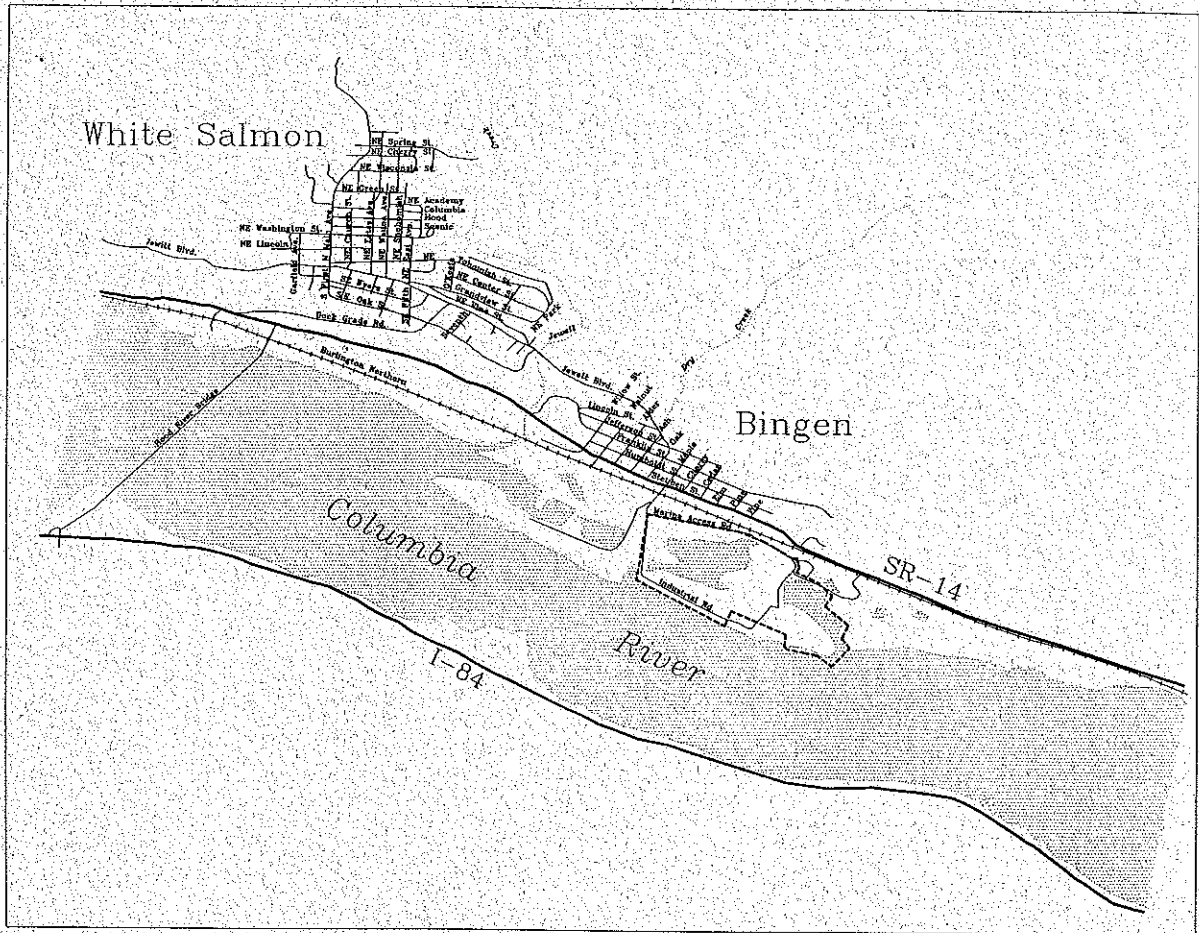
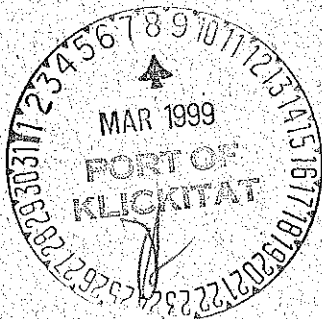
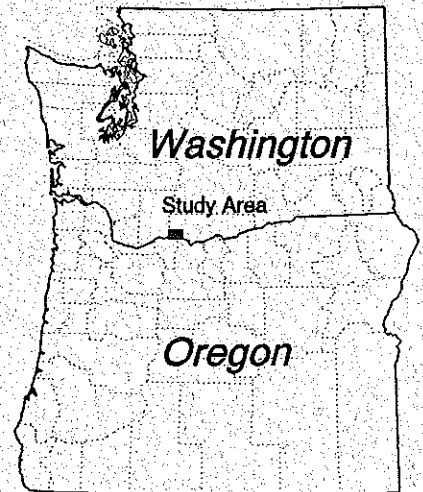


# Port of Klickitat Access Study



Prepared for the  
Klickitat County  
Transportation Policy Committee

December 1991



# **PORT OF KLICKITAT ACCESS STUDY**

**DECEMBER 1991**

**Prepared For:**

Klickitat County Transportation Policy Committee

**Prepared By:**

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# **CHAPTER 1**

## **Executive Summary**

## Chapter 1

### Executive Summary

This study will evaluate traffic and safety problems at the existing access (Maple St.) to the Port of Klickitat property and determine the need and evaluate improved access alternatives, in light of proposed development opportunities. The traffic and safety issues along State Route 14 (SR-14) will also be examined, from the Hood River Bridge to east of Bingen. The Port of Klickitat has a 103.3 acre mostly undeveloped parcel of land that is situated south of SR-14 and Burlington Northern Railroad tracts along the Columbia River in Bingen, Washington. The majority of the land has been farmed in recent years, however some of the land is also used for a marina, windsurfing, and logging operations.

Under current summer conditions, SR-14 has a 40 MPH speed limit and carries 8,750 vehicles between Hood River Bridge and Bingen, and 25 MPH speed limit and carries 6,300 vehicles through downtown Bingen. The Maple Street access has no posted speed and carries approximately 2,000 vehicles. No traffic signals are preset in the study area. Maple Street is controlled by stop signs at its intersection with SR-14. A three year accident history indicates that accidents in downtown Bingen are frequently associated with vehicles entering or leaving a driveway or parking spaces due to the limited sight distance created from on street parking. P.M. peak hour traffic volumes were used to analyze the level of service (LOS) for roadways and major intersections. Level of service is a qualitative measure of traffic's operating condition ranging from 'A' to 'F', with LOS 'A' representing the best operating conditions and 'F' the worst. Level of service of 'D' is the acceptable standard in most urban areas for p.m. peak hour traffic. The LOS analysis of four major intersections show that left turns from intersecting streets are experiencing considerable delays.

The proposed development on the Port of Klickitat property will generate as much as 6,317 daily vehicle trips. During the P.M. peak hour, 493 vehicle trips will be generated. To evaluate future road conditions and access to the Port property trips generated by proposed development were added to existing summer traffic volumes. Traffic volumes would increase 320% on the Maple street access, 49% on SR-14 east of Hood River Bridge, and 20% on SR-14 east of Bingen. Level of Service on SR-14 in the study area will decrease to LOS of 'E'. Longer delays will be experienced by those making left and through movements from roads intersecting SR-14. All four intersections studied, within the study area, had a LOS of 'E' or 'F' for left turn movements from roads intersecting SR-14.

Due to the conflicts at the existing Maple Street access a new eastern access was analyzed. With a new eastern access traffic volumes will remain approximately the same on SR-14 west of Maple Street; However, traffic volumes east of Maple Street will increase 128% to 9,700 daily vehicles and Maple Street south of SR-14 will slight increase above existing traffic volumes. All four intersections studied and a new eastern at-grade intersection will have a LOS of 'E' or 'F' for left turn movements from roads intersecting SR-14.

