US 2/97 Corridor Safety Study

Blewett Junction to Easy Street (Wenatchee)

FINAL REPORT

Prepared for:

Washington State Department of Transportation
North Central Region

Prepared by:

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in association with

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City of Cashmere
Link Transit

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US 2/97 Corridor Safety Study Technical Reports/Memorandums

Traffic Existing Conditions
Environmental Technical Memorandums
Existing Bridge Conditions Report
Level 1 Screening Memorandum
Level 2 Screening Memorandum
Level 3 Screening Memorandum

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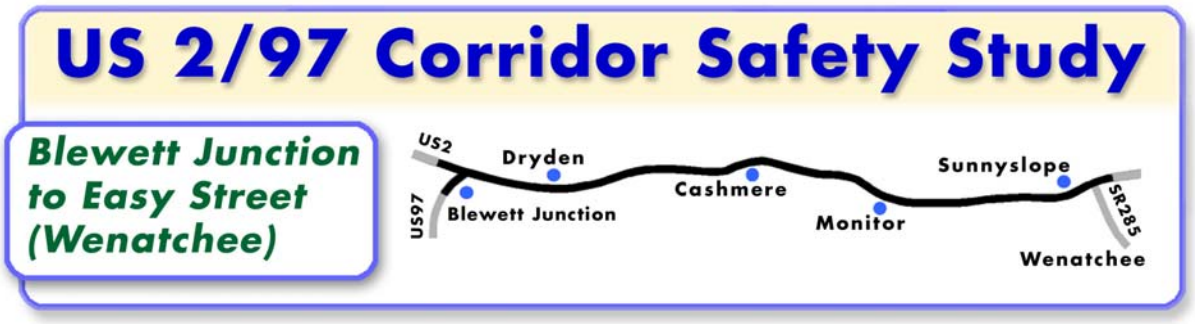


1. EXECUTIVE SUMMARY

INTRODUCTION

The North Central Region of the Washington State Department of Transportation (WSDOT) conducted the US 2/97 Corridor Study to identify short- and long-range safety improvements on US 2/97 between Blewett Junction and Easy Street in Wenatchee. The goal of this study is to develop a list of projects that can be constructed over time to improve safety. The underlying vision of this study is to "develop the corridor so that it is a safe limited access facility that accommodates travel growth in the region." The principle objective was to analyze the existing at-grade intersections (both signalized and unsignalized) within the project limits and determine needed future improvements.

The study consisted of conceptual design and environmental analysis of projects to improve the safety and operations, while maintaining or improving capacity of this 14.4-mile segment of four-lane highway in Chelan County. This corridor was selected for study because 4 of the 17 intersections are considered high accident locations.

Primary participants included Washington State Department of Transportation; Chelan County; City of Cashmere; Link Transit; and the consultant team, led by David Evans and Associates, with Parsons Brinckerhoff and Triangle Associates.

PUBLIC INVOLVEMENT

A citizen Sounding Board was developed based on interviews with local citizens and business leaders to convene a cross-section of the community to provide input on the process, evaluation of alternatives and public outreach efforts. The Sounding Board met five times during the project, and was invited to participate in the screening meetings, which analyzed alternatives and developed a list of recommended alternatives. Upon conclusion of the study, all members agreed that the process was conducted in an open and responsive manner, and they supported the process used to develop the proposed recommendations. (See letter following this Executive Summary).

Members of the Sounding Board:

Cashmere
Dean Falteisek
Jim Geary

Dryden
Cheryl Christensen
Alvina Goehner

Monitor
Jerry Larson
Joe Rumble

Sunnyslope
Mary Ann Corning
Chuck Graves

Emergency/Safety
Bob Wildfang, Fire District Commissioner
Lt. Mike Warren, WA St. Highway Patrol

Local Transportation
Greg Pezoldt, Chelan County Engineer

Fruit Industry
Dan Kenoyer, Blue Star Growers
Jeff Kraus, Blue Bird

LINK Transit
Terry Talbot

Additionally, residents along the US 2/97 study corridor were asked to provide their input regarding operational and safety problems encountered along the US 2/97 facility. Three rounds of Open Houses were held in April 2001, November 2001, and February 2002. The Open Houses were conducted to obtain feedback from the community and engage the public in a dialogue regarding the safety issues and the options under consideration.

EXISTING CONDITIONS

Corridor Roadway Facilities

The US 2/97 highway is the main route traveling through the study area. It is a four-lane, partially controlled, limited access facility with two lanes in each direction that are separated by barriers, paved medians, and turn-pockets. US 2/97 side streets are typically stop-controlled. Current signalized intersections include Aplets Way (signal constructed during study, 2001) and Cotlets Way in Cashmere, Main Street/Easy Street in Monitor, and Easy Street in Wenatchee. Occasional driveways access orchards with homes, or a small group of homes throughout the corridor. Frontage roads parallel US 2/97 throughout portions of the corridor, providing additional access to the surrounding communities, but no continuous secondary road network currently exists serving the entire corridor due to natural terrain, the Wenatchee River, and US 2/97 constraints.

Safety

Accident data shows that between 1994 and 2000 a total of 625 accidents in the study area were reported and/or recorded. The Blewett Junction, Cotlets Way, Main Street/Easy Street, and Easy Street intersections each had 27 or more accidents from the beginning of 1994 to the end of 2000. These four intersections have the highest number of both mainline and side-street turning movements along the corridor, and the last three noted are signalized.

From 1994 and 2000, approximately 315 accidents occurred on mainline US 2/97 segments between intersections, most of which were single vehicle collisions (included run off the road, fixed objects, and striking animals including deer).

Existing Operations

Existing traffic volumes on US 2/97 were greater in the east (Cashmere-Wenatchee) than in the west (Big Y Junction to Cashmere), which was expected due to the greater level of development toward Wenatchee. The PM peak hour varied throughout the corridor, with the western portion of the study area tending to start between 3:00 and 4:00 p.m. whereas the eastern end generally started between 4:00 and 5:00 p.m.

The existing level of service (LOS) for mainline US 2/97 is very good with LOS A operations on nearly all mainline segments. The side streets operations varied from LOS A to LOS F, with the majority of side-street operations at LOS C or D, revealing difficult access from the side-streets.

Future Operations

A travel demand model was developed to project 2021 traffic volumes in the corridor and in order to assess traffic operations under future conditions. Under 2021 forecasted volumes, side-street access becomes more difficult with many side-street operations at LOS F, revealing that access to US 2/97 is projected to deteriorate in the future. Safety on the US 2/97 facility, access to the US2/97 facility, and corridor mobility are important considerations needing to be addressed as traffic grows in the corridor.

Proposed recommendations were developed with the three noted considerations in mind, as well as projected traffic volumes and anticipated corridor needs for the future.

Environmental Overview

The US 2/97 project corridor is located in the Wenatchee River Valley. Within the project corridor, the highway has three existing crossings of the Wenatchee River and one crossing of Peshastin Creek. The Wenatchee River and Peshastin Creek are the primary constraining environmental features for the development of alternatives. Because of its scenic qualities, US 2/97 has been designated as a state scenic byway. The long-range goal is to achieve National Scenic Byway status for the entire corridor from Everett to Wenatchee.

Most of the study area is located in unincorporated Chelan County with the only incorporated city being Cashmere. Currently the river valley portion of the study area near the highway is dominated by agricultural land use. The northern and southern limits of the study area transition to resource production and Wenatchee National Forest lands. The next largest land use is devoted to residential development (12 percent). Commercial and industrial development make up two percent of the study area. The predominant land use greater than one mile from the highway is resource production on Wenatchee National Forest lands.

The Chelan County and City of Cashmere Comprehensive Plans reflect their respective community visions for the development of the study area over the next 20 years. Both plans envision a major conversion of land use from agricultural/resource-based uses to rural and urban residential uses. It is expected that agricultural uses will diminish and no longer be the primary land use in many areas along the US 2/97 corridor, especially from Cashmere to Wenatchee.

ALTERNATIVES DEVELOPMENT AND EVALUATION

Alternatives Development

The alternatives developed in the study were evaluated on a total corridor basis, examining impacts to both US 2/97 and the adjacent communities. To facilitate alternative development and evaluation, the corridor was divided into five areas. The five areas were created based around the five major communities in the study area: Blewett, Dryden, Cashmere, Monitor, and Sunnyslope. The intersections within each area are listed in the table below and shown in Table 1.

Table 1. Study Emphasis Areas

Reference Area	Area Name	Intersections with US 2/97
Area A	Blewett	Blewett Junction (US 2 and US 97), US 2 at Blewett Cutoff Road, US 97 at Blewett Cutoff Road, Saunders Road/Deadman Hill Road, Motel Road, and Dryden Transfer Station Road
Area B	Dryden	Alice Avenue, Dryden Avenue, and North Dryden Road*
Area C	Cashmere	Hay Canyon Road/Goodwin Road, Aplets Way (Division Street), Cotlets Way (Cottage Avenue), Old Monitor Road, and Red Apple Road/Old Monitor Road
Area D	Monitor	Stoffel Road, Red Apple Road/Selfs Road, and Main Street/Easy Street
Area E	Sunnyslope	Lower Sunnyslope Road/Lower Monitor Road, School Street, and Easy Street (Wenatchee)

*North Dryden Road was also looked at with alternatives in Area C due to its proximity to Area C.

A three-level screening process was applied to evaluate potential alternatives and their ability to meet current and future needs and remedy deficiencies within the US 2/97 corridor. Level 1 evaluated a range of alternatives at each location to screen-out alternatives that did not address the identified corridor safety goals. Level 2 centered on refining alternatives that passed the Level 1 screening and included traffic analysis for the proposed alternatives and an environmental review of constraints. Level 3 screening focuses on the cost/benefit ratio and conceptual construction costs of the proposed alternatives to arrive at both short and long-term recommended alternatives for each area under study.

Prioritization Philosophies and Methodology

The wide range of alternatives proposed along the length of the US 2/97 corridor required the development of a consistent and fair method of prioritizing implementation of the proposed improvements. Various measures such as benefit-to-cost analysis, total cost, and safety benefit were quantitative means of prioritization considered by the study team. More qualitative criteria, such as WSDOT's budget constraints and public comments, were also considered.

WSDOT's current budget for safety improvement projects does not contain provisions for the corridor improvements recommended by this study. Funding opportunities are expected to be highly competitive and difficult to predict in the near-term and long-term future. Corridor-wide and short-term alternatives were anticipated to be constructed within one to two bienniums, using the Region's available budget. Long-term projects were considered to compete at the statewide level for design and construction funds. Table 2 outlines the priority listing of each identified project within its respective category of corridor-wide, short-term, or long-term.

Corridor-wide improvements are recommended to provide safety benefits that are consistent throughout the project area. Standardized design and consistent driver information contribute to greater safety by meeting driver expectations.

Short-Term Recommendations

Intersection improvements recommended include restriping left-turn pockets, adding pavement for right-turn lanes or pockets, and adding illumination. Existing turn pockets and luminaire locations were field measured to provide a basis for evaluating design requirements and making recommendations. Requirements for turning tapers, pockets, and deceleration lanes were evaluated using existing and future traffic volumes and were based on WSDOT's *Design Manual* requirements. Recommendations were based on future forecast volumes. It should be noted that while the recommendations below are discussed as intersection improvements, there may be some benefit in performing the striping improvements immediately with the North Central Region's maintenance workforce. However, where extension of the left-turn pocket or striping gap necessitates additional illumination, concurrent striping and luminaire installation is strongly recommended. See Appendix A for each intersection's turn pocket/gap requirement calculations and recommendations.

Long-Term Recommendations

Intersections improvements recommended included providing additional control of movements at existing intersections, using either a signal or creation of a new interchange. Signalized intersections are proposed where the signal operation is expected to operate at an acceptable LOS for the 20-year horizon. A new interchange is proposed where the traffic volumes and movements require control beyond a signal and usually involve some major roadway realignment of the local county road or frontage road and bridge

structures over US 2/97. The interchange recommendations are expected to compete for statewide design and construction funding.

NEXT STEPS

The total estimated project cost for all short term and long term projects is $67,588,000. The Current Law Budget for transportation (S.B. 6347 - planned for November vote) establishes $33,078,160 for safety improvement projects statewide. The bill requires WSDOT to establish a list of projects in addition to the specific projects identified by the legislature. The US 2/97 proposed improvements will need to be prioritized for funding with competing safety projects within the North Central Region. In order to obtain funding for as many projects as possible, consideration should be given to identify multi-agency project sponsorship opportunities as well as locating and obtaining grant funds.

Given the lengthy process required to develop long-term improvement projects, construction of the first interchange is not likely to occur before the 2005-2007 transportation budget biennium. In order to keep these long-term improvements on schedule as well as ensure budget allocation, it is recommended that environmental impact analysis and documentation, design file preparation, and preliminary engineering begin as soon as practical.

Other technical documents prepared for this study include:

Traffic Existing Conditions Technical Memorandum
Environmental Technical Memorandum
Existing Bridge Conditions Report
Level 1 Screening Memorandum
Level 2 Screening Memorandum
Level 3 Screening Memorandum
Traffic Technical Memorandum – Traffic Operations Analysis for Second and Third Level Screening
Visual Quality Analysis
Public Involvement/Information Plan

Table 2. US 2/97 Priority Rank Project List

Improvement	Description	Estimated Construction Cost
Corridor-Wide Improvements		
1. Continuous Shoulder Rumble Strip (CSRS)	CSRS along the outside shoulders of US 2/97 were proposed to address run-off-the-road accidents that occur along the corridor.	$42,000
2. Corridor Signing	This improvement would install consistent warning signs: W2-1 and a W16-8 supplemental warning sign with the cross street name(s) in advance of the intersection on each approach.	$33,000
3. Advance Signal Change Beacons	Although still in the trial and data collection phase, an informal evaluation by the project team indicated the advance beacons provide benefit. Should WSDOT conclude from the field trial that the beacons are of benefit, this study recommends providing advance signal change beacons at all existing and future signalized intersections. The cost is for providing advance beacons at two existing signalized intersections.	$90,000
Short-Term Improvements		
1. Hay Canyon Road/Goodwin Road	The Hay Canyon Road/Goodwin Road intersection improvements consist of adjusting the left turn lengths and increasing the westbound right turn pocket.	$53,000
2. Red Apple Road/Old Monitor Road	The Red Apple Road/Old Monitor Road intersection improvements consist of increasing the left turn pockets and adding a right turn lane in the westbound direction.	$58,000
3. Dryden Avenue	The Dryden Avenue intersection improvements consist of increasing the left turn lanes pockets and adding right turn pockets in the east and westbound directions.	$196,000
4. Red Apple Road/Selfs Road	The Red Apple Road/Selfs Road intersection improvements consist of increasing left turn pockets and adding a right turn pocket in the westbound direction.	$79,000
5. Blewett Junction	The Blewett Junction intersection improvements consist of providing larger right-turn radii to and from US 97 and increasing the left turn pocket in the westbound direction	$771,000
6. School Street	The School Street intersection improvements consist of lengthening the left-turn lane in the eastbound direction and increasing the right-turn deceleration lane in westbound direction and add a sign bridge with westbound lane	$220,000

Improvement	Description	Estimated Construction Cost
	destinations.	
7. Cotlets Way	The Cotlets Way intersection improvements include adjusting the left-turn pockets and lengthen the right-turn lane in the eastbound direction.	$170,000
8. Saunders Road/Deadman Hill Road	The Saunders Road/Deadman Hill Road intersection improvements consist of increasing left-turn lanes and adding a right-turn deceleration lane in the westbound direction.	$197,000
9. Old Monitor Road	The Old Monitor Road intersection improvement consists of adding approximately four luminaires to provide illumination at this currently unlit T-intersection.	$31,000
10. Alice Avenue	The Alice Avenue intersection improvements consist of increasing the left-turn gap in both directions.	$17,000
11. North Dryden Road	The North Dryden Road intersection improvements consist of increasing the left-turn lanes and adding a right-turn pocket in the westbound direction.	$58,000
12. Lower Sunnyslope Road /Lower Monitor Road	The Lower Sunnyslope Road/Lower Monitor Road intersection improvements consist of increasing left-turn pockets and adding a right-turn lane in the westbound direction.	$306,000
13. Aplets Way	The Aplets Way intersection improvements consist of lengthening the left-turn lane and increasing the right-turn lane in the eastbound direction.	$124,000
14. Main Street/Easy Street	The Main Street/Easy Street intersection improvements consist of adjusting the left-turn pockets and increasing the right turn lane in the eastbound direction.	$103,000

Improvement	Description	Estimated Construction Cost
Long-Term Improvements		
1. Dryden Avenue Signalization	A traffic signal is proposed for the Dryden Avenue intersection. This project also closes the existing westbound "slip ramp" from Dryden Avenue.	$326,000
2. Hay Canyon Road/Goodwin Road Signalization	A traffic signal is proposed for the Hay Canyon Road/Goodwin Road intersection when warrants are met.	$259,000
3. Blewett Diamond Interchange	A diamond interchange is proposed as the long-term recommendation at Blewett Junction approximately 1100 feet west of the existing Blewett Junction intersection.	$16,800,000
4. East Cashmere Diamond Interchange	A diamond interchange is proposed as the long-term recommendation in east Cashmere east of the Red Apple Road/Old Monitor Road intersection with frontage road connections via Titchenal Way to Cottage/Cotlets Ave.	$21,100,000
5. Sunnyslope Diamond Interchange	A diamond interchange is proposed as the long-term recommendation in the Sunnyslope area approximately one-quarter mile east of the Lower Sunnyslope Road/Lower Monitor Road intersection.	$12,200,000
6. Goodwin Road Bridge Replacement	A new grade separated crossing of US 2/97 is proposed approximately one-quarter mile west of the existing Goodwin Road/Hay Canyon Road intersection and may be considered the first phase of a new diamond interchange. The bridge spans the Burlington-Northern railroad tracks, Wenatchee River, and US 2/97.	$14,300,000

2. INTRODUCTION

The North Central Region of the Washington State Department of Transportation (WSDOT) undertook the US 2/97 Corridor Safety Study to identify short- and long-range safety improvements on US 2/97 between Blewett Junction and Easy Street in Wenatchee. The study consisted of preliminary design and environmental analysis to improve the safety and operations, while maintaining or improving capacity of this 14.4-mile segment of four-lane highway in Chelan County. The project vision was to develop the corridor so that it is a safe limited access facility that accommodates travel growth within the region. The principle objective was to analyze the existing at-grade intersections (both signalized and unsignalized) within the project limits in order to identify short- and long-range alternatives to improve safety.

This corridor was selected for study because four of the 17 intersections are considered high accident locations. Three traffic signals were operating along the corridor when the project began in January 2001: one at Cotlets Way, one at Main Street/Easy Street and one at Easy Street in Wenatchee. A traffic signal was installed at Aplets Way during the summer of 2001. Another traffic signal, at Dryden Road, is planned to be budgeted for engineering and design in the 2003-2004 WSDOT biennium budget and has strong community support. This study was formulated to identify safety improvements throughout the corridor that would balance mobility needs with community access. Improvements have been developed using a systematic approach.

Alternatives that were considered, singly or in combination, included the following improvements:

- Taking no action;
- Providing channelization improvements at unsignalized intersections;
- Constructing signalized intersections;
- Constructing grade-separated interchanges to replace specific intersections;
- Constructing grade-separated interchanges at alternate locations;
- Constructing a secondary road network;
- Constructing pedestrian overcrossings or undercrossings;
- Restricting turning movements at intersections;
- Closing specific intersections; and
- Constructing U-turn opportunities.

The alternatives developed in the study were evaluated on a total corridor basis, examining impacts to both US 2/97 and the adjacent communities. To facilitate development and evaluation of alternatives, the corridor was divided into five areas. The five areas were developed around the five major communities in the study area: Blewett, Dryden, Cashmere, Monitor, and Sunnyslope. The intersections within each area are listed in the table below and shown in Figure 1.

Table 2.1. Study Emphasis Areas

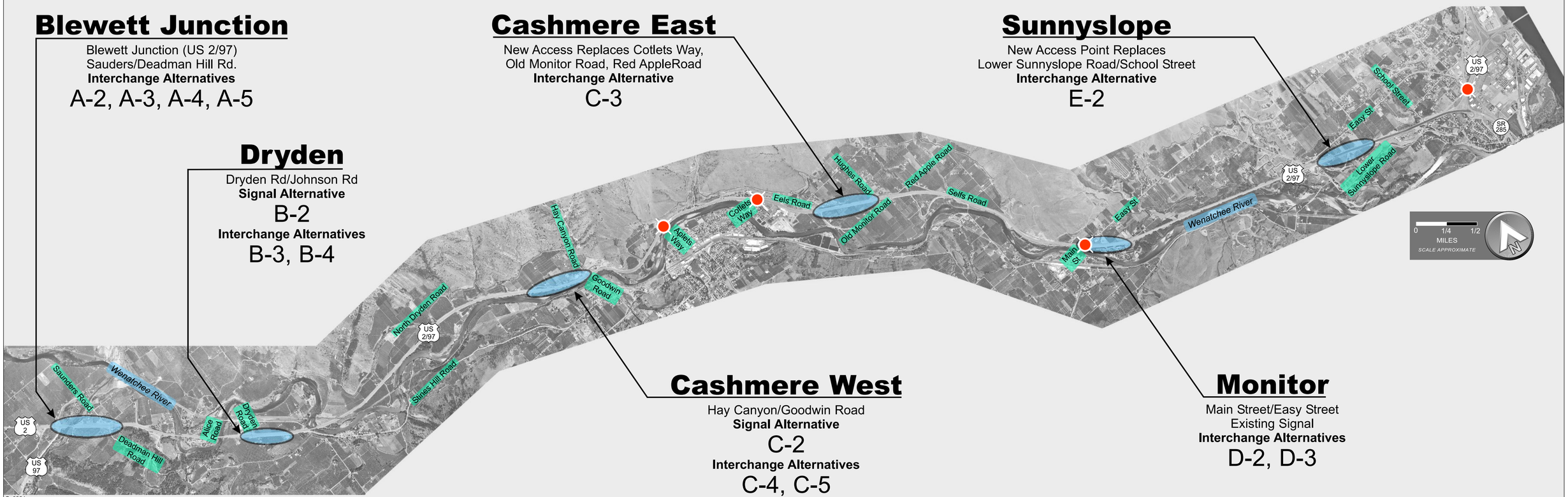
Reference Area	Area Name	Intersections with US 2/97
Area A	Blewett	Blewett Junction (US 2 and US 97), US 2 at Blewett Cutoff Road, US 97 at Blewett Cutoff Road, Saunders Road/Deadman Hill Road, Motel Road, and Dryden Transfer Station Road
Area B	Dryden	Alice Avenue, Dryden Avenue, and North Dryden Road*
Area C	Cashmere	Hay Canyon Road/Goodwin Road, Aplets Way (Division Street), Cotlets Way (Cottage Avenue), Old Monitor Road, and Red Apple Road/Old Monitor Road
Area D	Monitor	Stoffel Road, Red Apple Road/Selfs Road, and Main Street/Easy Street
Area E	Sunnyslope	Lower Sunnyslope Road/Lower Monitor Road, School Street, and Easy Street (Wenatchee)

*North Dryden Road was also looked at with alternatives in Area C due to its proximity to Area C.

