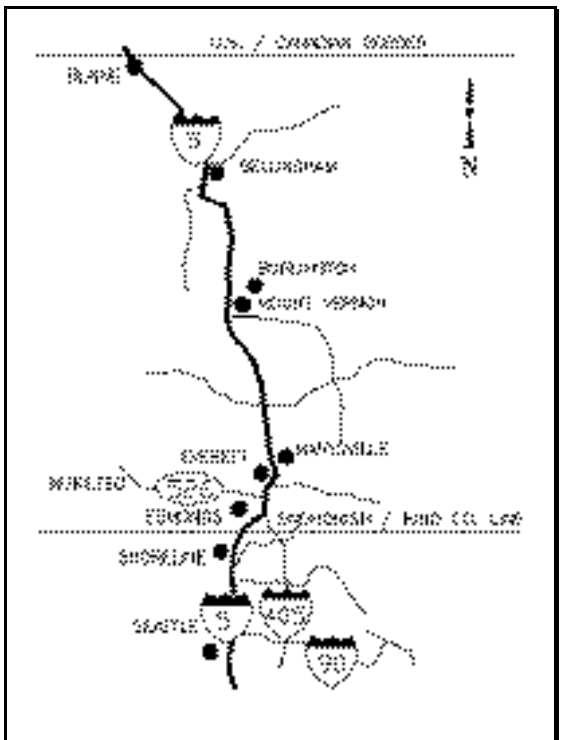
Executive Summary

This executive summary presents the final recommendations and a brief description of the Interstate 5 (I-5) Seattle to Vancouver, B.C. Intelligent Transportation System (ITS) Early Deployment Program. The study was performed by Parsons Brinckerhoff, PB Farradyne Inc., and their subconsultants.

Project Description

The I-5 Seattle to Vancouver B.C. study is intended to provide the Washington State Department of Transportation (WSDOT) with an implementation plan for the deployment of ITS technologies along Interstate 5 from the U.S./Canadian international border to the King/Snohomish County line. This study follows the guidance set forth by the WSDOT Venture program in providing a fully integrated state-wide transportation system on the roadways within WSDOT's jurisdiction. The study focused on specific applications in the areas of traffic management, traveler information, emergency management, and commercial vehicle operations (CVO) with the emphasis on providing specific projects to be deployed throughout the corridor.



Corridor Limits:
Snohomish/King County Line (MP 177.76) to U.S./Canadian Border (MP 276.56)

As a result of this study, thirteen project prospectuses that address the corridor transportation needs have been prepared. Each prospectus includes a project description, cost estimate, and an implementation schedule.

The corridor study included the seven project tasks summarized below.

Work Element 1 - Assess Transportation Needs

Work element 1 consisted of corridor tours and interviews with key stakeholders and officials from the WSDOT, Washington State Patrol (WSP), city and county agencies, U.S. and Canadian Customs, B.C. Ministry of Transportation (MoTH) and others. Data was gathered relating to the transportation needs along the I-5 corridor with emphasis given to safety, congestion management, CVO, and the U.S./Canadian border crossings.

Work Element 2 - Identify Corridor ITS Opportunities
Based on the findings of the needs assessment, work element 2 identified specific ITS applications to address the corridor needs.

Work Element 3 - Recommend Corridor Strategies
Based on an assessment of appropriate ITS applications and project steering committee input, work element 3 finalized and prioritized the specific ITS applications considered for implementation.

Work Element 4 - Develop Corridor Plan
Work element 4 prepared the specific project prospectuses recommended for the corridor by the steering committee. Cost estimates and benefit/cost analyses were conducted for each of the proposed projects.

Work Element 5 - Develop Corridor Communication Plan
Work element 5 assessed the existing communication system along the corridor. Specific recommendations on the communication infrastructure to be utilized for the ITS elements along the corridor was included as part of the corridor plan developed in work element 4.