Four possible access roads to the Port property were analyzed: Improved Maple Street access, Eastern At-Grade Access, Eastern Above-Grade Access, and Eastern Tunnel Access. The analysis of possible access roads used the following six criteria: Level of service relief, safety, cost, land acquisition, economic development potential, and disruption to traffic.

Based on the six criteria and given the proposed land use assumptions, the Eastern At-Grade Access Road with some minor improvements at the SR-14/Maple Street intersection would be the preferred alternative. This alternative includes the construction of a new two-lane access road with approximately a 5% grade from SR-14 down to the Port property, having at-grade intersections with Marina Road, railroad tracts, and SR-14. In addition, appropriate left and right turn lanes would be added at the SR-14/Maple Street intersection. This alternative will offer adequate level of service and safety, although conflicts with trains will remain. The estimated cost to construct an eastern at-grade access road is \$500,000. This alternative will be attractive to private investors by offering direct access from the highway to their potential site, thus increasing local employment and bringing additional recreational dollars into the community. There will be little disruption of traffic on SR-14. An at-grade railroad crossing permit will need to be secured by the Port of Klickitat, and financing found for the construction of this facility.



## **CHAPTER 2**

# **INTRODUCTION AND BACKGROUND**

## Chapter 2

### Introduction and Background

IRC was designated as the Regional Transportation Planning Organization (RTPO) for Klickitat County and entered into an agreement to form the RTPO in July 1990. The RTPO process in Klickitat County is overseen by the Klickitat County Transportation Policy Committee. The Committee identified the need to improve vehicular access to 103-acre Port of Klickitat property and requested IRC along with the Washington State Department of Transportation to seek RTPO discretionary funds to undertake this access study. IRC submitted a request and received discretionary funds for this study.

#### Background

The Port of Klickitat has a 103.3 acre mostly undeveloped parcel of land that is situated south of SR-14 and the Burlington Northern Railroad tracts along the Columbia River in Bingen, Washington (Figure 1). The site contains a 12.5 acre lake, 18.1 acres of wetland, and 3,700 feet of shoreline with the Columbia River. The majority of the land has been farmed in recent years, however 18.4 acres is currently used for a boat basin, much of the shoreline is used by windsurfers, and 4.4 acres is being leased to a logging company which also owns another 7.2 acres along the Columbia River adjoining the Port of Klickitat parcel. SDS Lumber owns the adjacent land east and west of the Port property. Current vehicle access to the property is made at Maple Street.

In the 1960's the Port of Klickitat constructed several dikes on a portion of the property, and dredged an inlet and boat basin using the spoils to fill part of a slough and areas inside the dikes. The filled area is a 15.5 acre area known as the "Point Tract". The Point Tract has an elevation between 86 and 89 feet above mean sea level with the remainder of the Port property having a current level around 80 feet. The Port of Klickitat is preparing to receive 700,000 cubic yards of alluvial material from the U.S. Army Corps of Engineers, which is being removed from the Bonneville Dam area. This alluvial material will be used to raise 60 acres of low level land within the diked area to approximately 88 to 90 feet above mean sea level, which will make development possible on this property. The Port has secured all needed permits to receive the alluvial material, with the assurance that natural areas will not be filled. The U.S. Army Corps of Engineers will begin delivery of the alluvial material in late spring of 1992.



In 1986 Congress enacted the Columbia Gorge Scenic Area Act designating 285,000 acres of the Columbia Gorge under the jurisdiction of a bi-state commission instructed to develop a management plan consistent with the Act. The Act designates Urban Areas, General Management Areas, and Special Management Areas within the Scenic Area. The Port of Klickitat property lies within the Bingen Urban Area, which is exempt from land-use control of the Act.

Currently, the Bingen Marina is the only marina on the Washington side of the Columbia River within the Scenic Area. The marina receives heavy seasonal usage from tribal fisherman and recreational users. In addition, the Port made shore line improvements in the late 1980's which made this site attractive to windsurfers. Seasonal traffic counts exceed 30,000 vehicles to this property. The current demand for access to the Columbia River enhances the development potential of the Port property.

## **Purpose**

The purpose of this study is to evaluate traffic and safety problems at the existing access to the 103-acre Port of Klickitat property and determine the need and evaluate improved access alternatives, in light of proposed development opportunities in the area.

## **Road Network**

The road network for this study is defined as State Route 14 (SR-14) from the Hood River Bridge to just east of the 103-acre site, including Marina Access Road (east/west road south of the Burlington Northern railroad tracts on the north portion of the Port property).

SR-14 in this 1.9 mile road segment extends from the Hood River Bridge to east of Bingen. Through downtown Bingen curb, gutter, and sidewalks are provided on both sides of SR-14. Parallel parking is provided on both sides of SR-14 in Bingen, with angle parking existing on the south side of SR-14 between Walnut Street and Ash Street. Major intersections include Hood River Bridge, Ash Street, Oak Street, and Maple Street. Maple Street south of SR-14 intersects the Burlington Northern railroad tracts with an at-grade railroad crossing that is controlled by stop signs. The Marina Access Road is approximately a half mile long paved two lane road. This east/west road is shared by recreation users and SDS lumber. SDS has an agreement with the Port of Klickitat to maintain Marina Access Road.

SR-14 runs parallel to the Columbia River on the Washington State side of the river from Interstate 5 in Vancouver, Washington to Interstate 82 in eastern Washington. The Cities of Bingen and White Salmon are the only two cities that directly impact SR-14 within the study area. Within the study area SR-14 can be accessed from Interstate 84, which runs parallel to the Columbia River on the Oregon State side of the river, by way of the Hood River Bridge.

## **Demographics**

The majority of existing housing, population and employment within the study area is located within the Cities of Bingen and White Salmon. The 1990 Census estimates the City of Bingen population at 645 and the City of White Salmon population at 1,861, for a total population of 2,506. Both cities are contesting that there was an under counting of population.

Downtown Bingen has grown as a linear core area along SR-14, with restaurants and retail stores located adjacent to SR-14. Residential development in Bingen is mainly located north of SR-14, while industrial development is located south of SR-14. White Salmon is elevated above the Columbia River to the northwest of Bingen, with SR-141 (Oak Street) being the major access to SR-14.

## **Study Procedure**

The first step of the study involved the collection of data to determine existing traffic volume and safety problems in the study area. The second step of the study was to estimate the future traffic volumes in order to identify future capacity problems. This was accomplished by estimating the type and amount of development by converting the development into trips and distributing/assigning trips to the road network. The third step of the study was to identify and evaluate existing access and proposed access alternatives. The fourth and final step is to recommend the preferred access and improvements. This step will include an environmental evaluation of impacts the preferred alternative will have to the site.

## **CHAPTER 3**

# **EXISTING CONDITIONS**

## Chapter 3

### Existing Conditions

This chapter describes the road characteristics and traffic operations within the study area. This includes: Number of lanes, posted speeds, intersection control, traffic accident history, traffic volumes, and level of service.