The project schedule was developed around three key components of the study and public involvement opportunities. A process flowchart (see Figure 2) was developed to guide the project. The project schedule adhered to the following sequence of events:

- Purpose and Needs Statement – Review of Existing Conditions, Gather Input from the Public, Define Problem
- Alternatives Development – Develop Range of Solutions, Presentation to the Public for Comments
- Select Alternatives – Refine Design, Costs, and Safety Benefits; Presentation of the Recommendations to the Public

A critical part of the study process was the public involvement process. The project team recognized that successful solutions would require the support of the communities using the intersections and the highway. To accomplish this, a plan was developed that included regular meetings with a citizen Sounding Board (described in the Public Involvement Process Section), newsletters and open houses during each of the above phases, a web site, and press releases. Nine open houses were held with a total attendance of over 200 people and five meetings were held with the 13-member citizen Sounding Board.



Conceptual

US 2/97 Corridor Safety Study

Washington State Department of Transportation

DAVID EVANS AND ASSOCIATES INC.

PB

Existing Traffic Signal

Interchange Area

US 2/97

Overview

US 2/97 CORRIDOR SAFETY STUDY

PROCESS FLOWCHART

AGENCY COORDINATION

Project Development Team

WSDOT Project Staff
WSDOT Maintenance
WSDOT Local Programs
WSDOT Program Management
WSDOT Environmental Services
Chelan County Public Works
City of Cashmere
LINK Transit

PUBLIC PROCESS

Citizen Sounding Board

Dean Falteisek, Cashmere
Jim Geary, Cashmere
Cheryl Christensen, Dryden
Alvina Goehner, Dryden
Jerry Larson, Monitor
Joe Rumble, Monitor
Mary Ann Corning, Sunnyslope
Chuck Graves, Sunnyslope
Bob Wildfang, Fire Dist. 6 Comm.
Lt. Mike Warren, WA State Patrol
Greg Pezoldt, Chelan County
Dan Kenoyer, Blue Star Growers
Jeff Kraus, Blue Bird
Terry Talbot, LINK Transit

Traffic Forecast (2021)
Current Traffic Counts
Accident History
Roadway Characteristics
Land Use & Sensitive Areas

EXISTING CONDITIONS

Project Development Team

- Safety Concerns
- Traffic Problems
- Future Needs
- Environmental Issues/Enhancements
- Community Concerns

Identify Problems

ALTERNATIVES DEVELOPMENT

Seven Criteria

- Safety
- Traffic Operations
- Community/ Public Opinion
- Environmental Issues
- Land Use/ Economic Issues
- Constructibility/ Maintainability
- Design/Cost

Project Development Team

- Brainstorm Possible Treatments
- Screen for Feasibility (Level 1)
- Develop Options (Level 2)
- Evaluate for Effectiveness (Level 3)

Short-Term | Long-Term

SELECT RECOMMENDED ALTERNATIVE

Project Development Team

Short-Term | Long-Term

Benefit to Cost Ratio

- Safety Benefit
- Construction Cost with Right-of-Way

PRIORITIZE RECOMMENDED PROJECTS

Short-Term | Long-Term

FINAL REPORT AND RECOMMENDATIONS

WSDOT

Sounding Board Review Meeting
Newsletter 1
Open Houses (4 total) April 2001
Sounding Board Review Meeting
Newsletter 2
Open Houses (3 total) November 2001
Sounding Board Review Meeting
Sounding Board Review Meeting
Newsletter 3
Open Houses (2 total) February 2002

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3. ROADWAY/TRAFFIC CONDITIONS AND ENVIRONMENTAL OVERVIEW

TRAFFIC CORRIDOR NEEDS

Existing Conditions

Access

The US 2/97 highway is the main route traveling through the study area. It is a four-lane, partially controlled, limited access facility with two lanes in each direction that are separated by barriers, paved medians, and turn-pockets. US 2/97 side streets are typically stop-controlled. Current signalized intersections include Aplets Way and Cotlets Way in Cashmere, Main Street/Easy Street in Monitor, and Easy Street in Wenatchee. Occasional driveways access orchards, homes, or group of homes throughout the corridor. Frontage roads parallel US 2/97 throughout portions of the corridor, providing additional access to the surrounding communities, as well as county road connections.

Alternate routes and access points are available at various locations along the corridor, but no continuous secondary road network currently serves the entire corridor. Of the available alternative routes, most are narrow, two-lane, local access roads with minimal or no shoulders. Some of the alternative routes follow the US 2/97 alignment and function as frontage roads, but most require considerable out of direction travel and have considerably lower speed limits.

Operations

Existing traffic volumes throughout the corridor were examined. It was found that the traffic volumes on US 2/97 were greater east of Cashmere than between Blewett Junction and Cashmere, which was expected due to the greater level of development toward Wenatchee. The PM peak hours also varied through the corridor; there was no one PM peak hour for the whole corridor. The PM peak hour in the western portion of the study area tended to start between 3:00 and 4:00 p.m. whereas in the eastern end it started between 4:00 and 5:00 p.m.

The existing level of service (LOS) for mainline US 2/97 is very good with LOS A operations on all mainline segments, except one segment at the east end of the corridor. US 2/97 left turn operations at unsignalized intersections were also found to operate predominantly at LOS A, but drop to LOS B at the east end of the corridor and for the westbound left turn at Blewett Junction.

Side street operations in 2001 varied from LOS A to LOS F, with the majority of side street movements operating between LOS C and LOS D. Three of the 27 unsignalized side street approaches were found to operate at LOS F: Blewett Junction, Aplets Way (before signalization), and Lower Sunnyslope Road/Lower Monitor Road. Signalized intersections were found to operate at LOS C or above, except for the southbound Cotlets Way approach, which operates at LOS D. The analysis revealed that the majority of the existing traffic needs in the corridor are for the side street movements.

Safety

Accident data examined as part of this study revealed that the Blewett Junction, Cotlets Way, Main Street/Easy Street, and Easy Street intersections each had 27 or more accidents from the beginning of 1994 to the end of 2000. These four intersections have the highest number of mainline and side street turning movements along the corridor. The last three noted intersections are signalized. The predominant

accident types at unsignalized intersections were left-turn and right-angle accidents, while the predominant accident types for signalized intersections were left-turn and rear-end accidents.

From 1994 through 2000, approximately 315 accidents occurred on mainline US 2/97 segments between intersections, most of which were single vehicle collisions. The predominant collision type involved a vehicle striking an animal or bird. Other common accident types between intersections included vehicles losing control and running off the road, vehicles overturning, and vehicles hitting fixed objects.

Another safety issue identified by the study was design deficiencies of the existing highway alignment. A horizontal curve between Aplets Way and Hay Canyon Road/Goodwin Road limits sight distance and speed. Vertical curves along the corridor, such as at Saunders Road/Deadman Hill Road and Red Apple Road/Old Monitor Road, also limit sight distance. Finally, side street sight distance is limited at several locations, such as at northbound Goodwin Road and at Old Monitor Road.

Public Comments

The residents along the US 2/97 study corridor were asked to provide their input regarding operational and safety problems encountered along the US 2/97 facility. Key themes from the April 2001 public open houses are listed below:

- The amount of traffic on the highway makes turning left or traveling through intersections (crossing US 2/97) from cross streets difficult.
- High traffic speeds on the highway also make turning left or traveling across US2/97 from the cross streets difficult to negotiate.
- Portions of the US 2/97 alignment have restricted sight distances, which causes difficulty entering and exiting the highway.
- A lack of alternative routes or a frontage road system forces drivers to rely on US 2/97.
- A lack of advance warnings prior to signalized intersections is a safety concern for motorists.
- Drivers are using inside lane for travel instead of a passing lane as signed.
- Better channelization and lane markings at intersections are needed throughout the corridor.

See Existing Conditions Summary Report for additional information. [(1)]

Future Year 2021 Conditions

Projected Traffic Growth

Available traffic data for the US 2/97 corridor were collected as input to the development of a travel demand model. Traffic information collected included data from two permanent recorder locations (one east of Blewett Junction and the other east of Cashmere) and traffic count data from the WSDOT *Annual Traffic Report*.

[1] Existing Conditions Summary Report, May, 2001.

Additionally, demographic data were collected for Chelan County. The Chelan County and City of Cashmere Comprehensive Plans were reviewed for projected demographic trends. Lastly, county forecasts were collected (from Chelan County and the State of Washington) for the economic and demographic variables listed below:

- Population
- Employment
- Civilian labor force
- Retail sales
- Real price of gas (cost of travel)
- Income measures
- Wage and salary information

Historical traffic data were analyzed with the above listed variables to develop statistical models to forecast traffic within the corridor. Relationships between the two data sets were tested using linear regression analysis to determine which of the explanatory variables best correlated with historical traffic growth in the US 2/97 corridor. Similar to findings from the existing conditions review, which found that traffic patterns differed between the east and west ends of the corridor, the explanatory variables for traffic growth in the corridor were found to be slightly different. Traffic growth in the east end of the corridor was most closely related to population growth, whereas traffic growth in the west end of the corridor was most closely related to growth in employment, population, and the real price of gas. Forecasts for these variables were then used as input into the two models to forecast future traffic growth for the US 2/97 study area.

The east end of the corridor is projected to grow by 46 percent by 2021, which is consistent with the comprehensive plan forecasts for population and employment growth. The west end of the corridor is projected to grow by approximately 34 percent by 2021, which is consistent with the more rural land-use in this area.

Planned Transportation Improvements

A review of the six-year Transportation Improvement Program (TIP) (2001 - 2006) for Chelan County, identified two projects that are scheduled within the study area. They are the replacements of the West Monitor Bridge and West Cashmere Bridge. Limited project funding for the West Monitor Bridge is scheduled for 2003. The City of Cashmere has no major projects that affect the US 2/97 corridor in its six-year TIP.

Operations

Operations for mainline segments in 2021 are projected to remain at LOS A for the majority of the corridor, with more eastern segments projected to operate at LOS B and one segment in the east end of the corridor projected to operate at LOS C. In comparison to existing conditions, the number of US 2/97 roadway segments projected to operate at LOS B or C would increase from 1 to 11. Most mainline US 2/97 operations at unsignalized intersections for 2021 are also expected to experience a reduction in future year operations to LOS B, with some dropping to LOS C (at nearly all intersections).

Side street operations are projected to vary from LOS A to LOS F in 2021. The majority of the side street movements will operate at LOS F, compared to the exiting conditions findings of LOS D. Of the 27 side street approaches, the number operating at LOS F is expected to increase from three to 17, compared with existing conditions. Operations at all of the signalized intersections are projected to deteriorate from existing conditions, ranging between LOS C and LOS E in 2021. Operations at both Cotlets Way and

Easy Street are projected to operate at LOS E and D, respectively, thereby failing to meet the WSDOT minimum LOS C standard for rural areas.

As was found during the existing conditions review, year 2021 projected operations for the PM peak-hour demonstrate the need to improve side street access and operations throughout the corridor. These future baseline findings, in addition to the safety issues found in the existing conditions review, revealed the need to develop grade-separated access alternatives at some locations.

ENVIRONMENTAL OVERVIEW [2]

Environmental Overview of the Study Area

The study area is a two-mile wide corridor (approximately one mile on each side of the highway) along US 2/97 from the Columbia River at Olds Station to Peshastin, including the Wenatchee River. The study area was selected for the environmental analysis that included most of the users that access the highway daily. Most of the study area is located in unincorporated Chelan County and includes the communities of Peshastin, Dryden, Monitor, and Sunnyslope. The only incorporated city in the study area is Cashmere. The predominant land use greater than one mile from the highway is resource production on Wenatchee National Forest lands.

Besides local residential, commercial, and agricultural traffic, the highway is also used by three other user groups. These are the daily travelers from the region that commute between Wenatchee and Leavenworth, trucks that haul freight between Wenatchee and Western Washington via US 2 and US 97, and weekend and summer tourists who are primarily from Western Washington traveling to Chelan County and adjacent counties for recreation.

The US 2/97 project corridor is located in the Wenatchee River Valley. Within the project corridor, the highway has three existing crossings of the Wenatchee River and one crossing of Peshastin Creek. There are ten other crossings of the Wenatchee River and one other crossing of Peshastin Creek within the study area. The highway parallels the Wenatchee River in much of the project area. As a result, the Wenatchee River and Peshastin Creek are the primary constraining environmental features for the development of alternatives.

Because of its scenic qualities, US 2/97 has been designated as a state scenic byway. The long-range goal is to achieve National Scenic Byway status for the entire corridor from Everett to Wenatchee. One of the many plans to promote the corridor is to provide a multi-modal trail along the corridor between Everett and Wenatchee.

Population

The overall population of Chelan County was 52,250 in 1990. Current U.S. Census information released for the year 2000 estimates that Chelan County has grown to 66,616 people, a 27.5 percent increase from 1990. The Washington State Office of Financial Management estimates that in year 2017 there will be 90,444 people within Chelan County (an addition of 23,828 people or 35.8 percent over 2000). The population was not determined for the study area, though there are approximately 5,500 households along the corridor that were included in the newsletter mailing list.

[2] See Environmental Existing Conditions Report, May, 2001 for additional information.

Land Use

Currently the river valley portion of the study area near the highway is dominated by agricultural land use. The northern and southern limits of the study area transition to resource production and Wenatchee National Forest lands. The next largest land use is residential development (12 percent). Commercial and industrial development make up two percent of the study area.

The Chelan County and City of Cashmere Comprehensive Plans reflect their respective community visions for the development of the study area over the next 20 years. Both plans envision a major conversion of land from agricultural/resource-based uses to rural and urban residential uses. It is expected that agricultural uses will diminish and will no longer be the primary land use in many areas along the US 2/97 corridor, especially between Cashmere and Wenatchee.

In accordance with the Growth Management Act, Chelan County has designated some of the existing orchards as commercial agricultural lands. The county is concerned about protecting and maintaining a vital agricultural economy, while also allowing residential and other non-farm development. The City of Cashmere has not designated any commercial agricultural lands.

The review of the land use information did not reveal any project constraints. However, recognizing the interrelationship between transportation systems and land use, changes to the transportation system resulting from this study could cause a shift from rural residential and agricultural uses to higher density residential and commercial development to occur. Likewise, changes to the land uses in the corridor may impact the alternatives recommended, including the timing of implementation.

Parks and Recreation

Three public parks are located along the proposed project corridor: Riverside Park in Cashmere, Wenatchee River County Park just east of Monitor, and Peshastin Pinnacles State Park along North Dryden Road. Wenatchee River County Park is between the river and US 2/97 east of Main Street/Easy Street and includes camping and picnicking. Riverside Park in Cashmere is located across the river from US 2/97 east of Aplets Way. Peshastin Pinnacles State Park is a 135-acre park used for hiking and rock climbing. It is located approximately 1,000 feet north of US 2/97.

Other important recreational facilities in the area include the Chelan County Fairgrounds and Chelan County Historical Museum. The Chelan County Fairgrounds are located one mile west of Cashmere on Westcott Drive. The fairgrounds are on a 40-acre site with over 1,200 parking spaces and 300 RV hook-ups. The Chelan County Fair is held annually the weekend after Labor Day. These facilities are also used for off-season community events.

The Chelan County Historical Museum is located at 600 Cotlets Way in Cashmere. This facility provides exhibits related to the natural and anthropological history of the Cashmere Valley.

Under Section 4(f) of the Department of Transportation Act of 1966, federally funded projects are prohibited from taking land from a significant publicly owned park, recreation area, wildlife or waterfowl refuge, or from a significant historical site. As indicated by Section 4(f), acquisition of park and recreation lands must be avoided unless no other practical or feasible alternatives are available. Of the identified parks and recreational facilities, only the Wenatchee River County Park is directly adjacent to the highway and was a constraint to the development of alternatives. The Wenatchee River County Park is also used for temporary housing for migrant farm workers.

Archaeological Resources

Five cultural resources studies have been conducted in the US 2/97 Corridor Safety Study area. One archaeological site, the Cashmere Burial site (45CH311), is located within 0.25 miles of US 2/97 in the project corridor. This site contained a single Indian juvenile burial (Welch 1987). The US 2/97 right-of-way plans identify another site, an Indian Cemetery, adjacent to the highway located in the southwest quarter of the northwest quadrant, Section 3, Township 23 North, Range 19 East, Willamette Meridian. This site is not included in the maps provided by the Office of Archaeological and Historical Protection. It is recommended that this site be researched for more detail before the 30 percent design is developed.

Floodplains

As noted above, much of the project corridor is located adjacent to the Wenatchee River. The corridor is also adjacent to Peshastin Creek at the junction of US 2 and US 97. Flooding does occur along the Wenatchee River and Peshastin Creek as a result of combined heavy snow accumulations in the mountains and heavy rains in the valleys and other low-lying areas. The 100-year floodplain is defined as the area that has a one percent probability of inundation in any given year. The following sections of the proposed project corridor are within the 100-year floodplain identified by U.S. Federal Emergency Management Agency (FEMA) floodplain maps:

- Peshastin Creek at the US 97/US 2 Junction;
- Wenatchee River approximately 0.1 miles west of Dryden Avenue;
- Wenatchee River approximately 0.4 miles east of Dryden Avenue;
- Wenatchee River at Aplets Way in Cashmere; and
- Wenatchee River approximately 2 miles east of Main Street/Easy Street.

Floodplains are considered a project constraint due to regulations discouraging fill placement within floodplains. Unavoidable fill placement within floodplains requires mitigation, which usually requires the purchase of additional right-of-way. In addition, floodplains are usually classified as jurisdictional shorelines and wetlands, which have additional constraints as discussed below.

Jurisdictional Shorelines

In accordance with the State Shoreline Management Act, Chelan County and the City of Cashmere have adopted Shoreline Master Programs for managing activities within local shoreline areas. The project corridor has conservancy, rural, and urban shorelines. Each area has common characteristics, defined boundaries, and specific regulations to govern use and activities in the area.

The Chelan County Zoning Ordinance indicates that the county has identified Frequently Flooded Areas as those areas located within the FEMA 100-year floodplain. The ordinance states that development within floodplain areas must comply with county regulations, including the setbacks for riparian buffers in shoreline environments shown in **Table 3.1.**

Table 3.1. Designated Shoreline Classification and Buffers

Environment Classification	Buffer Width	
	High Intensity	Low Intensity
Conservancy	250 feet	200 feet
Rural	150 feet	100 feet
Urban	100 feet	75 feet

Construction activities with potential encroachments within the buffer areas noted above may not be feasible in the more restrictive shoreline environments. Within sensitive shoreline environments, construction of new improvements may be restricted or prohibited by shoreline protection regulations.

Wetlands

The U.S. Department of Interior National Wetlands Inventory maps provided baseline wetlands information, which was supplemented with data from Chelan County and a two-day wetland reconnaissance effort. Existing databases, including Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species and Washington Department of Natural Resources (WDNR) Natural Heritage, were used as primary data sources. Nearly all wetlands shown by the National Wetlands Inventory in the project vicinity are contained within the Wenatchee River floodplain. These riparian wetlands adjoin US 2/97 at several points. Permits including Hydraulic Project Approval (HPS) from WDFW and Clean Water Act Section 404 permits from the U.S. Army Corps of Engineers would be required to alter or discharge stormwater to wetlands. For any road improvement projects that encroach on wetlands that adjoin streams, the WDFW will require mitigation measures as part of the HPA permit.

Vegetation

Several protected plants were considered as potentially occurring in the project vicinity. The WDNR Natural Heritage Database was used as a primary data source and a local botanical expert from the U.S. Forest Service was contacted to discuss the potential presence of federally listed plants within the study area. The federally listed plants or plants proposed for federal listing include Ute ladies'-tresses (*Spiranthes diluvialis*), Wenatchee Mountains checkermallow (*Sidalcea oregana* var. *calva*), and showy stickseed (*Hackelia venusta*). None of these plants were observed during the March 2001 site inspection.

Ute ladies'-tresses is federally listed as “threatened.” Potentially suitable habitat could occur in herbaceous dominated wetlands and riparian areas within the project area, however the presence of this rare plant is not expected. Surveys are recommended for areas where suitable habitat is present to confirm the absence of Ute ladies'-tresses. Surveys should be completed when the species is flowering (August through mid-September). The other two species of plants are highly unlikely to occur within the project area.

Wildlife

The WDFW Priority Habitat and Species database was used as the primary data source for the identification of wildlife in the study area. The primary protected wildlife species found in the project vicinity is the bald eagle (Haliaeetus leucocephalus), which is federally listed as “threatened.” Wintering concentrations and roost sites have been documented in several locations, primarily in the river valley east

of Monitor. For projects with federal funding, impacts to federally listed species should be avoided or minimized to be in compliance with Section 7 of the Endangered Species Act (ESA) of 1973 (as amended). Impacts potentially occurring to bald eagles within the study area could result from disturbance due to construction noise and increased human activity, loss of perching and/or roosting habitat, or impacts to bald eagle prey species (salmonids) because of water quality degradation.

Fish

Several protected species and stocks of fish use the project area reaches of the Wenatchee River and Peshastin Creek. The upper Columbia spring-run Chinook Salmon (Oncorhynchus tshawytscha) and upper Columbia River Steelhead Trout (Oncorhynchus mykiss) are federally listed as "endangered" under ESA; the Bull Trout (Salvelinus confluentus) is listed as "threatened." The Sockeye Salmon (Oncorhynchus nerka) are also protected under the Magnuson-Stevens Fishery Management Act. Upper Columbia River spring Chinook Salmon and Upper Columbia River Steelhead Trout may use waters within the project area for migratory holding, spawning, overwintering, and rearing. Bull Trout and Sockeye Salmon are unlikely to use this area for life stages other than migration.

Nearly all tributary streams crossing US 2/97 were found to be either dry washes or fully channelized irrigation ditches. Therefore, alteration of these is likely to have minimal effect on fish beyond possible wet-season conveyance of sediment to the Wenatchee River. For any road improvement projects that encroach on the river or adjoining wetlands or which discharge collected stormwater into the river, the WDFW will require measures to protect these species as part of the HPA permit. Federally listed fish are also afforded protection under ESA. Impacts to water quality and other habitat parameters as well as impacts to individual fish should be avoided or minimized to be in compliance with ESA.

Key Intersection Area Constraints along US 2/97

The following table summarizes the environmental constraints that are apparent at each of the project intersections.

