HIGHWAY 99 TRAFFIC SAFETY AND CIRCULATION STUDY

Prepared for:
The City of Edmonds

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1 INTRODUCTION

1.1. Background

The City of Edmonds last studied the State Route 99 (SR 99) Corridor as part of its Highway 99 Enhancement Project/Market Assessment. That report's mission was to assess the market feasibility of the commercial and residential development in the vicinity of Highway 99. The study identified enhancement scenarios, market factors, multifamily housing considerations, and short-term retail development opportunities. The report also identified Highway 99's deficiencies that prevent the area from further development, including the need to improve left turns and highway crossings.

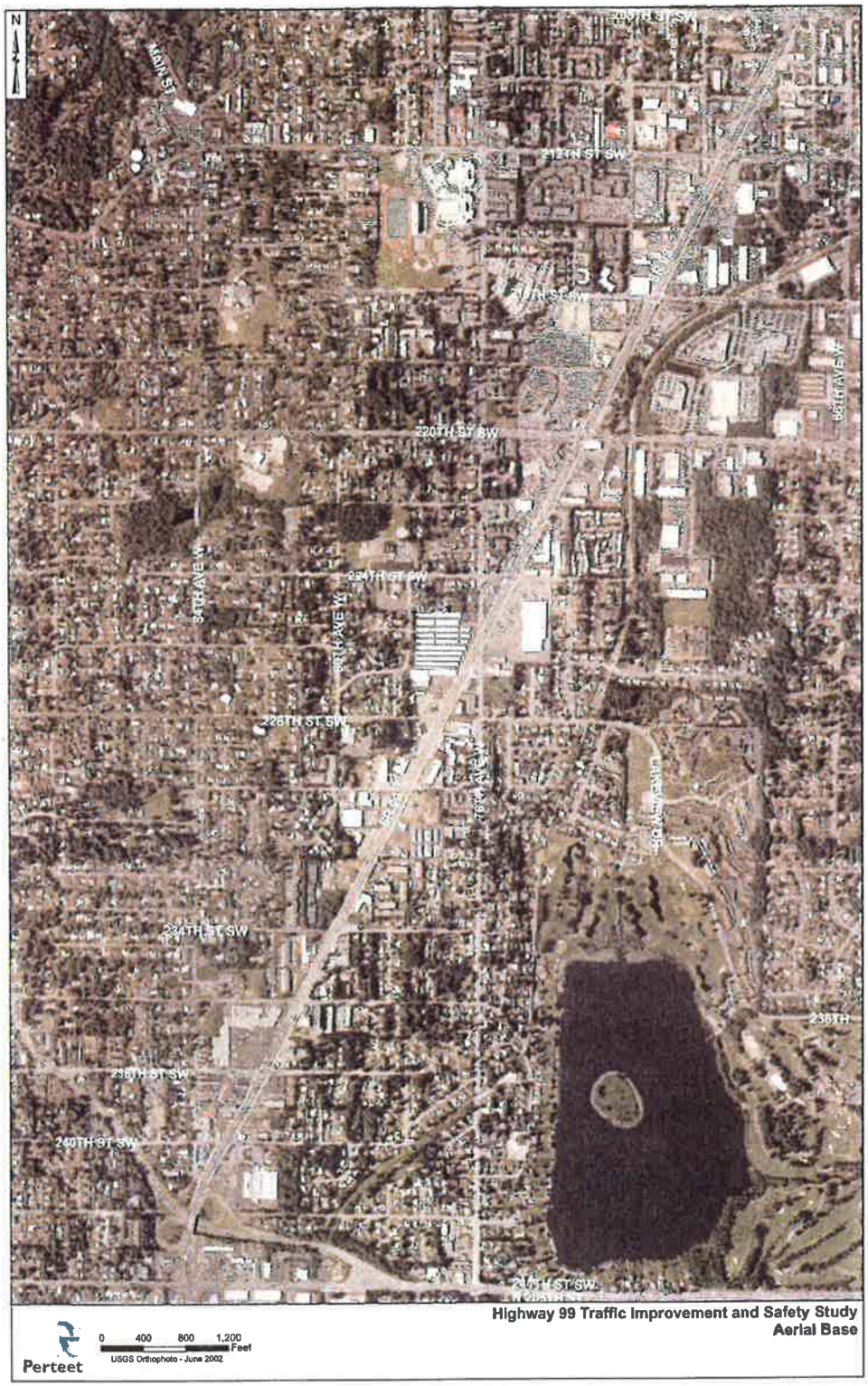
The report also identified a need to examine the transportation system and circulation along the Highway 99 Corridor through Edmonds. This was warranted by several factors, including:

- The forthcoming deployment of a Bus Rapid Transit (BRT) system by Community Transit;
- The need to improve access to adjacent properties;
- A desire to intensify land use and associated traffic impacts in the area;
- The congestion delays on the highway which are caused by increased traffic volumes in the vicinity; and
- An increase in the Highway 99 Corridor collision rate.

1.2 Study Area

The SR 99 Traffic and Circulation Study area primarily includes the portions of SR 99 that lie with in the city limits of Edmonds, as shown on ***Figure 1.1***. The study area is roughly bounded by SR 104 to the south and 212th Street SW to the north and one block to the east of west of SR 99.

Figure 1.1
Highway 99 Traffic and Safety Improvement Study Area



1.3 Goals and Objectives

The goals of the study were as follows:

- To work efficiently with those who represent the study area's community, business, and agency interests to collaborate on a vision of SR 99's future transportation system;
- To evaluate the transportation system's needs based on current and future traffic and land-use conditions;
- To consider the potential for Urban Village or other Transit-Oriented or Transit-Adjacent Development opportunities;
- To develop a prioritized list of multi-modal solutions to the transportation needs of the study area ;
- To identify projects for early implementation and incorporation into the CIP; and
- To obtain adoption of the study recommendations by the Edmonds City Council.

1.4 Process

The SR 99 Traffic and Circulation Study followed a well-defined process to its completion. City staff prepared a scope of work with input from the consultant, Perteet, Inc. The scope of work was approved by the City Council, and final work plans were put in place in January 2006. Regular updates of the study's progress were made to City Staff.

A Technical Advisory Committee was instituted with representatives from several departments of the City and also with representatives of other agencies to coordinate relevant projects in the area. A detailed Public Involvement Process was initiated over the course of the study, which is described in further sections of this report. In addition, an open houses, workshops and design charrettes were undertaken throughout the study process.

Basic tasks for the study included assembling Highway 99's current land-use and travel data, making traffic projections for a 20-year horizon, and analyzing travel operations. Specific projects were then developed and tested with a particular emphasis on multi-modal solutions. The projects were developed in public forums, using input from business and neighborhood leaders. The projects were then analyzed and evaluated using technical criteria and subjective criteria developed and administered by representatives of the public. Regular progress meetings with City of Edmonds staff, other agencies, and public representatives were conducted throughout the course of the study.

1.5 Related Projects and Studies

The SR 99 Traffic and Circulation Study was coordinated with the help of other plans, studies, and projects that have been conducted in the *project study area*. The following are considered to be the most relevant:

Highway 99 Enhancement Project/Market Assessment

This report assessed the market feasibility of the commercial and residential development along Highway 99. The report built upon the scenarios presented in the City of Edmonds Highway 99 Enhancement Report. The analysis validated many of the thoughts in the enhancement report, summarized the land-use and market conditions, analyzed the benefits to improving SR 99, and made recommendations for further studies and actions to be taken by the city. The report was completed in August 2004.

SR 99 Corridor – Bus Rapid Transit Planning Study

Community Transit conducted a Bus Rapid Transit (BRT) Planning Study for the SR 99 Corridor extending from Everett to Downtown Seattle within Snohomish and King Counties. The study developed transit ridership forecasts based on various route options and levels of service. The study identified BRT components that would be needed for the operation in the SR 99

corridor, and identified deployment schedules and cost. The final report was released in December 2004.

1.6 Report Structure

This report is organized with the following sections:

- Public Involvement
- Existing and Future Conditions
- Project Development and Evaluation
- Recommended Project Implementation

2 Public Involvement

Public involvement for the SR 99 Traffic and Circulation Study was an essential element in the development and ranking of transportation alternatives. The following activities were undertaken to ensure maximum public involvement:

- A Design Charrette in April 2006
- A Public Open House in June 2006
- Public presentations to the SR 99 Task Force in fall of 2006, and Edmonds City Council in February 2007.

2.1 Design Charrettes

The charrette was facilitated by the consultant Perteet, Inc., and was conducted from 9 a.m. to Noon on Friday, April 6, 2006 at Edmonds City Hall. The purpose of the charrette was to investigate potential improvements that could be made along the SR 99 corridor through the city limits of Edmonds. Representatives from Lynnwood, Shoreline, WSDOT; along with City of Edmonds Staff members attend the workshop. The workshop began with a presentation covering the corridor's background information. The presentation topics included roadway geometrics, roadway classification, accident analysis, traffic volumes, pedestrian crossings, bicycle facilities, transit facilities, adjacent land use and potential economic redevelopment opportunities.

The group identified several concerns about the SR 99 roadway that need to be addressed as part of the improvements:

- Pedestrian accidents.
- Poor illumination.
- Need better balance between business access and safety.
- High vehicle speeds.
- Lack of defined pedestrian crossings

- Not enough bicycle crossings to interurban trail and other bike facilities.
- Poor signal timing.

The group analyzed the corridor and a block by block basis. The following list of potential improvements was identified for further investigation and review:

212th Street SW

- Improve channelization on 212th Street to eliminate split phase signal timing.

216th Street SW

- Add right-turn lanes at 216th on the west side. Improve intersection to eliminate split phasing.
- Better linkage from the BRT and park-and-ride at 216th.
- Improve lighting from 220th to 216th.

220th Street SW

- 220th to 224th - Consolidate driveways and add median to reduce accidents.
- Add BRT Stop at 224th.

224th Street SW

- Improve intersection at 76th Avenue West.
- Eliminate southbound left turns at 76th Avenue West by constructing a median

228th Street SW

- Construct 228th between SR 99 and 76th Avenue West.
- Add signal at intersection of 228th and SR 99.
- Consolidate driveways.
- Improve illumination.

230th Street SW

- Improve illumination.

234th Street SW

- Signalize intersection of 234th and SR 99.
- Add medians to restrict left turns.

236th Street SW

- Restrict 236th to right-in, right-out.
- Add medians to restrict left turns.

238th Street SW

- Northbound U-turn.
- Add C-curb/medians to restrict left turns.

240th Street SW

- Restrict 240th to right-in, right-out and southbound left turns.
- Redevelop Burlington Coat Factory to 238th. Vacate 240th Street right of way and construct a new north-south road connecting to 238th.
- Construct a ring road from behind Burlington Coat Factor, under SR 99 up to 238th.

2.2 Public Open Houses

A public open house was held on Thursday, June 22, 2006, from 6 to 7:30 p.m. at the Edmonds Public Works Facility, 7110 210th Street SW. This open house was used to introduce the SR 99 Traffic and Circulation Study to the public and to seek their feedback on issues in the study area. This open house was attended by only three people.

2.3 SR 99 Task Force

The SR 99 Task Force reviewed the SR 99 Traffic and Circulation Study in fall 2006. A presentation was made to the task force in October of 2006. The group reviewed project alternatives and offered feedback for the study. Several members of the Citizen Advisory Transportation Committee attended the open houses and workshops.