#### Road Characteristics

##### Number Of Lanes (See Figure 2)

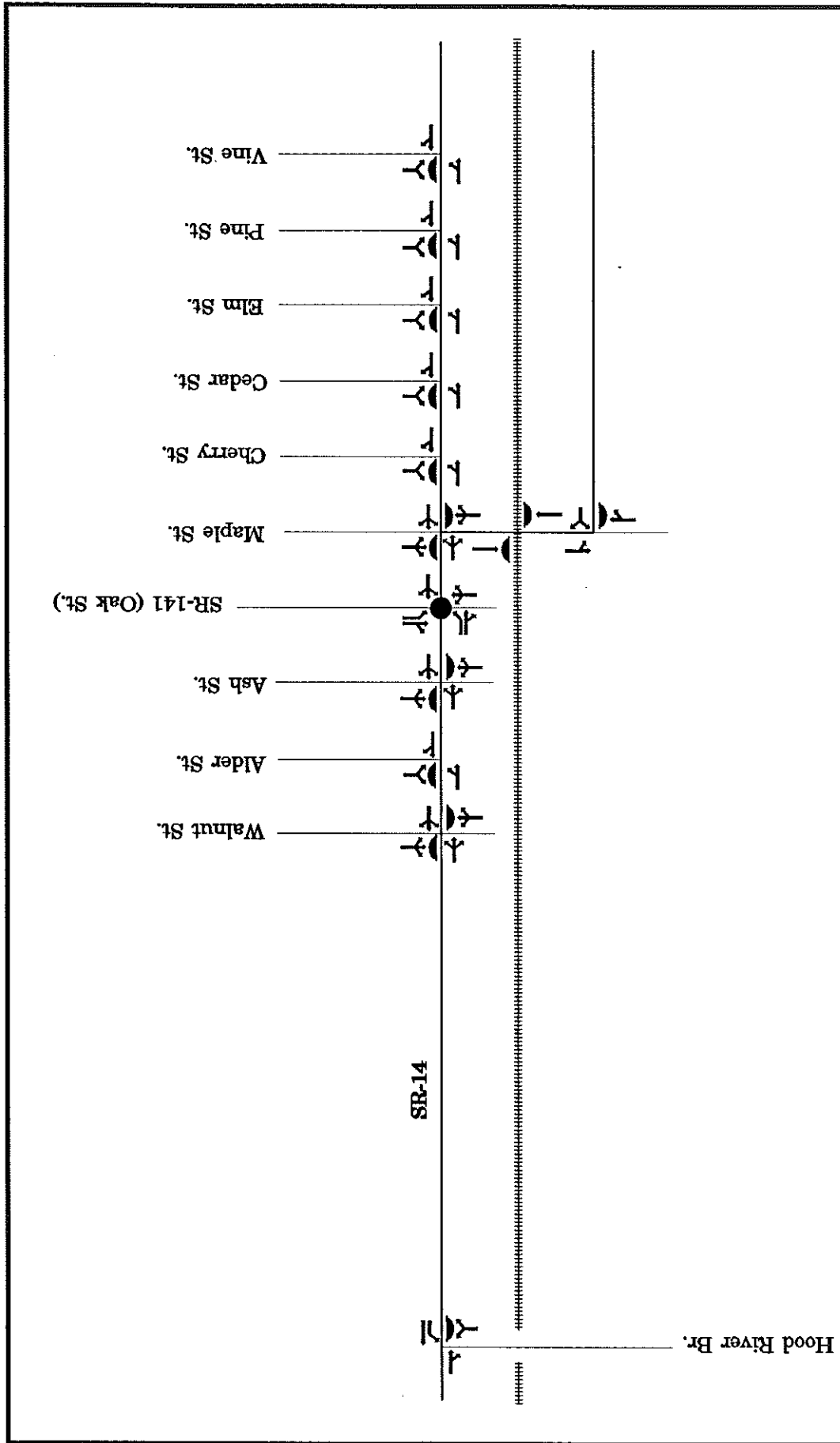
SR-14 is a two lane facility throughout the study area, with the addition of left turn lanes for westbound traffic on SR-14 at the Hood River Bridge intersection and eastbound and southbound traffic on SR-14 at (SR-141) Oak Street. Marina Access Road, south of the railroad tracts and north of the Port property is a paved two lane road.

##### Posted Speeds (See Figure 2)

SR-14 has a 50 MPH speed limit west and east of study area. Within the study area SR-14 has a 40 MPH speed limit between Hood River Bridge and Bingen, and 25 MPH through downtown Bingen. Marina Access Road has no posted speed.

##### Intersection Control (See Figure 2)

No traffic signals are present along SR-14 within the study area. However, there is a flashing amber signal, that flashes yellow on SR-14 and red at Oak Street. Traffic on SR-14 is not controlled, although stop signs are present for cross streets. The railroad crossing at Maple Street is controlled by stop signs and flashing railroad signal. Marina Access Road has no intersection controlled.



**Intersection Control**

- Stop Sign
- Flashing Signal

**Port Of Klickitat Access Study**

**Intersection Control and Lane Geometry**

**Figure 2**

**Intergovernmental Resource Center**



## Traffic Operations

### Traffic Accident History (May 30, 1986 - May 30, 1989) (See Figure 3)

A separate evaluation of accident history is calculated for road segments and intersections. Using a three year accident history and daily traffic, accident rates are calculated by million vehicle miles (MVM) for road segments and million entering vehicles (MEV) for intersections.

There were 26 accidents on SR-14 between Hood River Bridge and east of Bingen (M.P. 67.00) during the three year period. These accidents consisted of one fatality, two injury accidents (4 individuals injured), and 23 property damage only accidents.

SR-14 has an accident rate of 2.04 MVM in the study area. Accidents in downtown Bingen are frequently associated with vehicles entering or leaving a driveway or parking spaces due to the limited sight distance created from on-street parking. Utility poles in downtown Bingen are located adjacent to the road. Three utility poles were struck by vehicles in downtown Bingen during this time period, one of which was associated with the fatality. All intersections are under the one accident per MEV used to identify hazardous intersections. SR-14 at Maple Street had no reported accidents during this three year period.