Table 3.2. Environmental Constraints by Key Intersection

Intersection	Environmental Constraints
Blewett Junction	Peshastin Creek Riparian Area; Conservancy and Rural Shoreline; Floodplain
US 2 at Blewett Cutoff Road	None apparent
US 97 at Blewett Cutoff Road	Peshastin Creek Riparian Area; potential Ute ladies'-tresses habitat; Conservancy Shoreline; Floodplain
Saunders Road/Deadman Hill Road	None apparent
Motel Road	None apparent
Dryden Transfer Station Road	Emergent wetland in southwest quadrant of the intersection
Alice Avenue	Wenatchee River Crossing to east; Urban Shoreline, Floodplain
Dryden Avenue	None apparent
North Dryden Road	Intermittent stream in southwest quadrant of the intersection
Hay Canyon Road/Goodwin Road	Adjoins Wenatchee River channel immediately to south, Rural Shoreline on north side of river, Urban Shoreline on south, Floodplain
Aplets Way	Adjoins Wenatchee River channel immediately to south, Rural Shoreline on north side of river, Urban Shoreline on south, Floodplain

Intersection	Environmental Constraints
Cotlets Way	Archaeological site north of US 2/97 and east of the intersection
Old Monitor Road	None apparent
Red Apple Road/Old Monitor Road	None apparent
Stoffel Road	None apparent
Red Apple Road/Selfs Road	None apparent
Main Street/Easy Street	Adjoins Wenatchee River channel immediately to south, Conservancy Shoreline, Floodplain, Wenatchee River County Park, Eagle wintering roosts approximately one-half mile downstream, potential Ute ladies'-tresses habitat
Lower Sunnyslope Road/Lower Monitor Road	Emergent/open water wetland near northwest quadrant of intersection, potential Ute ladies'-tresses habitat
School Street	None apparent
Easy Street (Wenatchee)	None apparent

Impacts and Mitigation

For any proposed project activities that encroach within or over a stream channel, an HPA permit will be required from WDFW. This permit will specify required mitigation measures, primarily including Best Management Practices. These are likely to include specific measures to control sedimentation and water pollution as well as seasonal windows limiting work near streams to the summer low-flow season and other times when migratory fish are less likely to be present.

Should impacts to streams and wetlands be unavoidable, compensatory mitigation is likely to be required. Because many small tributary streams are ephemeral and channelized in nature, most of the compensatory mitigation opportunities for fish are likely to be located along the mainstem Wenatchee River and Peshastin Creek. Compensatory mitigation would likely involve restoring remnant side channels and floodplain areas.

Planting of native riparian trees would be beneficial for both fish and wildlife throughout much of the project area. A number of wetlands have been filled or drained during past development activities in the project area. There are opportunities for wetland creation and enhancement throughout the Wenatchee River riparian areas, including along US 2/97 west of the Lower Sunnyslope Road intersection.

4. PUBLIC INVOLVEMENT PROCESS

SUMMARY

WSDOT identified community involvement as an essential element of the project and committed to an active public involvement program. To match this commitment, the public involvement plan for the project was designed to provide multiple approaches that would make it easy for the community to be informed about, to participate in, and to shape the final product of the study.

The specific goals identified for the public outreach program were to:

- Inform the public about the project, including the purpose, process, schedule.
- Promote active public participation in the project.
- Receive input from the public about existing problems, perceptions of problems, and potential solutions.
- Ensure that the study process was open, fair, and responsive to public needs and concerns.

PUBLIC INFORMATION PROGRAM COMPONENTS

Project newsletters, media outreach, fliers, a project website, and informational notices were used to make information about the project and opportunities for public involvement available to as many local citizens as possible. These techniques were linked to three sets of public meetings at three key points during the study. Project newsletters were mailed to all residents and businesses in the project area and to a list of stakeholders outside the project area in March and November 2001, in advance of the first two rounds of public meetings. Invitational postcards were sent in February 2002, in advance of the final round of public meetings. The newsletters contained information about the progress of the study as well as information about how residents could get involved with the study.

Media outreach for all three rounds of public meetings included press releases, radio interviews, and paid advertisements. Press releases were distributed throughout the Wenatchee Valley in April and November 2001 and in February 2002. WSDOT Project Manager Kirk Berg was interviewed on KPQ's local radio talk show in April and November 2001 and February 2002 to discuss the project and the upcoming meetings. Finally, paid advertisements were placed in the local weekly and daily newspapers that serve the corridor in advance of the final round of meetings.

Fliers were also mailed in advance of all three rounds of open houses/public meetings to a list of 14 popular community locations in the project area with a request that they be posted. These fliers invited the public to attend the meetings and/or to visit the project website for more information and the opportunity to provide comments electronically. Informational notices were provided in advance of most of the meetings to local institutions (i.e., Wenatchee Chamber of Commerce, Cashmere Valley School District) that publish newsletters with a request that they include the notices in their newsletters and publications.

A project website was created and updated with new material throughout the study, but especially in connection with the three rounds of public meetings. Material posted at the website included project newsletters, press releases, invitations to public meetings, summaries of public comments, graphics of alternatives, and technical reports. Comment sheets were posted in April 2001, requesting public comment on the existing problems. In November 2001, written descriptions and visual depictions of the

alternatives under consideration were posted, along with a comment sheet for the public to share their opinions. In February, the website was revised to present the draft recommendations (written descriptions and visual depictions) with a comment sheet for the public to use to record their opinions.

In addition, WSDOT provided a briefing about the study to the Cashmere City Council in April 2001. WSDOT also attended meetings in Dryden and in Hay Canyon (January 2002) to discuss local needs, interests, and preferences for US 2/97 improvements in the project area.

PUBLIC INVOLVEMENT PROGRAM COMPONENTS

Interviews with more than 30 stakeholders were conducted at the beginning of the study. The purpose of the interviews was to ask for suggestions regarding a public information/public involvement program, to identify appropriate candidates for a Sounding Board, and to get an early read on problems experienced by people using US 2/97. The public information/public involvement program was designed based upon these comments.

The interviews highlighted an option for improving safety, which a number of the stakeholders thought would greatly increase safety, particularly in the winter months. This option was to install an advance warning beacon that would flash only as drivers approached a traffic signal when the light was about to change and a stop would be required. When the study began, continuously flashing lights were in place at signalized intersections along the highway - which many stakeholders thought were confusing to the traveling public. In response to these suggestions, WSDOT designed and installed an advance warning beacon at the Main Street/Easy Street intersection in the summer of 2001 on a one-year trial basis.

Citizen Sounding Board

A group of key community leaders were asked to form a Sounding Board, which first convened on March 22, 2001. Participants were selected based upon recommendations received from the stakeholder interviews to represent the communities, businesses, governmental and other interests along the corridor. They included the following members:

Cashmere
- Dean Falteisek
- Jim Geary

Dryden
- Cheryl Christensen
- Alvina Goehner

Monitor
- Jerry Larson
- Joe Rumble

Sunnyslope
- Mary Ann Corning
- Chuck Graves

Emergency/Safety
- Bob Wildfang, Fire District Commissioner
- Lt. Mike Warren, WA St. Highway Patrol

Local Transportation
- Greg Pezoldt, Chelan County Engineer

Fruit Industry
- Dan Kenoyer, Blue Star Growers
- Jeff Kraus, Blue Bird

LINK Transit
- Terry Talbot

The key tasks and purposes of the Sounding Board were outlined in their charter. The Sounding Board agreed to offer advice on public outreach, including informational materials (newsletters, press releases, etc.) and their distribution over the course of the project. They also agreed to offer advice on public involvement activities and materials presented to the public. Finally, the Sounding Board reviewed and

commented on the results of the screening of alternatives by the consultant team in advance of each set of public meetings.

The project team met with the Sounding Board five times during the course of the study. The meeting dates and discussion topics were as follows:

- March 2001 to prepare for the first round of public meetings in April;
- August 2001 to review public comment from the April meetings, to review and comment on the criteria to be used to screen the alternatives, and to review and discuss an initial set of alternatives;
- September 2001 to review a narrowed set of alternatives and to plan the fall round of meetings;
- January 2002 to review and comment on the draft set of recommended alternatives; and
- February 2002 to review the final set of recommended alternatives and to plan the final round of public meetings.

Members of the Sounding Board were invited to attend a two-day Level 2 Screening meeting in December 2001. At this meeting, the alternatives presented at the November open houses were refined. They were also invited to the Level 3 Screening meeting on February 2002 to select a set of recommended alternatives. Several members of the Sounding Board attended these sessions.

Open Houses/Public Meetings

Open houses/public meetings were scheduled at three key points in the study process to provide information and to receive public comment. Meeting dates and locations were as follows:

- April 2001: Monitor, Sunnyslope, Wenatchee, Dryden, and Cashmere
- November 2001: Cashmere, Sunnyslope, and Dryden
- February 2002: Cashmere and Sunnyslope

The majority of the public meetings were conducted as open houses. The project team talked individually with meeting participants to hear concerns, clarify design alternatives, and receive feedback on the project. Graphic displays provided information gathered through the study and depicted alternatives that were under consideration. Comment sheets were available to attendees to be completed and returned at the meetings or by mail. Both of the February open houses also included a brief presentation of the recommended alternatives followed by opportunities for questions and comments from the audience.

At the request of the Dryden community, the public meetings in Dryden began with presentations by the project team and opportunities for questions and comments from the audience. After the question and response sessions concluded, the meetings were then conducted in the same manner as the open houses.

The feedback received from the open houses and public meetings was used to identify issues within the corridor, refine alternatives, and identify the preferred recommendations. The public involvement process was integral to the development of the alternatives. More information about the information received from the public is included in the next section.

5. ALTERNATIVES DEVELOPMENT AND EVALUATION

SUMMARY OF THREE-LEVEL PROCESS

A three-level screening process was created to identify and evaluate potential alternatives to meet current and future needs and remedy deficiencies within the US 2/97 corridor. In general, both the alternatives and evaluation methodology started out rather broad and general and moved with the advancement of the alternatives to a more specific and detailed design and analysis. Throughout the screening process, the alternatives and screening measures were reviewed by both the Sounding Board and the general public to make sure that the alternatives developed were consistent with the purpose of the study and the interests of the surrounding communities.

Potential treatments and projects were identified along the corridor with input from the public (through the first series of open houses) and based on the technical analysis of traffic and safety needs for the corridor. The first level of screening was a qualitative assessment of the feasibility of potential treatments for the corridor. The second level screening consisted of a review of more detailed operational analysis and alternatives development (preliminary design) for each potential project. Refinement of the projects that passed second level screening made up the third level of evaluation and development of project recommendations.

A combination of public input and ideas with technical analysis of traffic and safety deficiencies along the US 2/97 corridor and a review of the project mission, goals, and criteria for plan success were used to identify potential treatments and improvements for the roadway corridor. Where accident history indicated high risk for side street traffic movements, treatments were identified to reduce the number and type of conflicts at an intersection. The treatments ranged from prohibition of high-risk movements to grade separation.

When developing potential alternatives, the study team:

- Reviewed the existing safety problems found throughout the corridor;
- Considered the traffic needs for both side street and mainline operations;
- Reviewed available planning documents for data on population and employment growth in the corridor;
- Considered land-use, economic, and social impacts of the proposed alternatives; and
- Reviewed comments received from the public, with a goal of incorporating their suggestions where possible.

In addition, design recommendations considered how to balance the competing interests of maintaining acceptable LOS on the mainline and side street approaches as well as increasing safety throughout the corridor.

The alternatives developed tended to be intersection specific, with an attempt to address known intersection problems and deficiencies. Improvements also included corridor-wide and area-wide treatments where applicable. Analysis of all the alternatives was considered in both a corridor-level context and an area-level context. Five areas were identified along the US 2/97 corridor, from west to east as follows: Blewett, Dryden, Cashmere, Monitor, and Sunnyslope. The following sections detail the alternative development and screening process undertaken for this study.

Level 1 Screening

A range of alternatives was generated for each area, and the corridor as a whole, based upon the identified needs and deficiencies. Improvement alternatives ranged from short-term to long-term, from relatively inexpensive to very expensive construction costs, and from those with no environmental impacts to those with significant impacts. The initial alternative generation focused on those solutions with the potential to address the needs identified; limits were not placed on the brainstormed projects. Almost 100 distinct possible improvements were ultimately identified, with anywhere from 13 to 22 in each study area (A - E). Projects in the corridor ranged from adding advance warning signs and channelization changes at the intersections to constructing interchanges, realigning US 2/97, and closing minor street access points to US 2/97. It was decided early in the study that US 2/97 would not be relocated, but that the study would consider options that maintained the existing alignment of US 2/97.

The focus of the screening for Level 1 Analysis was to identify feasible improvements. A qualitative evaluation was performed to understand the potential impacts of the changes to local roads, mainline operations, and fatal flaws. The next step was to factor in the public comments received at the first round of open houses. The Sounding Board reviewed the possible projects to determine if any of them did not align with the purpose, needs, and vision of the project. For example, if it was determined that an alternative did not fundamentally provide safer operation at a particular location, it was considered fatally flawed because it did not meet the primary goal for the study and was removed from further consideration.

The selection criteria, developed and used for the first level screening of alternatives, was based on the purpose and needs of the project. These criteria were developed to assess the overall qualitative benefits of each of the proposed alternatives. Thus, the process essentially determined how an alternative would serve the traffic on US 2/97 and its cross streets and identified the potential safety benefit for each of the alternatives. The categories used to evaluate the feasibility of the alternatives are summarized in Table 5.1. Each of the categories contained specific criteria that were used to assess the feasibility of each alternative.

Table 5.1. Level 1 Evaluation Categories and Criteria

Evaluation Category	Evaluation Criteria
Safety	Potential for Accident Reduction Access Control
Traffic	Improves Level of Service (operation) Improves Community Mobility Improves Regional Mobility
Community/Public Opinion	Community Support
Environmental	Impacts to Natural/Sensitive Areas Impacts to Parks/Cultural Resources
Land Use/ Social/Economic	Impacts to Existing Properties and/or Displacements Economic Development
Constructability	Construction Constraints Maintenance
Design/Cost	Design Standards Ability to Obtain Funding

One of the conclusions reached through this analysis was the distinction between short- and long-term alternatives. Initially, the alternatives seemed to fit into three categories: short-, intermediate-, and long-term. The short-term low-cost projects were selected to provide safety improvements within one to two

WSDOT biennial budgeting cycles and address more immediate safety needs. Long-term projects focused on providing a more permanent solution to address safety and traffic levels of service for the next 20 years and are more costly. The intermediate-term projects included some construction, but were not as large in terms of construction length, magnitude of impact, or construction costs as were the long-term improvements. A list of short-term alternatives was advanced for further evaluation along with the long-term alternatives in each area. The intermediate-term alternatives that were judged feasible by the project team were combined into either the short- or long-term alternative categories.

The end result of the Level 1 Screening process was the advancement of 34 potential projects to the second level of screening. The projects forwarded to the next level of analysis were a mix of short- and long-term improvements that were considered to have the best potential for meeting the needs of the corridor and were consistent with the intent of the study. The following table (Table 5.2) lists all of the projects that passed Level 1 Screening, by area.

Table 5.2. Level 1 Screening Results

Area	Level 1 Alternative Number	Combined & Renumbered Alternative to be Carried Forward to Level 2	Description
Blewett	A-2	A-1	Channelization Improvements at US 97/US 2 Intersection
	A-3	A-1	Increase Length or Provide Left-Turn Deceleration Lengths
	A-4	A-1	Improve Signing and Striping
	A-7	A-1	Provide Right-Turn Deceleration at Saunders Road/Deadman Hill Road Intersection
	A-5	A-2	Channelized T-Intersection: Close Jeske Road to Left-Turning Traffic, Channelize US 2/97
	A-12a	A-3	Westbound US 2 to US 97 Flyover Ramp
	A-13b	A-4	Standard Diamond Interchange (Shifted) at US 2/US 97
	A-14	A-5	Modified Trumpet Interchange at US 2/US 97
	A-19	A-4, A-5	Grade Separated Crossing at Saunders Road/Deadman Hill Road
Dryden	B-2	B-1	Improve Signing and Striping, Add Access Control for Side Streets
	B-3	B-1	Increase Length or Provide Left-Turn Deceleration Pocket
	B-8	B-1	Signalize Dryden Avenue
	B-9a	B-1	Left-Turn Restriction from Alice Avenue
	B-12	B-2	Grade Separation at Alice Avenue
	B-14	B-2	US 2/97 Interchange at Dryden Avenue
	B-15	B-3	US 2/97 Overcrossing East of Dryden Avenue
Cashmere	C-1	C-1	Enhance Signing, Striping, and Illumination
	C-5	C-1	Close Old Monitor Road Intersection
	C-8	C-1	Channelized T-Intersection at Hay Canyon Road with right-turns only to/from Goodwin Road
	C-10	C-2	Signalize Hay Canyon Road/Goodwin Road
	C-14	C-3,C-4	Cashmere East Interchange-Red Apple Road Selfs Road Overcrossing
	C-19	C-5	Cashmere West Interchange-Westcott Road Extension and River Bridge
	C-20	C-6	Cashmere West Interchange-Overcrossing without River Bridge

Area	Level 1 Alternative Number	Combined & Renumbered Alternative to be Carried Forward to Level 2	Description
Monitor	D-1	D-1	Signing, Striping, and Illumination
	D-2	D-1	Signal Visibility
	D-11	D-2	Interchange at Main Street/Easy Street with US 2/97 Overcrossing
	D-13	D-3	Interchange East of Main Street/Easy Street
Sunnyslope	E-1	E-1	Signing, Striping, and Illumination
	E-2	E-1	Restrict Exiting Left Turns at School Street
	E-6	E-1	Modified-Restrict Exiting Left Turn Only
	E-3	E-2	Restrict School Street to Right-In, Right-Out
	E-8	E-3	Close Lower Sunnyslope Road/Lower Monitor Road
	E-9	E-3	Close School Street
	E-14b	E-3	Sunnyslope Interchange with New Overcrossing

Reference: Summary of the Level 1 Screening Meeting, December 26, 2001.

Level 2 Screening

Initial steps for the Level 2 Screening process centered upon refining the alternatives and the evaluation procedure. The alternatives were further detailed in terms of potential lane configurations and turn-lane lengths, assessed for elevation or grade changes, and examined for other design related features. Traffic reassignments resulting from street alignment changes, closures, or combinations of improvements were identified and applied for each alternative as needed and the operational impacts of each alternative were analyzed. Finally, conceptual construction costs were also estimated for each proposed alternative.

Building upon the Level 1 Screening process, the Level 2 Screening procedure used the same base criteria, except that constructability and cost were combined into one criterion. The resulting six criteria were further stratified for evaluation as shown below.

Table 5.3. Level 2 Evaluation Categories

Evaluation Criterion	Evaluation Measure
Safety	Potential for Accident Reduction Access Control
Traffic	Level of Service Community Mobility Regional Mobility
Public Opinion	Written Comments Open House Discussion Sounding Board Feedback
Environmental	Potential Impacts to Natural/Sensitive Areas Potential Impacts to Parks/Cultural Resources
Land Use/ Social/Economic	Impacts to Existing Properties and/or Displacements Economic Development
Constructability	Construction Constraints Maintenance Construction Cost

Each of the alternatives was reviewed with respect to each of the evaluation measures and given a rating of one to five, with one being the least benefit received and five being the most. The rankings for each measure within each criterion were averaged to receive a ranking for each criterion. A weighted average ranking was computed for each alternative, with the safety evaluation criterion receiving the highest weight (25 percent) and the remaining five criteria receiving 15 percent each.

A key public comment received during the open houses during the Level 2 Screening process was that maintaining access to and from roads intersecting US 2/97 was critical. Both area residents and business owners felt it essential that alternate routes be established prior to the closure of any intersection or prohibition of any intersection turning movement. Thus, this requisite eliminated or modified several short-term alternatives; it was not acceptable for existing access to be removed without some other access improvement. A clear example of the importance of public comment was how the proposed turn restrictions at the Hay Canyon Road/Goodwin Road intersection was modified. Northbound traffic was proposed to be restricted from crossing US 2/97 or from turning left in order to reduce right angle collisions. The Hay Canyon community voiced strong opposition to this proposed design in written comments and a special community meeting with WSDOT staff. This alternative was removed from further consideration, and the signalization alternative became the preferred solution.

As the above example illustrates, some short-term alternatives with potential for accident reduction were eliminated from further consideration due to community opposition to unacceptable mobility impacts and the limited roadway alternatives parallel to US 2/97. As a result, short-term alternatives carried forward from Level 2 did not include access closures or turn prohibitions.

The direction for the refinement of short-term improvements was to identify improvement for each intersection, albeit with minor effect on safety, and to provide some benefit throughout the corridor. Direction was also received to clarify corridor-wide improvements in the short-term and better define proposed elements.

One of the results of the evaluation process was the further refinement of short-term alternatives and development of long-term improvements. Short-term options included lengthening left- and right-turn tapers and pockets in accordance with the WSDOT *Design Manual*. Short-term options also included illumination and signing improvements throughout the corridor. The long-term alternatives continued to focus on providing more permanent solutions to address safety needs and traffic levels of service over the next 20 years. Short- and long-term projects by area that passed Level 2 evaluation and screening are shown in Table 5.4.

Table 5.4. Level 2 Screening Results

Area	Description	
Blewett	A-1	Channelization, Signing, and Illumination Improvements at US 2/97 and Saunders Road/Deadman Hill Road
	A-4	Standard Diamond Interchange (Shifted) at US 2/US 97
	A-5	Modified Trumpet Interchange at US 2/US 97
Dryden	B-1	Channelization, Signing, and Illumination Improvements at Dryden Road and Alice Road, and Signalize Dryden Road
Cashmere	C-1	Channelization, Signing, and Illumination Improvements at Each Intersection
	C-1	Cotlets Way Channelization Improvements
	C-1	Channelized T-Intersection at Hay Canyon Road with Right-Turns Only to/from Goodwin Road Bridge (subsequently removed based on community input)
	C-2	Signalize Hay Canyon Road/Goodwin Road

	C-3	Cashmere East Interchange-Red Apple Road Overcrossing
	C-4a	Cashmere West Interchange-New Selfs Road Overcrossing west of Goodwin Road and US 2/97 Shifted North
Monitor	D-1	Short-term Channelization/Signal Options
Sunnyslope	E-1	Short-term Channelization Options
	E-2	Sunnyslope Interchange with New Overcrossing, Includes Closure of School Street and Lower Sunnyslope Road Lower Monitor Road Intersections

Reference: Summary of the Level 2 Screening Meeting, March 28, 2002.

Level 3 Screening

The purpose of the Level 3 Screening was to refine alternatives that passed the Level 2 Screening process. Detailed traffic evaluation of alternatives was completed as part of Level 2 Screening and minor adjustments and additional evaluation was performed for Level 3 Screening review. The focus of the Level 3 Screening evaluation of corridor-wide projects and area-specific projects was to select recommended long-term alternatives and compare the expected safety benefit with the estimated alternative cost for each project using a benefit-to-cost ratio. The resulting benefit-to-cost ratio for each project was used to guide the development of an implementation plan for corridor improvements and to help prioritize the projects. This final level of analysis included additional quantitative analyses of possible profiles for proposed interchange ramps, frontage road connections, alignments, additional LOS calculations assessing traffic impacts, preliminary construction cost estimates, benefit-to-cost ratios, and qualitative environmental reviews at the improvement locations.

Detailed short-term improvements for all intersections were developed and presented for review by the screening team, which consisted of WSDOT, Chelan County, Link Transit, the consultant staff, and Sounding Board members. Short-term improvements consist of left-turn pocket adjustments, right-turn lane or pocket additions, addition of roadway illumination and other minor channelization revisions. Long-term improvements included signalization at two locations (Dryden Avenue and Hay Canyon Road/Goodwin Road intersections) plus grade separation and bridge options in the Blewett, Cashmere, and Sunnyslope areas.

