bottom, 3:1 slopes about 1000 total length) and detention pond (50,000 cuff capacity)
Surfacing (Ton)	Ton	12,012.00	$20	$240,240	Assume 15" CSBC. 78' width and 0.35 mi. length
Pavement (Ton)	Ton	8,224.13	$60	$493,448	Assume 9" HMA, 78' width and 0.35 mi. length
Curb / Sidewalks	SY	2,669.33	$30	$80,080	6"curb and 6'-0" Sidewalk along both sides of roadway
Illumination (Est.)	LS	3.00	$35,000	$105,000	Illumination at 3 intersections (Wishkah, Monroe, and Park Streets)
Signing / Signals	LS	2.00	$250,000	$500,000	2 signalized intersections (Wishkah and Monroe Streets)
Utilities (Est.)	Est.	1.00	$125,000	$125,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$275,000	$275,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$175,000	$175,000	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$4,025,473**	

State Street Connection
Cost Summary

Right-of-Way, Acquisition & Relocation Costs		$2,165,000
Roadway Construction Costs		$4,025,000
	Construction Subtotal*	$6,190,000
Preliminary Engineering & Design (20% of Construction Subtotal)		$1,238,000
	Subtotal*	$7,428,000
Construction Management (10% of Construction Subtotal)		$619,000
	Subtotal*	$8,047,000
Contingencies (15% of Construction Subtotal)		$928,500
	Subtotal*	$8,975,500
Sales Tax (8.3%)		$744,967
	Total*	**$9,720,467**

Park to K Street
Right-of-Way

Right-of-Way Costs					
Parcel Number	**Property Use**	**Area (FT2)**	**Land Value**	**Building Value**	**Total**
Assumed ROW required at 2 intersections					$20,000
Subtotal					$20,000
Hazard Materials Investigations					$0
Relocation Allocation (Estimate at 50% of the value of the buildings)					$0
				Total	**$20,000**

Park to K Street
Roadway Construction

Roadway Construction Cost Estimate					
Design Element	**Units**	**Quantity**	**Unit Cost**	**Cost**	**Assumptions**
Mobilization (8%)	LS	1.00	$112,314	$112,314	
Demolition	Est.	1.00	$50,000	$50,000	Sidewalk, Curb and Gutter, Pavement etc.
Drainage (est.)	Est.	1.00	$50,000	$50,000	Relocation and Adjustment
Surfacing (Ton)	Ton	4,828.00	$20	$96,560	Assume 6" CSBC. 68' width and 2130' length (80' Existing ROW)
Pavement (Ton)	Ton	5,504.00	$60	$330,240	Assume 6" HMA, 68' width and 2130' length
Curb / Sidewalks	SY	2,840.00	$30	$85,200	6"curb and 6'-0" Sidewalk along both sides of roadway
Illumination (Est.)	LS	2.00	$35,000	$70,000	Illumination at 2 intersections (Michigan and S. M St.)
Signing / Signals	LS	2.00	$250,000	$500,000	2 signalized intersections (Michigan and S. M St.)
Utilities (Est.)	Est.	1.00	$50,000	$50,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$100,000	$100,000	Establish and maintain detour routes, flagging, construction signing
Environmental	Est.	1.00	$71,928	$71,928	Estimate 5% of Cost
Roadside Planting				$0	No street trees planned
Total				**$1,516,242**	

Assumptions:
Roadway width using existing 80' wide ROW
68' pavement & 2-6' sidewalk
Total Length - 2130'

Park to K Street
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs	$20,000
Roadway Construction Costs	$1,627,560
Construction Subtotal*	$1,647,560
Preliminary Engineering & Design (20% of Construction Subtotal)	$329,512
Subtotal*	$1,977,072
Construction Management (10% of Construction Subtotal)	$164,756
Subtotal*	$2,141,828
Contingencies (15% of Construction Subtotal)	$247,134
Subtotal*	$2,388,962
Sales Tax (8.3%)	$198,284
Total*	**$2,587,246**

US 101 / US 12 Interchange
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$696,000
Roadway Construction Costs		$1,627,000
Bridge Construction Costs		$23,737,000
	Construction Subtotal*	$26,060,000
Preliminary Engineering & Design (20% of Construction Subtotal)		$5,212,000
	Subtotal*	$31,272,000
Construction Management (10% of Construction Subtotal)		$2,606,000
	Subtotal*	$33,878,000
Contingencies (15% of Construction Subtotal)		$3,909,000
	Subtotal*	$37,787,000
Sales Tax (8.3%)		$2,162,980
	Total*	**$39,949,980**

Wishkah River Bridge
Cost Summary
Total

Right-of-Way, Acquisition & Relocation Costs		$7,809,000
Roadway Construction Costs		$2,026,000
Bridge Construction Costs		$75,298,784
	Construction Subtotal*	$85,133,784
Preliminary Engineering & Design (20% of Construction Subtotal)		$17,026,757
	Subtotal*	$102,160,541
Construction Management (10% of Construction Subtotal)		$8,513,378
	Subtotal*	$110,673,919
Contingencies (15% of Construction Subtotal)		$12,770,068
	Subtotal*	$123,443,987
Sales Tax (8.3%)		$10,245,851
	Total*	**$133,689,838**

US 101 Regional Circulation Project
Hoquiam and Wishkah Bridges

29-Sep-06

Bridge Cost Estimate

Hoquiam River Crossing

	Unit	Quantity	Unit Cost	Total
Mobilization	LS		LS	$7,422,924
Work Access	SF	29,740	50	$1,487,000
E/W Connection Bridge	SF	333,680	218	$72,742,240
	Total Bridge Cost			$81,652,164

Wishkah River Crossing

	Unit	Quantity	Unit Cost	Total
Mobilization	LS		LS	$6,845,344
Work Access	SF	8,400	50	$420,000
E/W Connection Bridge	SF	312,080	218	$68,033,440
	Total Bridge Cost			$75,298,784

US 101 I/C

	Unit	Quantity	Unit Cost	Total
Mobilization	LS		LS	$2,157,875
Removal of Portions of Exist. Br.	SF	500	1000	$500,000
Work Access	SF	7,200	50	$360,000
WS Ramp	SF	48,750	275	$13,406,250
NE Ramp	SF	29,250	250	$7,312,500
	Total Bridge Cost			$23,736,625

US 101 Regional Circulation Project

22-Aug-06

Bridge Cost Estimate - Backup Calculations

Hoquiam River Crossing

	Length	Width	Factor		Area
Work Access	800	30			24,000
	50	30	4		6,000
				Total	30,000
E/W Connection	3880	86		Total	333,680

Wishkah River Crossing

	Length	Width	Factor		Area
Work Access	200	30			6,000
	40	30	2		2,400
				Total	8,400
E/W Connection West of I/C	1660	88			146,080
E/W Connection East of I/C	1500	102			153,000
WS Ramp	500	26	0.5		6,500
NE Ramp	500	26	0.5		6,500
				Total	312,080

US101 I/C

	Length	Width	Factor		Area
Removal of Portions of Exist. Br.	250		2	Total	500
Work Access	200	30			6,000
	20	30	2		1,200
				Total	7,200
WS Ramp	1750	26			45,500
	250	26	0.5		3,250
				Total	48,750
NE Ramp	250	26	0.5		3,250
	1000	26			26,000
				Total	29,250

E2.
INTELLIGENT TRANSPORTATION SYSTEM (ITS)

From: Wakjira, Kano [mailto:WakjirK@WSDOT.WA.GOV]
Sent: Thursday, October 12, 2006 12:55 PM
To: Bernie Chaplin
Cc: Wakjira, Kano
Subject: ITS descriptions

CLOSED CIRCUIT TELEVISION CAMERAS (CCTV)

Closed Circuit Television Cameras (CCTV) are located on the freeways and other highways in strategic locations to monitor traffic flow, verify incidents and allow (Traffic Management Center) personnel a real-time assessment of situations. The primary objective of a CCTV system is to provide visual monitoring of freeway conditions and to verify incidents. TMC personnel are thus able to provide accurate information to resolve the incident and to minimize traffic impacts to the motoring public.

Close Window

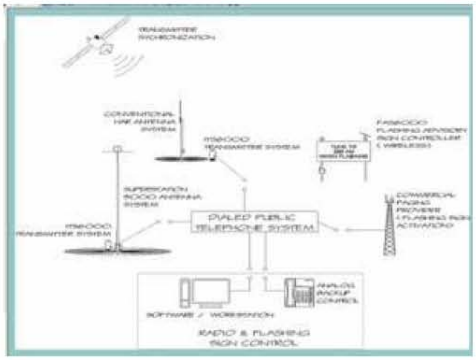
VARIABLE MESSAGE SIGN (VMS)

The Variable Message Signs (VMS) provide motorist information about traffic conditions on the freeway system. VMS's improve highway safety and enable motorist to make informed decisions on travel alternatives. VMS's are strategically placed on or near major freeways or

interchanges to optimize alternate routing options. In addition, VMS's on specific routes are currently used to provide Washington State Ferry users, information regarding delays and closures.

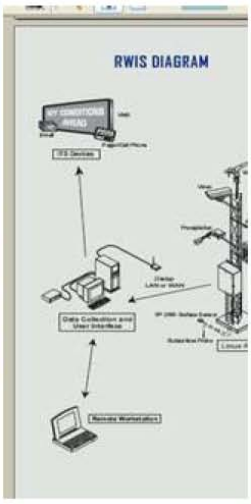
HIGHWAY ADVISORY RADIO (HAR)

The motoring public is made aware of incidents or situations that may affect their travel, by the TMC providing information to local radio stations. Updates to the media as well as the Public Affairs Information officer of WSDOT allow timely dissemination of current traffic conditions.

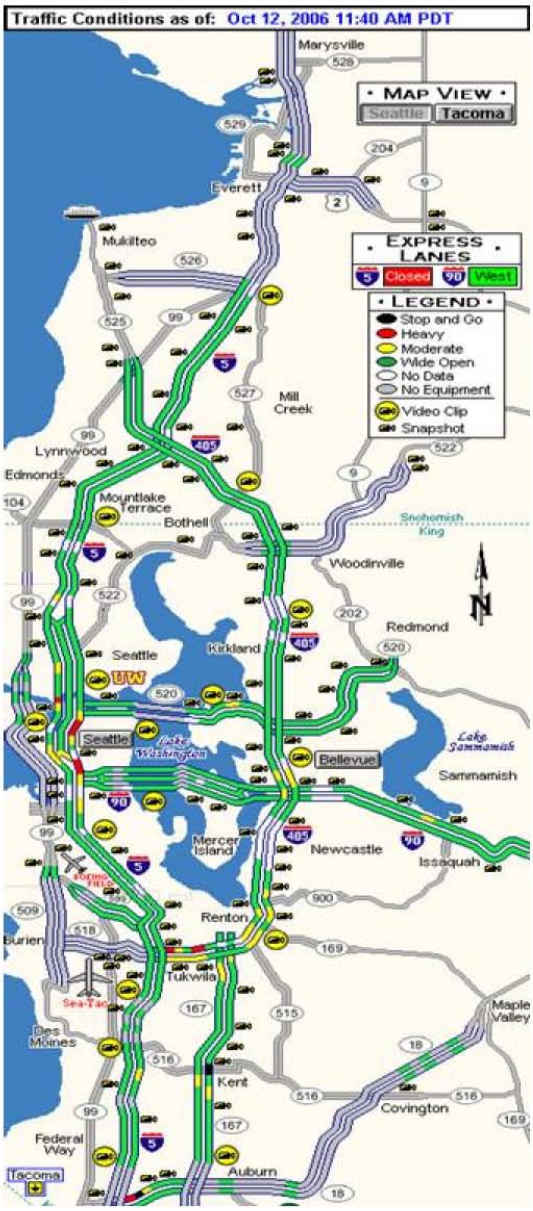


ROADWAY WEATHER INFORMATION SYSTEM (RWIS)

The main function of RWIS is to provide weather information for the purpose of warning motorists of inclement weather conditions.



DATA STATION
Data stations collect current volume, occupancy and, when speed loops are present, speed data from specific roadway locations. This information is transmitted to the central computer at Traffic Management Center for analysis and application.



Kano Wakjira
ITS Design
Olympic Region
5720 Capitol Blvd. SE
Tumwater, WA. 98501-6703

Tel: (360) 704-3284
Fax: (360) 357-2793
wakjirk@wsdot.wa.gov

11/21/2006

Intelligent Transportation System
Variable Message Signs

US 101 REGIONAL CIRCULATION PROJECT

LABOR: 45 $/Hr.