Work Element 6 - ITS Coordination/Outreach Effort
Work element 6 established the project steering committee which provided input, direction, and participative decision-making for the project. The steering committee included members from the WSDOT, WSP, Federal Highway Administration, Whatcom and Skagit Counties, and B.C. MoTH. In addition, the coordination and outreach efforts for the project were initiated during this work element. This effort was intended to stimulate interest and deepen the understanding of the ITS efforts for the corridor through a variety of media.

Work Element 7 - Final Report
Work element 7 consolidated the results of previous work elements and developed the executive summary.

Corridor Synopsis

Interstate 5 travels along the entire west coast of the United States ending at the Canadian border crossing. This route is a primary north/south corridor, serving transport, tourism, and commuters in cities such as Seattle, Portland, and Los Angeles.

The focus of this study is on the portion of I-5 within Washington State, from the northern King County line (MP 177.76) to its terminus at the Canadian Border (MP 276.56), a total length of 98.80 miles or 159.0 kilometers. The study route passes through or by the cities of Mountlake Terrace, Lynnwood, Everett, Marysville, Mount Vernon, Burlington, Bellingham, Ferndale, and Blaine. The study area crosses Snohomish, Skagit and Whatcom Counties.

The WSDOT operates a surveillance, control and driver information (SC&DI) system along the corridor. The system is operated by the department's Traffic Systems Management Center (TSMC) in north Seattle. The SC&DI infrastructure includes ITS field devices such as ramp meters, closed circuit television (CCTV) cameras, data stations, variable message signs (VMS), and highway advisory radio (HAR). The system utilizes a fiber optic cable infrastructure for the transmission of analog video, while Synchronous Optical Network (SONET) technology is utilized for the transmission of data.

This infrastructure provides tremendous benefits for the WSDOT, including

improved freeway efficiency through maintaining freeway capacity, reduction in merging and congestion related incidents, reduction in the time needed to clear incidents, and improving traffic information available to motorists. The SC&DI infrastructure along the I-5 corridor currently extends to 164th St. SW (MP 184), with plans for expansion to the Marysville area (MP 206).

System Architecture

The WSDOT has an extensive regional architecture currently in place along the I-5 corridor in accordance with the tenets of the ITS national architecture. The SC&DI program has developed installation, operations, and maintenance standards for this ITS infrastructure. This study recommends the expansion of the existing SC&DI field devices, and SONET based fiber optic communications infrastructure north of the Marysville area.

The expansion is highlighted by two specific projects recommended as part of this study. The northwest region TSMC expansion project would extend the SC&DI infrastructure north to the Mt. Vernon Area (MP 223). The Mt. Vernon and Bellingham area TMS project would further the SC&DI infrastructure north to the Bellingham area (MP 256). It would also introduce remote monitoring and control terminals in the Bellingham area at a remote Traffic Operations Center (TOC). The initial phases of these two projects would focus on the installation of fiber optic communications infrastructure and field devices at priority corridor locations, followed by the final build-out of the ITS field devices and communications infrastructure in future phases. Other recommended projects would be deployed throughout the corridor utilizing the ITS field devices when applicable and introducing new technologies to address the identified corridor needs such as rest area security, weather-related incidents, and low bridges. Finally, ITS technologies would be deployed at the U.S./Canadian border to enhance the efficiency of border crossing operations. Certain project elements would utilize leased communication lines for both field device and control center communications in the short-term followed by their integration with the WSDOT-owned fiber optic communication links as this infrastructure is extended northward along the corridor.

It is important that each of the recommended projects allow for the exchange of data with the WSDOT Smart Trek ITS backbone currently being developed under the U.S. DOT Model Deployment Initiative (MDI) program. Each effort must emphasize the utilization of consistent communication protocols and data exchange schemes. The data exchange would benefit the individual projects along the corridor by providing access to corresponding traffic information. It would also benefit the ITS backbone system itself by adding valuable data to this integrated traveler information network.