Evaluation criteria for the third level of screening included the same Safety, Environmental, and Cost categories of evaluation as used for Level 2. The focus for each criteria included the potential for accident reduction and annual safety benefit (for the Safety Category), the potential impacts to natural and sensitive areas plus visual impacts (for the Environmental Category), and the probable construction cost, right-of-way required and benefit-to-cost ratio (for the Cost Category). These criteria were used directly to evaluate the long-term alternatives. An additional evaluation tool for the short-term projects was a list of current and future deficiencies at each intersection to help clarify need and priority for improvement.

Conclusions of the Level 3 Screening Process

Blewett

A diamond interchange alternative is preferred for the Blewett Junction vicinity. With comparable safety benefits expected for either the diamond or the trumpet interchange configuration, the diamond would be most cost effective and would have less impact on the area. A broader area of impact was identified through the evaluation and the alternative will be carried forward with some additional roadway connections north of US 2/97.

Impacts associated with this alternative would likely include potential water quality impacts to Peshastin Creek and the Wenatchee River resulting from an increase in new impervious surface. If not treated and detained, runoff from new impervious surfaces could introduce contaminants and alter flow in these systems. Ground disturbance within 300 feet of Peshastin Creek could result in sediment deposition in the stream. This impact could be minimized through the implementation of appropriate Best Management Practices. Impacts to riparian vegetation may also result from construction equipment operation within 300 feet of Peshastin Creek. Ordinary construction activities could increase ambient noise levels and human activity. Impacts from this disturbance to wintering bald eagles could extend up to a half mile from the project area. However, existing noise levels are currently high from noise and activity associated with the state highway and no regular large concentrations of wintering bald eagles have been documented within a mile of the Blewett Junction vicinity.

Dryden

A signal at Dryden Avenue is the recommended long-term solution for access and mobility in the Dryden area and will serve the area sufficiently through the 20-year horizon. No environmental impacts are expected from this project.

Cashmere

West Cashmere

A three-phase sequence of projects was identified for the West Cashmere area, with improvements spanning more than 20 years. The first phase would be the installation of a traffic signal at Hay Canyon Road/Goodwin Road. The timing of the signal installation is dependent upon traffic volumes meeting MUTCD traffic signal warrant values. The recent installation of a traffic signal at Aplets Way is expected to have some influence on traffic volumes using the Hay Canyon Road/Goodwin Road intersection and thus traffic reassignments may have occurred since the project traffic counts in early 2000. Thus, WSDOT should continue to monitor the traffic volumes at the Hay Canyon Road/Goodwin Road intersection before constructing a traffic signal.

The second phase for the West Cashmere area would be the replacement of the West Cashmere Bridge (Goodwin Road) by Chelan County, to be located approximately 1,000 feet west of the current location. Access to and from US 2/97 would use the proposed traffic signal at Hay Canyon Road.

The third phase (after 2021) would reasonably include construction of a diamond interchange connecting the new county bridge to US 2/97 with ramps. It is critical that the county's replacement bridge span the railroad tracks, Wenatchee River, and US 2/97. It was concluded that a signalized intersection at Hay Canyon would serve the community safely for the next 20 years and no other traffic improvement would be required. The county bridge replacement would not be related to either safety or traffic needs, but more to address the bridge constraints and design standard limitations. A modified, tight diamond interchange configuration was proposed as the third phase element of West Cashmere improvements to minimize the community impacts of the grade separation.

New bridge and/or interchange construction could impact riparian habitat, including potential perch trees for wintering bald eagles. Such impacts should be minimized as much as possible. If impacts to riparian vegetation is necessary, the habitat should be evaluated to determine if surveys for Ute ladies'-tresses should be performed. If pile driving should be necessary, noise generated could disturb wintering eagles up to one mile away if performed during the wintering season (October 31-March 31). The demolition of the existing bridge could degrade water quality if foreign materials are allowed to enter the Wenatchee River. Any in-water work either associated with the dismantling of the existing bridge or the construction of the new bridge could potentially disturb federally listed salmonids in the project area. Depending on

the nature of the in-water work, salmonid spawning and rearing habitat could be affected. If piers are placed in the channel, they could alter the hydrodynamics of the river and could potentially impact spawning or rearing habitats. Water quality impacts are likely to occur to the Wenatchee River due to new impervious surface and ground disturbance. If not treated and detained, runoff from new impervious surfaces could introduce contaminants and alter flow in the Wenatchee River. Should construction activities increase ambient noise levels, wintering bald eagles may be affected up to a half mile from the project area.

East Cashmere

A two-phased approach for the East Cashmere area grade separation was rejected in the Level 3 Screening. The proposed interchange, including the extension of Titchenal Way to Old Monitor Road should go forward as a complete package, not as a phased implementation with the extension of Titchenal Way as Phase 1. New impervious surface associated with the construction of a new interchange could result in water quality impacts to the Wenatchee River. Ground disturbing activities and vegetation clearing within 300 feet of the Wenatchee River have the potential to result in sediment deposition in the river. Should construction activities increase ambient noise levels, wintering bald eagles may be affected up to a half mile from the project area.

Monitor

No long-term changes are recommended for the Main Street/Easy Street intersection area in Monitor. The current traffic signal system is expected to serve the community for access and safety through the 20-year horizon. Short-term turn-lane modifications are proposed with the timing of the changes to be determined after a review of the accident history. The recent implementation of actuated advanced warning signs for the signal will be evaluated for safety effectiveness by WSDOT staff. Results of this evaluation are important for the corridor and may result in more installations of advance warning systems at other signals along US2/97.

Sunnyslope

Third level screening for the Sunnyslope interchange alternative consisted of confirmation of the layout for the diamond interchange and assessment of benefits, estimated cost and benefit-to-cost ratio for the project.

New impervious surface associated with the construction of a new interchange could result in water quality impacts to the Wenatchee River. Ground disturbing activities and vegetation clearing within 300 feet of the Wenatchee River has the potential to result in sediment deposition in the river. Should construction activities increase ambient noise levels, wintering bald eagles may be affected up to a half mile from the project area.

Short-Term Alternatives

The short-term alternatives proposed within the corridor are geared toward correcting deficiencies in signing, illumination, and striping. Additionally, rumble strips and advance warning beacons are recommended to improve safety. These improvements could occur within one to two WSDOT biennial budgeting cycles and some could be completed using the existing WSDOT staff and budget.

The short-term alternatives may create new impervious surface where right turn lanes are being added, therefore water quality impacts may also apply to these alternatives. The new impervious surface creation would be on a smaller scale for the short-term alternatives, than for the long-term alternatives. Ground disturbing activities and vegetation clearing within 300 feet of the Wenatchee River may impact sediment

deposition in the river. Disturbance impacts associated with increased ambient noise during construction may affect wintering bald eagles within a half mile of the project.

Recommendations to Address Single-Vehicle Accidents

The primary focus of the study was on traffic operations and safety conditions along the corridor at the seventeen intersections along the project length. As a result, the three-tier screening process had heavy emphasis on intersection improvements. Following the primary evaluations, accident data was reviewed again for the roadway segments between intersections to address the high incidence of single vehicle accidents that occur between intersections. These conditions could be improved and accidents reduced with installation of a ground edge-stripe rumble strip treatment along the full length of the corridor. It is expected that this treatment could result in a 25 percent reduction in each type and severity of accidents. This treatment could have a high annual benefit with a low cost for implementation and was included in recommendations for the corridor-wide projects.

6. RECOMMENDATIONS

PRIORITIZATION PHILOSOPHIES AND METHODOLOGY

The wide range of alternatives proposed along the length of the US 2/97 corridor and their associated benefits and costs made it necessary to establish a method of prioritizing the implementation of the proposed improvements. Various measures such as benefit-to-cost analysis, total cost, and safety benefit were obvious quantitative means of prioritization considered by the study team. Less obvious criteria, such as WSDOT's budget constraints and public comments, were also examined.

Benefit-to-cost analysis permitted the examination of costlier improvements along with less expensive improvements by considering the benefits gained per incremental cost of the proposed improvement. This allowed a relative comparison between alternatives with considerable safety benefit and construction cost differences. Analysis was performed using WSDOT's Benefit-to-Cost Worksheet for Safety Improvement Projects for Collision Reduction. (Benefit-to-cost worksheets along with design proposals, graphics, and conceptual cost estimates are grouped according to the proposed improvement following the recommendations discussion.) Collision type and cost per collision, based on AASHTO 1989 data, were part of the spreadsheet calculations. Order of magnitude cost estimates were developed that included construction, right-of-way acquisition and project development costs. These project costs were compared with anticipated safety benefits, as a result of expected traffic accident reduction at each improvement location, to develop the benefit-to-cost ratio. This method provided a means of determining which alternative provided the "biggest bang for the buck."

Utilization of total cost as a method of prioritization has the distinct advantage of identifying improvements that could be implemented almost immediately. Some improvements may even be accomplished with WSDOT's current operations and maintenance budget and workforce. The disadvantage was that areas of highest need may not be the lowest cost improvement.

Evaluation of the total safety benefit of each alternative was also examined to determine which proposals would provide the greatest improvement in accident cost reduction, regardless of cost. This method focused on the safety needs in the corridor but was inherently biased toward alternatives with higher cost and for which implementation might be hindered by lack of funding. Safety benefits were derived from WSDOT's benefit-to-cost worksheet and based on six years of historical traffic accident data.

WSDOT's current budget for safety improvement projects does not contain provisions for the corridor improvements recommended by this study. Funding opportunities are expected to be highly competitive and difficult to predict. As such, examination of each alternative's budgetary needs was deemed a prudent means of providing a reality check of the implementation process. To accomplish this, a standardized approach was used in developing the order of magnitude cost estimates to assure meaningful comparison of alternatives. Categories, instead of specific items of work, were used to capture the nature and magnitude of cost at this stage of alternative development.

Public input played an important role in defining and shaping the alternatives developed for this project. This study recognized that implementation priority could be based on public comment, leaving selection of alternatives to a "popular vote". This method would generate the largest public support for the selected alternative from respondents. However, this method might not necessarily address the greatest safety need nor consider the greatest safety benefit to the public.

Benefit-to-cost ratio was the primary method used to establish the prioritized list of projects in this report although all of the above methods were utilized in varying degrees. Corridor-wide improvements emerged as the highest ranked projects and were, therefore, considered as a separate category. This category included consistent corridor signing, continuous shoulder rumble strips (CSRS), and advance signal change beacons for the existing signalized intersections.

Following the corridor-wide improvements are various short-term channelization improvements at each intersection in the project corridor. The number of turning-movement design deficiencies per intersection was initially considered as a means of prioritizing improvements based on greatest safety need. However, the deficiencies identified were not all of the same magnitude nor did they provide the same safety benefit. As a result, both short- and long-term intersection improvements were ranked using benefit-to-cost analysis. The intent of this process was to identify less costly projects that WSDOT may be able to implement before undertaking those that require legislative attention for funding. The table below shows the prioritized improvements, along with their safety benefit, construction cost, and benefit-to-cost ratio.

Table 6.1. Accident Benefit-to-Cost Analysis Summary

Improvement	Estimated Total Annual Safety Benefit	Estimated Construction Cost	Benefit-to-Cost Ratio
Corridor-Wide Improvements			
4. Continuous Shoulder Rumble Strip	$1,333,208	$42,000	300.48
5. Corridor Signing	$171,058	$33,000	49.07
6. Advance Signal Change Beacons	*	$145,000	
Short-Term Improvements			
15. Hay Canyon Road/Goodwin Road	$159,967	$53,000	54.49
16. Red Apple Road/Old Monitor Road	$69,100	$58,000	21.51
17. Dryden Avenue	$229,400	$196,000	15.91
18. Red Apple Road/Selfs Road	$73,533	$79,000	16.80
19. Blewett Junction	$177,767	$771,000	4.16
20. School Street	$29,167	$220,000	2.39
21. Cotlets Way	$25,680	$170,000	2.73
22. Saunders Road/Deadman Hill Road	$24,733	$197,000	2.27
23. Old Monitor Road	$6,570	$31,000	3.83
24. Alice Avenue	$4,533	$17,000	4.81
25. North Dryden Road	$4,433	$58,000	1.38
26. Lower Sunnyslope Road /Lower Monitor Road	$9,267	$306,000	0.55
27. Aplets Way	**	$124,000	
28. Main Street/Easy Street	**	$103,000	
Long-Term Improvements			
7. Dryden Avenue Signalization	$287,450	$326,000	11.98
8. Hay Canyon Road/Goodwin Road Signalization	$200,483	$259,000	10.52
9. Blewett Diamond Interchange	$493,983	$16,800,000	0.92
10. East Cashmere Diamond Interchange	$306,810	$21,100,000	0.45

Improvement	Estimated Total Annual Safety Benefit	Estimated Construction Cost	Benefit-to-Cost Ratio
11. Sunnyslope Diamond Interchange	$306,350	$12,200,000	0.78
12. Goodwin Road Bridge Replacement	$200,483	$14,300,000	0.44

* Safety benefit data was unavailable for advance signal change beacons.

** The traffic signals at Aplets Way and Main Street/Easy Street were constructed in 2001 and 1999, respectively. Insufficient accident data are available for these two intersections to reveal the trends in accident patterns. Advance signal change beacons were also installed at the Main Street/Easy Street intersection in 2001.

RECOMMENDED ALTERNATIVE DESCRIPTIONS

A description of each recommended alternative and its associated benefits and costs is provided in the following sections. The corridor-wide recommendations are discussed first, then the short-term recommendations, and finally the long-term recommendations. Within each of these categories, the alternatives have been arranged according to the rank order of priority.

Corridor-Wide Recommendations

Corridor-wide improvements are recommended to provide safety benefits that are consistent throughout the project area. Standardized design and consistent driver information contribute to greater safety by meeting driver expectations.

1. **Corridor-Wide Continuous Shoulder Rumble Strips.** CSRS along the outside shoulders of US 2/97 were proposed to address run-off-the-road accidents that occur along the corridor. Milled-in CSRS is recommended and is a standard design per WSDOT's *Design Manual*. CSRS is expected to provide $1.3 million in annual safety benefits at an implementation cost of $42,000, resulting in a very high (300.48) benefit-to-cost ratio.

2. **Corridor Signing.** Among the first items identified by the project team for corridor consistency was improvement in advance signing of intersections. Not all intersections are signed to indicate the cross street(s) and very few had any advance warning signs. This improvement would install a W2-1 warning sign and a W16-8 supplemental warning sign with the cross street name(s) in advance of the intersection on each approach. There would also be directional signs at the intersection indicating the cross street name(s). While this improvement may be of limited benefit to the local resident, these signs are very useful to visitors and infrequent travelers. The estimated annual safety benefit is over $170,000. The estimated cost to install intersection signs along the corridor is $33,000, resulting in a benefit-to-cost ratio of 49.07.

3. **Advance Signal Change Beacon.** The advance signal change beacons installed at the Main Street/Easy Street intersection have been very well received by the public. Although still in the trial and data collection phase, an informal evaluation by the project team indicated the advance beacons provide benefit. Should WSDOT conclude from the field trial that the beacons are of benefit, this study recommends providing advance signal change beacons at all existing and future signalized intersections. The changeover to these advance beacons also serves to eliminate the inconsistent use of warning signs and beacons throughout the corridor. Insufficient accident data since implementation of the advance beacon prevent estimation of an annual safety benefit. Installation of both advance beacons at Aplets Way and Cotlets Way is estimated to cost a total of $145,000.

Short-Term Recommendations

Recommended intersection improvements include restriping left-turn pockets, adding pavement for right-turn lanes or pockets, and adding illumination. Existing turn pockets and luminaire locations were field measured to provide a basis for evaluating design requirements and making recommendations. Requirements for turning tapers, pockets, and deceleration lanes were evaluated using existing and future traffic volumes and were based on WSDOT's *Design Manual* requirements. Recommendations were based on future forecast volume needs. It should be noted that while the recommendations below are discussed as an intersection improvement, there may be some benefit in performing the striping improvements immediately with WSDOT's maintenance workforce. However, where extension of the left-turn pocket or striping gap necessitates additional illumination, concurrent striping and luminaire installation is strongly recommended. See Appendix A for each intersection's turn pocket/gap requirement calculations and recommendations.

1. **Hay Canyon Road/Goodwin Road Intersection Improvements.** The Hay Canyon Road/Goodwin Road intersection improvements consist of increasing the eastbound left-turn lane striping gap by 35 feet; increasing the length of the westbound left-turn pocket by 65 feet and increasing the striping gap by 30 feet; increasing the length of the westbound right-turn pocket by 15 feet and adding 165 feet of taper; and adding one luminaire to increase light coverage for the extended westbound left-turn pocket. The estimated annual safety benefit of these proposed improvements is $160,000 with an order of magnitude construction cost estimate of $53,000 resulting in a benefit-to-cost ratio of 54.49.

2. **Red Apple Road/Old Monitor Road Intersection Improvements.** The Red Apple Road/Old Monitor Road intersection improvements consist of increasing the length of the eastbound left-turn striping gap by 60 feet; increasing the westbound left-turn lane striping gap by 100 feet; and adding 60 feet of westbound right-turn pocket and 165 feet of taper. The estimated annual safety benefit of these proposed improvements is $69,100 with an order of magnitude construction cost estimate of $58,000, resulting in a benefit-to-cost ratio of 21.51.

3. **Dryden Avenue Intersection Improvements.** The Dryden Avenue intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 60 feet; increasing the length of the westbound left-turn lane striping gap by 95 feet; adding 60 feet of right-turn pocket and 165 feet of taper for both eastbound and westbound directions; and adding approximately four luminaires to increase light coverage for the extended left-turn lane channelization. The estimated annual safety benefit of these proposed improvements is $229,400 with an order of magnitude construction cost estimate of $196,000, resulting in a benefit-to-cost ratio of 15.91.

4. **Red Apple Road/Selfs Road Intersection Improvements.** The Red Apple Road/Selfs Road intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 55 feet; adding 60 feet of westbound right-turn pocket and 165 feet of taper; and adding approximately three luminaires to increase light coverage for the extended eastbound left-turn lane channelization and at the Stoffel Road off-ramp gore. The estimated annual safety benefit of these proposed improvements is $73,500 with an order of magnitude construction cost estimate of $79,000, resulting in a benefit-to-cost ratio of 16.80.

5. **Blewett Junction.** The Blewett Junction intersection improvements consist of providing larger right-turn radii to and from US 97; adding flexible pylons to delineate enlarged islands created by the larger radius right-turns; increasing the length of the westbound left-turn pocket by 130 feet; lengthening the northbound right-turn pocket on US 97 by 660 feet; providing advance destination guide signs on US 97; and adding approximately two luminaires to increase light coverage for the extended westbound left-turn channelization. The estimated annual safety benefit of these proposed

improvements is $177,800 with an order of magnitude construction cost estimate of $771,000, resulting in a benefit-to-cost ratio of 4.16.

This short-term improvement is not compatible with the diamond interchange at Blewett Junction and should be weighed against the schedule and likelihood of interchange construction. Requirements for environmental permits (for construction alongside Peshastin Creek) may delay construction of the channelization improvements, making the proposed improvements infeasible.

6. **School Street.** The School Street intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 20 feet; increasing the length of the westbound right-turn deceleration lane striping by 300 feet; and adding a sign bridge with signs for westbound lane destinations approximately 750 feet in advance of the intersection. The estimated annual safety benefit of these proposed improvements is $29,200 with an order of magnitude construction cost estimate of $220,000, resulting in a benefit-to-cost ratio of 2.39.

7. **Cotlets Way.** The Cotlets Way intersection improvements include increasing the length of the eastbound left-turn striping gap by 75 feet, increasing the westbound left-turn pocket by 135 feet and adjusting the striping gap to 170 feet, and removing 100 feet of median barrier to provide 200 feet clearance from the westbound left-turn striping gap. Also included in the improvements are lengthening the eastbound right-turn deceleration lane by 25 feet and providing 50 feet of taper, adding 60 feet of westbound right-turn pocket and 165 feet of taper, and adding one luminaire to increase light coverage for the extended left-turn channelization. At the intersection of Titchenal Way and Cotlets Way, it is recommended to add a painted island with flexible pylons and paint a "no stopping" zone on northbound Cotlets Way to keep access to Titchenal Way unobstructed. The estimated annual safety benefit of these proposed improvements is $25,700 with an order of magnitude construction cost estimate of $170,000, which results in a benefit-to-cost ratio of 2.73.

8. **Saunders Road Road/Deadman Hill.** The Saunders Road/Deadman Hill Road intersection improvements consist of increasing the length of the eastbound left-turn pocket by 30 feet; increasing the length of the westbound left-turn lane striping gap by 75 feet; adding 580 feet of westbound right-turn deceleration lane and 50 feet of taper; and adding approximately three luminaires to increase light coverage for the extended left-turn lane channelization. The estimated annual safety benefit of these proposed improvements is $24,700 with an order of magnitude construction cost estimate of $197,000, resulting in a benefit-to-cost ratio of 2.27.

9. **Old Monitor Road.** The Old Monitor Road intersection improvement consists of adding approximately four luminaires to provide illumination at this currently unlit T-intersection. The estimated annual safety benefit of this improvement is $6,600 with an order of magnitude construction cost estimate of $31,000, resulting in a benefit-to-cost ratio of 3.83.

10. **Alice Avenue.** The Alice Avenue intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 95 feet; increasing the length of the westbound left-turn lane striping gap by 70 feet; and adding approximately two luminaires to increase light coverage for the extended left-turn lane channelization. The estimated annual safety benefit of these proposed improvements is $4,500 with an order of magnitude construction cost estimate of $17,000, resulting in a benefit-to-cost ratio of 4.81.

11. **North Dryden Road.** The North Dryden Road intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 70 feet; increasing the length of the westbound left-turn lane striping gap by 35 feet; and adding 60 feet of westbound right-turn pocket and 165 feet

of taper. The estimated annual safety benefit of these proposed improvements is $4,400 with an order of magnitude construction cost estimate of $58,000, resulting in a benefit-to-cost ratio of 1.38.

12. **Lower Sunnyslope Road/Lower Monitor Road.** The Lower Sunnyslope Road/Lower Monitor Road intersection improvements consist of increasing the length of the westbound left-turn pocket by 310 feet, including a striping gap of 170 feet and removing 100 feet of median barrier; adding 390 feet of westbound right-turn deceleration lane with 50 feet of taper and a six-foot high cut slope retaining wall; and adding approximately two luminaires to increase light coverage for the extended westbound left-turn lane channelization. The estimated annual safety benefit of these proposed improvements is $9,300 with an order of magnitude construction cost estimate of $306,000, resulting in a benefit-to-cost ratio of 0.55.

13. **Aplets Way.** The Aplets Way intersection improvements consist of increasing the length of the eastbound left-turn lane striping gap by 20 feet; increasing the length of the eastbound right-turn deceleration lane by 100 feet and providing 50 feet of taper; and adding 60 feet of westbound right-turn pocket and 165 feet of taper. The order of magnitude construction cost estimate is $124,000. Due to the recent installation of traffic signals at this intersection, sufficient comparable traffic accident history data were unavailable to perform a benefit-to-cost analysis. This study recommends monitoring the operation and accident rates at this intersection for deterioration to confirm the need and timing for these improvements.