	Unit	Quant.	Unit Cost	Mtl. Cost	Hr/Unit	Labor Cost	Total Cost	
VMS SYSTEM								
VMS SIGNS	EA.	1	$144,320.00	$144,320.00	40	$1,800.00	$146,120.00	
*Model 334 Cabinet	EA.	1	$3,500.00	$3,500.00	8	$360.00	$3,860.00	
Model 334 Cabinet Foundation	EA.	1	$2,600.00	$2,600.00	16	$720.00	$3,320.00	
VMS Testing	EA.	1	$0.00	$0.00	4	$180.00	$180.00	**VMS System**
#2 USE	FT.	100	$0.70	$70.00	0.004	$18.00	$88.00	**$155,228.00**
#6 USE	FT.	100	$0.31	$31.00	0.003	$13.50	$44.50	
6 Pair Communication Cable	FT.	300	$0.46	$138.00	0.005	$67.50	$205.50	
Transformer	EA.	1	$1,050.00	$1,050.00	8	$360.00	$1,410.00	
CONDUIT SYSTEM								
Type 1 J-Box	EA.	3	$125.00	$375.00	1.5	$202.50	$577.50	
Type 2 J-Box	EA.	1	$200.00	$200.00	2	$90.00	$290.00	
2" PVC Conduit	FT.	100	$3.50	$350.00	0.1	$450.00	$800.00	
2" GRS Conduit	FT.	200	$5.50	$1,100.00	0.1	$900.00	$2,000.00	
4" GRS Conduit	FT.	30	$6.00	$180.00	0.1	$135.00	$315.00	**Conduit System**
Conduit Hardware	FT.	330	$0.60	$198.00	0.01	$148.50	$346.50	**$5,534.00**
Directional Boring	FT.	0	$100.00	$0.00	1.667	$0.00	$ -	
Trenching	FT.	200	$5.00	$1,000.00	0.02	$180.00	$1,180.00	
Plastic Junction Box Markings	EA.	1	$25.00	$25.00	0	$0.00	$25.00	
Beam Guardrail Type 1	L.F.	262.5	$20.00	$5,250.00	0	$0.00	$5,250.00	
Beam Guardrail Flared Terminal	EA.	1	$1,850.00	$1,850.00	0	$0.00	$1,850.00	**Guardrail**
Beam Guardrail Anchor Type 4	EA.	1	$520.00	$520.00	0	$0.00	$520.00	**$7,620.00**
Truck-Mounted Impact Attenuator	EA.	1	$5,500.00	$5,500.00	0	$0.00	$5,500.00	
Operation of Truck-Mounted Impact Attenuator	HR	32	$38.00	$1,216.00	0	$0.00	$1,216.00	
Portable Changeable Message Sign	EA.	2	$3,000.00	$6,000.00	0	$0.00	$6,000.00	
Operation of Portable Changeable Message Sign	HR	32	$10.00	$320.00	0	$0.00	$320.00	**$20,019.00**
Other Temporary Traffic Control	L.S.	1	$1,383.00	$1,383.00	0	$0.00	$1,383.00	
Other Traffic Control Labor	HR	12	$0.00	$0.00	8	$4,320.00	$4,320.00	
Traffic Control Supervisor	L.S.	32	$40.00	$1,280.00	0	$0.00	$1,280.00	
Sign Bridge No. 1	L.S	1	$121,000.00	$121,000.00	0	$0.00	$121,000.00	**Sign Bridges $121,000.00**
Total							$309,401.00	
Mobilization	L.S	1	0	$0.00	0	#REF!	$30,000.00	
Preparation, Grading, Erosion Control	LS	1					$15,000.00	
Design and Contingencies							$ 145,600.00	
GRAND TOTAL							**$500,001.00**	

Quantity may vary

From: Alam, Nazmul [mailto:AlamN@WSDOT.WA.GOV]
Sent: Tuesday, October 10, 2006 4:45 PM
To: Bernie Chaplin
Subject: FW: Est. for ITS devices per each

Bernie,

Here is some info on ITS costs that might help.

Thanks,

Nazmul

From: Sutmiller, Forest
Sent: Wednesday, September 20, 2006 1:52 PM
To: Alam, Nazmul
Subject: FW: Est. for ITS devices per each

Recognize these costs may date back a year and if so there may have been anywhere between 12% to 33% percent increases in cost, particularly for stuff with copper wire in it and made of steel.

From: Burke, Benjamin
Sent: Monday, April 24, 2006 8:58 AM
To: Sutmiller, Forest
Subject: Est. for ITS devices per each

Below is the unit cost for each ITS device that we typically install. We use these numbers for pre-scoping and planning efforts.

CCTV $75K

HAR $75K

Data Station $75K

RWIS $75K

VMS $450K

Fiber Optic per mile $150K

Ramp Meter $100K

Of course, these estimates can change per the individual site conditions. These costs include PE, CE, Contingencies, Taxes, CN and 10% mob.

Let me know if you need more info.

Ben Burke

From: Alam, Nazmul [mailto:AlamN@WSDOT.WA.GOV]
Sent: Tuesday, October 10, 2006 4:47 PM
To: Bernie Chaplin
Subject: FW: Est. for ITS devices per each

FYI. If it helps.

From: Sutmiller, Forest
Sent: Wednesday, September 20, 2006 1:56 PM
To: Alam, Nazmul
Subject: FW: Est. for ITS devices per each

FYI...old costs for conduit type work (year 2005) with ITS stuff at bottom. Again, I suspect increased costs may range from 12% to 33% based upon current steel and copper prices in 2006.

From: Wentz, Dylinn
Sent: Friday, June 24, 2005 2:14 PM
To: Sutmiller, Forest
Cc: Reyes, Rafael; Villnave, Michael
Subject: Interconnection Signals

Forest,

As per your request to Steve Kim on 6/21/05. The costs associated are as follows:

Based on labor costs of $45.00 hour

2" conduit (plus hardware) $3.50 ft. (0.09 hour/ft)

6 pcc conductor $0.46 ft. (0.005 hour/ft)

Junction Box Type 1 $125.00 each (2 hour/each)

Trenching (hourly rate only) $4.50 hr (0.1 hour/ft)

Boring $91.40 ft

Casing 18" $27.40 ft (0.08 hour/ft)

Equipment costs (hourly rate only): 1.111 hr for each of the below

Crane

Backhoe

Boom Truck

Auger

Total for Trenching for 1 foot is approx $8.46 plus junction boxes and equipment costs

Total for Boring/Casing for 1 foot is approx $126.36 per foot plus junction boxes and equipment costs.

Total for Trenching for 1 mile is approx $44,668.80 plus junction boxes and equipment costs.

Total for Boring/Casing for 1 mile is approx. $667,180.80 plus junction boxes and equipment costs.

If you have any questions and or comments please let me know.

Thank you

Dy

From: Burke, Benjamin
Sent: Monday, April 24, 2006 8:58 AM
To: Sutmiller, Forest
Subject: Est. for ITS devices per each

Below is the unit cost for each ITS device that we typically install. We use these numbers for pre-scoping and planning efforts.

CCTV $75K

HAR $75K

Data Station $75K

RWIS $75K

VMS $450K

Fiber Optic per mile $150K

Ramp Meter $100K

Of course, these estimates can change per the individual site conditions. These costs include PE, CE, Contingencies, Taxes, CN and 10% mob.

Let me know if you need more info.

Ben Burke

From: Alam, Nazmul [mailto:AlamN@WSDOT.WA.GOV]
Sent: Friday, October 13, 2006 1:59 PM
To: Bernie Chaplin
Subject: RE: ITS Description and Cost

Bernie,

Thanks for the description and some associated costs. Here are my comments.

Please add some language right at the outset, perhaps after the first paragraph to say something to the effect: "The recommendations for this ITS project include a planning and design phase where actual locations and configurations would be determined." Also incorporate your last sentence "Specific locations for installation of ITS and Photo Detection Cameras would require further analysis by WSDOT".

Examples of ITS elements not necessary. Only mention those that are recommended.

Bulleted list of recommended elements is easy to read. It could start with: Elements of the recommended ITS system include:

Include CCTV as a recommended element.

Ask Aberdeen Maintenance office if 'Roadway Winter Information System (RWIS) would be appropriate for the area. Ice hazards? If they feel it would be good, then include this element also.

VMS (or HAR as low cost option)

"Data station -$75,000" Is this included in the recommended elements? VMS requires it?

Cost analysis says: Photo Detection Camera -150,000 per camera (does not include control station). Why not include control station? Would it work without control station? How much to add a control station? Perhaps not a control station as extravagant as would be required for say Tacoma, but one that is appropriate for the area and application.

Please remove ramp meters.

VMS- 500,000 per site- how many sites?

Contingencies, etc. are included?

Are we including "Data stations" in the recommended package? Wouldn't it be necessary for VMS?

Thanks,

Nazmul

From: Bernie Chaplin [mailto:bernie@xltech.com]
Sent: Thursday, October 12, 2006 3:13 PM
To: Alam, Nazmul
Cc: Leroy Slemmer; Chris Runner
Subject: ITS Description and Cost

Nazmul
<<...>>
Here is the description and recommended ITS systems for implementation. The Port Industrial Road recommendation comes from the Port Industrial Road Study, including cost.

Also included in the Cost Summary for each project.

Bernie Chaplin
Planning & Environmental Services
Exeltech Consulting
2590 Willamette Dr. N.E.
Lacey, WA 98516
Ph: 360-357-8289
Fax: 360/357-8225

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E3.
TRI-CITY IMPROVEMENTS

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
Tri-City Operational Improvements	10/13/2006	
City of Aberdeen		
Projects:	Cost Estimate	Assumptions
Wishkah and Heron Road Widening	$1,644,000	
Wishkah and Alder Street Intersection	$67,000	
Heron and Park Street Intersection	$79,000	
1st and Alder Intersection	$43,000	
Oak and Simpson Improvement	$300,000	New signal
Activate Traffic Actuation System	$32,000	32 signals
Replace Span wire Signal System (L St. at Wishkah & Heron, Alder and Park at Market and First Intersections.	$1,800,000	6 intersections @ $300000 ea
Provide Continuous Sidewalk and Upgrade Crossing to meet ADA Requirements	$1,292,000	
Wishkah and Heron Streets - Extend build out project one block to L street.	$547,000	
US 101 at So. Aberdeen Intersection Improvement	$104,000	
Total Cost	$5,908,000	
City of Hoquiam		
Projects:	Cost Estimate	Assumptions
US 101 N. Lincoln St. and 6th St. Intersection	$250,000	Engineering Study Cost only
E. Simpson and 7th St. Improvement	$350,000	Sidewalk, Ramps Streetscape and signal
Central Business District ADA Ramp Improvement	$300,000	75 ramps at Intersections
Riverside Bridge and Approaches Signage and Lighting	$150,000	
US 101 Simpson Ave. Bridge Approach	$450,000	
SR 109 and Spencer Ave. Intersection Improvement	$450,000	Signal, Curb and Sidewalk, Turning Radius, Crosswalk etc.
Total Cost	$1,950,000	
City of Cosmopolis		
Projects:	Cost Estimate	Assumptions
US 101 Center Turning Lane	$500,000	Demo, Striping 6000' and ROW Acquisition
US 101 Sidewalk Construction Between 1st and H St.	$1,329,000	Curb & sidewalk, Overlay, LS. etc.
Install Left Turn Pocket at US 101	$200,000	At Mill Creek Trail & Lions Park With ROW Acquisition
Total Cost	$2,029,000	

Tri-City Operational Improvements
Project Cost Estimate Summary
Wishkah–Heron – Total

10/12/2006

Roadway Construction Cost Estimate (Heron St.)

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$39,987	$39,987	(Per City's Cost Estimate)
Demolition	Est.	1.00	$116,463	$116,463	(Per City's Cost Estimate)
Sidewalk & misc.	LS	1.00	$337,238	$337,238	(Per City's Cost Estimate)
Drainage Improvements	LS	1.00	$4,272	$4,272	(Per City's Cost Estimate)
Pavement (Ton)	Ton	0.00	$70	$0	
Planing	SY	0.00	$3	$0	
Overlay	Ton	0.00	$50	$0	
Curb / Sidewalks	SY	0.00	$40	$0	
Utilities (Est.)	Est.	0.00	$50,000	$0	
Traffic Control & Misc.	LS	1.00	$41,863	$41,863	(Per City's Cost Estimate)
Roadside Planting	EA	0.00	$1,000.00	$0	
Total				**$539,822**	

Roadway Construction Cost Estimate (Wishkah St.)