### Traffic Volumes (See Figures 3 & 4)

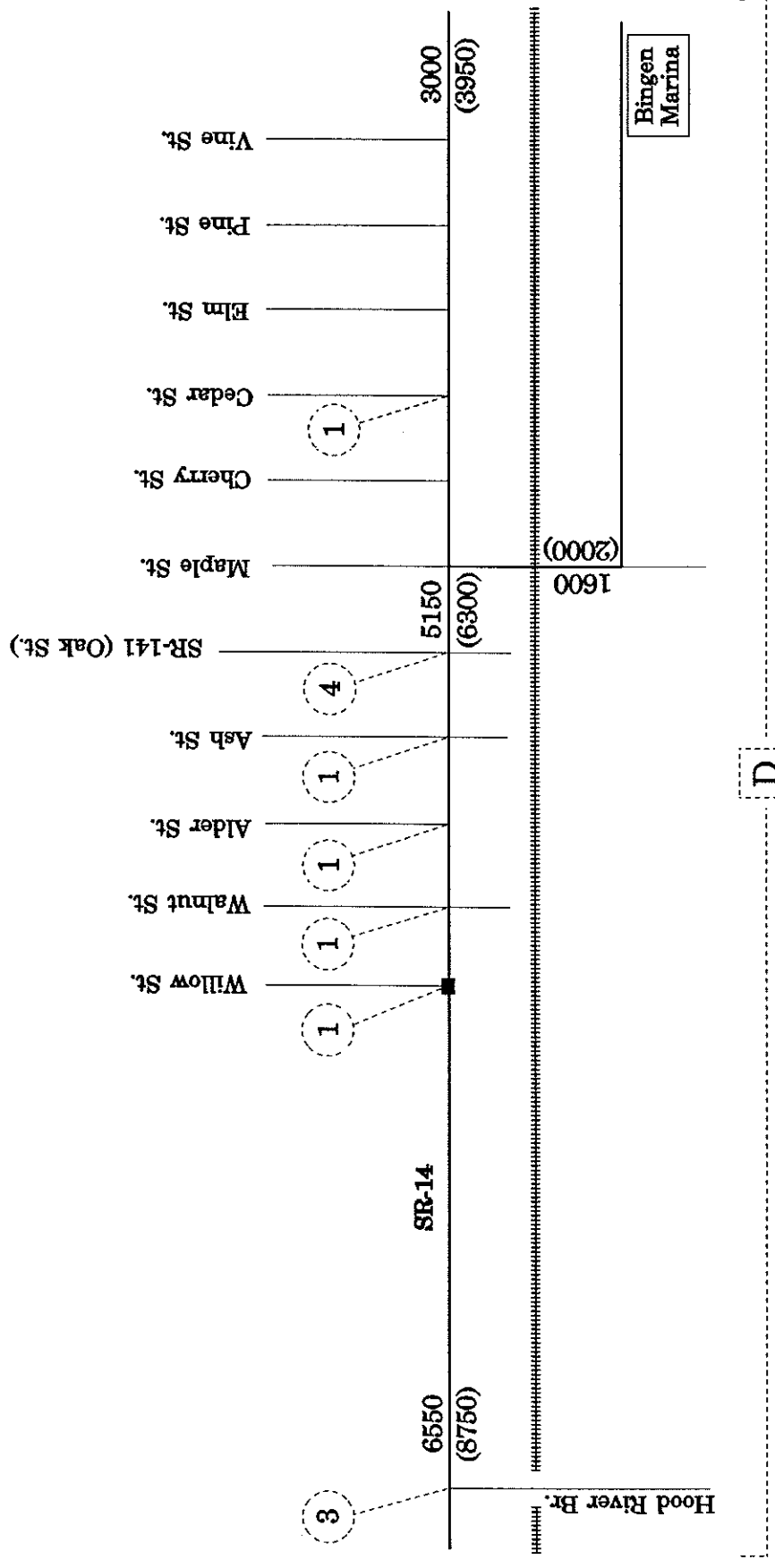
SR-14 carries a daily traffic volume of between 6,000 to 6,500 vehicles west of Oak Street, with daily traffic dropping to 4,250 east of Maple Street. Maple Street access to the Port carries 1,600 vehicles a day, most of the traffic is associated with the lumber mill. Truck percentage along SR-14 varies between 8% and 10% through the study area, while the truck percentage on the south leg of SR-14/Maple Street is 17%.

During the summer, travel within the study area increases 20-40 percent. The highest traffic volumes occur on a summer weekday, with truck and RV traffic also increasing. Usage of the Bingen Marina and Point Tract is mainly during the summer months.

### Level Of Service (See Figures 3 & 4)

Level of service is a qualitative measure of traffic operating condition using traffic volume data. There are six levels of service ranging from 'A' to 'F'. Level of service 'A' representing the best operating conditions and 'F' the worst operating conditions. Level of service of 'D' is the acceptable standard in most urban areas for p.m. peak hour traffic.

Existing summer traffic level of service along SR-14 in the study area is 'D' (Figure 3). The road network south of SR-14 near the Port operates adequately for current traffic volumes. The four major intersections analyzed in this study are intersections with SR-14 at the Hood River Bridge, Ash Street, SR-141 (Oak Street), and Maple Street. Analysis of the four intersections show that SR-14 movements and intersecting street right turn movement operated adequately, while left turn movements at Hood River Bridge and Oak Street were experiencing delays. The Maple Street access is operating at a level of service of 'D' during summer weekday peak hour traffic. Figure 4 provides level-of-service analysis and p.m. peak hour turn volumes for the four major intersections.



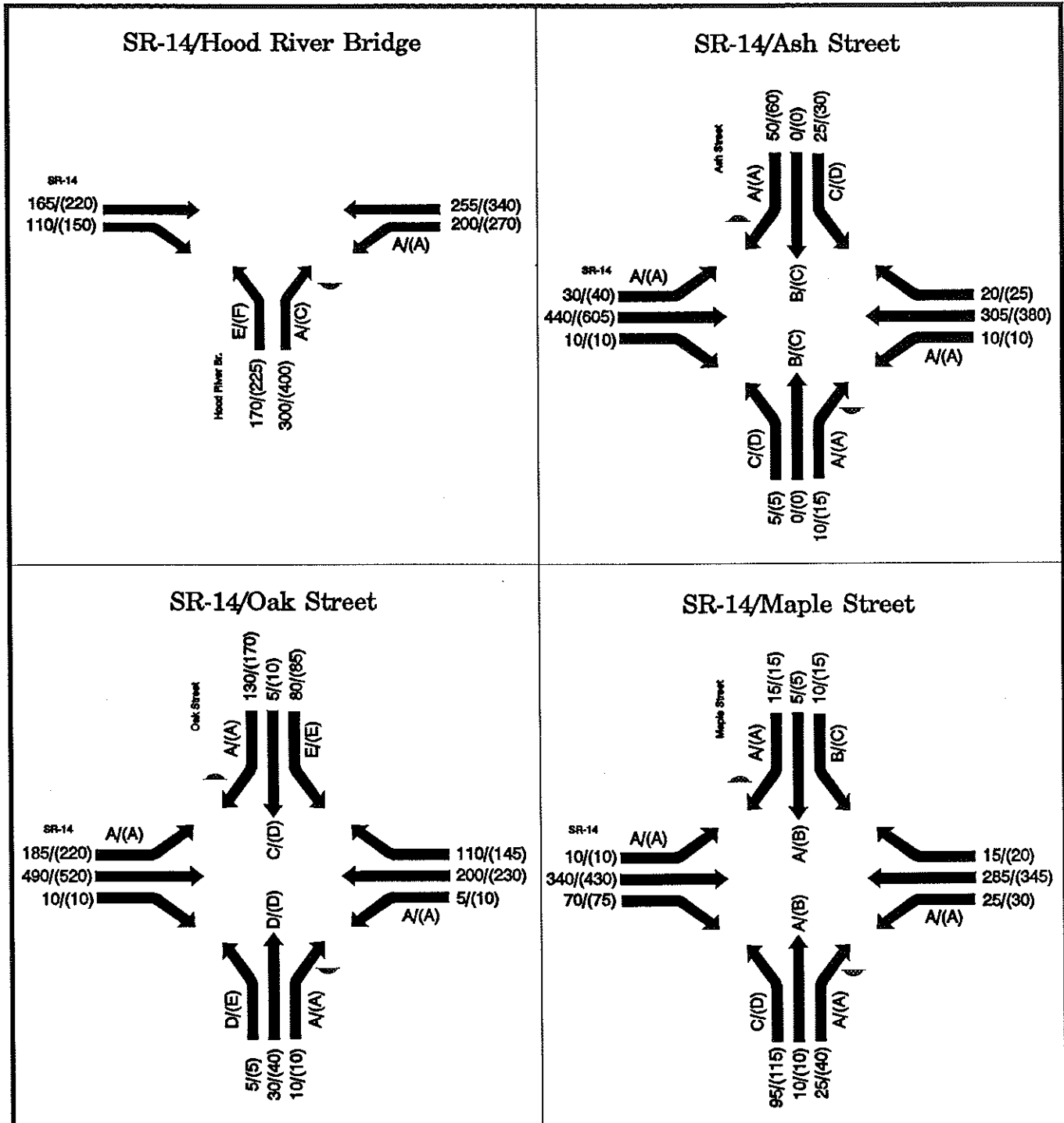
**Legend**  
 ## Daily Traffic  
 (##) Summer Daily Traffic  
 (#) Traffic Accidents  
 ■ Fatality  
 [A] Level of Service

Port Of Klickitat Access Study

## Traffic Operations

Figure 3

Intergovernmental Resource Center



<p>## Peak Hour Volumes</p> <p>(##) Summer Peak Hour Volumes</p>	<p>Port Of Klickitat Access Study</p>	<p>Figure 4</p>
<p>A Level of Service</p> <p>(A) Summer Level of Service</p> <p>Controlled Stop</p>	<p>Intersection Turn Volumes and Level of Service</p>	<p>Intergovernmental Resource Center</p>

## **CHAPTER 4**

### **2010 DEVELOPMENT CONDITIONS**

## Chapter 4

### 2010 Development Conditions

This chapter will describe and analyze the traffic impacts to the road network within the study area due to the proposed development of the Port of Klickitat 103-acre property. For purposes of this report, the year 2010 will be considered full build-out. Full build-out travel was produced through determining development (identifying major changes to land use), producing trip generation rates (ITE Trip Generation), and distributing and assigning trips (assign trips based on estimated travel destination).