Project Summaries

The I-5 corridor study resulted in thirteen specific project recommendations. The following is a summary of the recommended deployment for the corridor.

Broadcast Radio Dissemination System

Develop a system that allows route, weather, and traffic condition information to be sent to local broadcast radio stations. Each station would then have the capability to broadcast this information to its listeners.

Ice Detection Weather Warning System
Develop an ice detection and warning system at selected locations. Sensors would detect when bridge and road conditions become icy and a warning system would disseminate real-time, site- specific information to travelers, WSDOT maintenance personnel, and the WSP.

Internet Pre-Trip Traveler Information
Expand WSDOT's existing capabilities to provide weather, travel, and traffic information on the World Wide Web (WWW).

Rest Area Information Kiosks
Install traveler information kiosks at rest stops along the corridor. Traveler information would include both static and real-time data applicable to the corridor.

Over-Height Detection
Implement a system that provides advanced warning of low bridge clearances to commercial vehicle drivers and drivers of other high profile vehicles.

Portable Traffic Management System (TMS)
Develop a portable TMS to be utilized by WSDOT and WSP personnel during special events and maintenance and construction activities. Portable devices would include VMS, traffic signals, CCTV, and vehicle detection systems.

Speed Detection/Warning System
Install a speed detection/warning system at steep upgrade and downgrade locations as well as areas of known recurrent speeding. The warning system will be activated upon sensing a potentially hazardous condition.

Variable Speed Limit Signing and Weather Warning System
Implement a variable speed limit signing and weather warning system in the Mt. Vernon hills area (MP 223-228). The system will detect changing weather conditions and provide motorists with information, weather-related warnings, and variable speed limits.

Northwest Region TSMC Geographic Expansion
Expand the WSDOT SC&DI network along I-5 from Marysville (MP 206) to the Mt. Vernon interchange (MP 223). The expanded coverage along this stretch of roadway would provide better traffic management capabilities and increased motorist safety.

Mt. Vernon and Bellingham Traffic Management System
Install a TMS system which is consistent with the existing WSDOT SC&DI network for the Mt. Vernon and Bellingham area (MP 223 to MP 256).

Rest Area Security System
Enhance public security at rest areas along the corridor through the establishment of safe areas with enhanced lighting and improved surveillance and communication to emergency services.

Portable License Plate Optical Reader
Deploy portable license optical reader technologies to assist the WSP in streamlining inspection efforts at weigh stations, assist in enforcement, and provide WSDOT personnel with the means to conduct origin and destination studies.

US/Canadian Border Crossing Systems
Develop a system of data collection, computer database/algorithm and driver information technologies to reduce the travel times and improve efficiencies for the border crossing location.

Deployment Costs

The following is a budgetary estimate for the thirteen projects recommended for the corridor. These costs reflect initial project developments and deployment. In many cases the detailed prospectus recommends limited application such as prototype and spot deployments during phase one, followed by expanded application during subsequent phases. It is widely recognized that the costs of implementation beyond phase one will be significantly affected by the availability of rapidly developing technology and thus are not included in these estimates.

ITS Project	Estimated Capital Cost
Broadcast Radio Dissemination System	$174,000
Ice Detection Weather Warning System	$1,360,000
Internet Pre-Trip Traveler Information	$204,000
Rest Area Information Kiosks	$231,000
Over-Height Detection	$179,000
Portable Traffic Management System (TMS)	$780,000
Speed Detection/Warning System	$372,000
Variable Speed Limit Signing and Weather Warning System	$660,000
Northwest Region TSMC Geographic Expansion	$2,095,000
Mount Vernon and Bellingham Traffic Management System	$3,440,000
Rest Area Security System	$125,000
Portable License Plate Optical Reader	$22,000
US/Canadian Border Crossing Systems	$700,000
Total Deployment Costs	**$10,342,000**