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$37,544	$37,544	(Per City's Cost Estimate)
Demolition	Est.	1.00	$111,300	$111,300	(Per City's Cost Estimate)
Sidewalk & misc.	LS	1.00	$312,614	$312,614	(Per City's Cost Estimate)
Drainage Improvements	LS	1.00	$3,528	$3,528	(Per City's Cost Estimate)
Pavement (Ton)	Ton	0.00	$70	$0	
Planing	SY	0.00	$3	$0	
Overlay	Ton	0.00	$50	$0	
Curb / Sidewalks	SY	0.00	$40	$0	

Utilities (Est.)	Est.	0.00	$50,000	$0	
Traffic Control & Misc.	LS	1.00	$41,863	$41,863	(Per City's Cost Estimate)
Roadside Planting	EA	0.00	$1,000.00	$0	
			$469,304.10		
Total				**$506,848**	

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Roadway Construction Costs		$1,046,671
Construction Subtotal*		$1,046,671
Preliminary Engineering & Design		$209,334
(20% of Construction Subtotal)		
Subtotal*		$1,256,005
Construction Management		
(10% of Construction Subtotal)		$104,667
Subtotal*		$1,360,672
Contingencies		$157,001
(15% of Construction Subtotal)		
Subtotal*		$1,517,672
Sales Tax (8.3%)		$125,967
Total*		**$1,643,639**

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total					
	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$2,431	$2,431	
Demolition	Est.	1.00	$5,000	$5,000	
Saw Cut Pavement	L.F.	86.00	$10	$860	
Surfacing (Ton)	Ton	39.50	$25	$988	Assume 15" CSBC (470 SF)
Pavement (Ton)	Ton	17.86	$75	$1,340	Assume 6" HMA (470 SF)
Curb / Sidewalks	SY	104.00	$50	$5,200	6" curb and 6'-0" Sidewalk and Bulb Out Raised Barrier
Striping	EA	1.00	$2,000	$2,000	Striping etc.
Utilities (Est.)	Est.	1.00	$5,000	$5,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$10,000	$10,000	Establish and maintain detour routes, flagging, construction signing,
Roadside Planting	EA	33.00	$0.00	$0	No street trees planned

Total				**$32,818**	

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		$10,000
Roadway Construction Costs		$32,818
Projects:		**$42,818**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$8,564
Subtotal*		$51,382
Construction Management		
(10% of Construction Subtotal)		$4,282
Subtotal*		$55,663
Contingencies		$6,423
(15% of Construction Subtotal)		
Subtotal*		$62,086
Sales Tax (8.3%)		$5,153
Total*		**$67,239**

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total					
	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$2,964	$2,964	
Demolition	Est.	1.00	$4,000	$4,000	
Saw Cut Pavement	L.F.	86.00	$10	$860	
Surfacing (Ton)	Ton	39.50	$25	$988	Assume 15" CSBC (470 SF)
Pavement (Ton)	Ton	17.86	$75	$1,340	Assume 6" HMA (470 SF)
Curb / Sidewalks	SY	57.33	$50	$2,867	6” curb and 6'-0" Sidewalk and Bulb Out Raised Barrier
Striping	EA	1.00	$2,000	$2,000	Striping etc.
Utilities (Est.)	Est.	1.00	$15,000	$15,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$10,000	$10,000	Establish and maintain detour routes, flagging, construction signing,
Roadside Planting	EA	33.00	$0.00	$0	No street trees planned
Total				**$40,018**	

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		$10,000.00
Roadway Construction Costs		$40,018
Projects:		$50,018
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$10,004
Subtotal*		$60,022
Construction Management		
(10% of Construction Subtotal)		$5,002
Subtotal*		$65,023
Contingencies		$7,503
(15% of Construction Subtotal)		
Subtotal*		$72,526
Sales Tax (8.3%)		$6,020
Total*		**$78,546**

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total					
	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$1,271	$1,271	
Demolition	Est.	1.00	$2,000	$2,000	
Saw Cut Pavement	L.F.	50.00	$0	$15	
Surfacing (Ton)	Ton	12.00	$50	$600	Assume 15" CSBC (145 SF)
Pavement (Ton)	Ton	6.00	$100	$600	Assume 6" HMA (145 SF)
Curb / Sidewalks	SY	33.33	$50	$1,667	6" curb and 6'-0" Sidewalk and Bulb Out Raised Barrier
Striping	EA	1.00	$1,000	$1,000	Striping etc.
Utilities (Est.)	Est.	1.00	$5,000	$5,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$5,000	$5,000	Establish and maintain detour routes, flagging, construction signing,
Roadside Planting	EA	33.00	$0.00	$0	No street trees planned
Total				**$17,152**	

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		$10,000.00
Roadway Construction Costs		$17,152
Projects:		$27,152
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$5,430
Subtotal*		$32,583
Construction Management		
(10% of Construction Subtotal)		$2,715
Subtotal*		$35,298
Contingencies		$4,073
(15% of Construction Subtotal)		
Subtotal*		$39,371
Sales Tax (8.3%)		$3,268
Total*		**$42,638**

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total					
	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$60,951	$60,951	
Demolition	Est.	1.00	$2,000	$2,000	
Saw Cut Pavement	L.F.	50.00	$0	$15	
Surfacing (Ton)	Ton	837.50	$20	$16,750	Assume 15" CSBC, 5' wide and 2000' in length
Pavement (Ton)	Ton	380.00	$60	$22,800	Assume 6" HMA, 5" wide and 2000' in length
Curb / Sidewalks	SY	1,333.00	$25	$33,325	6” curb and 6'-0" Sidewalk (2000')
Ramp Reconstruction	LS	1.00	$672,000	$672,000	342 locations of Curb ramps, Curbs cut, Crossing etc.
Utilities (Est.)	Est.	1.00	$10,000	$10,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$5,000	$5,000	Establish and maintain detour routes, flagging, construction signing,
Roadside Planting	EA	33.00	$0.00	$0	No street trees planned

			$761,890.00		
Total				**$822,841**	

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		
Roadway Construction Costs		$822,841
Projects:		$822,841
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$164,568
Subtotal*		$987,409
Construction Management		
(10% of Construction Subtotal)		$82,284
Subtotal*		$1,069,694
Contingencies		$123,426
(15% of Construction Subtotal)		
Subtotal*		$1,193,120
Sales Tax (8.3%)		$99,029
Total*		**$1,292,149**

Tri-City Operational Improvements Project Cost Estimate Summary Wishkah–Heron – Total		
	10/12/2006	
Roadway Construction Costs		$348,647 (per city construction cost)
Construction Subtotal*		$348,647
Projects:		
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$69,729
Subtotal*		$418,376
Construction Management		
(10% of Construction Subtotal)		$34,865
Subtotal*		$453,241
Contingencies		$52,297
(15% of Construction Subtotal)		
Subtotal*		$505,538
Sales Tax (8.3%)		$41,960
Total*		**$547,498**

Tri-City Operational Improvements
Project Cost Estimate Summary
Wishkah–Heron – Total

	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$3,993	$3,993	
Demolition	Est.	1.00	$4,000	$4,000	
Saw Cut Pavement	L.F.	120.00	$10	$1,200	
Surfacing (Ton)	Ton	46.00	$25	$1,150	Assume 15" CSBC (550 SF)
Pavement (Ton)	Ton	20.90	$75	$1,568	Assume 6" HMA (550 SF)
Curb / Sidewalks	SY	80.00	$50	$4,000	6” curb and 6'-0" Sidewalk
Striping	EA	1.00	$3,000	$3,000	Striping etc.
Utilities (Est.)	Est.	1.00	$20,000	$20,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$15,000	$15,000	Establish and maintain detour routes, flagging, construction signing,
Roadside Planting	LS	1.00	$2,000.00	$2,000	Landscaping
Total				**$55,911**	

Tri-City Operational Improvements
Project Cost Estimate Summary
Wishkah–Heron – Total

	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		$10,000
Roadway Construction Costs		$55,911
Projects:		**$65,911**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$13,182
Subtotal*		**$79,093**
Construction Management		
(10% of Construction Subtotal)		$6,591
Subtotal*		**$85,684**
Contingencies		
(15% of Construction Subtotal)		$9,887
Subtotal*		**$95,571**
Sales Tax (8.3%)		$7,932
Total*		**$103,503**

Tri-City Operational Improvements
Project Cost Estimate Summary
Wishkah–Heron – Total

	10/12/2006				
Roadway Construction Cost Estimate					
Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$57,156	$57,156	
Demolition	Est.	1.00	$35,000	$35,000	
Saw Cut Pavement	L.F.	8,900.00	$5	$44,500	
Surfacing (Ton)	Ton	1,608.00	$25	$40,200	10" CSBC, 3' wide 9600 ' in length
Pavement (Ton)	Ton	547.20	$60	$32,832	3" HMA, 3' wide, 9600' in length
Planing	SY	0.00	$3	$0	
Overlay	Ton	0.00	$50	$0	1" HMA, 40' wide, 5900' in length
Curb / Sidewalks	SY	6,400.00	$45	$288,000	6" curb and 6'-0" Sidewalk (9600')
Street Lighting	EA	34.00	$2,000	$68,000	
Storm CB	EA	38.00	$2,000	$76,000	Catch Basin
Strom Piping	LF	648.00	$40	$25,920	Drainage Pipe
Utilities (Est.)	Est.	1.00	$79,000	$79,000	Impacts to existing utilities (electric, gas, telephone, water, sewer, cable)
Traffic Control (Est.)	LS	1.00	$25,000	$25,000	Establish and maintain detour routes, flagging, construction signing
Roadside Planting	LS	1.00	$75,000.00	$75,000	Landscaping
Total				**$846,608**	

Tri-City Operational Improvements
Project Cost Estimate Summary
Wishkah–Heron – Total

	10/12/2006	
Right-of-Way, Acquisition & Relocation Costs		
Roadway Construction Costs		$846,608
Projects:		**$846,608**
Preliminary Engineering & Design (20% of Construction Subtotal)		$169,322
Subtotal*		**$1,015,930**
Construction Management (10% of Construction Subtotal)		$84,661
Subtotal*		**$1,100,591**
Contingencies		$126,991
(15% of Construction Subtotal)		
Subtotal*		**$1,227,582**
Sales Tax (8.3%)		$101,889

Total*		**$1,329,471**

E4.
IMPROVE PORT INDUSTRIAL ROAD

Improve Port Industrial Road – Estimated Cost

Item	Cost
Right-of-Way Cost	$0
Roadway Construction Costs	$2,203,055
Preliminary Engineering	$550,764
Construction Management	$330,458
Contingencies	$330,458
Sales Tax	$182,854
TOTAL COST	**$3,597,589**

PROJECT# 0000000026648 10/9/2006

PORT INDUSTRIAL ROAD IMPROVEMENTS
Phase 1
Preliminary Cost Estimate

Project Title - Port of Grays Harbor

Location: Grays Harbor

Owner - Port of GH

Estimate by - Bradley J. Shea, P.E., HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$105,000.00	$105,000
0025	CLEARING AND GRUBBING	ACRE	-	$10,000.00	$-
0049	REMOVING DRAINAGE STRUCTURE	EACH	15		$-
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	1	$15,000.00	$15,000
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$-
0160	SAW CUTTING	L.F.	-	$2.00	$-
		Total this section:		**$120,000**	
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	2,790	$15.00	$41,850
0421	GRAVEL BORROW INCL. HAUL	C.Y.	1,346	$35.00	$47,110
0470	EMBANKMENT COMPACTION	C.Y.	2,790	$4.00	$11,160
		Total this section:		**$100,120**	
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	-	$1,750.00	$-
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$-
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	-	$60.00	$-
		Total this section:		**$0**	
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	1,047	$45.00	$47,115
5120	CRUSHED SURFACING TOP COURSE	TON	432	$45.00	$19,440
		Total this section:		**$66,555**	
	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$100	$1.00	$100
		Total this section:		**$100**	

	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	6,510	$75.00	$488,250
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$-
		Total this section:		**$488,250**	
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	-	$3,000.00	$-
6490	EROSION/WATER POLLUTION CONTROL	EST.	$1.00	$5,000.00	$5,000
		Total this section:		**$5,000**	
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	-	$15.00	$-
6806	PAINT LINE	L.F.	-	$1.30	$-
6817	PAINTED WIDE LINE	L.F.	-	$1.50	$-
6856	PLASTIC CROSSWALK LINE	S.F.	-	$15.00	$-
6858	PLASTIC STOP LINE	L.F.	-	$20.00	$-
6860	PLASTIC TRAFFIC ARROW	EACH	-	$60.00	$-
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$10,000.00	$10,000
6979	TRAFFIC CONTROL LABOR	HR	650	$75.00	$48,750
6972	TRAFFIC CONTROL SUPERVISOR	HR	350	$75.00	$26,250
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	-		$-
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	-		$-
		Total this section:		**$85,000**	
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$-
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$-
7055	CEMENT CONC. SIDEWALK	S.Y.	-	$20.00	$-
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$-
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$-
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$-
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$-
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$-
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$-
6243	ADJUST VALVE BOX	EACH	-	$200.00	$-
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$-