#### Development

The type of development which may occur on the Port of Klickitat property includes the following:

- Marina with 125 to 150 boat berths.
- Public Beach focused towards windsurfing with 450 to 500 parking spaces.
- Recreational Homes between 50 and 250 units
- Educational/Research Facility with approximately 50 employees.
- Specialty Retail including food and recreational stores, approximately 25,000 sq. ft.
- Office Park including general office buildings and support services, approximately 325,000 sq. ft., or a Hotel with 100 rooms could replace approximately 225,000 sq. ft. of office park.

## Trip Generation, Distribution, and Assignment

### Trip Generation

Trip generation estimates for the Port of Klickitat Access Study were developed by the Intergovernmental Resource Center based upon widely accepted trip rates published by the Institute of Transportation Engineers (ITE) in Trip Generation, 4th edition. Specialty retail trips were reduced 30% to account for the influence of other land uses. Marina and windsurfing trips were reduced 10% and 15% respectively to account for existing usage. Traffic volumes on SR-14 were increased at a rate of approximately 1% per year, based on historical traffic volume data. High and low estimates of full build-out trips were developed. For purposes of this report, the high estimate will be used to evaluate the worse case (Table 1).

Table 1

### VEHICLE TRIP GENERATION

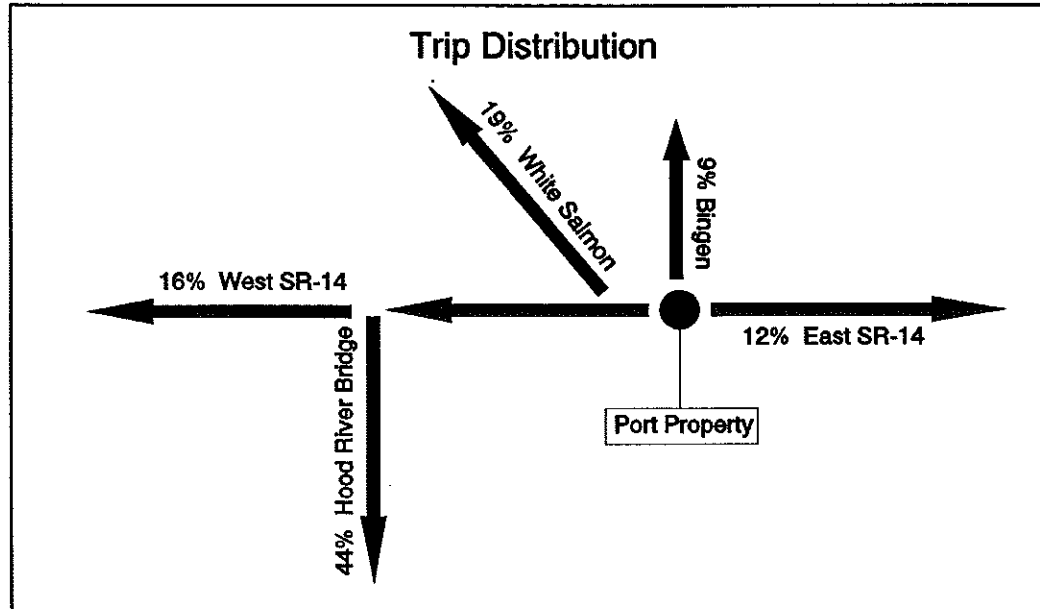
#### HIGH ESTIMATE

<u>LAND USE</u>	<u>SIZE</u>	<u>24 HOUR TRIP RATE</u>	<u>** P.M. PEAK **</u>			<u>24 HOUR TRIPS</u>	<u>P.M. PEAK</u>	
			<u>RATE</u>	<u>IN%</u>	<u>OUT%</u>		<u>IN</u>	<u>OUT</u>
Marina	150 berths	3.00	0.170	22	78	405	6	17
Public Beach/Windsurfing	500 parking	3.10	0.279	30	70	1318	42	98
Recreation Homes	250 units	3.16	0.262	60	40	790	40	26
Research Facility	50 employees	2.45	0.438	10	90	123	2	20
Specialty Retail	25,000 Sq ft	40.68	3.492	45	55	712	27	34
Office Park	100,000 Sq ft	11.29	1.360	15	85	1129	20	116
Hotel	100 rooms	18.40	0.664	78	22	1840	52	14
						-----	----	----
						6317	183	310

### Trip Distribution

Trip distribution for the 103-acre Port of Klickitat parcel was based on two methods of distribution. First, local trips (approximately 25% of trips produced) were distributed based on population centers in the area and travel times to those population centers. Second, all other trips were distributed on travel characteristics and existing traffic volume data. Figure 5 shows the combined trip distribution of all trips in and out of the 103-acre Port of Klickitat parcel.

FIGURE 5



### Trip Assignment

Projected trips were assigned to the road network based on the estimated trip distribution. Trips were assigned to roads considering logical routing, left turn at critical intersections, and minimum travel times. Multiple paths were assigned to achieve a realistic estimate. For example, from the Port property to BZ Corners, SR-141 spur would be quicker than SR-141 through White Salmon. However, some vehicles were assigned to SR-141.

### **2010 Traffic Conditions On Existing Road Network**

This scenario considers 2010 traffic on existing road network. Access to the Port of Klickitat property remains at Maple Street. The estimated 2010 traffic volumes are intended to indicate a worse case scenario and not necessarily daily conditions.



2010 Traffic Volumes (Table 2)

Estimated 2010 traffic volumes were estimated by adding traffic generated by the proposed development of the Port property to existing traffic volumes.

Traffic volumes on south Maple Street will increase significantly from the current 2000 vehicles per day to 8,600 vehicles per day. Since 44% of the traffic will cross the Hood River Bridge, traffic volumes between Maple Street and Hood River Bridge will increase significantly.