Members of the Highway 99 Task Force included:

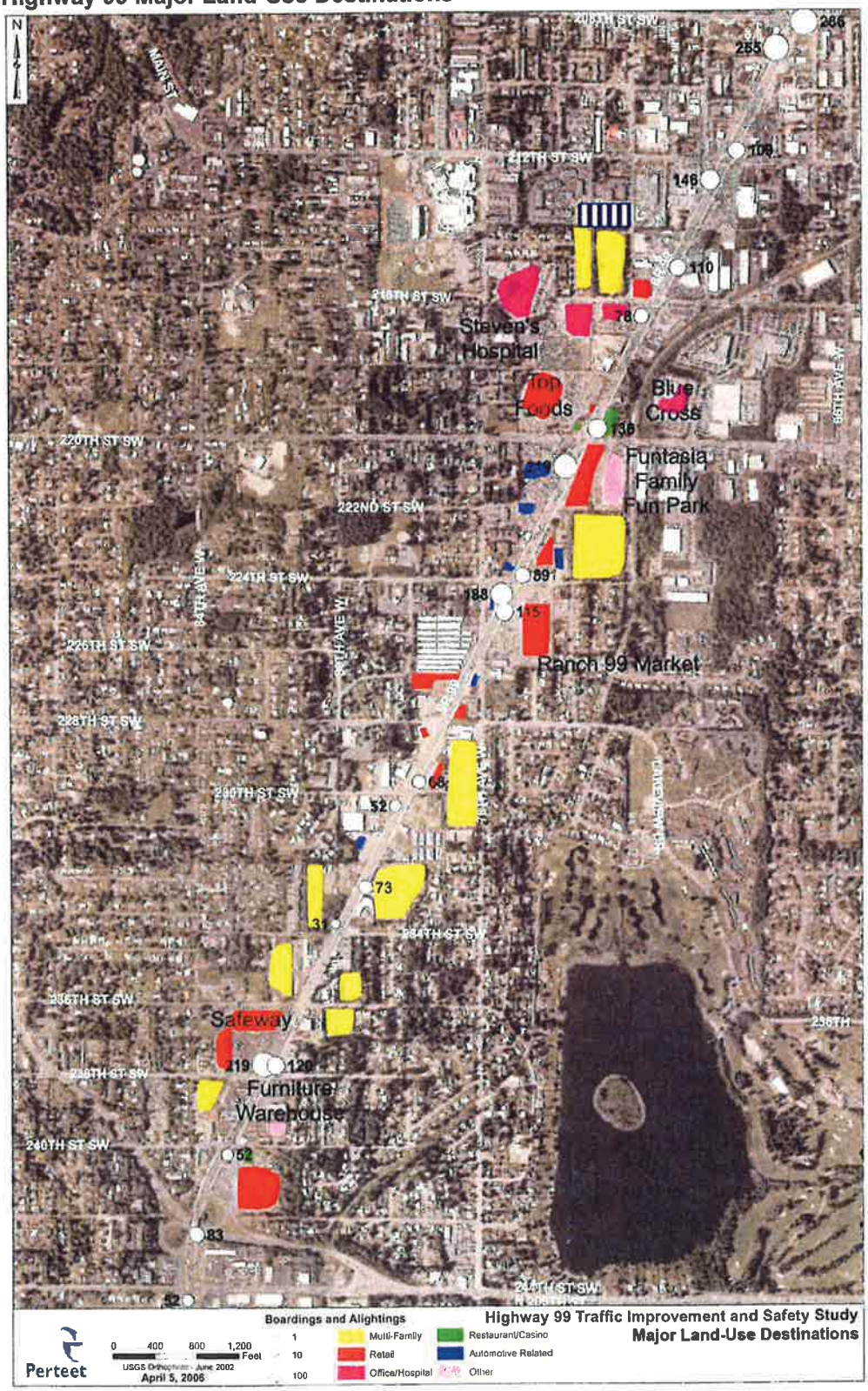
Richard Marin,	City Council
Ron Wamboldt,	City Council
Michael Plunkett,	City Council
Duane Bowman,	Development Services Director
Stephen Clifton,	Community Services Director
Don Sims,	Traffic Engineer
Bruce Wittenberg,	Citizen
Jim Underhill,	Citizen
Mike Popke,	Lynnwood Honda
Dale Behar,	Property Owner
Polly Junkermier-Poole,	Stevens Hospital
Jan Vance, Edmonds	Chamber of Commerce

3 Existing and Future Conditions

3.1 Land Use Development

To understand the movement of people in the study area, it is useful to know the primary origins and destinations of vehicles in the study area. ***Figure 3.1*** shows the locations of major destinations in the study area. These include many different retail uses, grocery stores, car dealerships, offices, professional services, health services, banks, financial services recreation, apartments, motels, and vacant land. The study area map identifies an area of impact, and an area of interest. In total, there is 700,000 square feet of retail space and 534,000 square feet of office space in the study area.

Figure 3.1
Highway 99 Major Land-Use Destinations



3.2 Roadway Infrastructure

3.2.1 Roadway section

Highway 99 is designated as a principal arterial. The current roadway section is shown in ***Figure 3.2***. The configuration consist of two 11-foot travel lanes in each direction, an 13- foot outside Business Access/ Transit (BAT) lane in each direction, a 13- foot center turn lane and 8 – foot sidewalks on both sides

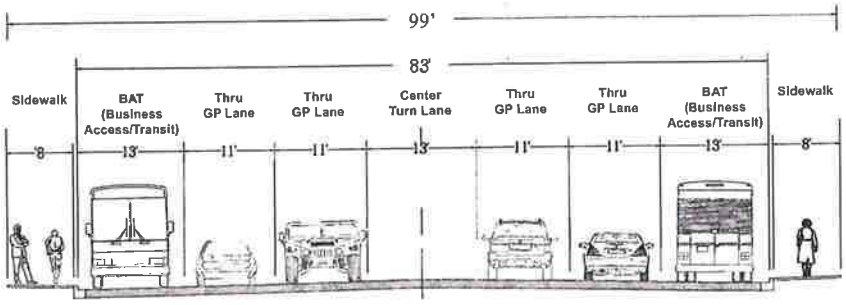
3.2.2 Intersection Traffic Control

There are six traffic signals within the study area as shown in ***Figure 3.2***. All of the traffic signals fall under the jurisdiction of the City of Edmonds. The City of Lynnwood operates the signals as part of the coordinated traffic signal progression along SR 99.

In addition to the signals there are six intersections with stop control. The skewed intersection of 76th has been further controlled by restricting left turns on 76th and on northbound SR 99.

Figure 3.2
Highway 99 Existing Roadway

SR 99 Roadway
Seven Lane Section - 45 mph
With Sidewalks



Highway 99 Traffic Improvement and Safety Study
Existing Channelization

Perteet

3.2.3 Traffic Volumes

The existing pm peak hour volumes are depicted in ***Figure 3.3*** and the average daily. Through the project area, SR99's average daily traffic volume (ADT) is 34,000 vehicles. The traffic peak hourly volumes are the greatest along:

- SR 99 north of SR104 with 2940 vehicles per hour (vph)
- SR 99 north of 212th Street with 2810 vph
- 220th Street SW with 1630 vph
- 212th Street SW with 1070 vph

The area surrounding the project is fully developed under existing land uses with small pocket of redevelopement opportunities. As a result, traffic volumes are projected to grow slowly. The SR99 Corridor is projected to grow at a rate of 1.5% per year within the project study area.

Figure 3.3
Highway 99 Existing PM Peak Traffic Volumes

Figure 3.4
Highway 99 Existing Levels of Service

3.2.5 Existing Roadway Levels of Service

The existing Levels of Service (LOS) were calculated for all of the intersections within the study area based on PM peak hour traffic volumes collected during the year 2005 and based on the existing signal timing and lane configurations. The LOS calculations were performed using Synchro Version 5.0.

The LOS results are depicted in ***Figure 3.4.*** Most signalized intersections in the study area operate at LOS of D or worse during in the PM peak hour. The side-streets of the non-signalized intersections operate at an LOS of F.

What is a level of service?

In short, level of service (LOS) measures the length of delay caused by congestion at an intersection or on a roadway.

Level of service is a grade – A through F – used by transportation planners to describe how efficiently vehicles are moving along a roadway or through an intersection.

Level of service is a measure of the density of vehicles using a roadway – generally, the shorter amount of time it takes to travel down a road or get through an intersection, the better the level of service and speed.

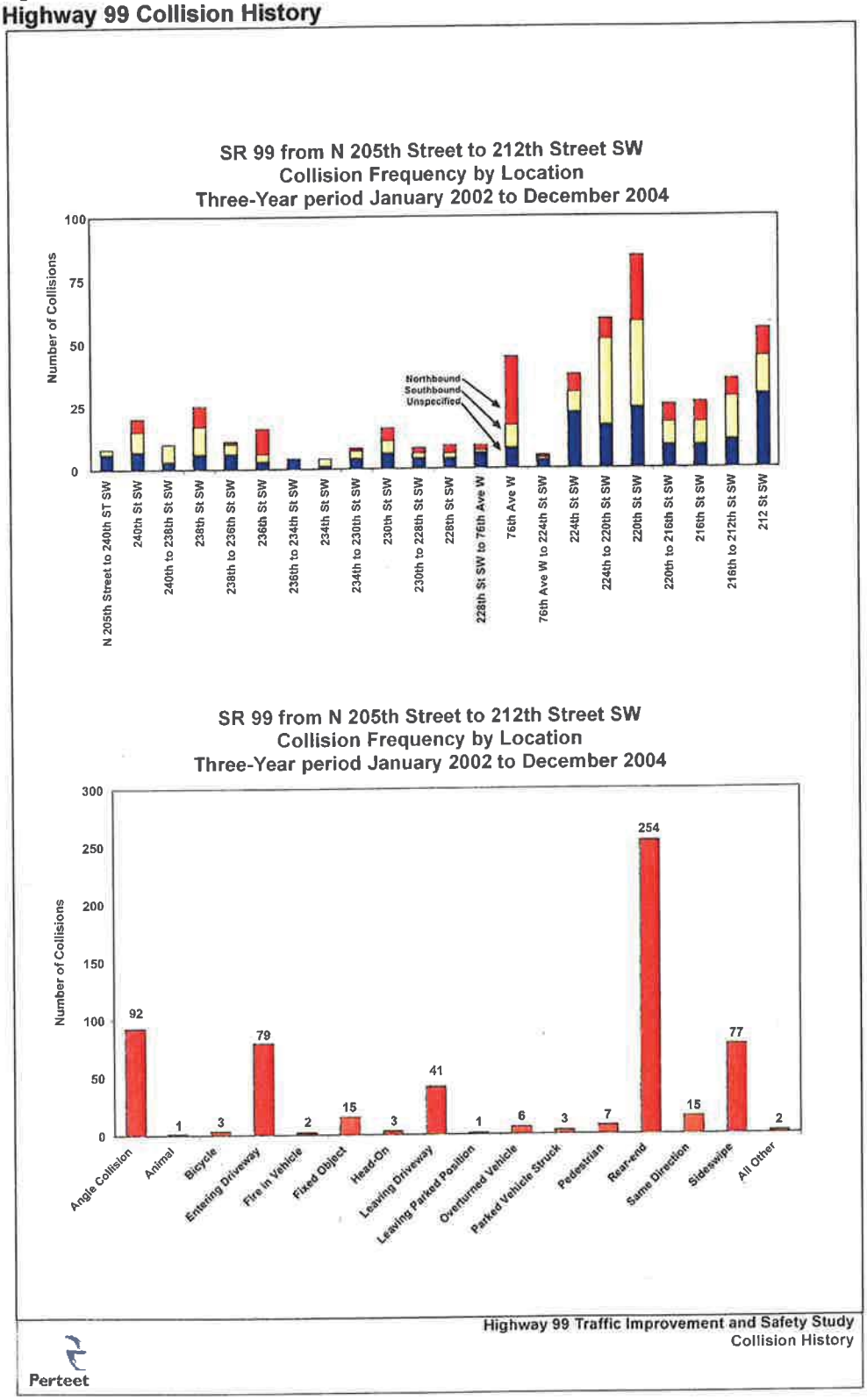
A grade of "A," for example, indicates minimal vehicular delay. A grade of "E" or "F" represents maximum delay or congestion and a poorly functioning roadway or intersection.