	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$-
7715	FORCE ACCOUNT	EST.	$40,000.00	$1.00	$40,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$1,500
		Total this section:		**$46,500**	
Subtotal Construction					**$911,525**
Contingency (15%)					$136,729
Estimated Total Project Cost					**$1,048,254**

PROJECT# 0000000026648 10/9/2006

PORT INDUSTRIAL ROAD IMPROVEMENTS
Phase 2
Preliminary Cost Estimate

Project Title - Port of Grays Harbor Phase 2

Location - Grays Harbor

Owner - Port of GH

Estimate by - Bradley J. Shea, P.E. HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$50,000	$50,000
0025	CLEARING AND GRUBBING	ACRE	-	$10,000.00	$-
0049	REMOVING DRAINAGE STRUCTURE	EACH	15		$-
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	-	$15,000.00	$-
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$-
0160	SAW CUTTING	L.F.	-	$2.00	$-
		Total this section:		**$50,000**	
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	-	$15.00	$-
0421	GRAVEL BORROW INCL. HAUL	C.Y.	-	$35.00	$-
0470	EMBANKMENT COMPACTION	C.Y.	-	$4.00	$-
		Total this section:		**$0**	
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	-	$1,750.00	$-
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$-
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	-	$60.00	$-
		Total this section:		**$0**	
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	-	$45.00	$-
5120	CRUSHED SURFACING TOP COURSE	TON	-	$45.00	$-
		Total this section:		**$0**	

	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$-	$1.00	$-
		Total this section:		**$0**	
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	-	$75.00	$-
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$-
		Total this section:		**$0**	
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	-	$3,000.00	$-
6490	EROSION/WATER POLLUTION CONTROL	EST.	$1.00	$5,000.00	$5,000
		Total this section:		**$5,000**	
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	-	$15.00	$-
6806	PAINT LINE	L.F.	100	$1.30	$130
6817	PAINTED WIDE LINE	L.F.	300	$1.50	$450
6856	PLASTIC CROSSWALK LINE	S.F.	400	$15.00	$6,000
6858	PLASTIC STOP LINE	L.F.	240	$20.00	$4,800
6860	PLASTIC TRAFFIC ARROW	EACH		$60.00	$-
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$10,000.00	$10,000
6979	TRAFFIC CONTROL LABOR	HR	150	$75.00	$11,250
6972	TRAFFIC CONTROL SUPERVISOR	HR	70	$75.00	$5,250
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	1	$250,000.00	$250,000
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	1	$250,000.00	$250,000
		Total this section:		**$537,880**	
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$-
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$-
7055	CEMENT CONC. SIDEWALK	S.Y.	-	$20.00	$-
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$-
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$-
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$-
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$-
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$-

3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$-
6243	ADJUST VALVE BOX	EACH	-	$200.00	$-
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$-
	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$-
7715	FORCE ACCOUNT	EST.	$40,000.00	$1.00	$40,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$1,500
		Total this section:		**$46,500**	
Subtotal Construction					$639,380
Contingency (15%)					$95,907
Estimated Total Project Cost					$735,287

PROJECT# 0000000026648 10/9/2006

PORT INDUSTRIAL ROAD IMPROVEMENTS
Phase 3
Preliminary Cost Estimate

Project Title - Port of Grays Harbor Phase 3

Location - Grays Harbor

Owner - Port of GH

Estimate by - Bradley J. Shea, P.E. HDR Engineering

-

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$50,000	$50,000
0025	CLEARING AND GRUBBING	ACRE	0.8	$5,000.00	$3,750
0049	REMOVING DRAINAGE STRUCTURE	EACH	15		$-
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	1	$10,000.00	$10,000
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$-
0160	SAW CUTTING	L.F.	6,675	$2.00	$13,350
			Total this section:	**$77,100**	
	GRADING				
0310	ROADWAY EXCAVATION INCL. HAUL	C.Y.	-	$15.00	$-
0421	GRAVEL BORROW INCL. HAUL	C.Y.	-	$35.00	$-
0470	EMBANKMENT COMPACTION	C.Y.	-	$4.00	$-
			Total this section:	**$0**	
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	22	$1,750.00	$38,500
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$-
3602	CORRUGATED POLY. STORM SEWER PIPE 12 IN. DIAM.	L.F.	2,500	$60.00	$150,000
			Total this section:	**$188,500**	
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	-	$45.00	$-
5120	CRUSHED SURFACING TOP COURSE	TON	225	$45.00	$10,125
			Total this section:	**$10,125**	

	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$-	$1.00	$-
			Total this section:	**$0**	
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	1,375	$75.00	$103,125
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$-
			Total this section:	**$103,125**	
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	1.0	$3,000.00	$3,000
6490	EROSION/WATER POLLUTION CONTROL	EST.	$1.00	$5,000.00	$5,000
			Total this section:	**$8,000**	
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	6,676	$15.00	$100,140
6806	PAINT LINE	L.F.	-	$1.30	$-
6817	PAINTED WIDE LINE	L.F.	-	$1.50	$-
6856	PLASTIC CROSSWALK LINE	S.F.	-	$15.00	$-
6858	PLASTIC STOP LINE	L.F.	-	$20.00	$-
6860	PLASTIC TRAFFIC ARROW	EACH		$60.00	$-
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$5,000.00	$5,000
6979	TRAFFIC CONTROL LABOR	HR	500	$75.00	$37,500
6972	TRAFFIC CONTROL SUPERVISOR	HR	200	$75.00	$15,000
	NEW SIGNAL INSTALLATION AT MYRTLE/INDUSTRIAL	LS.	-	$250,000.00	$-
	NEW SIGNAL INSTALLATION AT COMMERCE/INDUSTRIAL	LS.	-	$250,000.00	$-
			Total this section:	**$157,640**	
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$5,000.00	$5,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$-
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$-
7055	CEMENT CONC. SIDEWALK	S.Y.	4,058	$20.00	$81,160
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$-
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$-
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$-
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$-

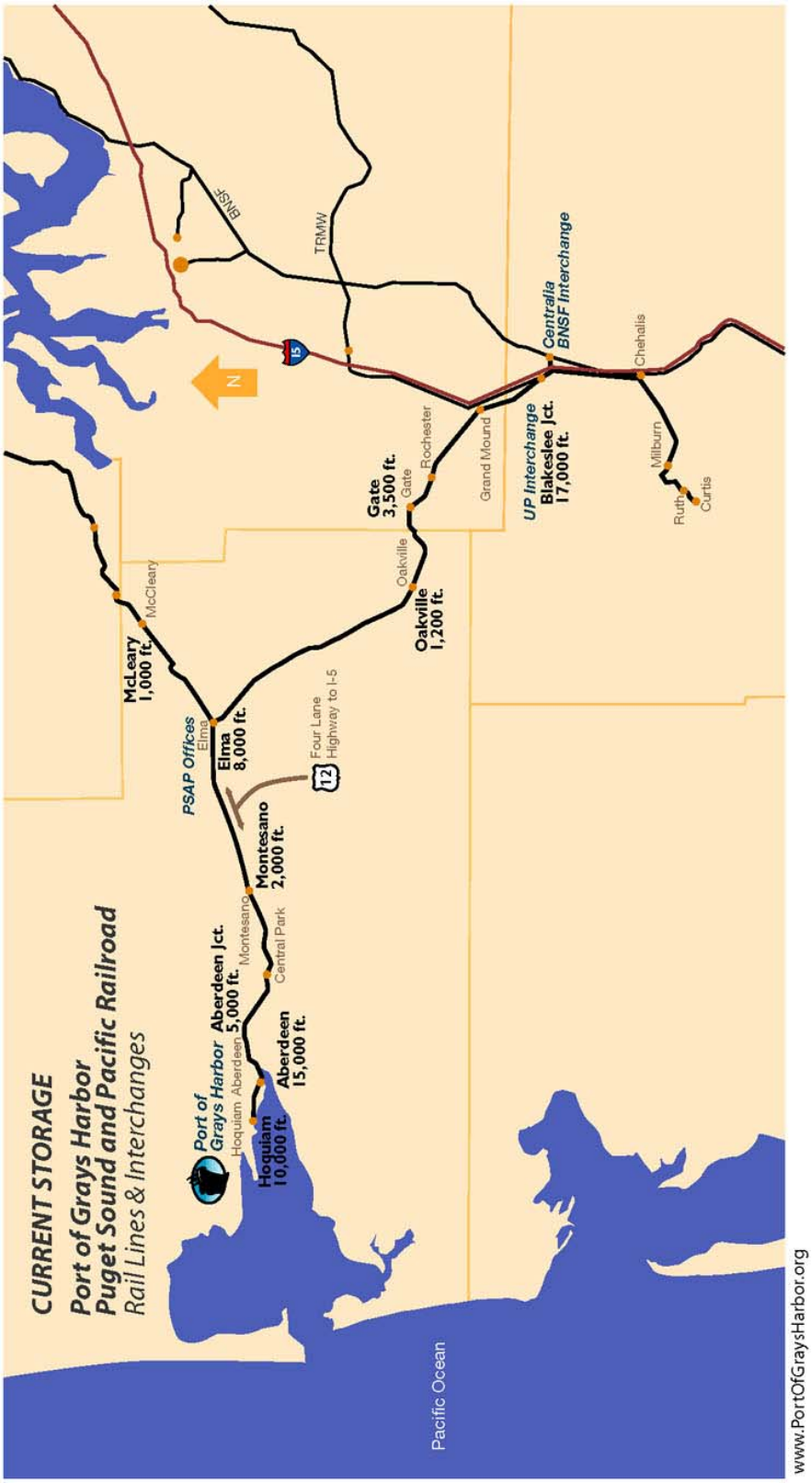
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$-
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$-
6243	ADJUST VALVE BOX	EACH	-	$200.00	$-
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$-
	ADJUST TO GRADE EXISTING WATER METER AND METER BOX	EACH	-	$200.00	$-
7715	FORCE ACCOUNT	EST.	$20,000.00	$1.00	$20,000
	LOCATE EXISTING UTILITIES	L.S.	1	$1,500.00	$1,500
			Total this section:	**$107,660**	
Subtotal Construction					$652,150
Contingency (15%)					$97,823
Estimated Total Project Cost					**$749,973**

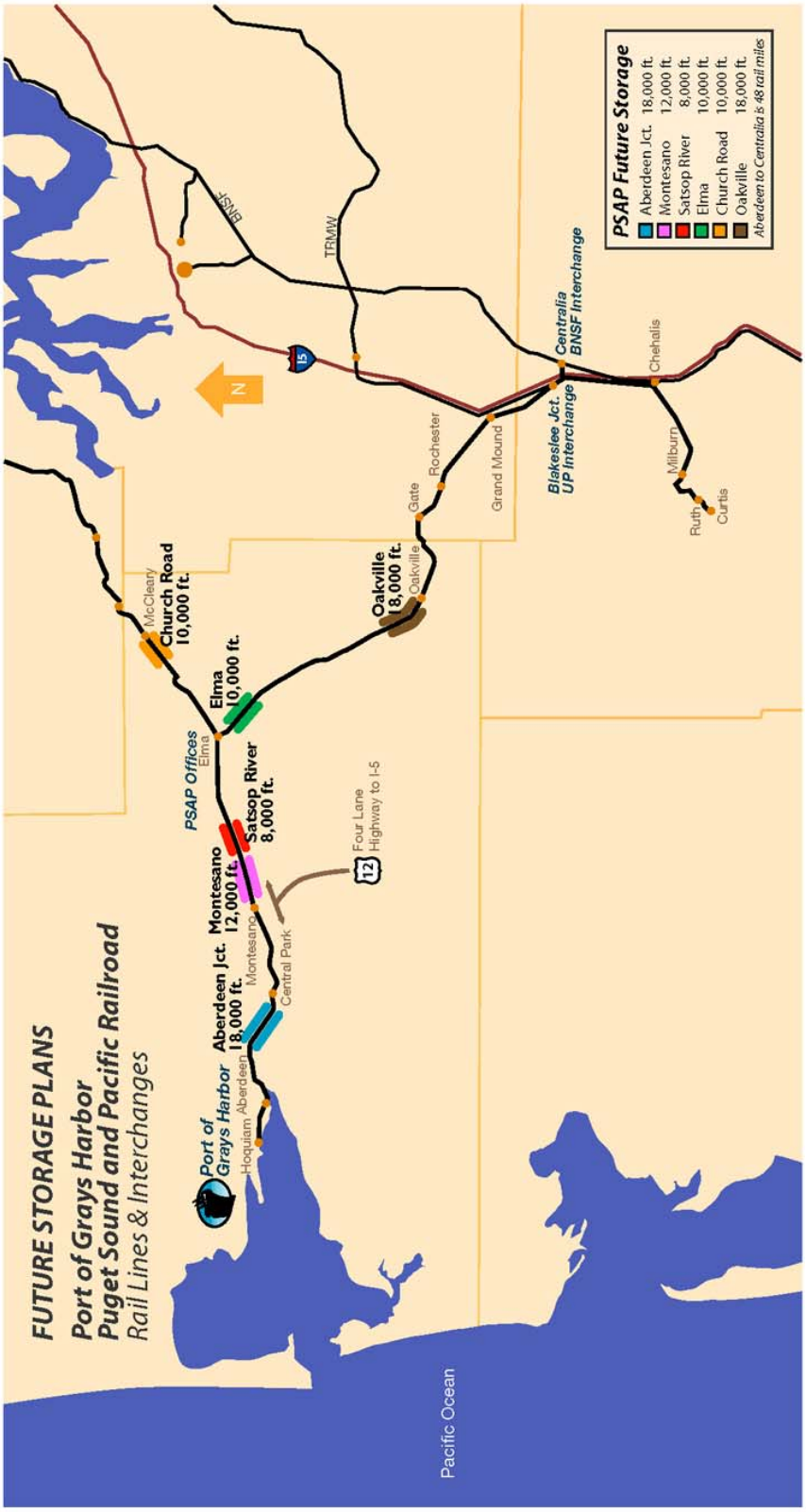
E5.
RAIL STORAGE YARD
EAST OF ABERDEEN

From: Ed McCullough [emccullough.pgh@techline.com]
Sent: Tuesday, September 26, 2006 3:20 PM
To: bernie@xltech.com
Cc: Leonard Barnes
Subject: Rai maps