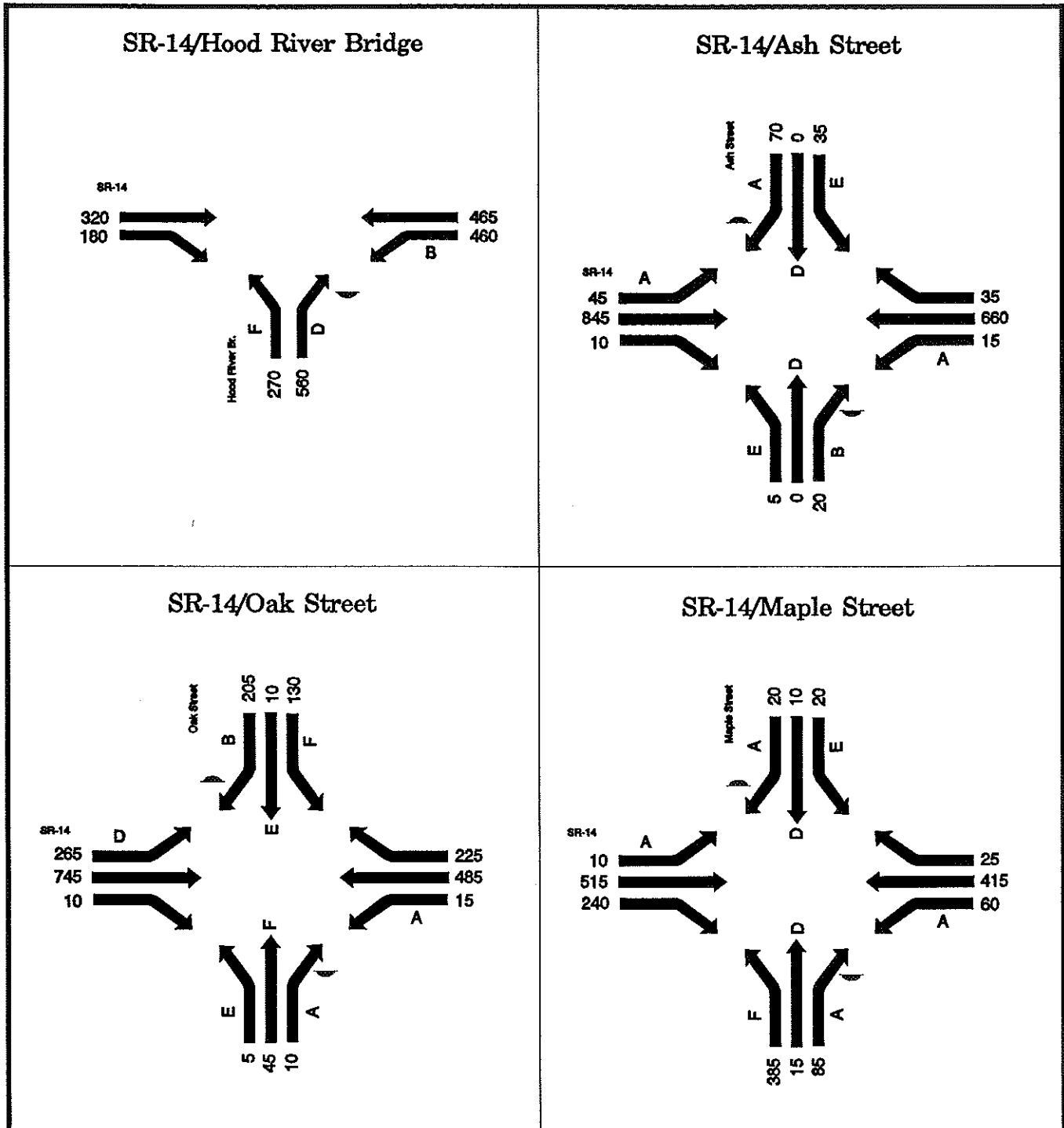
**Table 2**

**Traffic Volumes (No-Build)**

<u>Location</u>	<u>1989 Volume</u>	<u>2010 Volume</u>	<u>Difference</u>	<u>Growth</u>
SR-14 East of Hood River Bridge	8,750	13,000	4,250	49%
SR-14 West of Maple Street	6,300	12,000	5,700	90%
South Maple Street	2,000	8,400	6,400	320%
SR-14 At East Bingen City Limits	3,950	4,750	800	20%

2010 Level of Service (Figure 6)

2010 Level of service along SR-14 within the study will decrease from the current summer LOS 'D' to LOS 'E', with the greatest impact between Maple Street and the Hood River Bridge. Marina Access Road will have a significant increase in congestion. Level of service analysis of the four major intersections show that SR-14 left turn movements and intersecting street right turn movements continue to operate adequately, while intersecting street left turn movements experience even longer delays. Left turn movements from streets intersecting SR-14 operate at a level of service of 'E' or 'F' at all four intersections.



<p><b>Legend</b></p> <p>## Peak Hour Volumes</p> <p>A Level of Service</p> <p>Controlled Stop</p>	<p>Port Of Klickitat Access Study</p>	<p><b>Figure 6</b></p> <p>Intergovernmental Resource Center</p>
	<p>2010 Intersection Turn Volumes and Level of Service</p>	

### 2010 Safety

Safety issues along the study road network will continue to exist or will deteriorate as traffic volumes increase. In addition to safety issues identified by accident rates in chapter 3, all intersections throughout the study area will experience a decrease in sufficient gaps in the SR-14 traffic stream to permit traffic to safely make left turns to enter SR-14.

### 2010 Signal Warrant

Traffic signal warrants at the four study area intersections were analyzed using estimated 2010 traffic volumes. A traffic signal is considered warranted if it meets one of the eleven warrants from the Manual on Uniform Traffic Control Devices. For this study, analysis was based on peak hour volume. A more comprehensive analysis of traffic conditions should be performed before installing a traffic signal. Under 2010 traffic conditions, including development of Port property, a traffic signal is warranted on SR-14 at Hood River Bridge, SR-141 (Oak Street), and Maple Street.

### **Maple Street Access Conflicts**

The purpose of this study is to evaluate traffic and safety problems at the Maple Street access and determine the need and evaluate improved access alternatives, in light of proposed development opportunities in the area. Several conflicts will occur at the Maple Street access to the Port of Klickitat property as development occurs. The conflicts with the existing Maple Street access are:

- **Conflict Between Lumber Operations And Port Traffic.** With the increase in traffic to the Port property there will be an increase in the number of conflicts with lumber operations. Logging trucks enter and exit the road at various locations that are not easily identifiable to other motorists, thus limiting site visibility and creating a safety hazard. In addition, traffic to and from the Port property will impede the movement of heavy trucks entering Maple Street from the lumber mill.
- **SR-14/Maple Street Intersection Operations.** The SR-14/Maple Street intersection will not operate adequately without major improvements. Congestion at this intersection will mean long delays to vehicles making left turns from Maple Street to west bound SR-14, and a safety hazard to those that try.

Vehicular access to the Port property has been identified as a constraint to private investment in this property. The master plan for this site identifies a new access to SR-14 located approximately 1,800 feet east of Maple Street. Due to the conflicts at Maple Street, the eastern access identified in the master plan for this site should be analyzed. The existing access is indirect and the majority of the site is not visible from SR-14/Maple Street intersection, thus making this site less attractive to private investors than other sites located in other counties or Oregon. Unless access to the Port property is improved, this site is likely to be underdeveloped.

**2010 Port Access Via A New Eastern Access (Figure 7)**

This scenario considers 2010 traffic on SR-14 within the study area with the addition of an access to the Port of Klickitat property located east of Vine Street approximately 1,800 feet east of the existing access at Maple Street. The various access alternatives at this eastern access location will be addressed in Chapter 5 (Alternative Analysis).