14. **Main Street/Easy Street.** The Main Street/Easy Street intersection improvements consist of reducing the length of the left-turn lane striping gap and lengthening the eastbound right-turn deceleration lane by 185 feet with 50 feet of taper. The order of magnitude construction cost estimate is $103,000. Due to the recent installation of the traffic signal and the advance signal change beacons at this intersection, sufficient comparable traffic accident history data were not available to perform a benefit-to-cost analysis. This study recommends monitoring the operations and accident rates at this intersection for deterioration to confirm the need and timing for these improvements.

Long-Term Recommendations

1. **Dryden Avenue Intersection Signalization.** A traffic signal is proposed for the Dryden Avenue intersection when the *Manual on Uniform Traffic Control Devices* (MUTCD) traffic signal warrants are met. The signal is proposed as the final improvement for this intersection and assumes that short-term channelization improvements will have already been accomplished. Other improvements proposed during this stage are closing the existing westbound "slip ramp" from Dryden Avenue and creating a cul-de-sac at the end of the road as well as striping the intersection at Dryden Avenue immediately north of US 2/97 to provide better traffic lane delineation. The short-term channelization improvements could be combined with the signal installation if the short-term improvements have not been constructed and the funding and need for the long-term improvements is available. The total estimated annual safety benefit for just the signal is $287,500 with an order of magnitude construction cost estimate of $326,000, resulting in a benefit-to-cost ratio of 11.98. With its overwhelming community support, highest long-term benefit-to-cost ratio, and design funding available, this improvement has the highest implementation priority of the long-term alternatives.

2. **Hay Canyon Road/Goodwin Road Intersection Signalization.** A traffic signal is proposed for the Hay Canyon Road/Goodwin Road intersection when warrants are met. The signal is the first phase of long-term improvements proposed for the west end of Cashmere and assumes that short-term channelization improvements have already been completed. The existing eastbound off-ramp will remain operational. Short-term channelization improvements could be combined with the signal

installation if the short-term improvements have not been completed and the funding and need for the long-term improvements is available. The total estimated annual safety benefit for just the signal is $200,500 with an order of magnitude construction cost estimate of $259,000, resulting in a benefit-to-cost ratio of 10.52. The second phase of the long-term improvements for west Cashmere is included in the Goodwin Road Bridge Replacement recommendation.

3. **Blewett Junction Diamond Interchange.** A diamond interchange is proposed as the long-term recommendation at Blewett Junction. This improvement proposes realignment of US 97 to cross US 2 approximately 1100 feet west of the existing Blewett Junction intersection. A county road to the north would be constructed that roughly parallels US 2, creating a new T-intersection with the US 97 crossroad and connecting to Saunders Road and Jeske Road. Existing US 97, north of the Blewett Cutoff Road intersection, would become a dead-end, local access road. At-grade access to US 2 from Blewett Cutoff Road, Saunders Road, Doghouse Road, and Jeske Road would be closed but access would be provided via the proposed interchange. The estimated annual safety benefit for the diamond interchange is $494,000 with an order of magnitude construction cost estimate of $16,800,000 including R/W acquisition costs, resulting in a benefit-to-cost ratio of 0.92.

   The short-term improvements recommended at Blewett Junction are not compatible with the long-term improvements. Environmental permits may delay the construction of the short-term improvements. The implementation of short-term improvements should not occur if the long-term improvements are budgeted for construction.

4. **East Cashmere Diamond Interchange.** A diamond interchange is proposed as the long-term recommendation in east Cashmere. This improvement provides a new grade separated crossing approximately 1200 feet east of the Red Apple Road/Old Monitor Road intersection. A new county frontage road would be constructed along Titchenal Way extending to the new US 2/97 crossing. Old Monitor Road would intersect a new county frontage road on the south side at a T-intersection. The US 2/97 grade separated crossing would connect to Eels Road in the north. At-grade accesses to US 2/97 at Cotlets Way, Eels Road, Old Monitor Road, Red Apple Road/Old Monitor Road would be closed, but access would be provided via the proposed interchange. Removal of the traffic signal at Cotlets Way would be required. The estimated annual safety benefit for the diamond interchange is $306,800 with an order of magnitude construction cost estimate of $21,100,000, resulting in a benefit-to-cost ratio of 0.45.

5. **Sunnyslope Diamond Interchange.** A diamond interchange is proposed as the long-term recommendation in the Sunnyslope area. This improvement provides a new grade separated crossing approximately one-quarter mile east of the Lower Sunnyslope Road/Lower Monitor Road intersection. A new county road would be constructed to connect Lower Sunnyslope Road with Easy Street via the new US 2/97 crossing. At-grade access to US 2/97 at Lower Monitor Road and Lower Sunnyslope Road would be closed, but access would be provided via the proposed interchange. The estimated annual safety benefit for the diamond interchange is $306,400 with an order of magnitude construction cost estimate of $12,200,000, resulting in a benefit-to-cost ratio of 0.78. Even though this alternative has a higher benefit-to-cost ratio than the East Cashmere Diamond Interchange, it is ranked lower because current demand does not justify an interchange at this location before the East Cashmere Diamond Interchange.

6. **Goodwin Road Bridge Replacement.** A new grade separated crossing of US 2/97 is proposed approximately one-quarter mile west of the existing Goodwin Road/Hay Canyon Road intersection and may be considered the first phase of a new diamond interchange. The bridge spans the Burlington-Northern railroad tracks, Wenatchee River, and US 2/97. A new county road would connect Sunset

Highway and the bridge to the south and connect Hay Canyon Road to the north. When the replacement bridge is completed, the existing Goodwin Road Bridge will be removed and access to US 2/97 from Goodwin Road would be closed. This proposal allows maintenance of traffic via the existing bridge until the new bridge is complete and assumes the signal at the existing Hay Canyon Road intersection has been installed in an earlier phase, which would remain in place for this improvement. The estimated annual safety benefit for this grade separated crossing is $200,500 with an order of magnitude construction cost estimate of $14,300,000, resulting in a benefit-to-cost ratio of 0.44.

Other Considerations

During the existing conditions review, several deficiencies were noted along the corridor, primarily having to do with the alignment of US 2/97. A horizontal curve between Hay Canyon Road/Goodwin Road and Aplets Way avoids a large rock cut north of the highway and obstructs sight distance. Vertical curves at Saunders Road/Deadman Hill Road, between Alice Avenue and Dryden Avenue, and at Old Monitor Road also restrict sight distance. These deficiencies have not been addressed in this study, but should be considered if other major improvement opportunities arise.

Chelan County is also considering the replacement of the West Monitor Bridge, accessible from Stoffel Road in West Monitor. The West Monitor Bridge will be reconstructed either in its current location or further west of its current location. The location of the reconstructed bridge would have minor impacts on the US 2/97 corridor since it mainly serves local traffic. Both proposed bridge locations are compatible with the long-term East Cashmere Diamond Interchange alternative. If a new bridge is installed in West Monitor, the impacts to US 2/97 should be monitored.

7. NEXT STEPS

FUNDING

The Current Law Budget for transportation (S.B. 6347), which requires ratification by voters in November, establishes $33,078,160 for safety improvement projects statewide. The bill requires WSDOT to establish a list of projects in addition to the eight specific projects identified by the legislature. Safety improvements on the US 2/97 corridor were not specifically identified. As a result, the proposed US 2/97 improvements would need to be prioritized for funding with competing safety projects within the North Central Region. In order to obtain funding for as many projects as possible, consideration should be given to identifying multi-agency project sponsorship opportunities as well as locating and obtaining grant funds.

The total estimated project costs for all short-term and long-term projects is $67,588,000. Estimated conceptual construction costs for each proposed improvement are summarized below (the improvements are in priority order).

Table 7.1. Cost Summary

Improvement	Construction Cost (Including Right-of-Way)
Corridor-Wide Improvements	
1. Continuous Shoulder Rumble Strip	$42,000
2. Corridor Signing	$33,000
3. Advance Signal Change Beacons	$145,000
Short-Term Improvements	
1. Hay Canyon Road/Goodwin Road	$53,000
2. Red Apple Road/Old Monitor Road	$58,000
3. Dryden Avenue	$196,000
4. Red Apple Road/Selfs Road	$79,000
5. Blewett Junction	$771,000
6. School Street	$220,000
7. Cotlets Way	$170,000
8. Saunders Road/ Deadman Hill Road	$197,000
9. Old Monitor Road	$31,000
10. Alice Avenue	$17,000
11. North Dryden Road	$58,000
12. Lower Sunnyslope Road/Lower Monitor Road	$306,000
13. Aplets Way	$124,000
14. Main Street/Easy Street	$103,000
Long-Term Improvements	
1. Dryden Avenue Signalization	$326,000
2. Hay Canyon Road/Goodwin Road Signalization	$259,000
3. Blewett Junction Diamond Interchange	$16,800,000
4. East Cashmere Diamond Interchange	$21,100,000

Improvement	Construction Cost (Including Right-of-Way)
5. Sunnyslope Diamond Interchange	$12,200,000
6. Goodwin Road Bridge Replacement	$14,300,000
Total	**$67,588,000**

IMMEDIATE CONSTRUCTION OPPORTUNITIES

The following is a list of projects that have relatively minimal construction costs and are anticipated to provide substantial accident reduction benefit. As noted in the recommendations section of this report, some improvements, such as striping left-turn pockets or removing small sections of median barrier, can be implemented in conjunction with maintenance activities such as resurfacing. Identification and coordination of these types of opportunities with the proposed safety improvements is highly recommended to leverage the available funds.

Table 7.2. Immediate Implementation Improvements

Priority Rank	Corridor-Wide or Short-Term Improvement	Estimated Construction Cost	Benefit-to-Cost Ratio	Total Annual Safety Benefit
1	Continuous Shoulder Rumble Strip	$42,000	300.48	$1,333,208
2	Corridor Signing	$33,000	49.07	$171,058
3	Hay Canyon Road/Goodwin Road	$53,000	54.49	$159,967
4	Red Apple Road/Old Monitor Road	$58,000	21.51	$69,100
5	Red Apple Road/Selfs Road	$79,000	16.80	$73,533
	Total	**$265,000**		

PLAN AND PROGRAM UPDATES

The proposed improvements need to be identified in North Central Region's safety improvement project list, as well as in several regional and state plans to obtain state and federal funding. At the local level, the transportation plan in the Chelan County and City of Cashmere Comprehensive Plans should be updated to reflect concurrence and coordination of the proposed improvements between the state, county, and city. The North Central Regional Transportation Planning Organization's six-year TIP will also need to be updated to include these proposed improvements. At the statewide level, the improvements identified in the regional plans must be included in the Statewide TIP and the State Highway System Plan for funding consideration by WSDOT's Program Management Office.

PROJECT DEVELOPMENT

Given the lengthy process required to develop long-term improvement projects, construction of the first interchange is not likely to occur before the 2005-2007 transportation budget biennium. In order to keep these long-term improvements on schedule as well as ensure budget allocation, it is recommended that environmental impact analysis and documentation, design file preparation, and preliminary engineering begin as soon as practical.

8. DRAWINGS

APPENDIX A –
SHORT-TERM INTERSECTION PROPOSALS

Blewett Junction (US97) -- Estimated ATD volumes WB = 7223, EB = 7056

EASTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	PROPOSAL
GRADE TRAFFIC VOLUMES US-2 *% Trucks in Left Lane	(-) 2.041	 T=568 R=54 L=8 0.0%		 T=760 R=73 L=11 0.0%			
RIGHT TURN**	445' LANE	540' LANE	95' OF RT TURN LANE	540' LANE	95' OF RT TURN LANE	910-14 / 910-12	LEAVE AS IS, CONFLICT W/ ADJACENT INTERSECTION
LEFT TURN	90' POCKET	NOT REQUIRED		NOT REQUIRED		910-9B	
LEFT TURN DECEL. TAPER	230' GAP	N/A		N/A		H-3A STD PLNS	
WESTBOUND	**DESIGN** EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	
GRADE TRAFFIC VOLUMES US-2/97 *Trucks in Left Lane	(-) 2.041	 T=422 R=5 L=189 10.7%		 T=565 R=7 L=253 10.7%			
RIGHT TURN**	190' TAPER	RADIUS ONLY		RADIUS ONLY		910-12	
LEFT TURN LEFT TURN GAP	220' POCKET 170' GAP	225' POCKET 170' GAP		350' POCKET 170' GAP	130' OF LEFT TURN POCKET	910-9B / 910-4 H-3A STD PLNS	EXTEND LEFT TURN POCKET BY 130'
NORTHBOUND	**DESIGN** EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	
GRADE TRAFFIC VOLUMES US-97 *% Trucks in Left Lane % Trucks in Right Lane		 T=4 R=179 L=42 9.8% 15.1%		 T=6 R=240 L=57 9.8% 15.1%			
RIGHT TURN ADD LANE	EXCLUSIVE LANE	N/A - ACCELERATION LANE PREFERRED FOR TRUCK TRAFFIC		N/A - ACCELERATION LANE PREFERRED FOR TRUCK TRAFFIC		PG. 910.07(3)	LEAVE AS IS
RIGHT TURN	80'	4 VEH. X 25' = 100' + 165' TAPER = 265'	185' OF RIGHT TURN POCKET	23 VEH. X 25 = 575' + 165' TAPER= 740' OF RIGHT TURN TAPER	660' OF LEFT TURN POCKET	HCS OUTPUT 910-13	EXTEND RIGHT TURN POCKET BY 660'

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

Deadman/Saunders - Estimated ADT volumes WB = 6882, EB = 6816

EASTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	PROPOSAL
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 0.2522	 T=694 R=7 L=29 14.6%		 T=928 R=10 L=39 14.6%			
RIGHT TURN**	NONE	RADIUS ONLY		RADIUS ONLY		910-12	
LEFT TURN LEFT TURN GAP	95' POCKET 220' GAP	125' POCKET 170' GAP	30' OF LEFT TURN POCKET	125' POCKET 170' GAP	30' OF LEFT TURN POCKET	910-4 / 910-9B H-3A STD PLNS	EXTEND LEFT TURN POCKET BY 30'. LEAVE AS IS (OR REDUCE BY 30')
ENTERING SIGHT DISTANCE	1150' OF ESD	1150'		1150'		910-6	
WESTBOUND	**DESIGN** EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	**REF. FIG.**	
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 0.2522	 T=620 R=46 L=6 6.3%		 T=829 R=62 L=9 6.3%			
RIGHT TURN** CREST CURVE - DECISION SD	NONE 600' OF SD	225' POCKET OR 100' TAPER 1100'	225' POCKET OR 100' TAPER 500' OF SD	630' TURN LANE 1100'	630' OF RT. TURN LANE 500' OF SD	910-12 650-5 / 650-7 / 910.07(2)	ADD 630' RT. TURN LANE
LEFT TURN LEFT TURN GAP	120' POCKET 95' GAP	NOT REQUIRED N/A	IF USED, 75' OF GAP	100' POCKET 170' GAP	75' OF GAP	910-9B / 910-4 H-3A STD PLNS	LEAVE AS IS EXTEND GAP BY 75'
ENTERING SIGHT DISTANCE	700' OF ESD	1150'	450' OF ESD	1150'	450' OF ESD	910-6	LEAVE AS IS - AN ACCELERATION LANE WOULD CONFLICT WITH FUTURE RAMP OF PROPOSED LONG TERM ALTERNATIVE @ BLEWETT JUNCTION.

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

Alice Avenue -- Estimated ADT volumes WB = 6777, EB = 6581

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 1.1633	 T=650 R=2 L=23 5.3%		 T=870 R=3 L=31 5.3%			
RIGHT TURN**	NONE	RADIUS ONLY		RADIUS ONLY		910-12	
LEFT TURN LEFT TURN GAP	110' POCKET 75' GAP	100' POCKET 170' GAP	95' OF GAP	100' POCKET 170' GAP	95' OF GAP	910-9B H-3A STD PLNS	EXTEND GAP BY 95'
ENTERING SIGHT DISTANCE	1200' OF ESD	1150'		1150'		910-6	
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 1.1633	 T=691 R=7 L=4 0.0%		 T=924 R=10 L=6 0.0%			
RIGHT TURN** HORZ. CURVE - DECISION SD	NONE 525' OF SD	RADIUS ONLY 1100'	575' OF SD	RADIUS ONLY 1100'	575' OF SD	910-12 650-5 / 650-9	LEAVE AS IS - DUE TO A SAG CURVE JUST EAST OF THIS INTERSECTION, THE ACTUAL DRIVER SITE DISTANCE EXTENDS THROUGH THE SAG CURVE
LEFT TURN LEFT TURN GAP	100' POCKET 100' GAP	NOT REQUIRED N/A	IF USED, 70' OF GAP	NOT REQUIRED N/A	IF USED, 70' OF GAP	910-9B H-3A STD PLNS	EXTEND GAP BY 70'
ENTERING SIGHT DISTANCE	1200' OF ESD	1150'		1150'		910-6	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

Dryden/Johnson Intersection -- Estimated ADT volumes WB = 6757, EB = 6799

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE	(+) 2.0503						
TRAFFIC VOLUMES US-2/97		T=614 R=38 L=24		T=821 R=51 L=33			
*% Trucks in Left Lane		19.5%		19.5%			
RIGHT TURN**	NONE	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	910-14 / 910-12	ADD 225' RT. TURN POCKET
CREST CURVE - DECISION SD	895' OF SD	1100'	205' OF SD	1100'	205' OF SD	650-5 / 650-7	
LEFT TURN	115' POCKET	125' POCKET		125' POCKET		910-4 / 910-9B	
LEFT TURN GAP	110' GAP	170' GAP	60' OF GAP	170' GAP	60' OF GAP	H-3A STD PLNS	EXTEND GAP BY 60'
ENTERING SIGHT DISTANCE	1190' OF ESD	1150'		1150'		910-6	
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE	(+) 2.0503						
TRAFFIC VOLUMES US-2/97		T=569 R=41 L=7		T=761 R=55 L=10			
*% Trucks in Left Lane		2.9%		2.9%			
RIGHT TURN**	NONE	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	225' POCKET OR 100' TAPER	910-12	ADD 225' RT. TURN POCKET
CREST CURVE - DECISION SD	895' OF SD	1100'	205' OF SD	1100'	205' OF SD	650-5 / 650-7	
LEFT TURN	100' POCKET	NOT REQUIRED		NOT REQUIRED		910-9B / 910-4	
LEFT TURN GAP	75' GAP	N/A	IF USED, 95' OF GAP	N/A	IF USED, 95' OF GAP	H-3A STD PLNS	EXTEND GAP BY 95'
ENTERING SIGHT DISTANCE	1190' OF ESD	1150'		1150'		910-6	LEAVE AS IS

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

N. DRYDEN ROAD - Estimated ADT Volumes WB = 6775, EB = 6772

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 1.61%	 T=660 R=1 L=2 0.0%		 T=883 R=2 L=3 0.0%			
RIGHT TURN**	NONE	NONE		NONE		910-14 / 910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	135' POCKET 100' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	70' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP R=2	70' GAP	910-9B H-3A WDOT STD PLNS	REDUCE POCIKET BY 35' AND INCREASE GAP BY 35'
E.B. ACCELERATION LANE	NONE	NONE		NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	>1200'	1150'		1150'		910-6	
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 1.61%	 T=687 R=16 L=1 12.5%		 T=919 R=22 L=2 12.5%			
RIGHT TURN**	NONE	NONE		60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	910-12 / 910-13	ADD 60' POCKET & 165' TAPER
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	110' POCKET 135' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	35' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP R=3	35' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 35'
W.B. ACCELERATION LANE	NONE	NONE		NONE		910-15	
ENTERING SIGHT DISTANCE	>1200'	1150'		1150'		910-6	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

HAY CANYON ROAD / GOODWIN ROAD -- Estimated ADT volumes WB = 7168, EB = 7364

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 0.126%	 T=625 R=46 L=9 11.8%		 T=915 R=68 L=14 11.8%			
RIGHT TURN**	600' SLIP RAMP	60' POCKET WITH 165' TAPER		425' DECELERATION LANE		910-14 / 910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	105' POCKET 135' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	35' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP R=63	35' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 35'
E.B. ACCELERATION LANE	NONE	NONE		NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	1400'	1150'		1150'		910-6	
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 0.126%	 T=634 R=20 L=48 7.2%		 T=928 R=30 L=71 7.2%			
RIGHT TURN**	45' POCKET	NONE		60' POCKET WITH 165' TAPER		910-12 / 910-13	INCREASE POCKET 15' & ADD 165' TAPER
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	85' POCKET 140' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	15' POCKET 30' GAP	150' LEFT TURN POCKET 170' LEFT TURN GAP R=17	65' POCKET 30' GAP	910-9B H-3A WDOT STD PLNS	INCREASE POCKET BY 65' INCREASE GAP BY 30'
W.B. ACCELERATION LANE	NONE	NONE		NONE		910-15	
ENTERING SIGHT DISTANCE	1140'	1150'		1150'		910-6	LEAVE AS IS

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

APLETS WAY - Estimated ADT volumes WB = 7374, EB = 7250

EASTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	PROPOSAL
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 0.494%	 T=499 R=54 L=20 NO DATA		 T=731 R=80 L=30 NO DATA			
RIGHT TURN**	290' P. W/ 190' TP.	60' POCKET WITH 165' TAPER		390' DECELERATION LANE	100' DECELERATION LANE	910-12 / 910-14	LENGTHEN DECEL. LANE BY 100' & ADJUST TAPER ACCORDINGLY
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	310' POCKET 150' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	20' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	20' GAP	910-9B H-3A WDOT STD PLNS	DECREASE POCKET TO MAKE MEET GAP STANDARD
E.B. ACCELERATION LANE	NONE	NONE		R=120 NONE		910-12 / 910-15	
ENTERING SIGHT DISTANCE	NA						
WESTBOUND	**DESIGN EXISTING**	**2001 REQUIREMENTS**	**2001 NEEDS**	**2021 REQUIREMENTS**	**2021 NEEDS**	**REF. FIG.**	
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 0.494%	 T=731 R=22 L=199 NO DATA		 T=1070 R=33 L=292 NO DATA			
RIGHT TURN**	NONE	NONE		60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	910-13	ADD 60' POCKET & 165' TAPER
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	305' POCKET 180' GAP	200' LEFT TURN POCKET 170' LEFT TURN GAP		300' LEFT TURN POCKET 170' LEFT TURN GAP R=6		910-9B H-3A WDOT STD PLNS	
W.B. ACCELERATION LANE	NONE	NONE		NONE		910-12	
ENTERING SIGHT DISTANCE	NA						

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

COTLETS WAY / EELS ROAD - Estimated ADT Volumes WB = 9896, EB = 10,017

EASTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	PROPOSAL
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 0.328%	 T=528 R=50 L=7 3.2%		 T=773 R=74 L=11 3.2%			
RIGHT TURN**	365'	60' POCKET		390' DECELERATION LANE	25' LANE	910-12 / 910-14	LENGTHEN DECEL. LANE BY 25' & ADJUST TAPER ACCORDINGLY
LEFT TURN LEFT TURN GAP	100' POCKET 95' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	75' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	75' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 75'
E.B. ACCELERATION LANE	570'	560' ACCELERATION LANE		R=321 560' ACCELERATION LANE			
ENTERING SIGHT DISTANCE	NA						

WESTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 0.328%	 T=668 R=23 L=341 4.0%		 T=978 R=34 L=499 4.0%			
RIGHT TURN**	NONE	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	910-12 / 910-13	ADD 60' POCKET & 165' TAPER
LEFT TURN LEFT TURN GAP	215' POCKET 210' GAP	300' LEFT TURN POCKET 170' LEFT TURN GAP	85' POCKET	350' LEFT TURN POCKET 170' LEFT TURN GAP	135' POCKET	TRAFFIC ANALYSIS, 95TH PERCENTILE H-3A WDOT STD PLNS	INCREASE TURN POCKET 135' AND ADJUST GAP ACCORDINGLY REMOVE 100' MEDIAN BARRIER
W.B. ACCELERATION LANE	NONE	NONE		R=20 NONE		910-12	
ENTERING SIGHT DISTANCE	NA						

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

OLD MONITOR ROAD - Estimated ADT volumes WB = 9194, EB = 9443

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE	(+) 0.819%						
TRAFFIC VOLUMES US-2/97		T=755 R=12 L=0		T=1105 R=18 L=0			
*% Trucks in Left Lane		NO DATA		NO DATA			
RIGHT TURN**	330' TAPER	NONE		NONE		910-12	
LEFT TURN	NONE					910-9B	
LEFT TURN GAP	NONE					H-3A WDOT STD PLNS	
TRAFFIC VOLUMES N.B. SIDE ST.							
LIGHTING	NONE	LEFT TURN MOVEMENT ILLUMINATION		NONE (PART OF INTERCHANGE)		840.04 (4)	INSTALL 4 LUMINAIRES
E.B. ACCELERATION LANE	NONE	NONE		R=14 NONE		910-12	
ENTERING SIGHT DISTANCE	1230'	1150'		1150'		910-6	

WESTBOUND	DESIGN					REF. FIG.
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

RED APPLE ROAD / OLD MONITOR ROAD - Estimated ADT volumes WB = 9194, EB = 9443

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 1.40%	T=753 R=9 L=12 2.9%		T=1102 R=14 L=18 2.9%			
RIGHT TURN**	NONE	NONE		NONE		910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	100' POCKET 110' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	60' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	60' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 60'
E.B. ACCELERATION LANE	NONE	NONE		R=9 NONE		910-12	
ENTERING SIGHT DISTANCE	940'	1150'	210' OF ESD	1150'	210' OF ESD	910-6	LEAVE AS IS DUE TO HIGH COST TO INCREASE LENGTH OF VERTICAL CURVE AND LOW VLOUMES
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 1.40%	T=1062 R=15 L=7 0.0%		T=1554 R=22 L=11 0.0%			
RIGHT TURN**	NONE	NONE		60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	910-12 / 910-13	ADD 60' POCKET & 165' TAPER
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	100' POCKET 70' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	100' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	100' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 100'
W.B. ACCELERATION LANE	NONE	NONE		R=24 NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	> 1200'	1150'		1150'		910-6	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

RED APPLE ROAD / SELFS ST. - Estimated ADT Volumes WB = 9183, EB = 9292

EASTBOUND	DESIGN EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	REF. FIG.	PROPOSAL
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane		T=1010 R=8 L=1 0.0%		T=1478 R=8 L=2 0.0%			
RIGHT TURN**	NONE	NONE		NONE		910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	105' POCKET 115' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	55' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	55' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 55'
E.B. ACCELERATION LANE	N/A	N/A		R=N/A N/A		910-12	
ENTERING SIGHT DISTANCE	> 1200'	1150'		1150'		910-6	
WESTBOUND	**DESIGN** EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	**REF. FIG.**	
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane		T=879 R=23 L=0 0.0%		T=1286 R=34 L=0 0.0%			
RIGHT TURN**	NONE	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	910-12 / 910-13	ADD 60' POCKET & 165' TAPER
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	N/A N/A	N/A N/A		N/A N/A		910-9B H-3A WDOT STD PLNS	
W.B. ACCELERATION LANE	NONE	NONE		R=8 NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	DID NOT MEASURE	1150'		1150'		910-6	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

EASY ST. / MAIN ST. - Estimated ADT volumes WB = 9184, EB = 9395

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 5.00%	 T=955 R=35 L=31 7.0%		 T=1398 R=52 L=46 7.0%			
RIGHT TURN**	285' POCKET	60' POCKET WITH 165' TAPER		470 ' DECELERATION LANE	185' DECEL. LANE	910-12 / 910-14	LENGTHEN DECEL. LANE BY 185' & ADJUST TAPER ACCORDINGLY
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	115' POCKET 215' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP		100' LEFT TURN POCKET 170' LEFT TURN GAP		910-9B H-3A WDOT STD PLNS	
E.B. ACCELERATION LANE	NONE	NONE		R=107 NONE		910-12 / 910-15	
ENTERING SIGHT DISTANCE	NA						
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 5.00%	 T=837 R=14 L=43 4.5%		 T=1225 R=21 L=63 4.5%			
RIGHT TURN**	75' POCKET	60' POCKET WITH 165' TAPER		60' POCKET WITH 165' TAPER		910-12 / 910-13	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	175' POCKET 255' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP		100' LEFT TURN POCKET 170' LEFT TURN GAP		910-9B H-3A WDOT STD PLNS	REDUCE GAP BY 85 FEET (Note: Existing Pocket and Gap together are 160' longer than Standard.)
W.B. ACCELERATION LANE	NONE	NONE		R=58 NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	NA						

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

LOWER MONITOR ROAD / LOWER SUNNYSLOPE ROAD - Estimated ADT volumes WB = 9595, EB = 9660

	DESIGN						
EASTBOUND	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	**REF. FIG.**	**PROPOSAL**
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(+) 5.0%	 T=743 R=7 L=2 0.0%		 T=1088 R=11 L=3 0.0%			
RIGHT TURN**	NONE	NONE		NONE		910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	100' POCKET 175' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP		100' LEFT TURN POCKET 170' LEFT TURN GAP		910-9B H-3A WDOT STD PLNS	
E.B. ACCELERATION LANE	NONE	NONE		R=21 NONE		910-12	
ENTERING SIGHT DISTANCE	> 1200'	1150'		1150'		910-6	
	DESIGN						
WESTBOUND	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS	**REF. FIG.**	
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane	(-) 5.0%	 T=1085 R=31 L=29 4.5%		 T=1588 R=46 L=43 4.5%			
RIGHT TURN**	NONE	60' POCKET WITH 165' TAPER	60' POCKET WITH 165' TAPER	390' DECELERATION LANE	390' DECELERATION LANE	910-12 / 910-13	ADD 390' DECELERATION LANE WITH 6' HIGH RETAINING WALL.
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	140' POCKET 265' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	TOTAL DECELERATION DISTANCE OF 715' FOR 5% DOWN GRADE, 60-0 MPH	100' LEFT TURN POCKET 170' LEFT TURN GAP		910-9B, 910-14 H-3A WDOT STD PLNS	INCREASE LEFT TURN POCET BY 310'
W.B. ACCELERATION LANE	NONE	NONE		R=3 NONE		910-12	
ENTERING SIGHT DISTANCE	> 1200'	1150'		1150'		910-6	

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

SCHOOL ST. - Estimated ADT volumes WB = 9627, EB = 9718

EASTBOUND	DESIGN					REF. FIG.	PROPOSAL
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane		T=795 R=9 L=19 13.9%		T=1164 R=14 L=28 13.9%			
RIGHT TURN**	NONE	NONE		NONE		910-12	
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES N.B. SIDE ST.	170' POCKET 150' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP	20' GAP	150' LEFT TURN POCKET 170' LEFT TURN GAP	20' GAP	910-9B H-3A WDOT STD PLNS	INCREASE GAP BY 20', LEAVE POCKET AS IS.
E.B. ACCELERATION LANE	NONE	NONE		R=14 NONE		910-12	
ENTERING SIGHT DISTANCE	704'	830'	126' of ESD	830'	126' of ESD	910-6	LEAVE AS IS DUE TO HIGH COST TO INCREASE LENGTH OF VERTICAL CURVE AND LOW VOLUMES
WESTBOUND	**DESIGN**					**REF. FIG.**	
	EXISTING	2001 REQUIREMENTS	2001 NEEDS	2021 REQUIREMENTS	2021 NEEDS		
GRADE TRAFFIC VOLUMES US-2/97 *% Trucks in Left Lane		T=1087 R=68 L=6 4.3%		T=1591 R=100 L=9 4.3%			
RIGHT TURN**	90' POCKET	390' DECELERATION LANE	300' POCKET	390' DECELERATION LANE	300' POCKET	910-12 / 910-14	INCREASE RIGHT TURN LANE BY 300' .
LEFT TURN LEFT TURN GAP TRAFFIC VOLUMES S.B. SIDE ST.	135' POCKET 235' GAP	100' LEFT TURN POCKET 170' LEFT TURN GAP		100' LEFT TURN POCKET 170' LEFT TURN GAP		910-9B H-3A WDOT STD PLNS	
W.B. ACCELERATION LANE	NONE	NONE		R=36 NONE		910-15 / 910-12	
ENTERING SIGHT DISTANCE	704'	830'	126' of ESD	830'	126' of ESD	910-6	LEAVE AS IS DUE TO HIGH COST TO INCREASE LENGTH OF VERTICAL CURVE AND LOW VOLUMES

*Percent of trucks in left lane based off of 4-hour counts
**Approach volumes based on 1/2 of through + right turn. Assumed 15 MPH turning speed.

APPENDIX B –
SHORT-TERM CONCEPTUAL COST ESTIMATE

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Corridor Wide Rumble Strips

Project Action: Install rumble strips along both sides of US 2/97

Washington State Department of Transportation

Date: Apr 2, 2002

Date of Cost Index: 2001

Made By: D. Horn

Checked By: K. Casseday

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$0	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$0		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$0		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$0	
3.1 Mainline	SF		$10	$0		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$0	
4.1	5%	of sections 1 & 2		$0		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$28,930	
5.1 Signal	EA	0	$200,000	$0		
5.2 Signs and Posts	EA	0	$500	$0		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$0		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$1,378		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
5.5 Rumble Strips	MI	28	$984	$27,552		
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$29,000
7. Contingencies			15% of Subtotal		$4,350	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$34,000
9. Mobilization -			10% of Line 8		$3,400	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$38,000
11. Sales Tax -			8.00% of Line 10		$3,040	
12. Subtotal (Round to the nearest 1000)						$42,000
13. Construction Engineering & Cont.			15% of Line 12		$6,300	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$49,000
III. DESIGN ENGINEERING & ADMIN			12% of Line 14			$5,880
IV. TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$55,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Corridor Wide Advance Signing for Intersections

Project Action: Replace advance signing with consistent, large and highly reflective signs; Add Street Name signs at all intersections

Washington State Department of Transportation

Date: April 3, 2002

Date of Cost Index: 2001

Made By: K. Casseday

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$0	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$0		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$0		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$0	
3.1 Mainline	SF		$10	$0		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$0	
4.1	5%	of sections 1 & 2		$0		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$22,575	
5.1 Signal	EA	0	$200,000	$0		
5.2 Signs and Posts	EA	43	$500	$21,500		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$0		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$1,075		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$23,000
7. Contingencies			15%	of Subtotal	$3,450	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$27,000
9. Mobilization -			10%	of Line 8	$2,700	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$30,000
11. Sales Tax -			8.00%	of Line 10	$2,400	
12. Subtotal (Round to the nearest 1000)						$33,000
13. Construction Engineering & Cont.			15%	of Line 12	$4,950	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$38,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$4,560
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$43,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Blewett Junction Intersection Improvements

Project Action: Improve RT radii to/from US 97. Extend RT pocket from US 97 & add directional signs.

Washington State Department of Transportation

Date: 6-Feb-02

Date of Cost Index: 2001

Made By: T. Olsen

Checked By: K. Nakano / T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$87,500	
1.1 Clearing/Grubbing	Acre		$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$40,250		
1.3 Major Cut/Fill	CY	750	$7	$5,250		
1.4 Major Walls	CY	1,400	$7	$9,800		
1.5 Drainage	8%	of Sections 2 & 3		$32,200		
2. Structures					$277,500	
2.1 Retaining Walls	SF	3,700	$75	$277,500		
3. Surfacing / Paving					$125,000	
3.1 Mainline	SF	25,000	$5	$125,000		
3.2 Cross Street	SF	0	$3	$0		
4. Roadside Development					$24,500	
4.1	5%	of sections 1,2 & 3		$24,500		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$48,000	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	2	$5,000	$10,000		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$31,250		
5.4 Misc. Traffic Items	5%	of Sections 3 & 5.2		$6,750		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$563,000
7. Contingencies			15%	of Subtotal	$84,450	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$648,000
9. Mobilization -			10%	of Line 8	$64,800	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$713,000
11. Sales Tax -			8.00%	of Line 10	$57,040	
12. Subtotal (Round to the nearest 1000)						$771,000
13. Construction Engineering & Cont.			15%	of Line 12	$115,650	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$887,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$106,440
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$994,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Saunders/Deadman Hill Intersection Improvements

Project Action: Right turn lane. Left turn lane & gap extension w/ add'l illumination.

Washington State Department of Transportation

Date: 6-Feb-02

Date of Cost Index: 2001

Made By: T. Olsen

Checked By: K. Nakano / T. McDonald

		Unit	Quantity	Unit Price	Cost	Subtotal	Total
I.	RIGHT OF WAY						
	Acquisition						$0
	Farmland	SF	0	$1	$0		
	Commercial	SF	0	$10	$0		
II.	CONSTRUCTION						
1.	Grading / Drainage					$14,850	
1.1	Clearing/Grubbing	Acre		$500	$0		
1.2	Roadway Prism	10%	of Sections 2.1 & 3		$8,250		
1.3	Major Cut/Fill	CY	0	$7	$0		
1.4	Major Walls	CY	0	$7	$0		
1.5	Drainage	8%	of Sections 2 & 3		$6,600		
2.	Structures					$0	
2.1	Retaining Walls	SF	0	$75	$0		
3.	Surfacing / Paving					$82,500	
3.1	Mainline	SF	16,500	$5	$82,500		
3.2	Cross Street	SF	0	$3	$0		
4.	Roadside Development					$4,868	
4.1		5%	of sections 1,2 & 3		$4,868		
	(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5.	Traffic Services & Safety					$40,500	
5.1	Signal	EA	0	$200,000	$0		
5.2	Illumination	EA	3	$5,000	$15,000		
5.3	Traffic Control	25%	of Sections 3 & 5.1		$20,625		
5.4	Misc. Traffic Items	5%	of Sections 3 & 5.2		$4,875		
	(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6.	Major Utilities					$0	
		0%	of sections 1, 2 & 3		$0		
	Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$143,000
7.	Contingencies			15%	of Subtotal	$21,450	
8.	Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$165,000
9.	Mobilization -			10%	of Line 8	$16,500	
10.	Subtotal Lines 8 & 9 (Round to the nearest 1000)						$182,000
11.	Sales Tax -			8.00%	of Line 10	$14,560	
12.	Subtotal (Round to the nearest 1000)						$197,000
13.	Construction Engineering & Cont.			15%	of Line 12	$29,550	
14.	Construction Total Lines 12 and 13 (Round to the nearest 1000)						$227,000
III.	DESIGN ENGINEERING & ADMIN			12%	of Line 14		$27,240
IV.	TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$255,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Alice Avenue Intersection Improvements
Project Action: Left turn gap extension. Add illumination.

Washington State Department of Transportation
Date: 6-Feb-02
Date of Cost Index: 2001
Made By: T. Olsen
Checked By: K. Nakano / T. McDonald

		Unit	Quantity	Unit Price	Cost	Subtotal	Total
I.	RIGHT OF WAY						
	Acquisition						$0
	Farmland	SF	0	$1	$0		
	Commercial	SF	0	$10	$0		
II.	CONSTRUCTION						
1.	Grading / Drainage					$0	
1.1	Clearing/Grubbing	Acre	0	$500	$0		
1.2	Roadway Prism	10%	of Sections 2.1 & 3		$0		
1.3	Major Cut/Fill	CY	0	$7	$0		
1.4	Major Walls	CY	0	$7	$0		
1.5	Drainage	8%	of Sections 2 & 3		$0		
2.	Structures					$0	
2.1	Retaining Walls	SF	0	$75	$0		
3.	Surfacing / Paving					$0	
3.1	Mainline	SF	0	$5	$0		
3.2	Cross Street	SF	0	$3	$0		
4.	Roadside Development					$0	
4.1		5%	of sections 1,2 & 3		$0		
	(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5.	Traffic Services & Safety					$10,500	
5.1	Signal	EA	0	$200,000	$0		
5.2	Illumination	EA	2	$5,000	$10,000		
5.3	Traffic Control	25%	of Sections 3 & 5.1		$0		
5.4	Misc. Traffic Items	5%	of Sections 3 & 5.2		$500		
	(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6.	Major Utilities					$0	
		0%	of sections 1, 2 & 3		$0		
	Construction Subtotal Items 1,2,3,4, 5 and 6			(Round to nearest 1000)			$11,000
7.	Contingencies			15%	of Subtotal	$1,650	
8.	Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$13,000
9.	Mobilization -			10%	of Line 8	$1,300	
10.	Subtotal Lines 8 & 9 (Round to the nearest 1000)						$15,000
11.	Sales Tax -			8.00%	of Line 10	$1,200	
12.	Subtotal (Round to the nearest 1000)						$17,000
13.	Construction Engineering & Cont.			15%	of Line 12	$2,550	
14.	Construction Total Lines 12 and 13 (Round to the nearest 1000)						$20,000
III.	DESIGN ENGINEERING & ADMIN			12%	of Line 14		$2,400
IV.	TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$23,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Dryden/Johnson Intersection Improvements

Project Action: Right turn pockets. Left turn gap extensions w/ add'l illumination.

Washington State Department of Transportation

Date: 6-Feb-02

Date of Cost Index: 2001

Made By: T. Olsen

Checked By: K. Nakano / T. McDonald

		Unit	Quantity	Unit Price	Cost	Subtotal	Total
I.	RIGHT OF WAY						
	Acquisition						$0
	Farmland	SF	0	$1	$0		
	Commercial	SF	0	$10	$0		
II.	CONSTRUCTION						
1.	Grading / Drainage					$14,040	
1.1	Clearing/Grubbing	Acre		$500	$0		
1.2	Roadway Prism	10%	of Sections 2.1 & 3		$7,800		
1.3	Major Cut/Fill	CY	0	$7	$0		
1.4	Major Walls	CY	0	$7	$0		
1.5	Drainage	8%	of Sections 2 & 3		$6,240		
2.	Structures					$0	
2.1	Retaining Walls	SF	0	$75	$0		
3.	Surfacing / Paving					$78,000	
3.1	Mainline	SF	15,600	$5	$78,000		
3.2	Cross Street	SF	0	$3	$0		
4.	Roadside Development					$4,602	
4.1		5%	of sections 1,2 & 3		$4,602		
	(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5.	Traffic Services & Safety					$44,400	
5.1	Signal	EA	0	$200,000	$0		
5.2	Illumination	EA	4	$5,000	$20,000		
5.3	Traffic Control	25%	of Sections 3 & 5.1		$19,500		
5.4	Misc. Traffic Items	5%	of Sections 3 & 5.2		$4,900		
	(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6.	Major Utilities					$0	
		0%	of sections 1, 2 & 3		$0		
	Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$142,000
7.	Contingencies			15%	of Subtotal	$21,300	
8.	Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$164,000
9.	Mobilization -			10%	of Line 8	$16,400	
10.	Subtotal Lines 8 & 9 (Round to the nearest 1000)						$181,000
11.	Sales Tax -			8.00%	of Line 10	$14,480	
12.	Subtotal (Round to the nearest 1000)						$196,000
13.	Construction Engineering & Cont.			15%	of Line 12	$29,400	
14.	Construction Total Lines 12 and 13 (Round to the nearest 1000)						$226,000
III.	DESIGN ENGINEERING & ADMIN			12%	of Line 14		$27,120
IV.	TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$254,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: North Dryden Road Intersection Improvements

Project Action: Right turn lane; Left turn striping

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$4,860	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$2,700		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$2,160		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$27,000	
3.1 Mainline	SF	2,700	$10	$27,000		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$1,593	
4.1	5%	of sections 1 & 2		$1,593		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$7,223	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	0	$5,000	$0		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$6,750		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$473		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$41,000
7. Contingencies			15%	of Subtotal	$6,150	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$48,000
9. Mobilization -			10%	of Line 8	$4,800	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$53,000
11. Sales Tax -			8.00%	of Line 10	$4,240	
12. Subtotal (Round to the nearest 1000)						$58,000
13. Construction Engineering & Cont.			15%	of Line 12	$8,700	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$67,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$8,040
IV. TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$76,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Hay Canyon Road Intersection Improvements

Project Action:
Right turn lane extension
Left turn lane extension and striping

Washington State Department of Transportation
Date: Feb 13, '02
Date of Cost Index: 2001
Made By: J. St. John
Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$3,888	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$2,160		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$1,728		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$21,600	
3.1 Mainline	SF	2,160	$10	$21,600		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$1,274	
4.1	5%	of sections 1 & 2		$1,274		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$11,028	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	1	$5,000	$5,000		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$5,400		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$628		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$38,000
7. Contingencies			15%	of Subtotal	$5,700	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$44,000
9. Mobilization -			10%	of Line 8	$4,400	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$49,000
11. Sales Tax -			8.00%	of Line 10	$3,920	
12. Subtotal (Round to the nearest 1000)						$53,000
13. Construction Engineering & Cont.			15%	of Line 12	$7,950	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$61,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$7,320
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$69,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Aplets Way Intersection Improvements
Project Action: Right turn lane and extension; Left turn lane striping, Remove median barrier

Washington State Department of Transportation
Date: Feb 13, '02
Date of Cost Index: 2001
Made By: J. St. John
Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$10,584	
1.1 Remove Median	LF	0	$20	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$5,880		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$4,704		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$58,800	
3.1 Mainline	SF	5,880	$10	$58,800		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$3,469	
4.1	5%	of sections 1 & 2		$3,469		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$15,729	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	0	$5,000	$0		
5.3 Impact Attenuator	EA	0	$10,000	$0		
5.4 Traffic Control	25%	of Sections 3 & 5.1		$14,700		
5.5 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.4		$1,029		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$89,000
7. Contingencies			15%	of Subtotal	$13,350	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$103,000
9. Mobilization -			10%	of Line 8	$10,300	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$114,000
11. Sales Tax -			8.00%	of Line 10	$9,120	
12. Subtotal (Round to the nearest 1000)						$124,000
13. Construction Engineering & Cont.			15%	of Line 12	$18,600	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$143,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$17,160
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$161,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Cotlets Way Intersection Improvements

Project Action: Right turn lane and extension; Left turn lane striping, Remove median barriers