3.2.6 Accident History

The entire study area had 601 accidents during the three-year record period, January 2002 to December 2004. ***Figure 3.5*** shows a summary of the accident locations and types. The accident rate remained fairly constant at approximately 200 accidents per year throughout this time period. The most frequent types of accidents were:

- Rear end collisions - 42% of all accidents.
- Approach turns - 28%.
- Angle Collisions - 15%.
- Sideswipes - 13%.

Figure 3.5
Highway 99 Collision History



Every two year the WSDOT identifies high accident locations (HAL) and high accident corridors (HAC) for all of the state highways. The entire Highway 99 corridor has been identified as a HAC. ***Figure 3.6*** shows the HACs in the study area that appeared on the most recent WSDOT list. There were two locations in the study area identified as HALs:

234th Street SW to north of 76th Avenue SW

The majority of collisions in this location occurred at the intersection of 76th Avenue West. Angle collisions and rear-end collisions of vehicles entering and leaving 76th Avenue account for over 90% of the accidents.

224th Street SW to 216th Street SW.

Most of the accidents there were approach collisions involving vehicles turning onto or off of Highway 99 between 224th Street SW and 216th Street SW. The significant number and close proximity of driveways in this area can attribute to the vast majority of the accidents. See ***Figure 3.7.***

Figure 3.6
Highway 99 Types of Collisions at Key Locations

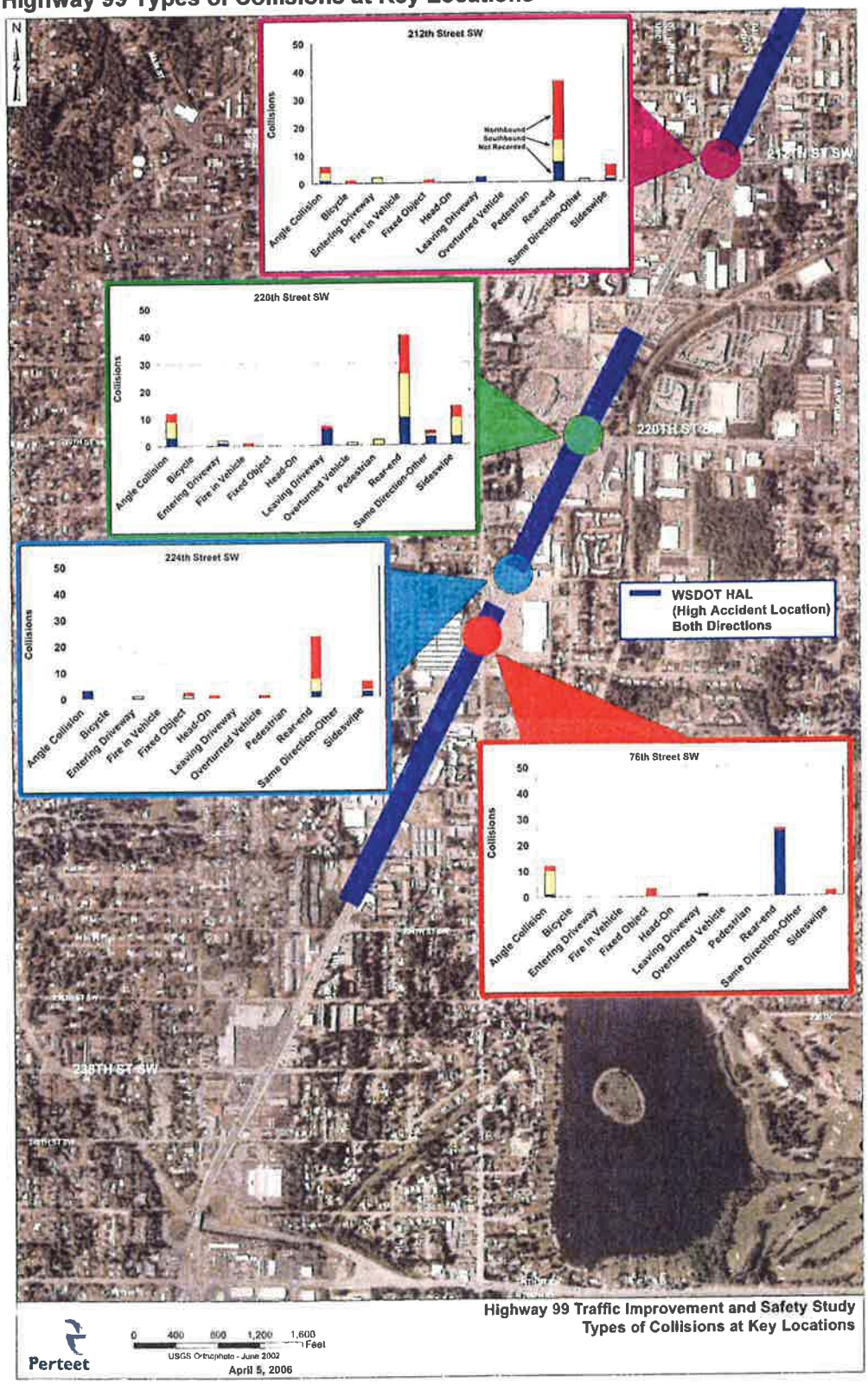
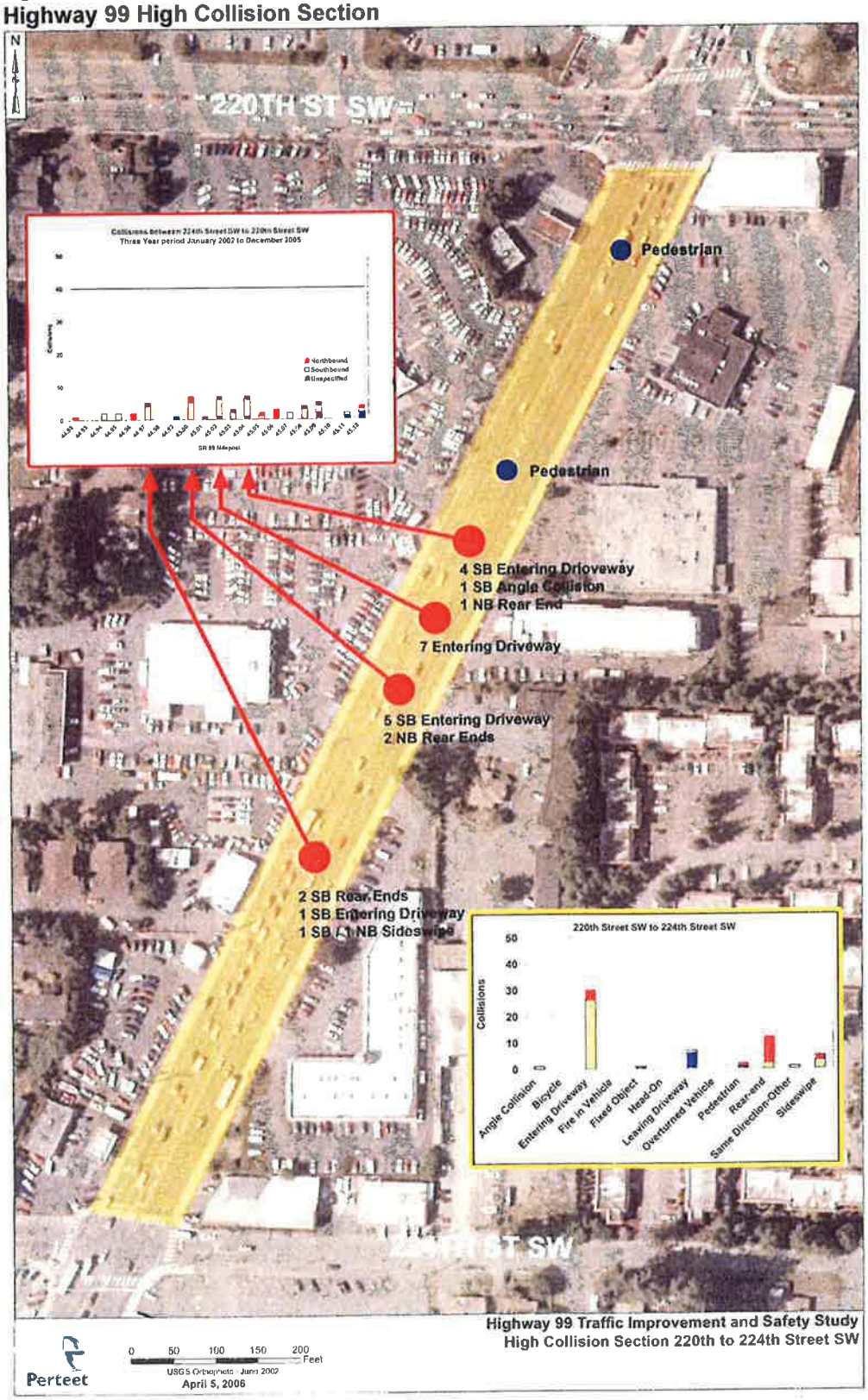


Figure 3.7
Highway 99 High Collision Section



3.3 Transit Infrastructure and Needs

3.3.2 Transit Infrastructure and Service Areas

The peak period frequency of buses that serve the street network in the study area on weekdays is shown in ***Figure 3.8***. Many of the bus stops are along principal arterial streets, such as Highway 99, 220th Street SW and 76th Avenue W. .