Traffic Volumes (Table 3)

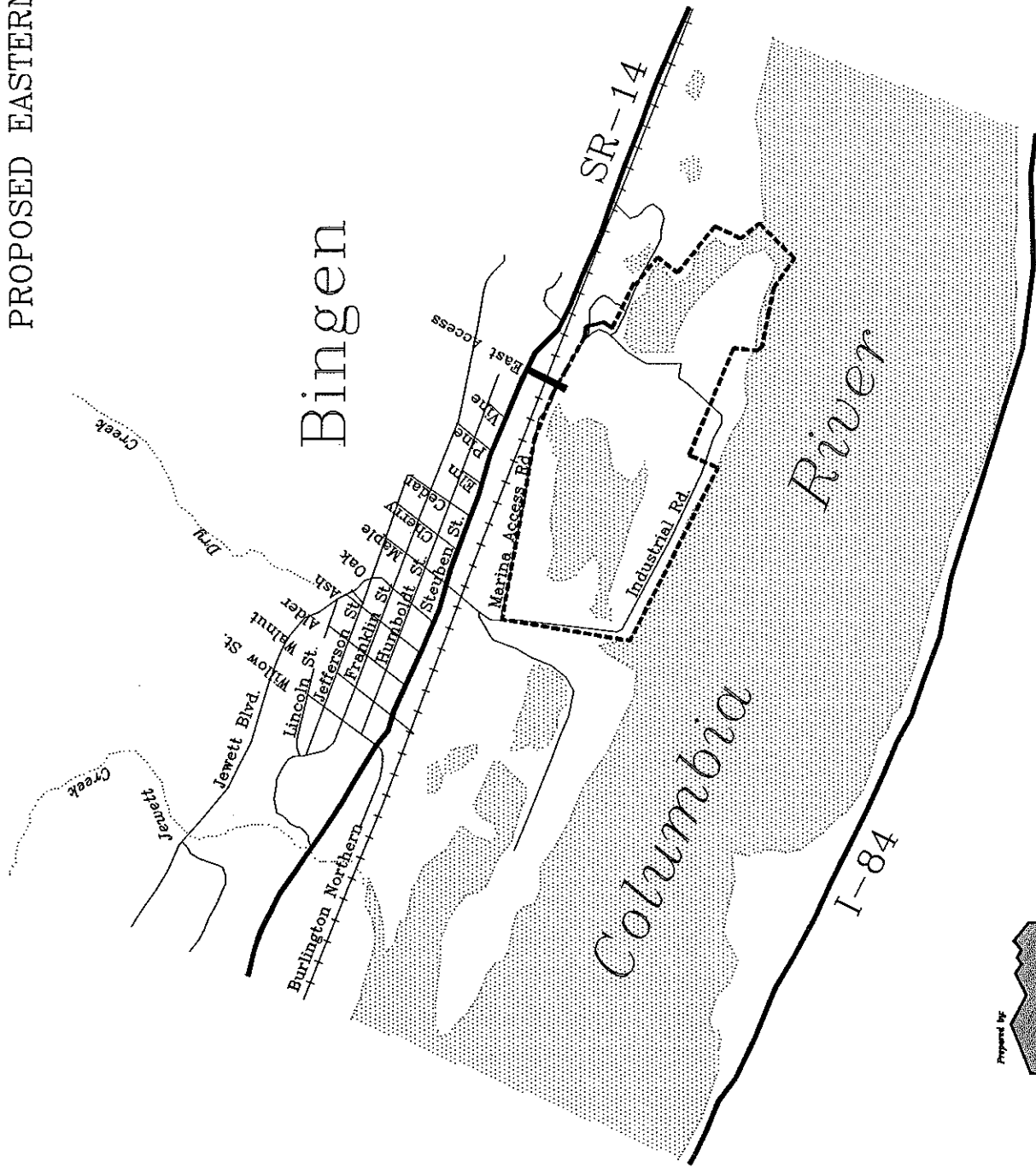
Traffic volumes with the new Port access remain the same from Maple Street to Hood River Bridge as they are for the 2010 no-build scenario. However, traffic volumes on south Maple Street will remain approximately the same as existing traffic volumes and traffic volumes east of Maple Street will increase from the current 4,250 vehicles per day to 9,900 vehicles per day.

**Table 3**

**Traffic Volumes (New Access)**

<u>Location</u>	<u>1989 Volume</u>	<u>New Access</u>	<u>Difference</u>	<u>Growth</u>	<u>2010 Maple St</u>
SR-14 West Of Maple Street	6,300	12,000	5,700	90%	12,000
South Maple Street	2,000	2,200	200	10%	8,400
SR-14 East of Maple Street	4,250	9,700	5,450	128%	5,500

Figure 7  
PROPOSED EASTERN ACCESS

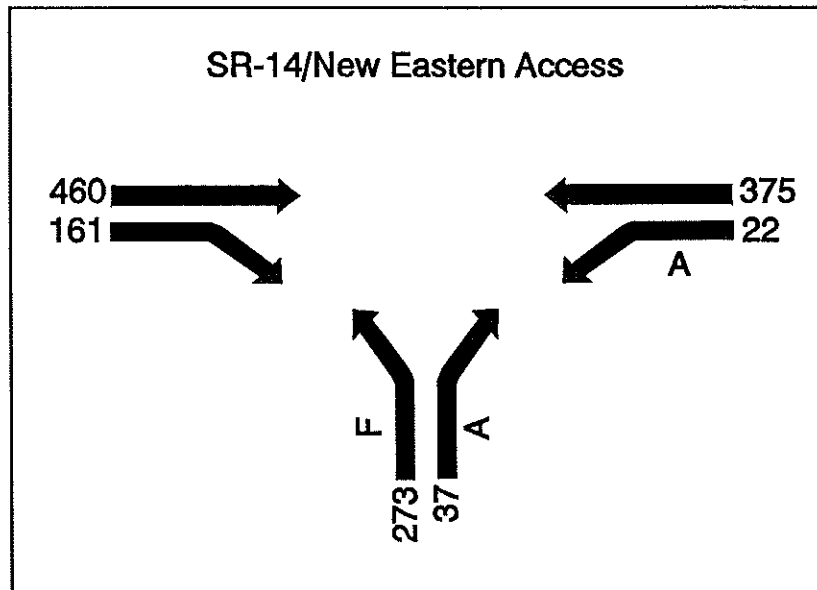


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RESOURCE CENTER**

Level of Service (Figure 8)

Level of service along SR-14 within the study will decrease from the current LOS of 'D' to a LOS of 'E'. Operation of Marina Access Road will increase with less than 100 vehicles using this east/west road per day. Level of service analysis of the four major intersections show that SR-14 left turn movements and intersecting street right turn movements continue to operate adequately, while intersecting street left turn movements experience even longer delays. The Hood River Bridge, Ash Street, and Oak Street intersections operate exactly the same as in the 2010 No-Build scenario. The new eastern access will operate adequately for all movements except left turns from the new access road will operate at LOS 'F'(if an at-grade intersection). Left turn movements from streets intersecting SR-14 will continue to operate at a level of service 'E' or 'F' at all intersections analyzed.

Figure 8



Signal Warrant

Traffic signal warrants at the four study area intersections and eastern Port access were analyzed using estimated 2010 traffic volumes. Analysis was based on peak hour volume. However, a more comprehensive analysis of traffic conditions should be performed before installing a traffic signal. Under 2010 traffic conditions with a new eastern access to the Port property, a traffic signal is warranted on SR-14 at Hood River Bridge, SR-141 (Oak Street), and Eastern access (if an at-grade intersection).

## **CHAPTER 5**

# **ALTERNATIVE ANALYSIS**

## Chapter 5

### Alternative Analysis

This chapter identifies and presents an analysis of proposed access alternatives to the Port of Klickitat property. This chapter will address which improvements will more effectively improve traffic circulation to accommodate future estimated traffic due to the anticipated development of the 103-acre Port of Klickitat Property. With any of the alternative the Port Access Road must be maintained, due to an agreement with SDS Lumber. The analysis of possible improvements used six criteria: Level of service relief, safety, cost, land acquisition, economic development potential, and disruption to traffic. A summary of the alternative analysis based on the six criteria is given in Table 4. A report containing plan/profile maps and a detailed description of each alternative is contained in Appendix A.