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$13,844	
1.1 Remove Median	LF	100	$20	$2,000		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$6,580		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$5,264		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$65,800	
3.1 Mainline	SF	6,580	$10	$65,800		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$3,982	
4.1	5%	of sections 1 & 2		$3,982		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$38,602	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	2	$5,000	$10,000		
5.3 Impact Attenuator	EA	1	$10,000	$10,000		
5.4 Traffic Control	25%	of Sections 3 & 5.1		$16,450		
5.5 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.4		$2,152		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$123,000
7. Contingencies			15%	of Subtotal	$18,450	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$142,000
9. Mobilization -			10%	of Line 8	$14,200	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$157,000
11. Sales Tax -			8.00%	of Line 10	$12,560	
12. Subtotal (Round to the nearest 1000)						$170,000
13. Construction Engineering & Cont.			15%	of Line 12	$25,500	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$196,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$23,520
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$220,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Add Illumination at Old Monitor Intersection

Project Action: Add four light standards

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: K. Casseday

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$0	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$0		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$0		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$0	
3.1 Mainline	SF		$10	$0		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$0	
4.1	5%	of sections 1 & 2		$0		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$21,000	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	4	$5,000	$20,000		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$0		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$1,000		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$21,000
7. Contingencies			15%	of Subtotal	$3,150	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$25,000
9. Mobilization -			10%	of Line 8	$2,500	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$28,000
11. Sales Tax -			8.00%	of Line 10	$2,240	
12. Subtotal (Round to the nearest 1000)						$31,000
13. Construction Engineering & Cont.			15%	of Line 12	$4,650	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$36,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$4,320
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$41,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Red Apple/Old Monitor Road Intersection Improvements

Project Action: Right turn lane; Left turn striping

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$4,860	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$2,700		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$2,160		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$27,000	
3.1 Mainline	SF	2,700	$10	$27,000		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$1,593	
4.1	5%	of sections 1 & 2		$1,593		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$7,223	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	0	$5,000	$0		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$6,750		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$473		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$41,000
7. Contingencies			15%	of Subtotal	$6,150	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$48,000
9. Mobilization -			10%	of Line 8	$4,800	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$53,000
11. Sales Tax -			8.00%	of Line 10	$4,240	
12. Subtotal (Round to the nearest 1000)						$58,000
13. Construction Engineering & Cont.			15%	of Line 12	$8,700	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$67,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$8,040
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$76,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Red Apple/Selfs Road Intersection Improvements

Project Action: Right turn lane, left turn striping; Add three light standards

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$4,860	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$2,700		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$2,160		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$27,000	
3.1 Mainline	SF	2,700	$10	$27,000		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$1,593	
4.1	5%	of sections 1 & 2		$1,593		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$22,973	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	3	$5,000	$15,000		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$6,750		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$1,223		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$57,000
7. Contingencies			15%	of Subtotal	$8,550	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$66,000
9. Mobilization -			10%	of Line 8	$6,600	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$73,000
11. Sales Tax -			8.00%	of Line 10	$5,840	
12. Subtotal (Round to the nearest 1000)						$79,000
13. Construction Engineering & Cont.			15%	of Line 12	$11,850	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$91,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$10,920
IV. TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$102,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Easy Street/Main Street Intersection Improvements

Project Action: Right turn lane extension; Remove median barrier, replace impact attenuator

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John w kxc edits

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$7,560	
1.1 Remove Median	LF	0	$20	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$4,200		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$3,360		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$42,000	
3.1 Mainline	SF	4,200	$10	$42,000		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$2,478	
4.1	5%	of sections 1 & 2		$2,478		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$21,735	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	0	$5,000	$0		
5.3 Impact Attenuator	EA	1	$10,000	$10,000		
5.4 Traffic Control	25%	of Sections 3 & 5.1		$10,500		
5.5 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.4		$1,235		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$74,000
7. Contingencies			15%	of Subtotal	$11,100	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$86,000
9. Mobilization -			10%	of Line 8	$8,600	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$95,000
11. Sales Tax -			8.00%	of Line 10	$7,600	
12. Subtotal (Round to the nearest 1000)						$103,000
13. Construction Engineering & Cont.			15%	of Line 12	$15,450	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$119,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$14,280
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$134,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: Lower Sunnyslope Road Intersection Improvements

Project Action: Right turn lane; Add 2 light standards

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$28,836	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$16,020		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$12,816		
2. Structures					$93,600	
2.1 Retaining Walls	SF	2,340	$40	$93,600		
3. Surfacing / Paving					$66,600	
3.1 Mainline	SF	6,660	$10	$66,600		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$4,772	
4.1	5%	of sections 1 & 2		$4,772		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$28,784	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	2	$5,000	$10,000		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$16,650		
5.4 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.3		$2,134		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$223,000
7. Contingencies			15%	of Subtotal	$33,450	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$257,000
9. Mobilization -			10%	of Line 8	$25,700	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$283,000
11. Sales Tax -			8.00%	of Line 10	$22,640	
12. Subtotal (Round to the nearest 1000)						$306,000
13. Construction Engineering & Cont.			15%	of Line 12	$45,900	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$352,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$42,240
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$395,000

SHORT-TERM CONCEPTUAL COST ESTIMATE

Project Description: School Street Intersection Improvements
Project Action: Right turn lane; Left turn striping

Washington State Department of Transportation
Date: Feb 13, '02
Date of Cost Index: 2001
Made By: J. St. John
Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$6,480	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$3,600		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$2,880		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$36,000	
3.1 Mainline	SF	3,600	$10	$36,000		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$2,124	
4.1	5%	of sections 1 & 2		$2,124		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$114,630	
5.1 Signal	EA	0	$200,000	$0		
5.2 Illumination	EA	0	$5,000	$0		
5.3 Sign Bridge	EA	1	$100,000	$100,000		
5.4 Traffic Control	25%	of Sections 3 & 5.1		$9,000		
5.5 Misc. Traffic Items	5%	of Sections 1.2, 5.1 - 5.4		$5,630		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	0%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$160,000
7. Contingencies			15%	of Subtotal	$24,000	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$184,000
9. Mobilization -			10%	of Line 8	$18,400	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$203,000
11. Sales Tax -			8.00%	of Line 10	$16,240	
12. Subtotal (Round to the nearest 1000)						$220,000
13. Construction Engineering & Cont.			15%	of Line 12	$33,000	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$253,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$30,360
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$284,000

APPENDIX C –
LONG-TERM CONCEPTUAL COST ESTIMATE

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Dryden Avenue Signalization

Project Action: Install signal, close slip ramp. Restripe frontage road & add cul-de-sac to west side.

Washington State Department of Transportation

Date: Feb 27, '02

Date of Cost Index: 2001

Made By: T. Olsen / K. Nakano

Checked By: K. Nakano / T. McDonald

		Unit	Quantity	Unit Price	Cost	Subtotal	Total
I.	RIGHT OF WAY						
	Acquisition						$0
	Farmland	SF	0	$1	$0		
	Commercial	SF	0	$10	$0		
II.	CONSTRUCTION						
1.	Grading / Drainage					$5,724	
1.1	Clearing/Grubbing	Acre	0	$500	$0		
1.2	Roadway Prism	10%	of Sections 2.1 & 3		$3,180		
1.3	Major Cut/Fill	CY	0	$7	$0		
1.4	Major Walls	CY	0	$7	$0		
1.5	Drainage	8%	of Sections 2 & 3		$2,544		
2.	Structures					$0	
2.1	Retaining Walls	SF	0	$75	$0		
3.	Surfacing / Paving					$31,800	
3.1	Mainline	SF	0	$5	$0		
3.2	Cross Street	SF	10,600	$3	$31,800		
4.	Roadside Development					$1,876	
4.1		5%	of sections 1,2 & 3		$1,876		
	(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5.	Traffic Services & Safety					$197,040	
5.1	Signal	EA	1	$150,000	$150,000		
5.2	Illumination	EA	0	$5,000	$0		
5.3	Traffic Control	25%	of Sections 3 & 5.1		$45,450		
5.4	Misc. Traffic Items	5%	of Sections 3 & 5.2		$1,590		
	(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6.	Major Utilities					$0	
		0%	of sections 1, 2 & 3		$0		
	Construction Subtotal Items 1,2,3,4, 5 and 6			(Round to nearest 1000)			$237,000
7.	Contingencies			15%	of Subtotal	$35,550	
8.	Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$273,000
9.	Mobilization -			10%	of Line 8	$27,300	
10.	Subtotal Lines 8 & 9 (Round to the nearest 1000)						$301,000
11.	Sales Tax -			8.00%	of Line 10	$24,080	
12.	Subtotal (Round to the nearest 1000)						$326,000
13.	Construction Engineering & Cont.			15%	of Line 12	$48,900	
14.	Construction Total Lines 12 and 13 (Round to the nearest 1000)						$375,000
III.	DESIGN ENGINEERING & ADMIN			12%	of Line 14		$45,000
IV.	TOTAL ESTIMATED COST			Lines I, 14 and III (Round to the nearest 1000)			$420,000

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Hay Canyon Road/Goodwin Road Signalization

Project Action: Install signal only; Channelization is part of short term improvements

Washington State Department of Transportation

Date: Feb 13, '02

Date of Cost Index: 2001

Made By: J. St. John / K. Cassiday

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$0
Agricultural	SF	0	$1	$0	
Comm./Residential	SF	0	$10	$0	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$0	
1.1 Clearing/Grubbing	Acre	0	$500	$0		
1.2 Roadway Prism	10%	of Sections 2.1 & 3		$0		
1.3 Major Cut/Fill	CY	0	$7	$0		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2 & 3		$0		
2. Structures					$0	
2.1 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$0	
3.1 Mainline	SF		$10	$0		
3.2 Cross Street	SF	0	$8	$0		
4. Roadside Development					$0	
4.1	5%	of sections 1 & 2		$0		
(Item includes Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$187,500	
5.1 Signal	EA	1	$150,000	$150,000		
5.2 Illumination	EA		$5,000	$0		
5.3 Traffic Control	25%	of Sections 3 & 5.1		$37,500		
5.4 Misc. Traffic Items	5%	of Sections 3 and 5.2		$0		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$0	
	10%	of sections 1, 2 & 3		$0		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$188,000
7. Contingencies			15%	of Subtotal	$28,200	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$217,000
9. Mobilization -			10%	of Line 8	$21,700	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$239,000
11. Sales Tax -			8.00%	of Line 10	$19,120	
12. Subtotal (Round to the nearest 1000)						$259,000
13. Construction Engineering & Cont.			15%	of Line 12	$38,850	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$298,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$35,760
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$334,000

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Blewett Junction - Diamond Interchange

Project Action: Diamond Interchange w/ relocated US 97. New county road from US 97 ext. to Jeske & Saunders

Washington State Department of Transportation

Date: March 18, '02

Date of Cost Index: 2001

Made By: S. Halim / V. Zimmerman

Checked By: K. Nakano / T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$2,026,895
Agricultural	SF	726,895	$1	$726,895	
Comm./Residential	SF	130,000	$10	$1,300,000	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$3,853,831	
1.1 Clearing/Grubbing	Acre	23	$500	$11,500		
1.2 Roadway Prism	15%	of Sections 2.2 & 3		$551,955		
1.3 Major Cut/Fill	CY	428,000	$7	$2,996,000		
1.4 Major Walls	CY	0	$7	$0		
1.5 Drainage	8%	of Sections 2.2 & 3		$294,376		
2. Structures					$1,500,000	
2.1 Bridge Structure	SF	10,000	$150	$1,500,000		
2.2 Retaining Walls	SF	0	$75	$0		
3. Surfacing / Paving					$3,679,700	
3.1 Mainline/Ramp	SF	250,370	$10	$2,503,700		
3.2 Cross Street	SF	147,000	$8	$1,176,000		
4. Roadside Development					$376,677	
	5%	of sections 1 & 3		$376,677		
(Item includes Fencing, Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$420,671	
Illumination	EA	18	$5,000	$90,000		
Traffic Control	LS			$150,000		
Misc. Traffic Items	2%	of sections 1, 2 & 3		$180,671		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$90,335	
	1%	of sections 1, 2 & 3		$90,335		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$9,922,000
7. Contingencies			25%	of Subtotal	$2,480,500	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$12,403,000
9. Mobilization -			10%	of Line 8	$1,240,300	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$13,644,000
11. Sales Tax -			8.00%	of Line 10	$1,091,520	
12. Subtotal (Round to the nearest 1000)						$14,736,000
13. Construction Engineering & Cont.			15%	of Line 12	$2,210,400	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$16,947,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$2,033,640
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$21,008,000

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Cashmere East Interchange
Project Action: Includes Titchenal Way Extension

Washington State Department of Transportation
Date: Feb 2002
Date of Cost Index: 2001
Made By: J. St. John
Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$3,100,000
Agricultural	SF	400,000	$1	$400,000	
Comm./Residential	SF	270,000	$10	$2,700,000	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$2,780,200	
1.1 Clearing/Grubbing	Acre	28	$500	$14,000		
1.2 Roadway Prism	15%	of Sections 2.2 & 3		$891,000		
1.3 Major Cut/Fill	CY	200,000	$7	$1,400,000		
1.4 Major Walls	CY		$7	$0		
1.5 Drainage	8%	of Sections 2.2 & 3		$475,200		
2. Structures					$1,968,000	
2.1 Bridge Structure	SF	9,120	$150	$1,368,000		
2.2 Retaining Walls	SF	8,000	$75	$600,000		
3. Surfacing / Paving					$5,340,000	
3.1 Mainline/Ramp	SF	230,000	$10	$2,300,000		
3.2 Cross Street	SF	380,000	$8	$3,040,000		
4. Roadside Development					$649,616	
	8%	of sections 1 & 3		$649,616		
(Item includes Fencing, Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$1,244,581	
Illumination	EA	20	$5,000	$100,000		
Traffic Signals	EA	2	$150,000	$300,000		
Traffic Control	5%	of sections 1, 2, 3, 4 & 6		$541,935		150,000
Misc. Traffic Items	3%	of sections 1, 2 & 3		$302,646		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$100,882	
	1%	of sections 1, 2 & 3		$100,882		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$12,084,000
7. Contingencies			25%	of Subtotal	$3,021,000	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$15,105,000
9. Mobilization -			10%	of Line 8	$1,510,500	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$16,616,000
11. Sales Tax -			8.00%	of Line 10	$1,329,280	
12. Subtotal (Round to the nearest 1000)						$17,946,000
13. Construction Engineering & Cont.			15%	of Line 12	$2,691,900	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$20,638,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$2,476,560
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$26,215,000

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Sunnyslope Interchange

Project Action: Includes Lower Sunnyslope Road connection

Washington State Department of Transportation

Date: Feb 2002

Date of Cost Index: 2001

Made By: J. St. John

Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Subtotal	Total
Acquisition						$140,000
Agricultural	SF	140,000	$1	$140,000		
Comm./Residential	SF	0	$10	$0		

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$1,427,575	
1.1 Clearing/Grubbing	Acre	15	$500	$7,500		
1.2 Roadway Prism	15%	of Sections 2.2 & 3		$697,875		
1.3 Major Cut/Fill	CY	50,000	$7	$350,000		
1.4 Major Walls	CY		$7	$0		
1.5 Drainage	8%	of Sections 2.2 & 3		$372,200		
2. Structures					$2,587,500	
2.1 Bridge Structure	SF	6,500	$150	$975,000		
2.2 Retaining Walls	SF	21,500	$75	$1,612,500		
3. Surfacing / Paving					$3,040,000	
3.1 Mainline/Ramp	SF	200,000	$10	$2,000,000		
3.2 Cross Street	SF	130,000	$8	$1,040,000		
4. Roadside Development					$357,406	
	8%	of sections 1 & 3		$357,406		
(Item includes Fencing, Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$665,804	
Illumination	EA	16	$5,000	$80,000		
Traffic Control	5%	of sections 1, 2, 3, 4 & 6		$374,152		150,000
Misc. Traffic Items	3%	of sections 1, 2 & 3		$211,652		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$70,551	
	1%	of sections 1, 2 & 3		$70,551		
Construction Subtotal Items 1,2,3,4, 5 and 6		(Round to nearest 1000)				$8,149,000
7. Contingencies			25%	of Subtotal	$2,037,250	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$10,187,000
9. Mobilization -			10%	of Line 8	$1,018,700	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$11,206,000
11. Sales Tax -			8.00%	of Line 10	$896,480	
12. Subtotal (Round to the nearest 1000)						$12,103,000
13. Construction Engineering & Cont.			15%	of Line 12	$1,815,450	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$13,919,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$1,670,280
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$15,730,000

LONG-TERM CONCEPTUAL COST ESTIMATE

Project Description: Goodwin Road Bridge Replacement
Project Action: Includes new Wenatchee River Bridge West of Goodwin Road

Washington State Department of Transportation
Date: Feb 2002
Date of Cost Index: 2001
Made By: J. St. John
Checked By: T. McDonald

I. RIGHT OF WAY	Unit	Quantity	Unit Price	Cost	Total
Acquisition					$1,292,000
Agricultural	SF	92,000	$1	$92,000	
Comm./Residential	SF	120,000	$10	$1,200,000	

II. CONSTRUCTION	Unit	Quantity	Unit Price	Cost	Subtotal	Total
1. Grading / Drainage					$407,460	
1.1 Clearing/Grubbing	Acre	5	$500	$2,500		
1.2 Roadway Prism	15%	of Sections 2.2 & 3		$172,800		
1.3 Major Cut/Fill	CY	20,000	$7	$140,000		
1.4 Major Walls	CY		$7	$0		
1.5 Drainage	8%	of Sections 2.2 & 3		$92,160		
2. Structures					$6,540,000	
2.1 Bridge Structure	SF	41,600	$150	$6,240,000		
2.2 Retaining Walls	SF	4,000	$75	$300,000		
3. Surfacing / Paving					$852,000	
3.1 Mainline/Ramp	SF	0	$10	$0		
3.2 Cross Street	SF	106,500	$8	$852,000		
4. Roadside Development					$62,973	
	5%	of sections 1 & 3		$62,973		
(Item includes Fencing, Temporary Water Pollution Control, Environmental Mitigation)						
5. Traffic Services & Safety					$801,005	
Illumination	EA	4	$5,000	$20,000		
Traffic Signals	EA	1	$150,000	$150,000		
Traffic Control	5%	of sections 1, 2, 3, 4 & 6		$397,021		150,000
Misc. Traffic Items	3%	of sections 1, 2 & 3		$233,984		
(Item includes Guard Rail, Concrete Barrier, Guide Posts, Striping, etc.)						
6. Major Utilities					$77,995	
	1%	of sections 1, 2 & 3		$77,995		
Construction Subtotal Items 1,2,3,4, 5 and 6 (Round to nearest 1000)						$8,742,000
7. Contingencies			25%	of Subtotal	$2,185,500	
8. Construction Subtotal Lines 1 through 7 (Round to nearest 1000)						$10,928,000
9. Mobilization -			10%	of Line 8	$1,092,800	
10. Subtotal Lines 8 & 9 (Round to the nearest 1000)						$12,021,000
11. Sales Tax -			8.00%	of Line 10	$961,680	
12. Subtotal (Round to the nearest 1000)						$12,983,000
13. Construction Engineering & Cont.			15%	of Line 12	$1,947,450	
14. Construction Total Lines 12 and 13 (Round to the nearest 1000)						$14,931,000
III. DESIGN ENGINEERING & ADMIN			12%	of Line 14		$1,791,720
IV. TOTAL ESTIMATED COST		Lines I, 14 and III (Round to the nearest 1000)				$18,015,000

APPENDIX D –
ACCIDENT BENEFIT/COST ANALYSIS
SUMMARY AND WORKSHEETS

Accident Benefit/Cost Analysis Summary			
Improvement	**Total Annual Safety Benefit**	**Estimated Construction Cost**	**B/C Ratio**
Signalization:			
Dryden Avenue Intersection	$287,450	$326,000	11.98
Goodwin/Hay Canyon Road Intersection	$200,483	$259,000	10.52
Interchanges and Long Term Phases:			
Blewett Diamond Interchange	$493,983	$16,800,000	0.92
Goodwin Bridge Replacement	$200,483	$14,300,000	0.44
East Cashmere Diamond Interchange	$306,810	$21,100,000	0.45
Sunnyslope Diamond Interchange	$306,350	$12,200,000	0.78
Corridor-wide Improvements:			
Intersection Warning Signs	$171,058	$33,000	49.07
Rumble Strips	$1,333,208	$42,000	300.48
Minor Channelization Improvements:			
Saunders/Deadman Hill Road	$24,733	$197,000	2.27
Alice Avenue	$4,533	$17,000	4.81
Dryden Avenue Channelization	$229,400	$196,000	15.91
North Dryden Road	$4,433	$58,000	1.38
Goodwin/Hay Canyon Road	$159,967	$53,000	54.49
Aplets Way	**	$124,000	
Cotlets Way	$25,680	$170,000	2.73
Old Monitor Rd (Illumination)	$6,570	$31,000	3.83
Red Apple/Old Monitor Road	$69,100	$58,000	21.51
Red Apple/Selfs Road	$73,533	$79,000	16.80
Easy Street/Main Street	**	$103,000	
Lower Sunnyslope Road	$9,267	$306,000	0.55
School Street	$29,167	$220,000	2.39
Major Channelization Revisions:			
Blewett Junction	$177,767	$771,000	4.16

** The traffic signals at Aplets Way and Main Street/Easy Street were constructed in 2001 and 1999, respectively. Insufficient accident data is available for these two intersections to reveal the trends in accident patterns. Also, actuated warning signs were installed at the Main Street/Easy Street intersection in 2001.