3.3.3 Existing Transit Ridership

The average daily number of people boarding and disembarking at each bus stop in the study area is shown in ***Figure 3.9.*** A significant portion of the boardings and disembarkings occurs at the signalized intersection along the corridor. Transit ridership activity is concentrated on several key destinations:

- Edmonds Park-and-Ride
- Multi-Family housing areas
- Stevens Hospital
- Edmonds Woodway High School

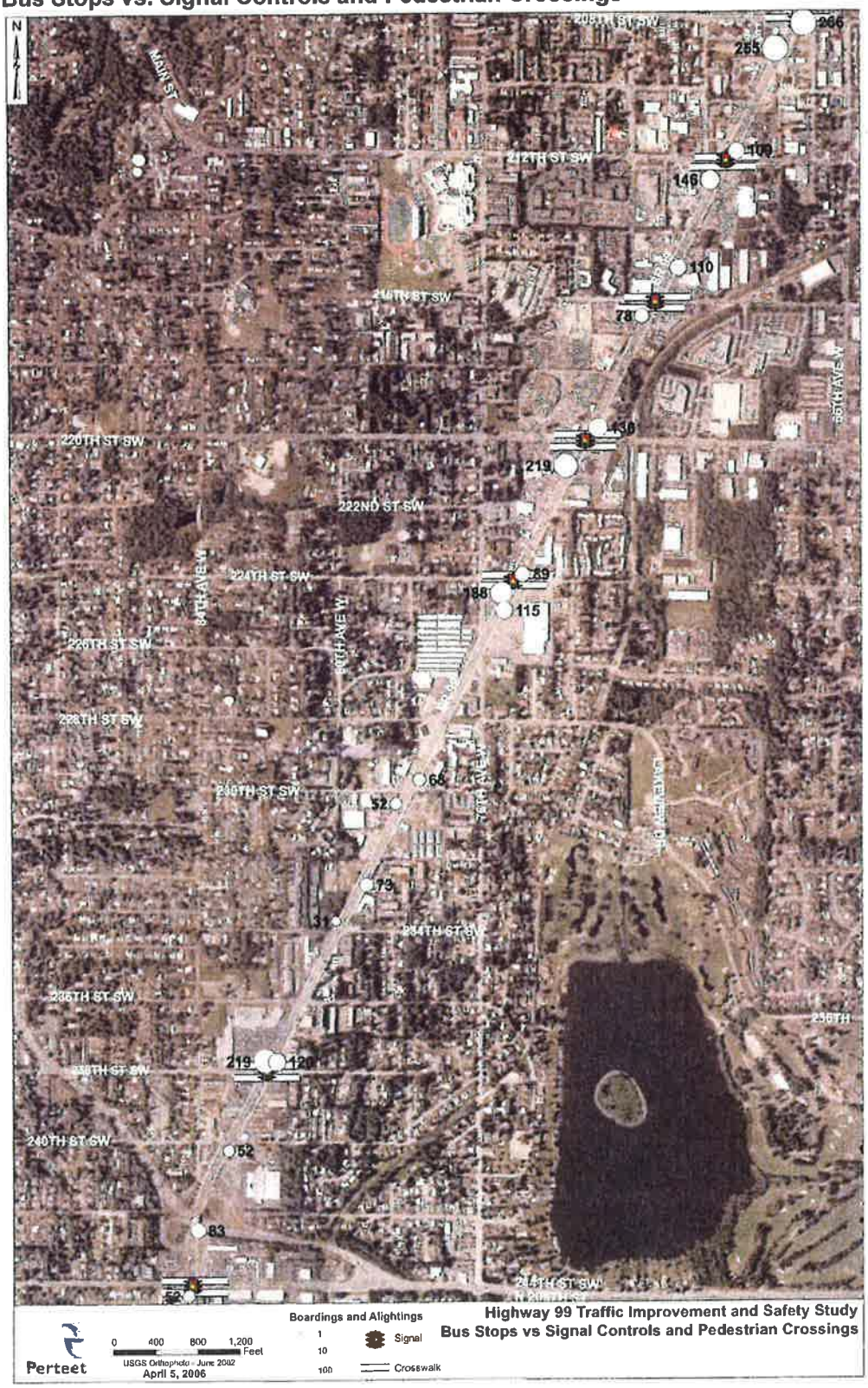
3.3.4 Transit Infrastructure Improvements

Community Transit is developing the Puget Sound region's first Bus Rapid Transit (BRT) system along the SR 99 corridor, which will connect Everett and the Snohomish-King County line in 2008. Once completed, the project will use the dedicated BAT lanes to travel through the corridor. The traffic signals along Highway 99 will be fitted with priority array systems to give preferential green time to buses that are behind schedule. In addition, riders will benefit from frequent headways, distinctive transit stations, unique vehicles, and other technological features that will improve service and accessibility.

At the same time, King County Metro is constructing a similar BRT system through the City of Shoreline. When completed, the entire BRT system will connect downtown Seattle to Everett via Highway 99.

Figure 3.8
Existing Bus Routes and Peak Period Frequency

Figure 3.9
Bus Stops vs. Signal Controls and Pedestrian Crossings



3.3.6 Future Transit Needs Assessment

Improved transit use is an alternate method to mitigate traffic congestion. Infrastructure improvements must be made where there is opportunity to influence modal choice and reduce vehicular traffic. Interestingly, the three greatest opportunities to improve transit usage occur near the areas of highest traffic congestion, so improved ridership may help reduce vehicular congestion. The existing transit services along Highway 99 have opportunities to promote transit-supportive infrastructure and transit-oriented development potential.

Transit supportive infrastructure improvements that can be completed by the city includes transit shelters, improved lighting and security, improved way-finding signage, and other amenities. But the most important improvements are considered to be pedestrian and bicycle access routes to key transit stops. The city can also influence where new and improved bus service will be routed by specifically designating a hierarchy of transit routes, much as it currently does for vehicular traffic and trucks, and then prioritizing appropriate infrastructure projects.

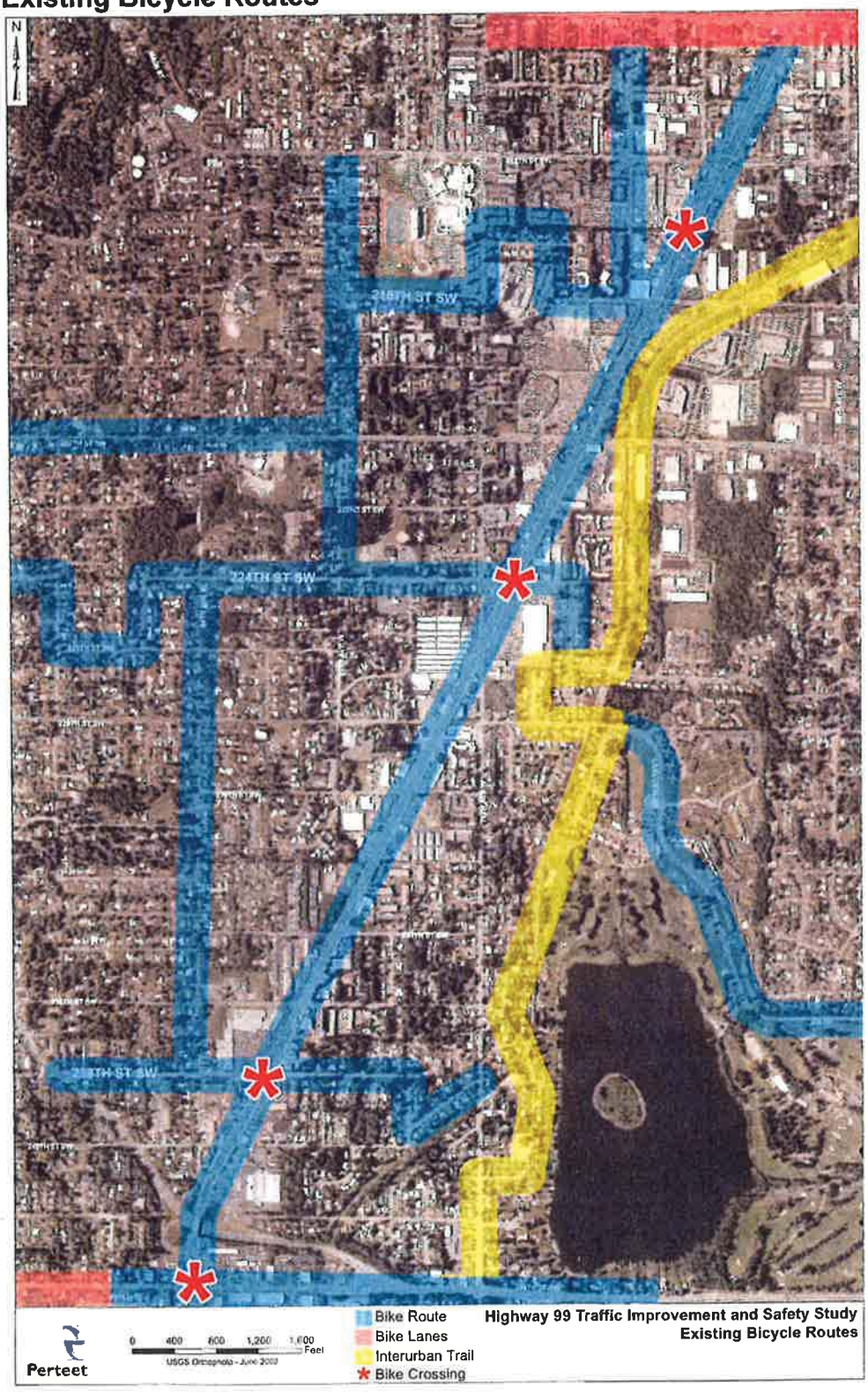
3.4 Non-Motorized Infrastructure and Needs

3.4.1 Existing Non-motorized Infrastructure

Currently the bicycle system in the study area consists of the interurban trail that roughly parallels Highway 99 to the east and bike routes that connect the west side of Highway 99 to the interurban trail. ***Figure 3.10*** shows the current extent of the bicycle route system within the study area. There are no existing continuous bicycle lanes through the study area east to west.

The existing pedestrian system consists of a series of corridors and isolated segments throughout the study area. Significant parts of the pedestrian system have been completed in the study area. There are many continuous pedestrian routes

Figure 3.10
Existing Bicycle Routes



3.4.3 Non-Motorized Traffic Volumes and Levels of Service

There is very little data collection on non-motorized transportation modes. Most pedestrian and bicycle counts are taken at intersections and used to determine signal timing to improve vehicular movements. Levels of service typically are considered to be the coverage area of bicycle and pedestrian facilities. Sidewalk width and set-back standards are currently applied on the basis of the street classification for vehicular needs.

3.4.4 Non-Motorized Infrastructure Improvements

Very few non-motorized improvement projects are shown within the study area of the City of Edmonds Transportation Comprehensive Plan. The 2000 Bikeway Comprehensive Plan currently does identifies SR 99 as a major bike improvement project.

3.4.5 Non-Motorized Needs Assessment

Improvements of even small scale can have a substantial impact on the pedestrian network, while it requires a substantially larger project to effectively improve the bicycle network. This is because most pedestrian improvements are made to connect residential, retail, and other land uses in relatively close proximity to each other, whereas bicycle improvements need to create an infrastructure conducive to longer-distance travel. Good pedestrian access is also a fundamental requirement to improved transit ridership.

There are also a limited number of crossings of Highway 99 in the study area and this restricts pedestrian travel far more than travel by automobiles or bicycles. To be conducive for non-motorized commuting, corridor crossings need to be every quarter-mile (1,300 feet) for pedestrians and every half-mile (2,600 feet) for cyclists

There are no crossing between 238th Street SW and 224th Street SW, 5150 feet (1 mile).

The spacing is poor for pedestrians and fair for bicycles. The problem is further compounded by the high level of automobile congestion at the major crossings, which creates an additional hazard or inconvenience for pedestrians and cyclists in the area.

It is not recommended to include Highway 99 as a major bikeway improvement project (as identified in the 2000 Bikeway Comprehensive Plan). The mixing of bicycles with the current BAT lane configuration introduces a high probability of conflicting movement with bikes and vehicles. Emphasis should be given to improving bicycle route crossings on Highway 99 and connecting those routes to the Interurban Trail.