Attachments: PGH Current Storage Rail Map.pdf; PGH Future Storage Rail Map.pdf

Bernie- Attached are rail maps we talked about. Cost to put in rail is about $1 million per mile if the rail is from the road bed up (new railroad from the ground up). Costs can be less if there is a road bed from old rail. We have id'd two potential 9,000 foot sidings at Aberdeen Jct., just east of Aberdeen. Each siding would be able to hold a unit train for passing large trains outside of town, reducing congestion in town. Estimate to put in 1 siding $1.7 million. If you have questions, I will be glad to help. Ed


CURRENT STORAGE
Port of Grays Harbor
Puget Sound and Pacific Railroad
Rail Lines & Interchanges
Port of Grays Harbor
Hoquiam
Aberdeen
Hoquiam 10,000 ft.
Aberdeen 15,000 ft.
Aberdeen Jct. 5,000 ft.
Montesano
Central Park
Montesano 2,000 ft.
PSAP Offices
Elma
Elma 8,000 ft.
McLeary 1,000 ft.
McCleary
Four Lane Highway to I-5
12
Oakville 1,200 ft.
Oakville
Gate 3,500 ft.
Gate
Rochester
Grand Mound
UP Interchange
Blakeslee Jct. 17,000 ft.
Centralia
BNSF Interchange
Chehalis
Milburn
Ruth
Curtis
TRMW
BNSF
5
N
Pacific Ocean
www.PortOfGraysHarbor.org



This map is for illustrative purposes only. Storage yard locations have not been identified. Further

www.PortOfGraysHarbor.org

E6.
REPLACE EXISTING HOQUIAM BRIDGES

US 101 Regional Circulation Project
Hoquiam Bridges Cost Summary

6-Oct-06

PROJECTS

Hoquiam Bridges Replacement	
High Level Bridges:	
Westbound	$72,398,019
Eastbound	$78,227,944
EIS	$3,000,000
Total Cost	**$153,626,000**
Low Level Bridges:	
Westbound	$59,112,080
Eastbound	$78,603,617
EIS	$3,000,000
Total Cost	$140,716,000

Hoquiam Bridges Replacement
High Roadway

Roadway Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1	$105,230	$105,230	
Demolition	Est.	1	$100,000	$100,000	
Hazardous Materials	Est.	1	$100,000	$100,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Excavation West	CY	3,668	$19	$67,852	excavate 3' depth by 220 ft. long, 50' wide
Excavation East	CY	2,668	$19	$49,352	excavate 3' depth by 220 ft. long, 50' wide
Embankment West	CY	6,111	$35	$210,830	Gravel borrow - 10' @ abut., 0' @ 220', width 50' plus excav vol.; quantity by the CY
Embankment East	CY	6,111	$35	$210,830	Gravel borrow - 10' @ abut., 0' @ 220', width 50' plus excav vol.; quantity by the CY
SEW Wall	SF	4,000	$32	$126,000	Structural Earth Wall to confine the approach fills (SF)
SEW Barrier	LF	800	$30	$23,600	Pedestrian Barrier on SEW (LF)
Drainage (Est.)	Est.	1	$200,000	$200,000	Collection system, water quality @ each end of the bridge
Surfacing (Ton)	Ton	921	$20	$18,420	Assume 15" CSBC. 220' X 50' approaches,
Pavement (Ton)	Ton	627	$63	$39,501	Assume 9" HMA, 220' X 50' approaches @ each approach
Curb / Sidewalks	SY	293	$30	$8,790	6” curb and 6'-0" Sidewalk along both sides of roadway
Traffic Control (Est.)	LS	1	$120,000	$120,000	Establish and maintain two way traffic, flagging, construction signing
Environmental	Est.	1	$40,205	$40,205	Estimate 3% of Construction Cost
Roadside Planting				$0	No street trees planned
Total				**$1,420,610**	

Hoquiam Bridges Replacement
Low Roadway

Roadway Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1	$26,655	$26,655	
Demolition	Est.	1	$200,000	$200,000	
Hazardous Materials	Est.	1	$20,000	$20,000	Possible hazards - asbestos, lead based paints, petroleum, industrial chemicals
Excavation West	CY	833	$19	$15,411	excavate 3' depth by 50 ft. long, 50' wide
Excavation East	CY	833	$19	$15,411	excavate 3' depth by 50 ft. long, 50' wide
Embankment West	CY	139	$35	$4,796	Gravel borrow - 2' @ abut., 0' @ 50', width 50' plus excav vol.; quantity by the CY
Embankment East	CY	139	$35	$4,796	Gravel borrow - 2' @ abut., 0' @ 50', width 50' plus excav vol.; quantity by the CY
Drainage (Est.)	Est.	1	$20,000	$20,000	Collection system, water quality @ each end of the bridge
Surfacing (Ton)	Ton	209	$30	$6,270	Assume 15" CSBC. 50' X 50' approaches,
Pavement (Ton)	Ton	143	$63	$8,978	Assume 9" HMA, 50' X 50' approaches @ each approach
Curb / Sidewalks	SY	33	$50	$1,650	6" curb and 6'-0" Sidewalk along both sides of roadway
Traffic Control (Est.)	LS	1	$25,000	$25,000	Establish and maintain two way traffic, flagging, construction signing
Environmental	Est.	1	$10,875	$10,875	Estimate 3% of Construction Cost
Roadside Planting				$0	No street trees planned
Total				**$359,839**	

Hoquiam Bridges
Replacement Cost – Hoquiam River Crossing

4-Oct-06

BRIDGE COST ESTIMATE

	Unit	Quantity	Unit Cost	Total
Hoquiam River Crossing – WB High Level				
Mobilization	LS		LS	$3,607,500
Work Access	SF	24,000	50	$1,200,000
E/W Connection Bridge	SF	155,000	225	$34,875,000
	Total Bridge Cost			**$39,682,500**
Hoquiam River Crossing – WB Low Level				
Mobilization	LS		LS	$120,000
Work Access	SF	24,000	50	$1,200,000
Movable Bridge	SF	20,000	1800	$36,000,000
	Total Bridge Cost			**$37,320,000**
Hoquiam River Crossing – EB High Level				
Mobilization	LS		LS	$3,945,000
Work Access	SF	24,000	50	$1,200,000
E/W Connection Bridge	SF	170,000	225	$38,250,000
	Total Bridge Cost			**$43,395,000**
Hoquiam River Crossing – EB Low Level				
Mobilization	LS		LS	$1,245,000
Work Access	SF	24,000	50	$1,200,000
E/W Connection Bridge	SF	50,000	225	$11,250,000
Moveable Bridge	SF	20,000	1800	$36,000,000
	Total Bridge Cost			**$49,695,000**

BACKUP

	Length	Width	Factor		Area
Hoquiam River Crossing – WB					
Work Access	600	30			18,000
	50	30	4		6,000
				Total	24,000
E/W Connection	3100	50		Total	155,000
Movable Bridge	400	50		Total	20,000
Hoquiam River Crossing – EB					
Work Access	600	30			18,000
	50	30	4		6,000
E/W Connection	3400	50		Total	170,000
E/W Connection	1000	50		Total	50,000
Movable Bridge	400	50		Total	20,000

Hoquiam Bridges Replacement
Eastbound High Level – Total

Right-of-Way, Acquisition & Relocation Costs		$5,000,000
Roadway Construction Costs		$1,420,610
Bridge Construction Costs		$43,395,000
	Construction Subtotal*	**$49,815,610**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$9,963,122
	Subtotal*	**$59,778,732**
Construction Management		
(10% of Construction Subtotal)		$4,981,561
	Subtotal*	**$64,760,293**
Contingencies		
(15% of Construction Subtotal)		$7,472,342
	Subtotal*	**$72,232,635**
Sales Tax (8.3%)		$5,995,309
	Total*	**$78,227,944**

Hoquiam Bridges Replacement
Westbound High Level – Total

Right-of-Way, Acquisition & Relocation Costs		$5,000,000
Roadway Construction Costs		$1,420,610
Bridge Construction Costs		$39,682,500
	Construction Subtotal*	**$46,103,110**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$9,220,622
	Subtotal*	**$55,323,732**
Construction Management		
(10% of Construction Subtotal)		$4,610,311
	Subtotal*	**$59,934,043**
Contingencies		
(15% of Construction Subtotal)		$6,915,467
	Subtotal*	**$66,849,510**
Sales Tax (8.3%)		$5,548,509
	Total*	**$72,398,019**

*Rounded to the nearest $1,000

Hoquiam Bridges Replacement
Eastbound Low Level – Total

Right-of-Way, Acquisition & Relocation Costs		$0
Roadway Construction Costs		$359,839
Bridge Construction Costs		$49,695,000
	Construction Subtotal*	**$50,054,839**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$10,010,968
	Subtotal*	**$60,065,807**
Construction Management		
(10% of Construction Subtotal)		$5,005,484
	Subtotal*	**$65,071,291**
Contingencies		
(15% of Construction Subtotal)		$7,508,226
	Subtotal*	**$72,579,517**
Sales Tax (8.3%)		$6,024,100
	Total*	**$78,603,617**

*Rounded to the nearest $1,000

Hoquiam Bridges Replacement
Westbound Low Level – Total

Right-of-Way, Acquisition & Relocation Costs		$0
Roadway Construction Costs		$359,839
Bridge Construction Costs		$37,320,000
	Construction Subtotal*	**$37,679,839**
Preliminary Engineering & Design		
(20% of Construction Subtotal)		$7,535,968
	Subtotal*	**$45,215,807**
Construction Management		
(10% of Construction Subtotal)		$3,767,984
	Subtotal*	**$48,983,791**
Contingencies		
(15% of Construction Subtotal)		$5,598,000
	Subtotal*	**$54,581,791**
Sales Tax (8.3%)		$4,530,289
	Total*	**$59,112,080**

*Rounded to the nearest $1,000

E7.
RELOCATE RAIL LINE SOUTH OF PORT INDUSTRIAL ROAD

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APPENDIX L

PROJECT# 0000000026648

2025 PROJECTS
PRELIMINARY COST ESTIMATE

Project Title - Port of Grays Harbor Rail Projects
Location - Grays Harbor
Owner - Port of GH
Estimate by - Bradley J. Shea, P.E. HDR Engineering