BENEFIT/COST WORKSHEET
for Collision Reduction

Safety Improvement Location: US 2/97 MP 106.45 MP 106.55

Safety Improvement Description: Dryden Road - Signalization

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $326,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

	Before (historic)				-	After (Estimated)			Annual Benefit
Collision Type	No.	Yrs.		Rate		Resultant Factor	Rate		
a) Fatality	1.00	6	=	0.17		0.50	0.08	=	0.08
b) Disabling Injury	2.00	6	=	0.33		0.50	0.17	=	0.17
c) Evident Injury	4.00	6	=	0.67		0.50	0.33	=	0.33
d) Possible Injury	5.00	6	=	0.83		0.50	0.42	=	0.42
e) Property Damage Only	4.00	6	=	0.67		0.70	0.47	=	0.20

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	83,333
b) (3b)(4b)	=	166,667
c) (3c)(4c)	=	21,667
d) (3d)(4d)	=	14,583
e) (3e)(4e)	=	1,200
f) Total, B	=	287,450

6. Service Life, n = 20 7. Salvage Value, T = 0 8 Interest Rate, i = 0.04

9. Present Worth of Costs, PWOC:

b) Present Worth Factorof a uniform series, SPWin 13.59

c) PWOC= I + K(SPWin)-T(PWni) 326,000

10. Present Worth of Benefits, PWOB=B(SPWin) 3,906,446

11. Benefit Cost Ration, B/C=PWOB/PWOC **11.98**

12. Net Benefit = PWOB-PWOC 3,580,446

BENEFIT/COST WORKSHEET
for Collision Reduction

Safety Improvement Location: US 2/97 MP 110.10 MP 110.18

Safety Improvement Description: Goodwin/Hay Canyon - Signalization

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $259,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

	Before (historic)				-	After (Estimated)			Annual Benefit
Collision Type	No.	Yrs.		Rate		Resultant Factor	Rate		
a) Fatality	1.00	6	=	0.17		0.50	0.08	=	0.08
b) Disabling Injury	1.00	6	=	0.17		0.50	0.08	=	0.08
c) Evident Injury	5.00	6	=	0.83		0.50	0.42	=	0.42
d) Possible Injury	2.00	6	=	0.33		0.50	0.17	=	0.17
e) Property Damage Only	3.00	6	=	0.50		0.70	0.35	=	0.15

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	83,333
b) (3b)(4b)	=	83,333
c) (3c)(4c)	=	27,083
d) (3d)(4d)	=	5,833
e) (3e)(4e)	=	900
f) Total, B	=	200,483

6. Service Life, n = 20 7. Salvage Value, T = 0 8 Interest Rate, i = 0.04

9. Present Worth of Costs, PWOC:

b) Present Worth Factorof a uniform series, SPWin 13.59

c) PWOC= I + K(SPWin)-T(PWni) 259,000

10. Present Worth of Benefits, PWOB=B(SPWin) 2,724,569

11. Benefit Cost Ration, B/C=PWOB/PWOC **10.52**

12. Net Benefit = PWOB-PWOC 2,465,569

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 104.16 MP 105.00

Safety Improvement Description: Blewett Diamond Interchange (Intersection (shown) Plus Mainline Benefit)
(see mainline sheet for additional accident reduction)

Evaluator: DMHO Date: 1/31/02

1. **Initial Project Cost, I:** $16,800,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	6	=	0.17		0.00	0.00	=	0.17
b) Disabling Injury	1.00	6	=	0.17		0.00	0.00	=	0.17
c) Evident Injury	9.00	6	=	1.50		0.25	0.38	=	1.13
d) Possible Injury	9.00	6	=	1.50		0.25	0.38	=	1.13
e) Property Damage Only	26.00	6	=	4.33		0.25	1.08	=	3.25

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	166,667
b) (3b)(4b)	=	166,667
c) (3c)(4c)	=	73,125
d) (3d)(4d)	=	39,375
e) (3e)(4e)	=	19,500
f) Total, B	=	**493,983**

Service Life, n	40	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		31.25
b) Present Worth, uniform series, PWU		19.79
c) PWOC= I + K(PWU) - T		$16,800,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$15,438,948
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**0.92**
12. Net Benefit=PWOB-PWOC		($1,361,052)

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 104.16 MP 105.00

Safety Improvement Description: Blewett Diamond Interchange (Mainline Impact)

Evaluator: DMHO Date: 1/31/02

1. **Initial Project Cost, I:** $0

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.70	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.70	0.00	=	0.00
c) Evident Injury	6.00	6	=	1.00		0.70	0.70	=	0.30
d) Possible Injury	3.00	6	=	0.50		0.70	0.35	=	0.15
e) Property Damage Only	13.00	6	=	2.17		0.70	1.52	=	0.65

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	19,500
d) (3d)(4d)	=	5,250
e) (3e)(4e)	=	3,900
f) Total, B	=	**28,650**

Service Life, n: 0
6. Interest Rate, i: 0.04
7. ADT Growth, g: 0.04
8. Salvage Value, T: 0
9. Present Worth of Costs, PWOC:
   a) Present Worth, uniform/gradient series, PWUG: 0.00
   b) Present Worth, uniform series, PWU: 0.00
   c) PWOC= I + K(PWU) - T: $0
10. Present Worth of Benefits, PWOB=B(PWUG): $0
11. Benefit Cost Ratio, B/C=PWOB/PWOC: **#DIV/0!**
12. Net Benefit=PWOB-PWOC: $0

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 110.13 MP 110.19

Safety Improvement Description: Goodwin Bridge Replacement

Evaluator: DMHO Date: 1/31/02

1. **Initial Project Cost, I:** $14,300,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	6	=	0.17		0.50	0.08	=	0.08
b) Disabling Injury	1.00	6	=	0.17		0.50	0.08	=	0.08
c) Evident Injury	5.00	6	=	0.83		0.50	0.42	=	0.42
d) Possible Injury	2.00	6	=	0.33		0.50	0.17	=	0.17
e) Property Damage Only	3.00	6	=	0.50		0.70	0.35	=	0.15

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	83,333
b) (3b)(4b)	=	83,333
c) (3c)(4c)	=	27,083
d) (3d)(4d)	=	5,833
e) (3e)(4e)	=	900
f) Total, B	=	**200,483**

Service Life, n	40
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	31.25
b) Present Worth, uniform series, PWU	19.79
c) PWOC= I + K(PWU) - T	$14,300,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$6,265,903
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**0.44**
12. Net Benefit=PWOB-PWOC	($8,034,097)

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 111.95 MP 113.27

Safety Improvement Description: East CashmereDiamond Interchange (Intersection (shown) plus Mainline Benefit)
(see mainline sheet for additional accident reduction)

Evaluator: DMHO Date: 1/31/02

1. **Initial Project Cost, I:** $21,100,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	5	=	0.00		0.00	0.00	=	0.00
b) Disabling Injury	0.00	5	=	0.00		0.00	0.00	=	0.00
c) Evident Injury	6.00	5	=	1.20		0.25	0.30	=	0.90
d) Possible Injury	3.00	5	=	0.60		0.25	0.15	=	0.45
e) Property Damage Only	17.00	5	=	3.40		0.25	0.85	=	2.55

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	58,500
d) (3d)(4d)	=	15,750
e) (3e)(4e)	=	15,300
f) Total, B	=	**306,810**

Service Life, n	40	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		31.25
b) Present Worth, uniform series, PWU		19.79
c) PWOC= I + K(PWU) - T		$21,100,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$9,589,035
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**0.45**
12. Net Benefit=PWOB-PWOC		($11,510,965)

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP ## 111.63 MP 113.50

Safety Improvement Description: East Cashmere Diamond Interchange (Mainline Impact)

Evaluator: DMHO, KXC edits Date: 2/5/02

1. **Initial Project Cost, I:** $0

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	5	=	0.20		0.70	0.14	=	0.06
b) Disabling Injury	2.00	5	=	0.40		0.70	0.28	=	0.12
c) Evident Injury	4.00	5	=	0.80		0.70	0.56	=	0.24
d) Possible Injury	5.00	5	=	1.00		0.70	0.70	=	0.30
e) Property Damage Only	31.00	5	=	6.20		0.70	4.34	=	1.86

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	$60,000
b) (3b)(4b)	=	$120,000
c) (3c)(4c)	=	$15,600
d) (3d)(4d)	=	$10,500
e) (3e)(4e)	=	$11,160
f) Total, B	=	**$217,260**

Service Life, n 0
6. Interest Rate, i 0.04
7. ADT Growth, g 0.04
8. Salvage Value, T 0
9. Present Worth of Costs, PWOC:
   a) Present Worth, uniform/gradient series, PWUG 0.00
   b) Present Worth, uniform series, PWU 0.00
   c) PWOC= I + K(PWU) - T $0
10. Present Worth of Benefits, PWOB=B(PWUG) $0
11. Benefit Cost Ratio, B/C=PWOB/PWOC **#DIV/0!**
12. Net Benefit=PWOB-PWOC $0

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 117.28 MP 118.46

Safety Improvement Description: Sunnyslope Diamond Interchange (Intersection Impact)
(see mainline sheet for additional accident reduction)

Evaluator: DMHO Date: 1/31/02

1. **Initial Project Cost, I:** $12,200,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.00	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.00	0.00	=	0.00
c) Evident Injury	7.00	6	=	1.17		0.25	0.29	=	0.88
d) Possible Injury	3.00	6	=	0.50		0.25	0.13	=	0.38
e) Property Damage Only	11.00	6	=	1.83		0.25	0.46	=	1.38

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	56,875
d) (3d)(4d)	=	13,125
e) (3e)(4e)	=	8,250
f) Total, B	=	**306,350**

Service Life, n	40
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	31.25
b) Present Worth, uniform series, PWU	19.79
c) PWOC= I + K(PWU) - T	$12,200,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$9,574,659
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**0.78**
12. Net Benefit=PWOB-PWOC	($2,625,341)

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP ## 117.00 MP 118.50

Safety Improvement Description: Sunnyslope Diamond Interchange (Mainline Impact)

Evaluator: DMHO/KXC edits Date: 2/5/02

1. **Initial Project Cost, I:** $0

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	6	=	0.17		0.70	0.12	=	0.05
b) Disabling Injury	3.00	6	=	0.50		0.70	0.35	=	0.15
c) Evident Injury	5.00	6	=	0.83		0.70	0.58	=	0.25
d) Possible Injury	3.00	6	=	0.50		0.70	0.35	=	0.15
e) Property Damage Only	22.00	6	=	3.67		0.70	2.57	=	1.10

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	$50,000
b) (3b)(4b)	=	$150,000
c) (3c)(4c)	=	$16,250
d) (3d)(4d)	=	$5,250
e) (3e)(4e)	=	$6,600
f) Total, B	=	**$228,100**

Service Life, n 0
6. Interest Rate, i 0.04
7. ADT Growth, g 0.04
8. Salvage Value, T 0
9. Present Worth of Costs, PWOC:
   a) Present Worth, uniform/gradient series, PWUG 0.00
   b) Present Worth, uniform series, PWU 0.00
   c) PWOC= I + K(PWU) - T $0
10. Present Worth of Benefits, PWOB=B(PWUG) $0
11. Benefit Cost Ratio, B/C=PWOB/PWOC **#DIV/0!**
12. Net Benefit=PWOB-PWOC $0

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 104.16 MP 118.46

Safety Improvement Description: Corridor-Wide - Signing

Evaluator: DMHO/KXC edits Date: 2/5/02

1. **Initial Project Cost, I:** $33,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	4.00	6	=	0.67		0.95	0.63	=	0.03
b) Disabling Injury	10.00	6	=	1.67		0.95	1.58	=	0.08
c) Evident Injury	47.00	6	=	7.83		0.95	7.44	=	0.39
d) Possible Injury	32.00	6	=	5.33		0.95	5.07	=	0.27
e) Property Damage Only	98.00	6	=	16.33		0.80	13.07	=	3.27

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	33,333
b) (3b)(4b)	=	83,333
c) (3c)(4c)	=	25,458
d) (3d)(4d)	=	9,333
e) (3e)(4e)	=	19,600
f) Total, B	=	**171,058**

Service Life, n	10	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		9.47
b) Present Worth, uniform series, PWU		8.11
c) PWOC= I + K(PWU) - T		$33,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$1,619,264
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**49.07**
12. Net Benefit=PWOB-PWOC		$1,586,264

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 104.16 MP 118.46

Safety Improvement Description: Corridor-Wide - Rumble Strips

Evaluator: DMHO Date: 4/2/02

1. **Initial Project Cost, I:** $42,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	5.00	6	=	0.83		0.75	0.63	=	0.21
b) Disabling Injury	22.00	6	=	3.67		0.75	2.75	=	0.92
c) Evident Injury	42.00	6	=	7.00		0.75	5.25	=	1.75
d) Possible Injury	31.00	6	=	5.17		0.75	3.88	=	1.29
e) Property Damage Only	197.00	6	=	32.83		0.75	24.63	=	8.21

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	208,333
b) (3b)(4b)	=	916,667
c) (3c)(4c)	=	113,750
d) (3d)(4d)	=	45,208
e) (3e)(4e)	=	49,250
f) Total, B	=	**1,333,208**

Service Life, n	10
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	9.47
b) Present Worth, uniform series, PWU	8.11
c) PWOC= I + K(PWU) - T	$42,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$12,620,350
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**300.48**
12. Net Benefit=PWOB-PWOC	$12,578,350

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 104.72 MP 104.75

Safety Improvement Description: Blewett Junction - Major Channelization Revision
(treat like right turn channelization)

Evaluator: DMHO/KXC edits Date: 2/5/02

1. **Initial Project Cost, I:** $771,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	6	=	0.17		0.60	0.10	=	0.07
b) Disabling Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
c) Evident Injury	6.00	6	=	1.00		0.60	0.60	=	0.40
d) Possible Injury	7.00	6	=	1.17		0.60	0.70	=	0.47
e) Property Damage Only	21.00	6	=	3.50		0.90	3.15	=	0.35

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	66,667
b) (3b)(4b)	=	66,667
c) (3c)(4c)	=	26,000
d) (3d)(4d)	=	16,333
e) (3e)(4e)	=	2,100
f) Total, B	=	**177,767**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$771,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$3,209,206
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**4.16**
12. Net Benefit=PWOB-PWOC	$2,438,206

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 105.00 MP 105.20

Safety Improvement Description: Deadman/Saunders - Lengthen Westbound Left-Turn Lane

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $197,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	4.00	6	=	0.67		0.60	0.40	=	0.27
d) Possible Injury	3.00	6	=	0.50		0.60	0.30	=	0.20
e) Property Damage Only	4.00	6	=	0.67		0.90	0.60	=	0.07

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	17,333
d) (3d)(4d)	=	7,000
e) (3e)(4e)	=	400
f) Total, B	=	**24,733**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$197,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$446,509
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**2.27**
12. Net Benefit=PWOB-PWOC	$249,509

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 106.05 MP 106.10

Safety Improvement Description: Alice Avenue - Lengthen Westbound Left-Turn Lane

Evaluator: DMHO Date: 2/12/02

1. **Initial Project Cost, I:** $17,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
d) Possible Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
e) Property Damage Only	2.00	6	=	0.33		0.90	0.30	=	0.03

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	4,333
d) (3d)(4d)	=	0
e) (3e)(4e)	=	200
f) Total, B	=	**4,533**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$17,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$81,840
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**4.81**
12. Net Benefit=PWOB-PWOC	$64,840

BENEFIT/COST WORKSHEET
for Collision Reduction

Safety Improvement Location: US 2/97 MP 106.45 MP 106.55

Safety Improvement Description: Dryden Road - Channelization

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $196,000.00

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

	Before (historic)				-	After (Estimated)		=	Annual Benefit
Collision Type	No.	Yrs.		Rate		Resultant Factor	Rate		
a) Fatality	1.00	6	=	0.17		0.60	0.10	=	0.07
b) Disabling Injury	2.00	6	=	0.33		0.60	0.20	=	0.13
c) Evident Injury	4.00	6	=	0.67		0.60	0.40	=	0.27
d) Possible Injury	5.00	6	=	0.83		0.60	0.50	=	0.33
e) Property Damage Only	4.00	6	=	0.67		0.90	0.60	=	0.07

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	66,667
b) (3b)(4b)	=	133,333
c) (3c)(4c)	=	17,333
d) (3d)(4d)	=	11,667
e) (3e)(4e)	=	400
f) Total, B	=	229,400

6. Service Life, n = 20 7. Salvage Value, T = 0 8 Interest Rate, i = 0.04

9. Present Worth of Costs, PWOC:

b) Present Worth Factorof a uniform series, SPWin 13.59

c) PWOC= I + K(SPWin)-T(PWni) 196,000

10. Present Worth of Benefits, PWOB=B(SPWin) 3,117,546

11. Benefit Cost Ration, B/C=PWOB/PWOC **15.91**

12. Net Benefit = PWOB-PWOC 2,921,546

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 108.85 MP 108.85

Safety Improvement Description: North Dryden - Lengthen Eastbound and Westbound Left-Turn Lanes, Add Westbound Right-Turn Lane

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $58,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
d) Possible Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
e) Property Damage Only	1.00	6	=	0.17		0.90	0.15	=	0.02

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	4,333
d) (3d)(4d)	=	0
e) (3e)(4e)	=	100
f) Total, B	=	**4,433**

Service Life, n	20	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		18.05
b) Present Worth, uniform series, PWU		13.59
c) PWOC= I + K(PWU) - T		$58,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$80,035
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**1.38**
12. Net Benefit=PWOB-PWOC		$22,035

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 110.10 MP 110.18

Safety Improvement Description: Goodwin/Hay Canyon - Lengthen Eastbound and Westbound Left-Turn Lanes, Westbound Right-Turn Lane Improvements

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $53,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	1.00	6	=	0.17		0.60	0.10	=	0.07
b) Disabling Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
c) Evident Injury	5.00	6	=	0.83		0.60	0.50	=	0.33
d) Possible Injury	2.00	6	=	0.33		0.60	0.20	=	0.13
e) Property Damage Only	3.00	6	=	0.50		0.90	0.45	=	0.05

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	66,667
b) (3b)(4b)	=	66,667
c) (3c)(4c)	=	21,667
d) (3d)(4d)	=	4,667
e) (3e)(4e)	=	300
f) Total, B	=	**159,967**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$53,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$2,887,864
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**54.49**
12. Net Benefit=PWOB-PWOC	$2,834,864

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 111.95 MP 112.00

Safety Improvement Description: Cotlets Way - Lengthen Eastbound and Westbound Left-Turn Lanes, Add Eastbound and Westbound Right-Turn Lanes
1995-1996 plus 1998-2000 data, signalized in 1994

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $170,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	5	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	5	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	3.00	5	=	0.60		0.60	0.36	=	0.24
d) Possible Injury	3.00	5	=	0.60		0.60	0.36	=	0.24
e) Property Damage Only	14.00	5	=	2.80		0.90	2.52	=	0.28

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	15,600
d) (3d)(4d)	=	8,400
e) (3e)(4e)	=	1,680
f) Total, B	=	**25,680**

Service Life, n	20	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		18.05
b) Present Worth, uniform series, PWU		13.59
c) PWOC= I + K(PWU) - T		$170,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$463,599
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**2.73**
12. Net Benefit=PWOB-PWOC		$293,599

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 112.59 MP 112.60

Safety Improvement Description: Old Monitor Road Intersection Illumination
1995-6 plus 1998-2000

Evaluator: KXC Date: 2/5/02

1. **Initial Project Cost, I:** $31,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	- After (Estimated) Resultant Factor	Rate	= Annual Benefit
a) Fatality	0.00	5	=	0.00	0.85	0.00	= 0.00
b) Disabling Injury	0.00	5	=	0.00	0.85	0.00	= 0.00
c) Evident Injury	3.00	5	=	0.60	0.85	0.51	= 0.09
d) Possible Injury	0.00	5	=	0.00	0.85	0.00	= 0.00
e) Property Damage Only	3.00	5	=	0.60	0.80	0.48	= 0.12

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injur	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damag	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	= 0
b) (3b)(4b)	= 0
c) (3c)(4c)	= 5,850
d) (3d)(4d)	= 0
e) (3e)(4e)	= 720
f) Total, B	= **6,570**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$31,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$118,608
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**3.83**
12. Net Benefit=PWOB-PWOC	$87,608

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 113.15 MP 113.30

Safety Improvement Description: Red Apple/Old Monitor Road - Lengthen Eastbound and Westbound Left-Turn Lanes, Add Westbound Right-Turn Lane
zero accidents in 1995-1996 and 1998-2000 data, Cotlets signalized in 1994. Input 1997 accidents for some value

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $58,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate		Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
c) Evident Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
d) Possible Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
e) Property Damage Only	1.00	6	=	0.17		0.90	0.15	=	0.02

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage On	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	66,667
c) (3c)(4c)	=	0
d) (3d)(4d)	=	2,333
e) (3e)(4e)	=	100
f) Total, B	=	**69,100**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$58,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$1,247,456
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**21.51**
12. Net Benefit=PWOB-PWOC	$1,189,456

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 113.90 MP 113.95

Safety Improvement Description: Red Apple/Selfs Road - Lengthen Eastbound Left-Turn Lane, Add Westbound Right-Turn Lane

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $79,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
c) Evident Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
d) Possible Injury	1.00	6	=	0.17		0.60	0.10	=	0.07
e) Property Damage Only	2.00	6	=	0.33		0.90	0.30	=	0.03

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	66,667
c) (3c)(4c)	=	4,333
d) (3d)(4d)	=	2,333
e) (3e)(4e)	=	200
f) Total, B	=	**73,533**

Service Life, n	20	
6. Interest Rate, i	0.04	
7. ADT Growth, g	0.04	
8. Salvage Value, T	0	
9. Present Worth of Costs, PWOC:		
a) Present Worth, uniform/gradient series, PWUG		18.05
b) Present Worth, uniform series, PWU		13.59
c) PWOC= I + K(PWU) - T		$79,000
10. Present Worth of Benefits, PWOB=B(PWUG)		$1,327,491
11. Benefit Cost Ratio, B/C=PWOB/PWOC		**16.80**
12. Net Benefit=PWOB-PWOC		$1,248,491

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 117.25 MP 117.40

Safety Improvement Description: L. Monitor/L. Sunnyslope - Add Westbound Right-Turn Deceleration Lane

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $306,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	2.00	6	=	0.33		0.60	0.20	=	0.13
d) Possible Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
e) Property Damage Only	6.00	6	=	1.00		0.90	0.90	=	0.10

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	8,667
d) (3d)(4d)	=	0
e) (3e)(4e)	=	600
f) Total, B	=	**9,267**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$306,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$167,290
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**0.55**
12. Net Benefit=PWOB-PWOC	($138,710)

BENEFIT/COST WORKSHEET
Safety Improvement Projects for Collision Reduction
With adjustments for Residual Value

Safety Improvement Location: US 2/97 MP 118.44 MP 118.49

Safety Improvement Description: School Street - Lengthen Eastbound Left Turn Lane

Evaluator: DMHO Date: 2/1/02

1. **Initial Project Cost, I:** $220,000

2. **Net Annual Operations & Maintenance Costs, K:** 0

3. Annual Safety Benefits in Number of Collisions:

Collision Type	Before (historic) No.	Yrs.		Rate	-	After (Estimated) Resultant Factor	Rate	=	Annual Benefit
a) Fatality	0.00	6	=	0.00		0.60	0.00	=	0.00
b) Disabling Injury	0.00	6	=	0.00		0.60	0.00	=	0.00
c) Evident Injury	5.00	6	=	0.83		0.60	0.50	=	0.33
d) Possible Injury	3.00	6	=	0.50		0.60	0.30	=	0.20
e) Property Damage Only	5.00	6	=	0.83		0.90	0.75	=	0.08

4. Costs Per Collision (AASHTO, 1989):

Collision Type	Cost
a) Fatality	$ 1,000,000
b) Disabling Injury	$ 1,000,000
c) Evident Injury	$ 65,000
d) Possible Injury	$ 35,000
e) Property Damage Onl	$ 6,000

5. Annual Safety Benefits by Costs of Collision:

a) (3a)(4a)	=	0
b) (3b)(4b)	=	0
c) (3c)(4c)	=	21,667
d) (3d)(4d)	=	7,000
e) (3e)(4e)	=	500
f) Total, B	=	**29,167**

Service Life, n	20
6. Interest Rate, i	0.04
7. ADT Growth, g	0.04
8. Salvage Value, T	0
9. Present Worth of Costs, PWOC:	
a) Present Worth, uniform/gradient series, PWUG	18.05
b) Present Worth, uniform series, PWU	13.59
c) PWOC= I + K(PWU) - T	$220,000
10. Present Worth of Benefits, PWOB=B(PWUG)	$526,543
11. Benefit Cost Ratio, B/C=PWOB/PWOC	**2.39**
12. Net Benefit=PWOB-PWOC	$306,543