4 Project Development and Evaluation

4.1 Alternatives Development Process

Using input from the charrette and technical analysis of existing conditions in the study area, Perteet, Inc., compiled a list of project recommendations for the Highway 99 Safety and Circulation Study. The project recommendations were matched with existing City of Edmonds Capital Investment Program (CIP), Transportation Facilities Plan (TFP), and Comprehensive Plan projects.

Perteet, Inc., facilitated public involvement in the development of transportation alternatives for this study. A design charette was held in early April 2006 to get public input on the transportation needs in the study area, and to identify specific issues for more detailed study.

In addition to the project suggestions generated from the public involvement process, the City of Edmonds, Perteet, Inc., and other agencies, staff identified the projects needed to address Highway 99's deficiencies. The technical analysis of the transportation system was performed using existing data and future traffic projections.

The project suggestions from the public involvement and charrette were combined with the projects identified by the technical analysis performed by Perteet, and the City of Edmonds.

Based on the comments returned by the City of Edmonds, the projects were screened for fatal flaws. A fatal flaw is an issue that effectively prevents a project from being viable (such as WSDOT access restrictions or signal spacing requirements) is considered to be a fatal flaw.

Fatally flawed projects were not removed from the project list, but instead were identified by striking through the text of the project description and describing the fatal flaw(s) in the "comments" column of the project list. Fatally flawed projects were left on the project list to clearly indicate that project suggestions raised during the public involvement process were given consideration, even if they were determined to be infeasible.

4.2 List of Alternatives

The complete List of Alternatives for evaluation, located in ***Appendix B***, includes all project suggestions raised during the public involvement portion of the alternatives development process, including fatally flawed projects.

4.3 Alternatives Evaluation Process

To evaluate these projects, a number of Measures of Effectiveness were developed and applied to each project. Perteet, Inc., developed quantitative and qualitative Measures of Effectiveness (MoEs) to evaluate the potential projects based on the goals and objectives of the study. The MoEs were intended to identify transportation alternatives that:

- Support the projected level of growth
- Improve vehicle safety along the SR 99 Corridor.
- Improve non-motorized connection and safety
- Protect neighborhoods from adverse traffic impacts
- Maintain or improve traffic operations in the SR 99 area

- Maintain or improve transit access and reliability along the SR 99 Corridor.
- Enhance the feasibility of transit-oriented development or transit -adjacent development in the SR99 corridor.
- Enhance the ascetics and quality of the users experience of the corridor

The potential MoEs were reviewed with City of Edmonds staff, which developed 11 final MoEs. Some of these MoEs are quantitative in nature, some are qualitative, and some are both.

A rating system was used to evaluate each project's relative impact on an MoE on a scale from 1 (worst) to 5 (best) with a rating of 3 being a neutral rating. This rating system allows the evaluator to assess whether each project will result in a net benefit or a net detriment to each measure of effectiveness, and allows a single scale to be applied to all MoEs and all projects.

MoE 1 - Political Feasibility and Acceptance

This measure evaluates each project based on the probability that it could be endorsed by the City of Edmonds, the public, and other impacted agencies.

Rating	Impact
1	High likelihood of opposition from City, public or agencies
2	Moderate likelihood of opposition from City, public, or agencies
3	No effect
4	Moderate likelihood of endorsement from City, public, or agencies
5	High likelihood of endorsement from City, public or agencies

MoE 2 - Reduction of Travel Time

This measure evaluated the overall expected annual travel time savings for each evaluated project compared to the future base condition. The travel time savings were calculated in person-minutes during the PM peak hour for the horizon year 2020 for all system users, including SOV and transit. This measure was applied to each corridor improvement, lane expansion, intersection improvement, or traffic control improvement.

Rating	Impact
1	Significantly increases travel delay
2	Slightly increases travel delay
3	No effect
4	Slightly decreases travel delay
5	Significantly decreases travel delay

MoE 3 - Improved Vehicular Safety

This measure estimated the annual collision reduction potential for each evaluated project. The potential for collision reduction was determined using current collision records and potential driver impatience using intersection LOS/queue lengths in 2020 compared to base line conditions for each corridor improvement, lane expansion, intersection improvement, or traffic control improvement.

Rating	Impact
1	Significantly increases accident potential
2	Slightly increases accident potential
3	No effect
4	Slightly decreases accident potential
5	Significantly decreases accident potential

MoE 4 - Transit Passenger Access, Convenience and Safety

This measure evaluated the non-travel time benefits for each project evaluated. Non-travel time benefits considered included the potential for a project to increase transit ridership by minimizing transfers or transfer time, improvements to pedestrian access time or safety, and improvements to transit coverage by increasing the portion of the study area within one quarter mile of a bus route.

Rating	Impact
1	Significantly degrades transit access, convenience and safety
2	Moderately degrades transit access, convenience and safety
3	Limited or no effect
4	Moderately improves transit access, convenience and safety
5	Significantly improves transit access, convenience and safety

MoE 5 - Pedestrian Access, Convenience and Safety

This measure rated the benefits occurring when pedestrian facilities are enhanced, waiting time for crossing roads are reduced, conflicts with vehicles are reduced, circuitous routes are minimized, crossings of major barriers are increased, personal safety is improved, and the pedestrian route coverage is improved. The measure also evaluated the recreational aspects of pedestrian improvements.

Rating	Impact
1	Significantly degrades pedestrian access, convenience and safety
2	Slightly degrades access, convenience and safety
3	No effect
4	Slightly improves pedestrian access, convenience and safety
5	Significantly improves pedestrian access, convenience and safety

MoE 6 - Bicycle Access, Convenience and Safety

This measure applied the FHWA Bicycle Compatibility Index rating system to every applicable bicycle project. Additionally, the benefits occurring when bicycle facilities are enhanced, conflicts with vehicles and pedestrians are reduced, circuitous routes are minimized, crossings of major barriers are increased, and vertical climbs and descents are minimized (minimum energy path), and recreational aspects were also included in the rating process.

Rating	Impact
1	Significantly degrades bicycle access, convenience and safety
2	Slightly degrades bicycle access, convenience and safety
3	No effect
4	Slightly improves bicycle access, convenience and safety
5	Significantly improves bicycle access, convenience and safety

MoE 7 - Aesthetics / Quality of User Experience

This measure rated the impacts of each project's impacts on aesthetics, vegetation, and vistas, as well as estimating the overall quality of user experience for the finished project.

Rating	Impact
1	Significantly degrades aesthetics / user experience
2	Slightly degrades aesthetics / user experience
3	No effect
4	Slightly improves aesthetics / user experience
5	Significantly improves aesthetics / user experience

MoE 8 - Neighborhood Impacts

This measure of effectiveness evaluated the potential neighborhood impacts for each project. A qualitative analysis of the traffic projections for 2020 was conducted by Perteet, Inc., to identify the likely impact of each roadway project on neighborhood cut-through traffic.

Rating	Impact
1	Significantly increases negative neighborhood impacts
2	Slightly increases negative neighborhood impacts
3	No effect
4	Slightly increases positive neighborhood impacts
5	Significantly increases positive neighborhood impacts

MoE 10 - Environmental Impacts

This measure assessed the overall environmental impacts for each project. This MoE was evaluated in two parts. A technical analysis of the impact of each project on the area of impervious surface was conducted by Perteet.

Rating	Impact
1	Significantly increases impacts on water resources
2	Slightly increases impacts on water resources
3	No effect
4	Slightly reduces impacts on water resources
5	Significantly reduces impacts on water resources

MoE 11 - Project Costs and Benefits

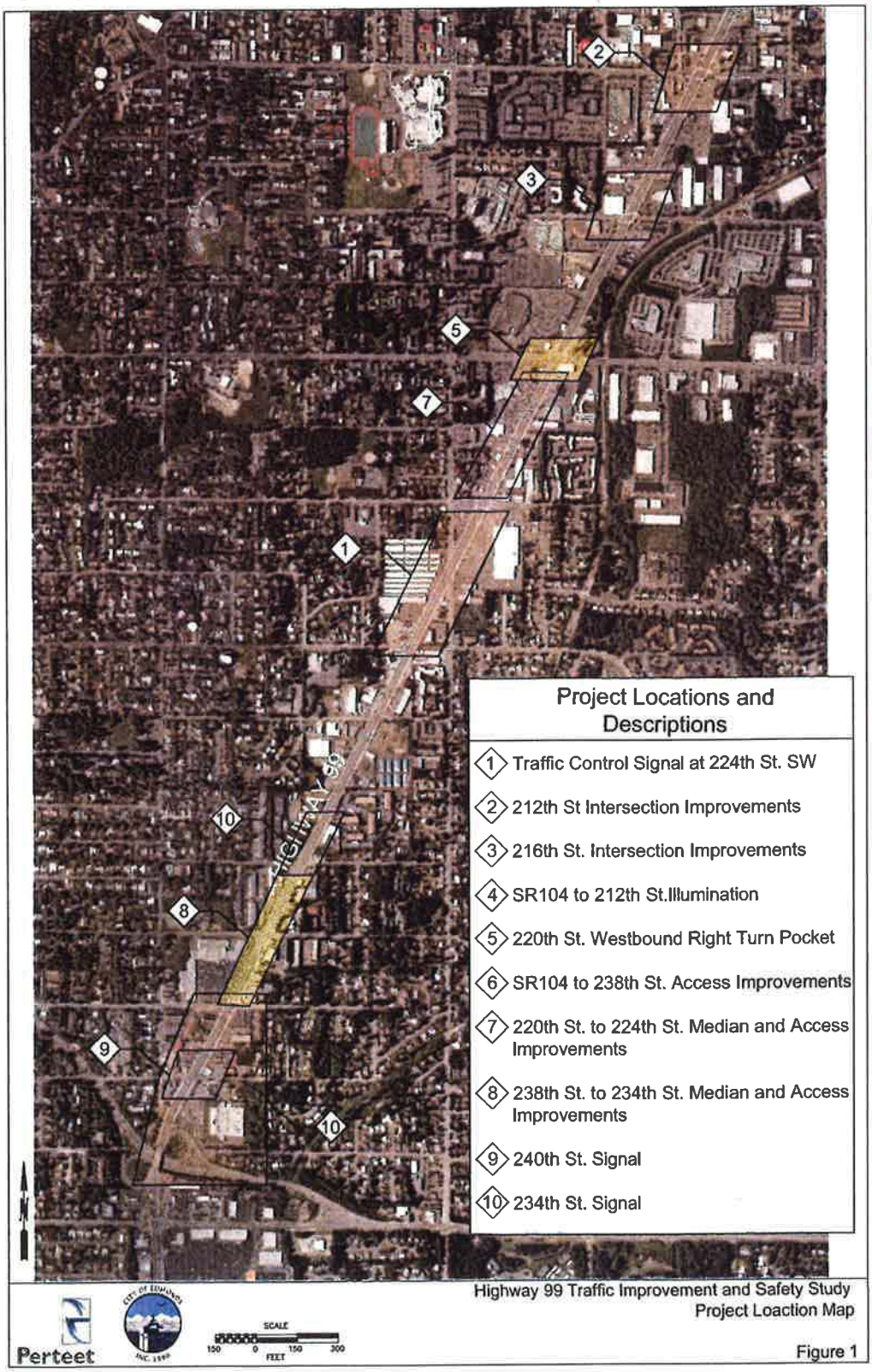
This measure assessed the relative cost effectiveness of projects by calculating the ratio of the annual PM peak hour travel-time savings with the estimated cost of the project amortized over a 20-year life. The cost estimates included ROW or easements, storm water/wetland mitigation, stream buffer mitigation, residential and commercial property acquisition, and planning level construction costs.