Signature

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL
	PREPARATION				
0001	MOBILIZATION	L.S.	1	$450,000	$ 450,000
0025	CLEARING AND GRUBBING	ACRE	-	$5,000.00	$ -
0050	REMOVAL OF STRUCTURE AND OBSTRUCTIONS	L.S.	-	$10,000.00	$ -
0140	REMOVE EXISTING PAINT STRIPING	L.F.	-	$1.50	$ -
0160	SAWCUTTING	L.F.	-	$2.00	$ -
		Total this section:			$450,000
	GRADING				
0310		C.Y.			$ -
0421	GRAVEL BORROW INCL. HAUL	C.Y.	-	$35.00	$ -
0470	EMBANKMENT COMPACTION	C.Y.	-	$4.00	$ -
		Total this section:			$0
	STORM SEWER				
3091	CATCH BASIN TYPE 1	EACH	-	$1,750.00	$ -
3151	TESTING STORM SEWER PIPE	L.F.	-	$2.50	$ -
3602	CORRUGATED POLY. STORM SEWER PIPE, 12 IN. DIAM.	L.F.	-	$60.00	$ -
		Total this section:			$0
	SURFACING				
5100	CRUSHED SURFACING BASE COURSE	TON	-	$45.00	$ -
5120		CY		$45.00	$ -
		Total this section:			$0
	LIQUID ASPHALT				
5334	ANTI-STRIPPING ADDITIVE	EST.	$ -	$1.00	$ -
		Total this section:			$0
	ASPHALT CONCRETE PAVEMENT				
5741	HMA CL. 1/2", PG 58-22	TON	-	$75.00	$ -
	TEMPORARY ASPHALT MIX	TON	-	$65.00	$ -
		Total this section:			$0
	EROSION CONTROL AND PLANTING				
6414	SEEDING, FERTILIZING, AND MULCHING	ACRE	-	$3,000.00	$ -
6490	EROSION/WATER POLLUTION CONTROL	EST.	$ -	$5,000.00	$ -
		Total this section:			$0
	TRAFFIC				
6700	CEMENT CONC. TRAFFIC CURB AND GUTTER	L.F.	-	$15.00	$ -
6806	PAINT LINE	L.F.	-	$1.30	$ -
6817	PAINTED WIDE LINE	L.F.	-	$1.50	$ -
6850	PLASTIC CROSSWALK LINE	S.F.	-	$15.00	$ -
6858	PLASTIC STOP LINE	L.F.	-	$20.00	$ -
6860	PLASTIC TRAFFIC ARROW	EACH		$60.00	$ -
6964	TEMPORARY TRAFFIC CONTROL DEVICES	L.S.	1	$5,000.00	$ 5,000
6979	TRAFFIC CONTROL LABOR	HR	500	$75.00	$ 37,500
	RAIL RE-LOCATION	LF	6,700	$51.15	$ 342,705
		LF			$ -
		Total this section:			$385,205
	OTHER ITEMS				
	CONTRACTOR SURVEY	L.S.	1	$10,000.00	$ 10,000
7047	UTILITY RELOCATION	LS.	-	$100,000.00	$ -
7380	RELOCATE EXISTING ILLUMINATION SYSTEM	LS.	-	$30,000.00	$ -
7055	CEMENT CONC. SIDEWALK	S.Y.	-	$20.00	$ -

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PROJECT# 0000000026648

2025 PROJECTS
PRELIMINARY COST ESTIMATE

ITEM#	ITEM	UNIT	QTY	UNIT	TOTAL	
7058	CEMENT CONC. SIDEWALK RAMP TYPE 1A	EACH	-	$1,500.00	$ -	
7058	SIGNAL INTERCONNECT	LS.	-	$30,000.00	$ -	
7058	GRAVITY BLOCK WALL	SF	-	$13.00	$ -	
9605	CONNECTION TO DRAINAGE STRUCTURE	EACH	-	$500.00	$ -	
3100	ADJUST CATCH BASIN	EACH	-	$350.00	$ -	
3110	LOCKING SOLID METAL COVER AND FRAME FOR CATCH BASIN	EACH	-	$250.00	$ -	
6243	ADJUST VALVE BOX	EACH	-	$200.00	$ -	
7043	ADJUST JUNCTION BOX	EACH	-	$175.00	$ -	
	ROW ACQUISITION		670,000	$8.00	$ 5,360,000	length of re-loc x 100' ROW x $8.00
7715	FORCE ACCOUNT	EST.	$ -	$1.00	$ -	
					$ -	
					$ -	
		Total this section:		$5,370,000		
Subtotal Construction					$6,205,205	
Contingency (15%)					$930,781	
Estimated Total Project Cost					**$7,135,986**	

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Washington State Department of Transportation

E8.
SEISMIC UPGRADES

From: Chris Runner [crunner@xltech.com]
Sent: Monday, October 09, 2006 4:58 PM
To: 'Bernie Chaplin'
Subject: FW: seismic upgrades for moveable bridges in Aberdeen and Hoquiam

Chris Runner

Planning & Environmental Services

Exeltech Consulting, Inc.

615 2nd Avenue, Suite 660

Seattle, WA 98104

Telephone: (206) 623-9646

Cellular: (206) 819-4099

Facsimile: (206) 623-9658

From: Dahl, Kevin [mailto:DahlK@WSDOT.WA.GOV]
Sent: Thursday, October 05, 2006 2:10 PM
To: crunner@xltech.com
Cc: Alam, Nazmul
Subject: seismic upgrades for moveable bridges in Aberdeen and Hoquiam

This is the information we have in our office concerning these bridges:

- Wishkah St. Bridge over the Wishkah River, all seismic upgrades are complete
- Heron St. Bridge over the Wishkah River, seismic upgrade includes strengthening the center pier foundation with drilled shafts -- $10 million
- Chehalis River Bridge, seismic upgrade includes strengthening the two bascule pier foundations with drilled shafts -- $10 million
- Simpson Ave Bridge over the Hoquiam River, all seismic upgrades complete
- Riverside Ave Bridge over the Hoquiam River, seismic upgrades include strengthening guide rails and counterweight bracing members, strengthening tower leg to pier anchorages -- $300,000. **[Completed.]**

Another source would be Dewayne Wilson at our Bridge and Structures office, his phone number is 360-705-7214.

Kevin Dahl
WSDOT
Aberdeen PEO
360-533-9352

Complete Seismic Upgrades to Area Bridges

This project would complete seismic upgrades to area bridges to ensure their use following a disaster. The following are area bridges in need of seismic upgrades:

> Heron Street Bridge over the Wishkah River Seismic upgrade includes strengthening the center pier foundation with drilled shafts – $10 million.
>
> Chehalis River Bridge Seismic upgrade includes strengthening the two bascule pier foundations with drilled shafts – $10 million.
>
> Riverside Ave Bridge over the Hoquiam River Seismic upgrades include strengthening guide rails and counterweight bracing members, strengthening tower leg to pier anchorages – $300,000. [Completed.]

Estimated Cost: $20,000,000*

Cost Estimate provided by WSDOT: John Hart, Project Engineer 10/6/06

E9.
WISHKAH MALL ACCESS

Wishkah Mall Access Improvements
Cost Summary
Mall Access Total – Phase 1

Right-of-Way, Acquisition & Relocation Costs		$0
Roadway Construction Costs		$313,900
	Construction Subtotal*	**$313,900**
Feasibility Study		$83,300
Preliminary Engineering & Design (20% of Construction Subtotal)		$62,780
	Subtotal*	**$459,980**
Construction Management (10% of Construction Subtotal)		$31,390
	Subtotal*	**$491,370**
Contingencies (15% of Construction Subtotal)		$47,085
	Subtotal*	**$538,455**
Sales Tax (8.3%)		$37,778
	Total*	**$576,233**

Wishkah Mall Access Improvements
Roadway Construction – Phase 1

Phase 1 Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$21,400	$21,400	
Striping Removal	Est.	1.00	$50,000	$50,000	Grind off all existing striping in parking lot
Remove Struct & Obs.	L.S.	1.00	$20,000	$20,000	Remove some existing curbs/islands in parking lot
Surfacing (Ton)	Ton	40.00	$25	$1,000	Assume 6" CSBC
Pavement (Ton)	Ton	20.00	$75	$1,500	Assume 6" HMA
Signal Interconnect	L.S.	1.00	$125,000	$125,000	Interconnect signals
Traffic Curb	LF	1,000.00	$15	$15,000	Curb for right-in/right-outs, misc. planters within parking lot
Striping	EA	30,000.00	$1	$30,000	Striping etc.
Traffic Control (Est.)	LS	1.00	$25,000	$25,000	Traffic Control associated with parking lot revisions.
Landscaping	L.S.	1.00	$25,000	$25,000	Misc. landscaping within planters
			$267,500		
Total				**$313,900**	

Wishkah Mall Access Improvements
Mall Access Total – Phase 2

Right-of-Way, Acquisition & Relocation Costs	$1,506,400
Roadway Construction Costs	$579,608
Construction Subtotal*	**$2,086,008**
Feasibility Study	$166,700
Preliminary Engineering & Design (20% of Construction Subtotal)	$417,202
Subtotal*	**$2,669,910**
Construction Management (10% of Construction Subtotal)	$208,601
Subtotal*	**$2,878,511**
Contingencies (15% of Construction Subtotal)	$312,901
Subtotal*	**$3,191,412**
Sales Tax (8.3%)	$271,801
Total*	**$3,463,213**

Wishkah Mall Access Improvements
Roadway Construction – Phase 2

Phase 2 Construction Cost Estimate

Design Element	Units	Quantity	Unit Cost	Cost	Assumptions
Mobilization (8%)	LS	1.00	$42,008	$42,008	
Striping Removal	Est.	1.00	$5,000	$5,000	Grind off existing striping along SR 101
Remove Struct & Obs.	L.S.	1.00	$5,000	$5,000	Remove pavement markings
Retaining Wall	SF	9,000.00	$45	$405,000	Retaining wall behind businesses, estimate average height 30' tall x 400' long
Surfacing (Ton)	Ton	660.00	$25	$16,500	Assume 6" CSBC
Pavement (Ton)	Ton	730.00	$70	$51,100	Assume 6" HMA
Traffic Curb	LF	1,500.00	$15	$22,500	Curb down centerline, perhaps median planter.
Sidewalk Repairs	SY	100.00	$35	$3,500	Replace misc. damaged sections
Striping	EA	1,500.00	$1	$1,500	Striping etc.
Traffic Control (Est.)	LS	1.00	$15,000	$15,000	Traffic Control associated with access control
Landscaping	L.S.	1.00	$12,500	$12,500	Assume misc. landscaping within median planters
			$525,100		

Total	**$579,608**

Appendix I

Project Summary Descriptions

Complete Seismic Upgrades to Area Bridges

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★★	★★★	★★	★★★

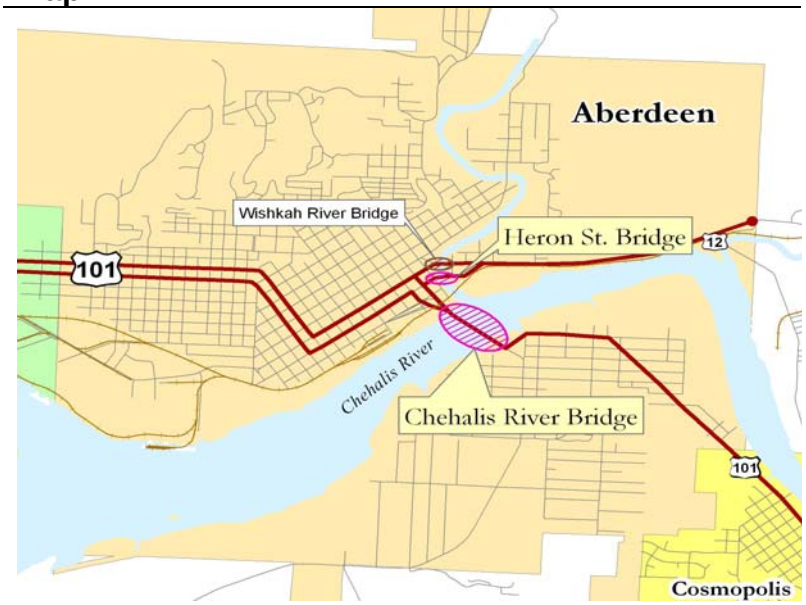
1 What is the project?

This project would provide seismic upgrades to two bridges in the tri-city area, the Chehalis River Bridge (built in 1951) and the Heron Street Bridge over the Wishkah River (built in 1949). The bridge locations are highlighted in Exhibit 3-2. Both bridges require stronger pier foundations to withstand a major earthquake.

The upgrades to the Chehalis River Bridge include strengthening the two-bascule pier foundations with drilled shafts. The upgrades to the Heron Street Bridge include strengthening the center pier foundation with drilled shafts.

Exhibit 3-2

Seismic Upgrades to Area Bridges Project Vicinity Map



2 What are the potential benefits and impacts of this project?

Seismic upgrades to these two bridges are vital to maintain access to regional health care facilities and provide fire and police protection in the event of a natural disaster. If these bridges were to fail during an earthquake, residents of South Aberdeen and Cosmopolis would be isolated from the rest of the community. The alternate route to the Chehalis River Bridge via SR 107 and US 12 is approximately 20 miles. This would add time and cost for moving people and goods through the region.

The Heron Street Bridge is an important link in the region's transportation network.

The Chehalis River Bridge provides access between South Aberdeen/Cosmopolis and US 12/downtown Aberdeen.

3 What is the estimated project cost?

Seismic upgrades to each bridge would cost approximately $10,000,000, resulting in a total project cost of $20,000,000.

Truck Route Alternative

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★★	★★★	★★★★	★★★★

1 What is the project?

The Truck Route Alternative project was initially identified in the early 1970s. This project would provide an alternate truck route corridor from the State Route (SR) 109/SR 109 Spur intersection in Hoquiam to the US 101/Chehalis Street intersection in Aberdeen, as shown in Exhibit 3-3. A new four- to five-lane (two lanes in each direction and left turn lanes) limited access truck route would parallel US 101 through South Hoquiam, the Port of Grays Harbor, and Aberdeen. Two new high-level, fixed span bridges over the Hoquiam River and Wishkah River would be provided. Other design features include a new alignment from Wishkah Street to State Street and completing grade-separated ramps at the US 12/US 101 interchange. The new corridor would be a designated truck route but would also provide an alternate route to US 101 for through and local traffic.

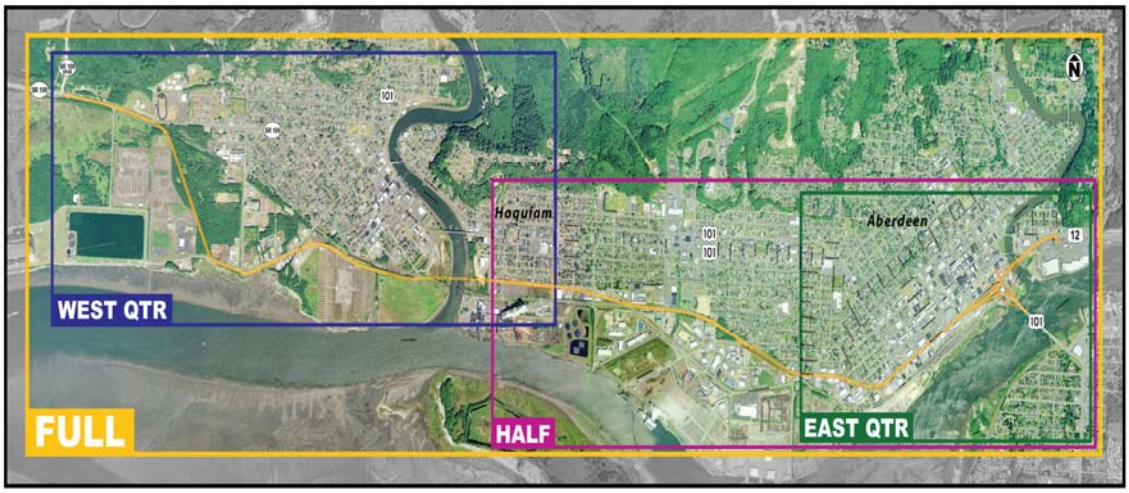
The truck route project could be constructed in phases, and four options were analyzed, including:

- Full Truck Corridor
- Half Truck Corridor
- East Quarter Truck Corridor
- West Quarter Truck Corridor

The full truck corridor option would consist of several smaller elements and could be constructed over several years as project funds become available. Before this project can move forward into design and construction, WSDOT would need to update the Final Environmental Impact Statement (EIS) (FHWA and WSDOT et al. 2000) completed in the late 1990's.

Exhibit 3-3

Truck Route Alignment Options



FULL

High-level Wishkah River Bridge; US 101 / SR 12 connection; State St.; new route to north of railroad (in Aberdeen); high level Hoquiam River Bridge; new route north and parallel to railroad (in Hoquiam) to SR 109.

Requires update of the EIS.

WEST QUARTER

High-level Hoquiam River crossing; continues along a new alignment along the railroad; connects to SR 109 east of Paulson Road, follows SR 109 and terminated at the SR 109/SR 109 Spur junction.

Requires update of the EIS.

HALF

High-level Wishkah Bridge; US 101 / SR 12 connection; new route North of railroad in Aberdeen to 22/23 St. (No new Hoquiam River Bridge).

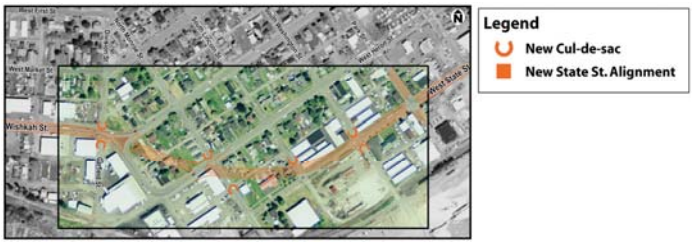
Requires update of the EIS.

EAST QUARTER

High-level Wishkah Bridge; US 101 / SR 12 connection; connect State Street to Port Industrial Road; Port Industrial Road improvements.

Requires update of the EIS.

Proposed Truck Route



New truck corridor alignment between State Street and Wishkah Street In Aberdeen.

The new US 12/US 101 interchange would provide ramps from northbound US 101 to eastbound US 12 and from westbound US 12 to southbound US 101.

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Washington State Department of Transportation

2 What are the potential benefits and impacts of this project?

This project would greatly improve motorist travel times and circulation patterns on US 12, US 101, and SR 109 by removing some truck and through traffic. Areas with high congestion, particularly in downtown Aberdeen and downtown Hoquiam, would see improved traffic flow and intersections would operate more efficiently, as shown in Exhibit 3-4. Truck mobility and circulation into the Port of Grays Harbor would improve, and the majority of trucks would no longer compete with vehicular traffic on US 101 through Aberdeen and Hoquiam. Most importantly, the full truck route would provide additional crossings over the Hoquiam River and Wishkah River. The new bridges would provide additional access to emergency responders, would reduce vehicle traffic on the existing bridges, and would not open to vessel traffic.

Exhibit 3-4
Intersection Level of Service

	Number of Intersections (2006)	Number of Intersections (2030 without the Full Truck Corridor)	Number of Intersections (2030 with the Full Truck Corridor)[1]
Level of Service A or B	26	13	23
Level of Service C or D	7	5	6
Level of Service E or F	1	16	4

1. The full truck corridor would eliminate one study intersection

3 What is the estimated project cost?

The project costs have been calculated separately for different project elements and segments and are shown in Exhibit 3-5. The full truck corridor, including a reevaluation of the National Environmental Policy Act (NEPA) EIS and construction of all the truck corridor elements, would cost approximately $386,000,000.

Where can I find descriptions for each segment of the full truck corridor?

A detailed description of each truck corridor segment is presented in Appendix H – Cost Estimate Report, Chapter 1 – Truck Route.

Exhibit 3-5
Truck Route Cost Summary

	West Quarter Truck Corridor	Half Truck Corridor	East Quarter Truck Corridor	Full Truck Corridor
Reevaluation of the NEPA EIS; early engineering including phasing analysis	$5,000,000	$5,000,000	$5,000,000	$5,000,000
Environmental Documentation	$3,000,000	$3,000,000	$3,000,000	$3,000,000
SR 109 Spur Junction to SR 109 at Paulson Road	$3,600,000			$3,600,000
New Alignment from Paulson Road to 5th Street	$18,900,000			$18,900,000
New Alignment from 5th Street along the Railroad to 10th Street	$5,700,000			$5,700,000
New Hoquiam River Bridge	$136,000,000			$136,000,000
22nd/23rd Streets to 30th Street		$16,100,000		$16,100,000
New Alignment from 30th Street to Port Industrial Road		$10,500,000	$8,000,000	$10,500,000
Port Industrial Road Improvements*	$3,600,000			
Port Industrial Road to Wishkah Street		$900,000	$900,000	$900,000
New Alignment from Wishkah Street to State Street		$9,700,000	$9,700,000	$9,700,000
State Street from Park Street to South K Street		$2,600,000	$2,600,000	$2,600,000
US 101/US 12 Connection		$40,000,000	$40,000,000	$40,000,000
New Wishkah River Bridge		$134,000,000	$134,000,000	$134,000,000
TOTAL COST	**$175,800,000**	**$221,800,000**	**$198,800,000**	**$386,000,000**

Tri-City Operational Improvements

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★★	★★★	★★★	★★★

1 What is the project?

The Tri-City Operational Improvements project provides 17 needed and visible improvements that can be implemented in the short term. Most of these projects are small in nature and are limited to a single intersection or a few city blocks. Exhibit 3-6 illustrates the location of each tri-city operational improvement, and Exhibit 3-7 provides a brief description of each project.

Exhibit 3-6
Tri-City Operational Improvements Vicinity Map

2 What are the potential benefits and impacts of this project?

The Tri-City Operational Improvements would provide each city with several small but beneficial projects that would enhance the quality of the regional transportation system. Each project in the Tri-City Operational Improvements is relatively low cost and would provide a quick and immediate benefit to the region. Several projects, including constructing curb extensions, Americans with Disabilities Act (ADA) compliant ramps, and sidewalks, would provide non-motorized safety and accessibility improvements in the tri-city area.

Where can I get more detailed description and cost information for each tri-city operational improvement?

The Cost Estimate Report (Appendix H) provides a more comprehensive description and detailed cost breakdown of each tri-city operational improvement.

3 What is the estimated project cost?

The full funding cost for all of the Tri-City Operational improvements would be approximately $10,000,000. The stakeholder committee has recommended full funding be allocated for this project.

Exhibit 3-7

Tri-City Operational Improvement Projects

Map Location	Project Description
A	Pedestrian and access improvements
B	Redesign or improve the intersection of Lincoln Street/6th Street to provide easier access to downtown Hoquiam
C	Improve signage, lighting, and sidewalk in the vicinity of the Riverside Bridge
D	Provide pedestrian safety, beautification, and economic development improvements
E	Approach improvements to the Simpson Avenue Bridge
F	Improve intersection operations to increase capacity and safety
G	Provide a right-turn pocket on westbound First Street
H	Replace the old span wire signal system
I	Increase right-turn radius from westbound Wishkah Street
J	Increase left-turn radius from southbound Park Street
K	Extend sidewalk bulb-out project (shown in green in Exhibit 3-6)
L	Intersection improvements and restriping at the South Aberdeen Fire Station
M	Install a left-turn pocket at the Mill Creek Pedestrian Link
N	Sidewalk Improvements in downtown Cosmopolis
O	Construct center left-turn lane
Downtown Hoquiam ADA Ramp Improvements in the Central Business District (Not shown on map)	Install 96 new Americans with Disabilities Act (ADA) accessible ramps, upgrade 144 existing ramps, and complete sidewalks along all state routes in Hoquiam.
Activate the Aberdeen Traffic Actuation System (Not shown on map)	Activate traffic loops along US 101 through downtown Aberdeen

Wishkah Mall Access Improvements

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★	★★	★★

1 What is the project?

The Wishkah Mall Access Improvements project shown in Exhibit 3-8 would provide channelization improvements and access revisions to the Wishkah Mall in two phases. The first phase would fund a new emergency vehicle access, turning movement and access revisions, signal coordination between the two signals located along US 12, and re-striping of the internal Wal-Mart and Top Foods parking area. The second phase would include analysis and construction of an alternate access road, located on the north side of US 12, and removal of several driveways along the highway.

Exhibit 3-8
Phased Wishkah Mall Access Improvements

2 What are the potential benefits and impacts of this project?

This project would improve access from US 12 to the Wishkah Mall. This includes reducing vehicle delays at site access driveways, improving safety by changing access control at some mall driveways, and providing a dedicated emergency vehicle access route that is not blocked by a train. This project would provide some public funds for improvements to private property; however, since Wal-Mart and adjacent businesses are critical to the economic vitality of the region, the stakeholder committee agreed full funding should be allocated for this project.

The primary access to the Wishkah Mall from Heron Street.

3 What is the estimated project cost?

The total project cost for both phases is approximately $4,000,000.

Intelligent Transportation Systems (ITS)

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★★★	★★★	★★★

1 What is the project?

This project would install ITS infrastructure at strategic locations to alleviate congestion, improve safety, and provide driver information. ITS encompass a broad range of technologies, including:

- Variable Message Signs
- Closed Circuit Television Cameras
- Highway Advisory Radio (HAR)
- Data Stations
- Road/Weather Information Systems
- Photo Detection Cameras

The ITS project would also include a planning phase analysis to integrate these technologies into the region's infrastructure. Final locations and configurations would be confirmed upon further analysis during this planning phase and final design. Examples of ITS are shown in Exhibit 3-9.