Rating	Impact
1	Very low cost-effectiveness
2	Slightly low cost-effectiveness
3	No effect
4	Slightly high cost-effectiveness
5	Very high cost-effectiveness

4.3.2 Evaluation Process

The initial project list was screened for projects that were determined to be fatally flawed due to one or more insurmountable conditions. The location of each project evaluated is noted, according to its project number, on ***Figure 4.1***.

Figure 4.1
Highway 99 Project Locations and Descriptions



5 Recommended Project Implementation

5.1 Recommended Project Actions

This section summarizes the recommendations from the Highway 99 Circulation and Safety Study for inclusion into implementation action programs or to be forwarded on to other studies for future analysis. Each project is briefly described, including the scope and discussion of any alternatives that were evaluated. Much more detail about each project is available in other sections of this report or in the Appendices. The results of the Measure of Effectiveness evaluations and the initial cost estimates for the projects are summarized in the box below each project description as follows:

- Overall Rating – The projects were rated by averaging each of the applied Measures of Effectiveness (MoE). Ratings ranged from Worst (1) to Neutral (3) to Best (5).
- Preliminary Project Budget – The low and high cost estimate for design and construction based on the project as detailed.

5.2 Recommended Projects

The City of Edmonds's short-term projects are listed in the Capital Investment Program Plan (CIP). CIP projects have dedicated funding, and many are scheduled for completion within six to seven years. The projects listed below are recommended for inclusion in the next update to the CIP.

Project 1: Traffic Control Signal at SR 99 and 228th Street SW

Signalize the intersection of 228th Street SW and SR 99 and extend 228th across the unopened right of way to 76th Street West, and eliminate left turn movements at 76th Street (see Section 6 for Graphic and Additional Information). These improvements make it possible for vehicles traveling to and from the southern portion of 76th Street to make a safer left turn movement that was eliminated by the raised median described above. In addition to this improve safety; the gives a safe crossing

for pedestrians. Currently, there, are no signalized crossing between 238th and 224th Street, a distance of 1 mile. The addition of the 224th Street SW signal will provide one intermediate crossing.

The signal improvements should include provisions for transit priority to be consistent with the other signals in the corridor.

Overall Rating	Preliminary Project Budget
Best	$1.6 million

Project 2: 212th Street SW Intersection Improvements

This project will add capacity to the 212th Street SW intersection. Improvements will be made to 212th Street by adding dedicated left turn pockets and two through lanes in each direction. The addition of the left-turn pockets makes it possible to change the signal operation from a split phase to projected movement. The net result increases the capacity of the intersection and reduces the average vehicle delay at intersection from 47 seconds (LOS D) to 29 second (LOS C).

Overall Rating	Preliminary Project Budget
Best	$1.6 million

Project 3: 216th Street SW Intersection Improvements

This project will add capacity to the 216th Street SW intersection. Improvements will be made to 216th Street by adding dedicated left turn pockets and one through lanes in each direction. The addition of the left turn pockets make it possible to change the signal operation from a split phase to projected movement. The net result increases the capacity of the intersection and reduces the average vehicles delay at intersection from 23 seconds (LOS C) to 17 second (LOS B).

The intersection improvements should include bicycle lanes to allow better access to and from the interurban trail and to be consistent with the City of Edmonds Bike Plan.

Overall Rating	Preliminary Project Budget
Best	$1.45 million

Project 4: Illumination

There is no formal illumination within the study area, only localized areas of non standard lighting. These improvements would add illumination from at regular intervals along the corridor. This project could be done in segments as budget allows or combined with other project on SR 99.

Overall Rating	Preliminary Project Budget
Better	$1.1 million

Project 5: 220th Westbound Right Turn Pocket

Add a right turn pocket on the westbound leg of 220th Street and SR99. Construct a retaining wall, reconstruct the curb, gutter and sidewalk and relocate the signal pole. The improvements will improve travel times by allowing vehicles to make right without being impeded by the through movements.

The property on the northeast corner was recently redeveloped. As a condition of their approval, the development was required to dedicated right-of-way along 220th for the addition of such an improvement.

.Overall Rating	Preliminary Project Budget
Better	$420,000

Project 6: SR104 to 238th Street SW Access Improvements

This project proposes to make access restrictions between SR104 and 238th Street SW. 240th Street should be restricted to right-in, right–out.

Overall Rating	Preliminary Project Budget
Better	$350,000

Project 7: 220th to 224th Median and Access Improvements

This improvement proposes to make access restrictions between 224th Street SW and 220th Street SW. The improvements would consist of raised medians and channelization. Driveway access on to SR 99 should be restricted to right-in, right-out, with the exception of one or two major driveways where left is should be allowed. In conjunction with these improvements consideration should be given to u-turns at the nearest signal north and south of the project.

Overall Rating	Preliminary Project Budget
Better	$290,000

Project 8: 234th to 238th th Median and Access Improvements

This improvement proposes to restrict left turns from being made onto SR 99 from 236th Street SW. The improvements would consist of raised medians and channelization. In conjunction with these improvements consideration should be given to U-turns at the nearest signal north and south of the project.

Overall Rating	Preliminary Project Budget
Better	$250,000

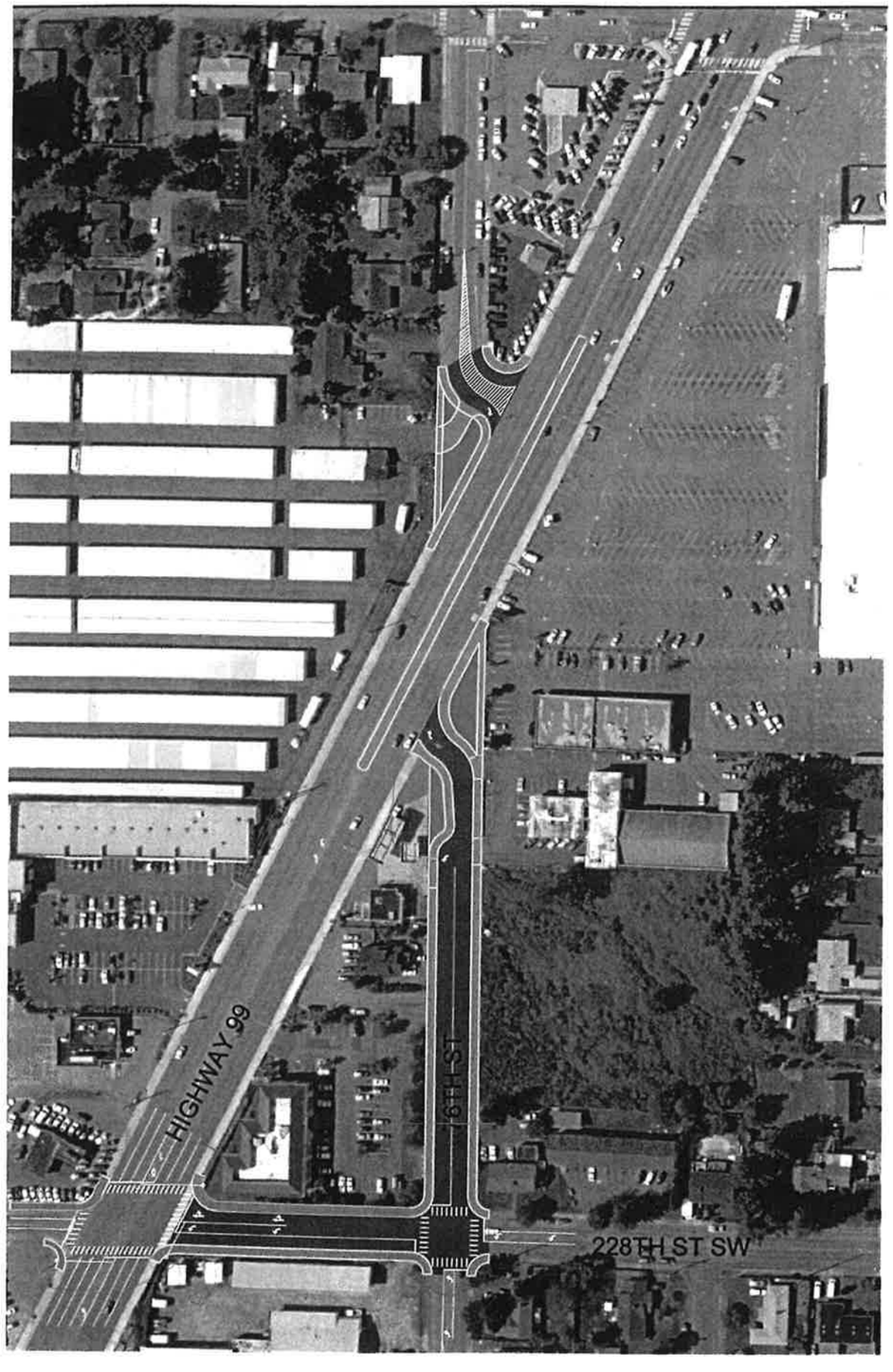
5.3 Projects Considered But Not Recommended

Project 9: 240th Street SW Intersection Signalization

This project would add a traffic signal to the intersection of 240th Street SW. WSDOT polices and state laws govern the spacing of traffic signals on state highways. For SR 99 through Edmonds, the preferred spacing is ½ mile (2640 feet) but spacings of a ¼ mile (1320 feet) are accepted. The spacing between the 238th, the nearest signalized intersection and 240th Street SW is only 750 feet.

Project 10: 234th Street SW Intersection Signalization

This project would add a traffic signal at the intersection of 234th Street SW. Current traffic volumes on 234th Street SW do not support signal warrants for the installation of a traffic signal. This project should be considered as a long range potential signal location. If development occurs on the neighboring parcels or in the vicinity of 234th, further studies should be done to support a signal at this location.



Highway 99 Traffic Safety and Circulation Study Project Locations

Project 1: Traffic Signal at SR99 & 228th Street SW

Project Description

Signalize the intersection of 228th Street SW and SR 99 and extend 228th across the unopened right of way to 76th Street West, and eliminate left turn movements at 76th Street (see Section 6 for Graphic and Additional Information). These improvements make it possible for vehicles traveling to and from the southern portion of 76th Street to make a safer left turn movement that was eliminated by the raised median described above. In addition, this improve safety; by giving a safe crossing for pedestrians. Currently, there, are no signalized crossing between 238th and 224th Street, a distance of 1 mile. The addition of the 228th Street SW signal will provide one intermediate crossing.

The signal improvements should include provisions for transit priority to be consistent with the other signals in the corridor.

Project Opinion of Cost

$1.6 Million

Measure of Effectiveness

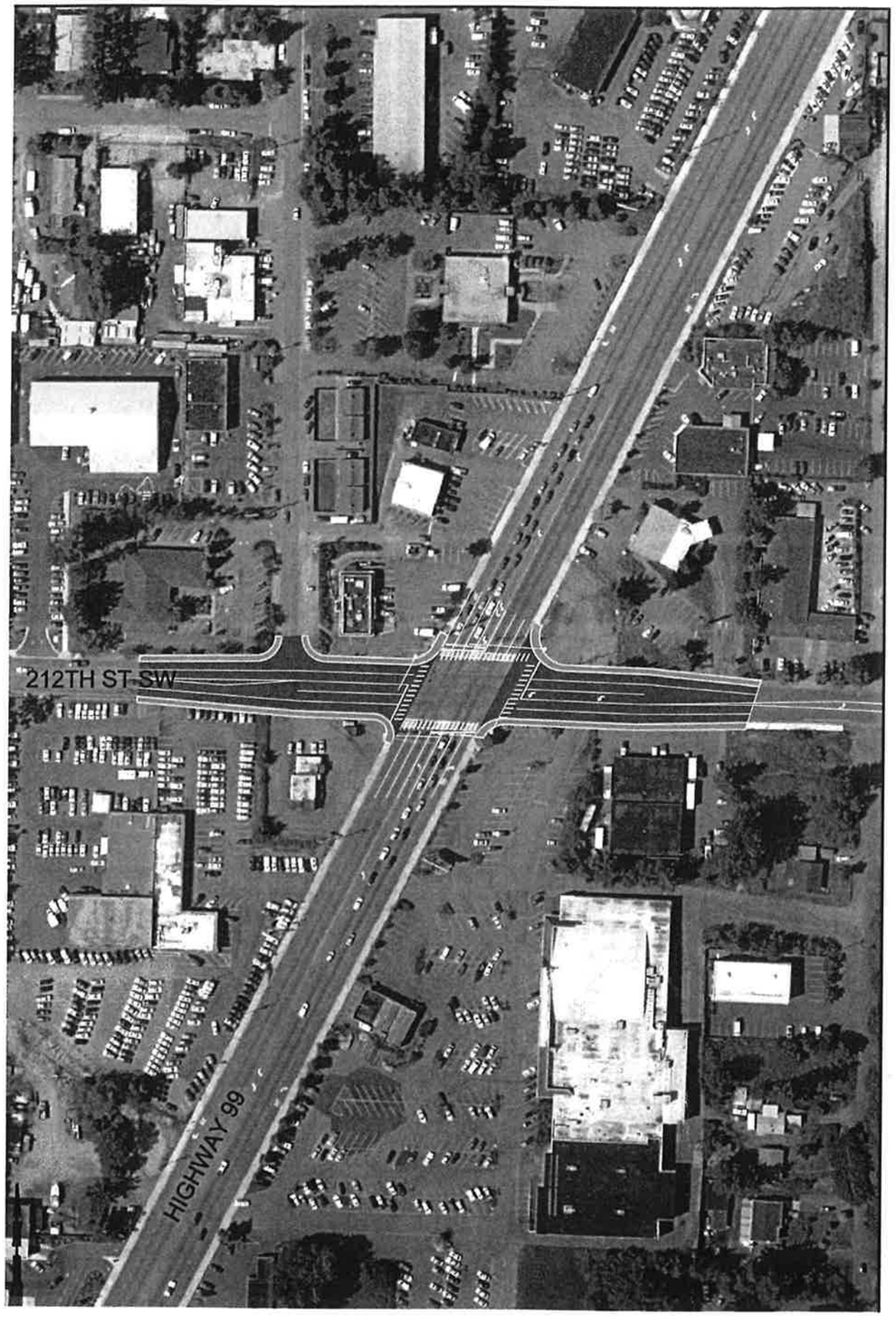
1. Political Feasibility and Acceptance	◕
2. Reduction of Travel Time	◔
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	●
5. Pedestrian Access, Convenience, and Safety	●
6. Bicycle Access, Convenience, and Safety	●
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◔
9. Air-Noise Impacts	◔
10. Environmental Impacts (New Impervious Surfaces)	◔
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Perteet

February 16.

Highway 99 Traffic Safety and Circulation Study Project Locations



Project 2: Traffic Signal at SR99 & 212th Street SW

Project Description

This project will add capacity to the 212th Street SW intersection. Improvements will be made to 212th Street by adding dedicated left turn pockets and two through lanes in each direction. The addition of the left-turn pockets makes it possible to change the signal operation from a split phase to projected movement. The net result increases the capacity of the intersection and reduces the average vehicle delay at intersection from 47 seconds (LOS D) to 29 second (LOS C).

Project Opinion of Cost

$1.6 million

Measure of Effectiveness

1. Political Feasibility and Acceptance	●
2. Reduction of Travel Time	●
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	◑
5. Pedestrian Access, Convenience, and Safety	◑
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◑
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◑
11. Project Costs and Benefits	◑

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

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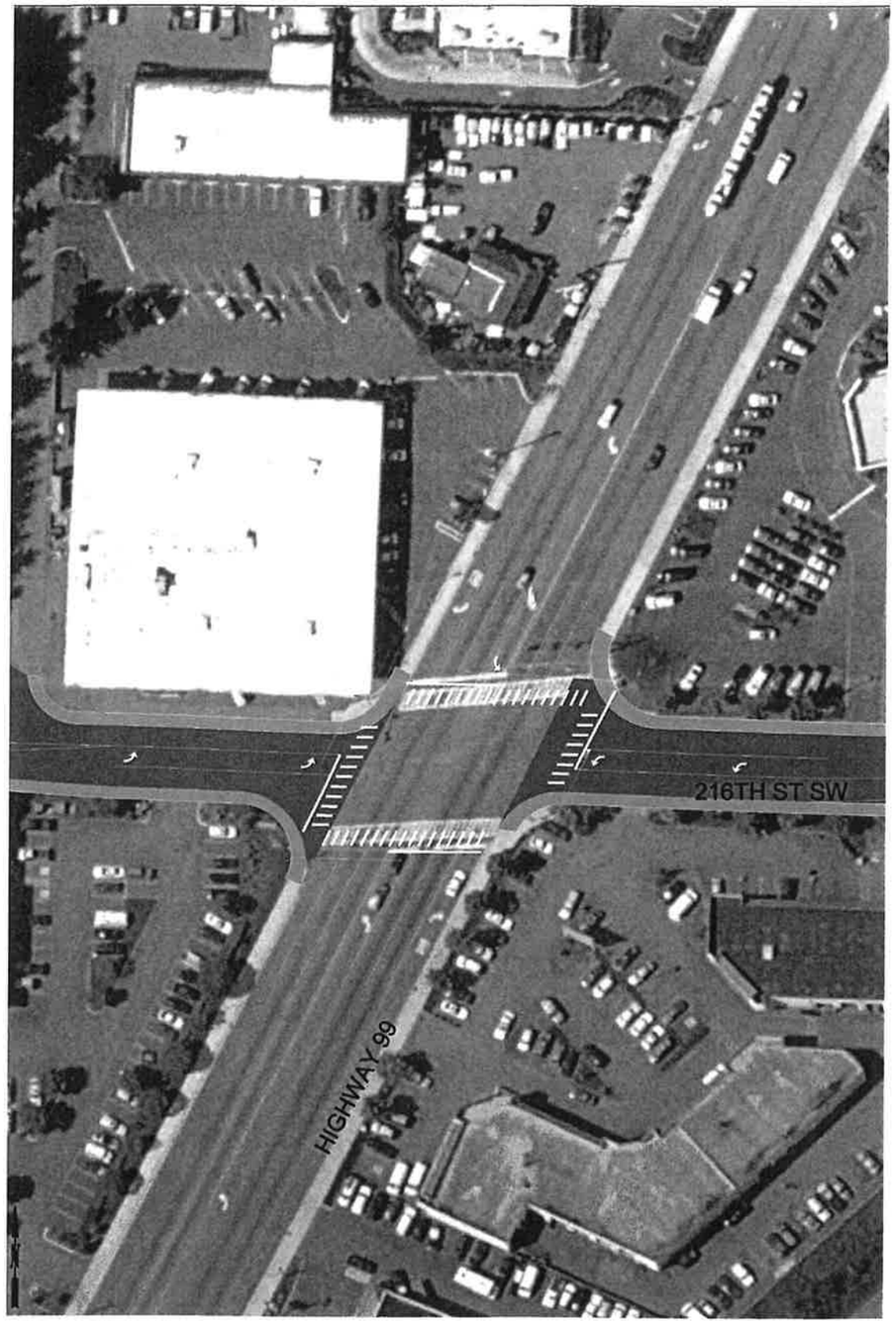

Highway 99 Traffic Safety and Circulation Study Project Locations

Project 3: Traffic Signal at SR99 & 216th Street SW

Project Description

This project will add capacity to the 216th Street SW intersection. Improvements will be made to 216th Street by adding dedicated left turn pockets and two through lanes in each direction. The addition of the left-turn pockets makes it possible to change the signal operation from a split phase to projected movement. The net result increases the capacity of the intersection and reduces the average vehicle delay at intersection from 47 seconds (LOS D) to 29 second (LOS C).

Project Opinion of Cost

$1.45 Million

Measure of Effectiveness

1. Political Feasibility and Acceptance	●
2. Reduction of Travel Time	●
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	◑
5. Pedestrian Access, Convenience, and Safety	◑
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◑
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◑
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Highway 99 Traffic Safety and Circulation Study Project Locations

Project 4: Illumination

Project Description

There is no formal illumination within the study area, only localized areas of non standard lighting. These improvements would add illumination from at regular intervals along the corridor. This project could be done in segments as budget allows or combined with other project on SR 99.

Project Opinion of Cost

$1.1 Million

Measure of Effectiveness

1. Political Feasibility and Acceptance	◕
2. Reduction of Travel Time	◑
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	●
5. Pedestrian Access, Convenience, and Safety	●
6. Bicycle Access, Convenience, and Safety	◕
7. Aesthetics/ Quality of User Experience	◕
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◑
9. Air-Noise Impacts	◑
10. Environmental Impacts (New Impervious Surfaces)	◑
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Perteet

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Highway 99 Traffic Safety and Circulation Study Project Locations

Project 5: Right Turn Pocket at 220th Street SW

Project Description

Add a right turn pocket on the westbound leg of 220th Street and SR99. Construct a retaining wall, reconstruct the curb, gutter and sidewalk and relocate the signal pole. The improvements will improve travel times through by allowing vehicles to make a free right.

The property on the northeast corner was recently redeveloped. As a condition of their approval, the development was required to dedicated right-of-way along 220th for the addition of such an improvement.