Exhibit 3-9
Intelligent Transportation Systems (ITS)

2 What are the potential benefits and impacts of this project?

The ITS technologies can have an immediate benefit to traffic operations during congested times, including:

- Warning motorists of bridge openings, train blockages, collisions, road construction, and severe traffic congestion; alerting them to alternative routes; and potentially reducing congestion and delays.
- Reducing red-light violations at high accident intersections.
- Providing information to local police and fire departments in the event of an accident or emergency in Aberdeen, Hoquiam, and Cosmopolis.

3 What is the estimated project cost?

The estimated cost of this project is $9,000,000.

What is Highway Advisory Radio?

Highway Advisory Radio (HAR), sometimes called traveler information stations, are low-powered AM radio transmitters typically used to broadcast roadway conditions and traffic delays. HAR messages are commonly located along major highways, tolled facilities, and other "closed" systems, including airports and national parks. HAR messages may be used to provide other information, such as:

- Construction detour routes.
- Traffic conditions and warnings.
- Information on tourist attractions.
- Public event notices.

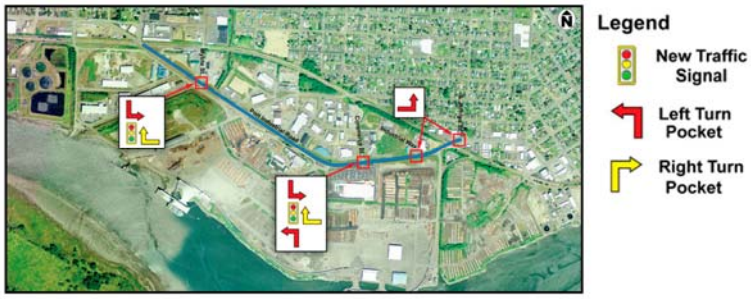
Improve Port Industrial Road

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★★	★★	★★★

1 What is the project?

This project would include several improvements to Port Industrial Road, such as intersection turn lanes, two traffic signals, sidewalks, storm drain facilities, proposed pavement overlay, and a center two-way left-turn lane. Exhibit 3-10 illustrates the improvements along the corridor.

Exhibit 3-10
Port Industrial Road Improvements



2 What are the potential benefits and impacts of this project?

This project would improve traffic flow, roadway capacity, and pedestrian and vehicle safety along the entire corridor. The project would benefit local traffic destined for Port of Grays Harbor businesses and through traffic using Port Industrial Road to avoid traffic congestion on US 101. Construction of the two-way left-turn lane and other intersection turn lanes would remove turning vehicles from through lanes, improving traffic flow along the corridor. The new traffic signals would shorten wait times at two of the higher-volume intersections in the corridor. The new traffic signals would also create additional traffic flow gaps at stop-sign controlled intersections on Port Industrial Road. As a result, vehicle wait times at both of the new signalized intersections and at unsignalized intersections would improve.

At the Port Industrial Road/Myrtle Street intersection, a traffic signal and traffic channelization improvements are recommended.

3 What is the estimated project cost?

The total construction cost for all of the proposed improvements is approximately $3,600,000.

Cosmopolis Downtown Revitalization

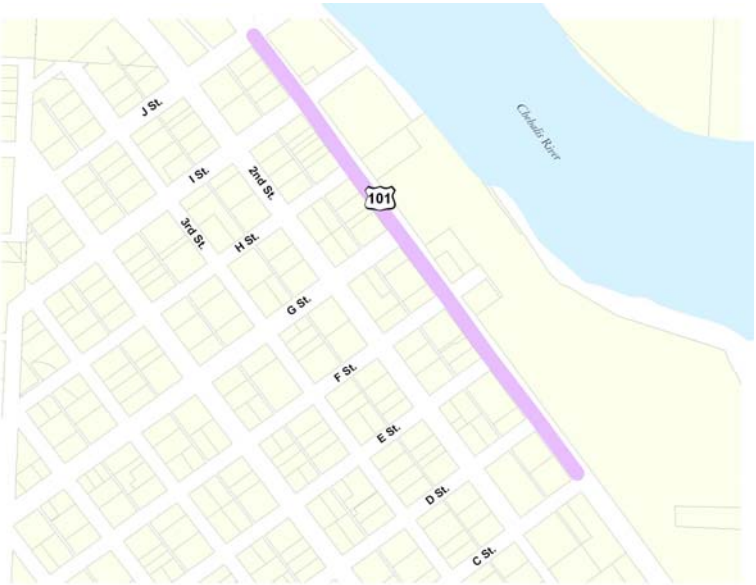
Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★	★★★★	★★★	★★★

1 What is the Project?

The Cosmopolis Downtown Revitalization project would improve the downtown area of Cosmopolis by constructing the following improvements between "C" Street and "F" Street on the west side of US 101, as shown in Exhibit 3-11:

- Replacing the aging sidewalks
- Improving street lighting and storm drainage facilities
- Reconstructing utilities underground
- Installing ADA compliant wheelchair ramps
- Retrofitting existing wheelchair ramps with truncated domes
- Adding landscaping
- Completing the Cosmopolis sidewalk project, along the west side of US 101 between "F" Street and "H" Street and a portion extending 300 feet to the south from "C" Street

Exhibit 3-11
Cosmopolis Downtown Revitalization Project Vicinity



2 What are the potential benefits and impacts of this project?

This project would revitalize Cosmopolis with improved pedestrian-friendly and aesthetically pleasing facilities. After Cosmopolis partially reconstructed the west side of US 101, many downtown businesses reinvested in their store frontage and eight new businesses opened creating 40 new fulltime jobs with a private investment of over $1 million. This resulted in a more attractive and economically viable business district.

The downtown Cosmopolis sidewalk project, as shown above, improved aesthetics on the west side of US 101. The Cosmopolis downtown revitalization would finish improving the west side of US 101 and provide similar improvements to the east side of the street.

3 What is the estimated project cost?

This project is expected to cost approximately $1,300,000.

Rail Car Storage East of Aberdeen

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★★	★★	★★★

1 What is the project?

This project includes the design and construction of a rail car storage yard east of Aberdeen to relieve rail conflicts in downtown Aberdeen from train switching movements across at-grade street crossings. Two new railroad sidings would be constructed to allow one train to pass another; the new sidings could also potentially be used for temporary rail car storage. Potential storage locations include Oakville, Aberdeen Junction, and other locations east of Aberdeen. These potential rail car storage locations are shown in Exhibit 3-12.

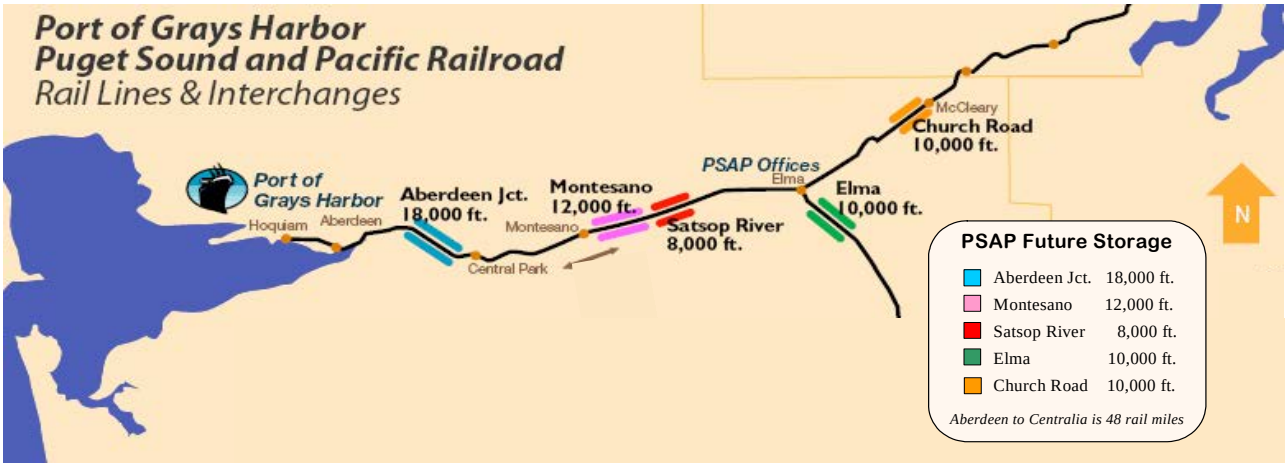
2 What are the potential benefits and impacts of this project?

This project would relieve rail congestion and minimize conflicts at rail/roadway crossings in the downtown Aberdeen area. Train cars are currently stored on the rail sidings south of State Street to allow larger trains to pass. Relocating the rail car storage area east of Aberdeen would greatly reduce trains blocking the Wishkah Mall access driveways. This would reduce traffic congestion caused by trains in the mall vicinity and along State Street.

3 What is the estimated project cost?

This project would cost approximately $4,300,000.

Exhibit 3-12
Future Rail Car Storage Locations East of Aberdeen



www.PortofGraysHarbor.org

This map is for illustrative purposes only. Storage yard locations have not been identified. Further study is needed.

GHCOG COUNCIL OF GOVERNMENTS

Washington State Department of Transportation

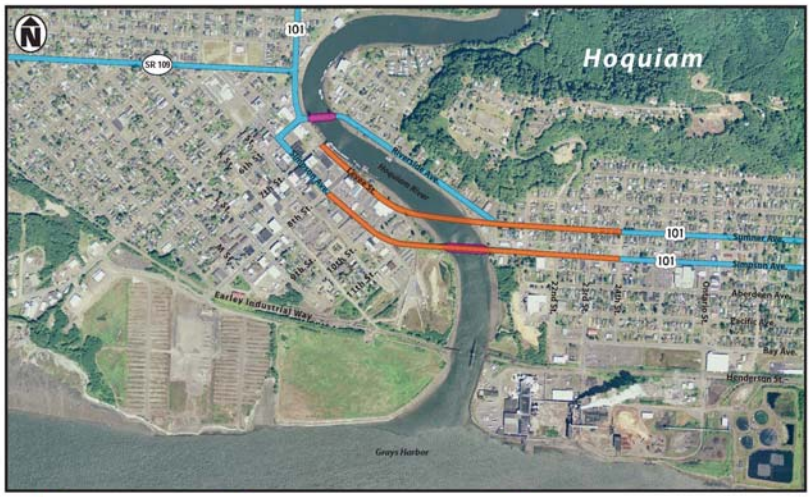
Replace Existing Hoquiam Bridges

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★	★★★	★★★

1 What is the project?

This project would replace the two existing Hoquiam River Bridges, as show Two alternative alignment options for replacing these structures include two hi level, fixed-span bridges or replacing eac bridge with low-level, moveable facilitie the same location. This project would lik require preparation of an environmental impact statement prior to constructing th two new bridges.

Exhibit 3-13
Replace Existing Hoquiam River Bridges



Existing US 101/SR 109
Optional Low Level Replacement Bridges
Optional High Level Replacement Bridges

2 What are the potential benefits and impacts of this project?

The high-level fixed-span crossing footprint would be over half a mile long to obtain an adequate clearance over the Hoquiam River. As a result, existing businesses near the Hoquiam River could be displaced or affected. The new high-level bridges would benefit local and through traffic mobility by eliminating periodic congestion caused by bridge openings.

The two new low-level bridges would have lower impacts to existing businesses compared to a new high-level facility, but would continue to have long-term maintenance costs associated with the mechanical bridge opening system. The low-level bridges may also have greater environmental impacts to fish habitat areas and to vessel navigation requirements from the U.S. Coast Guard.

Riverside Avenue Bridge

Simpson Avenue Bridge

3 What is the estimated project cost?

This project is expected to cost approximately $141,000,000 for two low-level movable bridges and approximately $154,000,000 for two new high-level structures.

Relocate Rail Line South of Port Industrial Road

Goal 1: Promote Regional Solutions	Goal 2: Promote Economic Vitality and Growth	Goal 3: Provide Multi-modal Solutions	Overall Average
★★★	★★★	★★	★★★

1 What is the project?

This project would relocate the existing Puget Sound and Pacific Railroad (PS&P) line between the vicinity of the Port Industrial Road/E. Terminal Way and 30th Street. The new rail alignment would traverse through the Port of Grays Harbor, as shown in Exhibit 3-14, and would eliminate the two existing at-grade railroad crossings along the corridor. The new railroad alignment would continue to operate within the existing and future industrial land uses.

Exhibit 3-14
Proposed Rail Realignment

2 What are the potential benefits and impacts of this project?

This project would eliminate all vehicle delays associated with trains crossing Port Industrial Road and greatly improve roadway operations through the Port. The project would also benefit residential property adjacent to the existing railroad alignment by reducing noise and other impacts from the rail line.

3 What is the estimated project cost?

The project is expected to cost approximately $6,200,000.

The two at-grade railroad crossings along Port Industrial Road would be removed in conjunction with this project.