Project Opinion of Cost

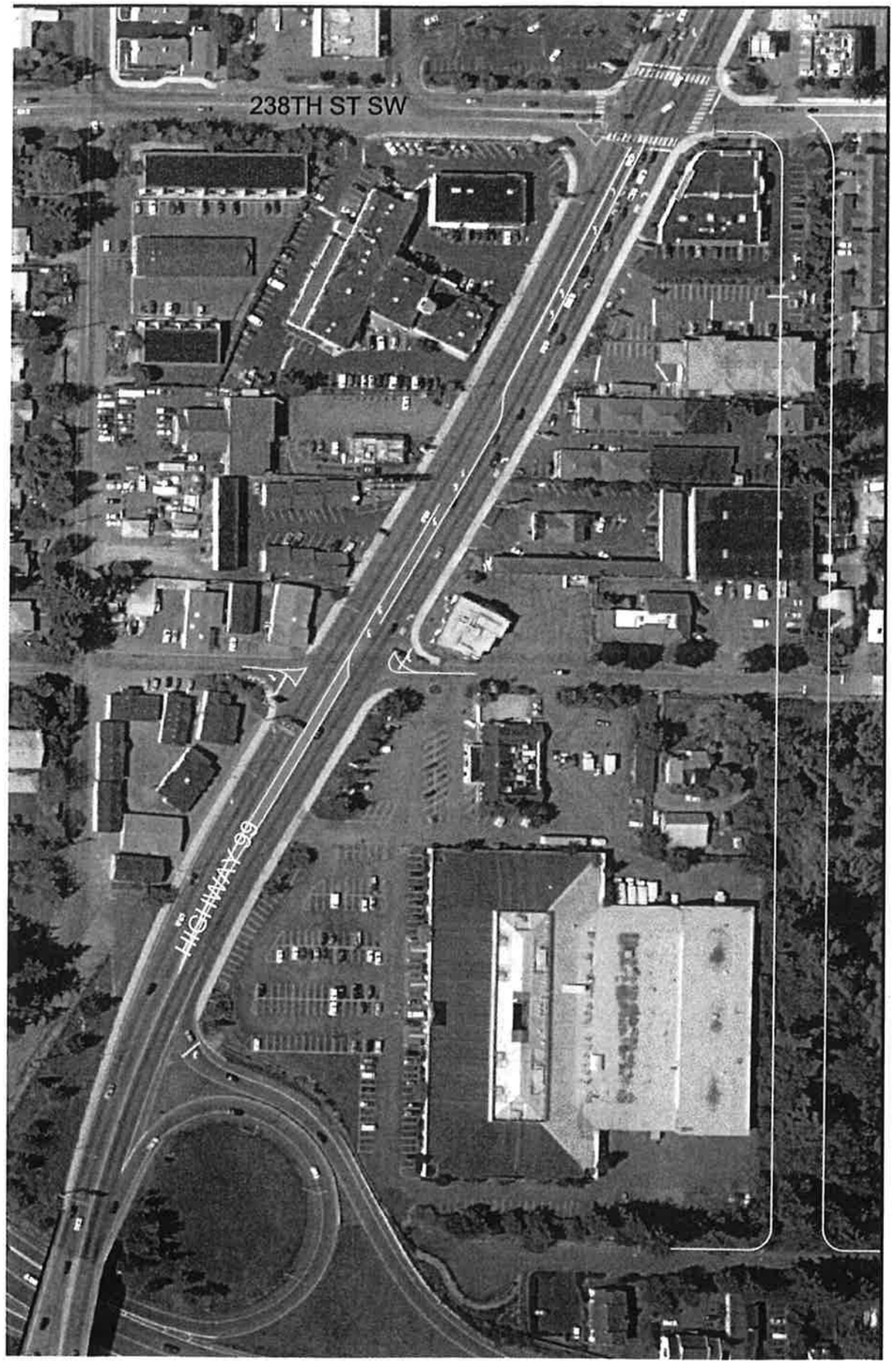
$420,000

Measure of Effectiveness

1. Political Feasibility and Acceptance	◕
2. Reduction of Travel Time	◕
3. Improved Vehicular Safety	◑
4. Transit Passenger Access, Convenience, and Safety	◑
5. Pedestrian Access, Convenience, and Safety	◑
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◑
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◔
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Highway 99 Traffic Safety and Circulation Study Project Locations



Project 6: SR104 to 238th Street SW Access Improvements

Project Description

This project proposes to make access restrictions between SR104 and 238th Street SW. 240th Street should be restricted to right-in, right–out.

In addition, in order to provide better access to the commercial properties on the eastside of SR99, a new north south road could be constructed between 238th Street and 240th Street SW. This would allow full access to SR99 at an existing traffic signal. This work would have to coincide with a major redevelopment of the affected properties.

Project Opinion of Cost

$350,000

Measure of Effectiveness

1. Political Feasibility and Acceptance	◕
2. Reduction of Travel Time	◑
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	◑
5. Pedestrian Access, Convenience, and Safety	◑
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◕
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◕
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◔
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

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Highway 99 Traffic Safety and Circulation Study Project Locations

Project 7: 220th to 224th Median and Access Improvements

Project Description

This improvement proposes to make access restrictions between 224th Street SW and 220th Street SW. The improvements would consist of raised medians and channelization. Driveway access on to SR 99 should be restricted to right-in, right-out, with the exception of one or two major driveways where left is could be allowed. In conjunction with these improvements consideration should be given to u-turns at the nearest signal north and south of the project.

Project Opinion of Cost

$290,000

Measure of Effectiveness

1. Political Feasibility and Acceptance	◔
2. Reduction of Travel Time	◕
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	◕
5. Pedestrian Access, Convenience, and Safety	◕
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◕
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◔
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◑
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Perteet

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Highway 99 Traffic Safety and Circulation Study Project Locations

Project 8: 234th to 238th Median and Access Improvements

Project Description

This improvement proposes to restrict left turns being made onto SR 99 from 236th Street SW. The improvements would consist of raised medians and channelization. In conjunction with these improvements consideration should be given to U-turns at the nearest signal north and south of the project.

Project Opinion of Cost

$250,000

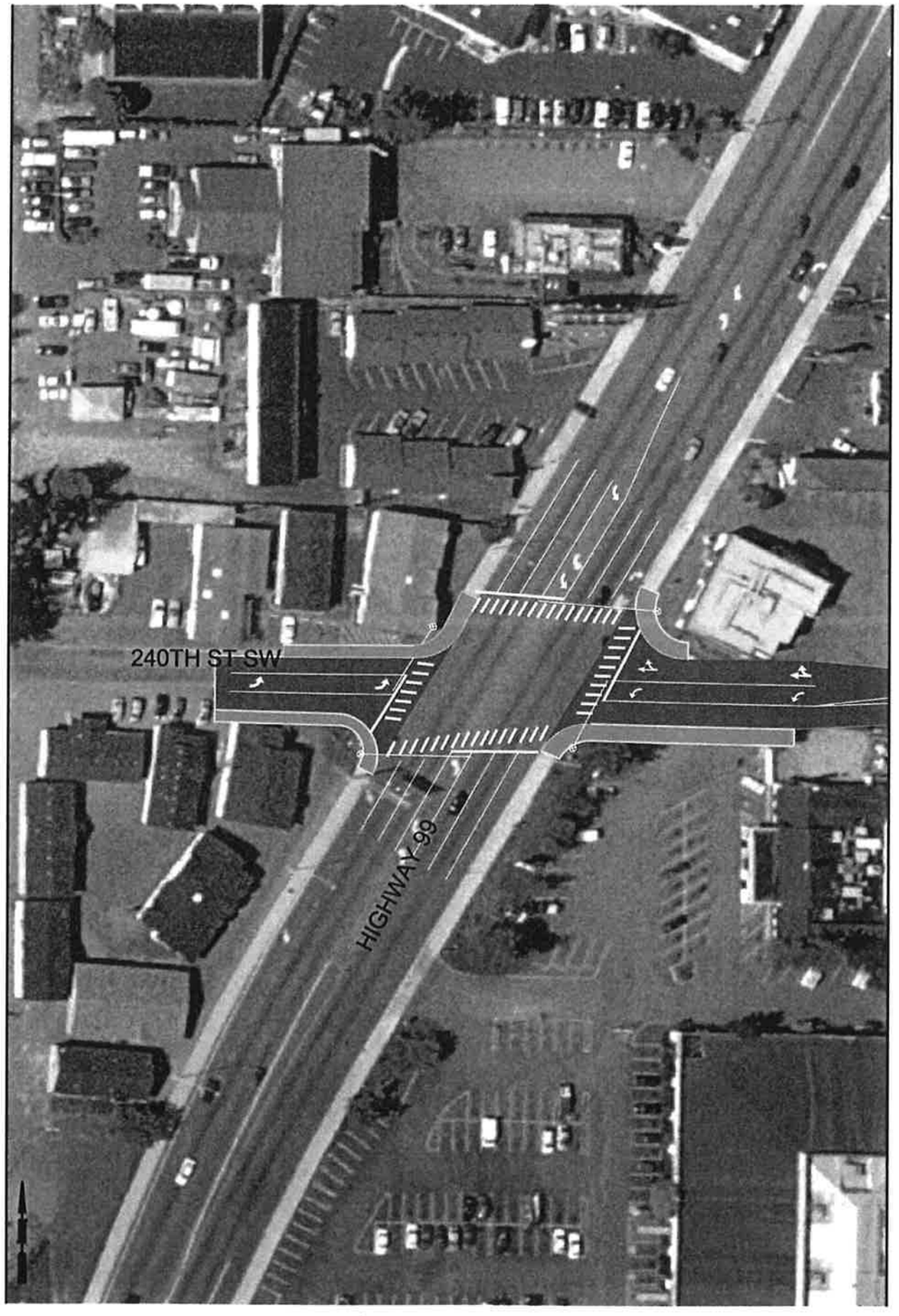
Measure of Effectiveness

1. Political Feasibility and Acceptance	◔
2. Reduction of Travel Time	◕
3. Improved Vehicular Safety	◕
4. Transit Passenger Access, Convenience, and Safety	◕
5. Pedestrian Access, Convenience, and Safety	◕
6. Bicycle Access, Convenience, and Safety	◑
7. Aesthetics/ Quality of User Experience	◕
8. Neighborhood Impacts (Potential for Cut-through Traffic)	◔
9. Air-Noise Impacts	◕
10. Environmental Impacts (New Impervious Surfaces)	◑
11. Project Costs and Benefits	◕

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Perteet

February 16.



Highway 99 Traffic Safety and Circulation Study Project Locations

Project 9: Traffic Signal at SR99 & 240th Street SW

Project Description

This project would add a traffic signal to the intersection of 240th Street SW. WSDOT polices and state laws govern the spacing of traffic signals on state highways. For SR 99 through Edmonds, the preferred spacing is ½ mile (2640 feet) but spacings of a ¼ mile (1320 feet) are accepted. The spacing between the 238th, the nearest signalized intersection and 240th Street SW is only 750 feet.

Project Opinion of Cost

$1.6 Million

Measure of Effectiveness

1. Political Feasibility and Acceptance	○
2. Reduction of Travel Time	◔
3. Improved Vehicular Safety	◔
4. Transit Passenger Access, Convenience, and Safety	◕
5. Pedestrian Access, Convenience, and Safety	◕
6. Bicycle Access, Convenience, and Safety	◕
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	○
9. Air-Noise Impacts	◔
10. Environmental Impacts (New Impervious Surfaces)	◔
11. Project Costs and Benefits	◔

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating

Perteet

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Highway 99 Traffic Safety and Circulation Study Project Locations

Project 10: Traffic Signal at SR99 & 234th Street SW

Project Description

This project would add a traffic signal at the intersection of 234th Street SW. Current traffic volumes on 234th Street SW do not support signal warrants for the installation of a traffic signal. This project should be considered as a long range potential signal location. If development occurs on the neighboring parcels or in the vicinity of 234th, further studies should be done to support a signal at this location.

Project Opinion of Cost

$1.2 Million

Measure of Effectiveness

1. Political Feasibility and Acceptance	◔
2. Reduction of Travel Time	◔
3. Improved Vehicular Safety	◔
4. Transit Passenger Access, Convenience, and Safety	◕
5. Pedestrian Access, Convenience, and Safety	●
6. Bicycle Access, Convenience, and Safety	●
7. Aesthetics/ Quality of User Experience	◑
8. Neighborhood Impacts (Potential for Cut-through Traffic)	○
9. Air-Noise Impacts	◔
10. Environmental Impacts (New Impervious Surfaces)	◔
11. Project Costs and Benefits	◔

Rating Legend	
●	Best (5)
◕	Better (4)
◑	Neutral (3)
◔	Worse (2)
○	Worst (1)
nr	No Rating