#### Access to Port of Klickitat Property

##### SR-14/Maple Street

The needed improvements at this location, if Maple Street remains the access to the Port of Klickitat property, include the addition of left turn lanes for eastbound, westbound, and northbound traffic, and addition of a right turn lane for eastbound and northbound traffic. An automatic cantilever railroad signal will need to be constructed at the Burlington-Northern railroad crossing on Maple Street to replace existing stop signs. Maple Street south of SR-14 will need to be widened to accommodate additional lanes. The intersection of SDS mill exit/Marina Road/Dike Road will need improved lane delineation and proper stop signing. When traffic volumes approach those forecasted in this report and all perceived mitigation measures have been taken at the intersection of SR-14/Maple Street, investigation into a traffic signal would be warranted.

With these improvements SR-14/Maple Street intersection will operate adequately, although northbound left turns will experience delays. Periodic delays associated with trains will continue. Safety will be improved with improved lane delineation and railroad crossing signals. A traffic signal could create a rear end accident problem on SR-14. The estimated cost of all improvements is \$320,000. Right of way would need to be acquired at Maple Street\Marina



Road intersection. The acquisition of right of way should be accomplished through the trading of property at no cost. The Port property may not reach full economic potential because of a lack in interest from private investors due to poor visibility of the Port property from SR-14/Maple Street intersection, and a perceived conflict with mill traffic. There will be minor disruption of traffic on SR-14 during the construction of this project.

#### SR-14/Eastern At-Grade Access Road

This option includes the construction of a new two-lane access road with a grade of approximately 5% from SR-14 down to the Port property, having an at-grade intersection with SR-14, Burlington-Northern railroad tracts, and Marina Access Road. The new access road would need to be controlled by automatic cantilever railroad signals at the railroad tract, and stop signs at Marina Access Road and SR-14. This 'T' intersection with SR-14 should include appropriate left and right turn lanes. In the future, a traffic signal may be warranted at SR-14, although a detailed engineering study should be completed before a signal is considered.

At the new intersection with SR-14, level of service will operate at an adequate level, although there will be some delays due to trains and northbound left turns. Safety should be adequate at the access road intersections with SR-14, the railroad, and Marina Road. However, there is some concern of safety due to the somewhat close proximity (140') of the railroad tracts to SR-14. However, this is approximately the same distance that the current Maple Street intersection has from the railroad tracts. The cost of constructing this new eastern access will be \$500,000. A small portion of undeveloped right of way will need to be acquired between the railroad tracts and SR-14. This access will improve the ability of the Port to attract private investment, with a more direct and visible entrance, thus having a positive impact on the local economy with the addition of employment and recreational dollars spent. There will be little disruption of traffic on SR-14; however, current marina traffic will be disrupted during construction.

#### SR-14/Eastern Above-Grade Access Road

This option would include the construction of a two-lane overpass crossing above SR-14 and the railroad tracts to access Port property, at approximately the same location as the at-grade crossing. In order to obtain sufficient height to clear the highway and railroad tracts, the overpass would need a very long circular approach structure built on a considerable amount of fill. The overpass would be a 400' long structure extending over Marina Road. To bring the road down to the Port property at a 6% grade, the access road would extend another 570' south from the end of the overpass on fill.

This connection with SR-14 will operate with little conflicts or delays other than slow or heavy vehicles which may have a difficult time with the steep grades. Safety should be very good by limiting left turn conflicts and conflicts with trains. The cost is considerably higher than an at-grade railroad crossing at \$3,000,000. Right of way will need to be acquired north of SR-14 to obtain sufficient height to clear the railroad tracts at a 6% grade and some of the developable Port property would be lost to the overpass. Less land would be available to develop than the at-grade access road, thus limiting the positive impact on the local economy. There will be disruption to traffic on SR-14 and railroad traffic during construction of the overpass.

### SR-14/Eastern Tunnel Access Road

This option includes the construction of a two-lane curving road that would pass underneath the railroad tracts from the Port of Klickitat property to connect with SR-14. There would be sharp curves to this new road near its intersections with SR-14 and the tunnel under the railroad tracts. The road would have a 5% grade and would be over 600' in length between SR-14 and the tunnel. The road would need to descend below the 100 year flood plain; however, positive drainage is possible.

This alternative will remove conflicts or delays with the railroad. However constraints will exist with the size of vehicle that can easily use the facility, and conflicts with SR-14 will increase due to the angle at which these roads intersect. Safety will be improved by the removal of conflicts with trains, but due to the curvature of the road, serious safety problems are likely to occur for vehicle traffic. This option would cost \$2,500,000 with much of the cost associated with the construction of the tunnel. Right of way will need to be acquired, which will displace residents and at least one business along SR-14. This option is not likely to positively effect the local economy. There will be some disruption to traffic during construction. For a period of time during the construction of the tunnel, rail traffic would need to be diverted, which will require the cooperation of Burlington-Northern.

### Summary

A summary of the alternative impacts based on the evaluation criteria is given in Table 5. All criteria was evaluated as to having a positive, neutral, or negative impact. As shown, the at-grade crossings' options are more cost effective and would require no major land acquisition. While the cost and land acquisition is high to go over or under the railroad tracts.

Table 5  
Alternative Analysis Summary

Alternatives	Maple Street	Eastern At-Grade	Eastern Overpass	Eastern Tunnel
Level of Service	○	○	+	-
Safety	○	○	+	-
Cost	+	+	-	-
Land Acquisition	+	+	-	-
Economic Potential	-	+	○	-
Traffic Disruption	○	○	-	-

+ Positive Impact  
 - Negative Impact  
 ○ Neutral Impact

## **CHAPTER 6**

# **RECOMMENDATIONS**

## Chapter 6

### Recommendations

#### Preferred Access Alternative

Based on the land use assumed in this report the preferred access is the eastern at-grade access road with some minor improvements at the Maple Street/SR-14 Intersection. The Maple Street improvements would include the addition of appropriate turn lanes. This option would be cost effective, require little right of way to be acquired, and offer a positive economic potential to the local area. The eastern at-grade access would have a neutral impact as to level of service, safety, and traffic disruption. The Maple Street improvements would relieve some of the traffic pressure at the new eastern at-grade access road, by offering an alternative access.

The Maple Street option is cost effective and could be functional, but based on the assumed land use, would limit the attractiveness of the site. The site would be less attractive because the entrance would be indirect and have poor visibility of the Port property. The eastern above-grade access road, although feasible, would require a tremendous amount of land and cost. The eastern tunnel would have operation problems, is expensive, would disrupt train traffic, and would require the removal of existing residents and a business along SR-14.

Two major hurdles exist to the construction of the eastern at-grade access road. First, the necessary permit must be secured for an at-grade railroad crossing. As a general rule, new at-grade railroad crossings are not encouraged. A need for a new at-grade railroad crossing must be proven. Once a need has been established, the plans for a new crossing must show that adequate safety measures will be taken to ensure the safety of vehicular traffic at the crossing. Second, financing for the construction of a new access road must be secured.

Three possible funding sources for a new eastern at-grade access road have been identified:

**Economic Development Administration (EDA) Grants and Loans (Federal)** - The U.S. Department of Commerce makes these grants and loans available to fund a variety of capital improvement projects that will generate economic growth and increase employment. Grants may be obtained to cover 50% of the project cost. Under unusual circumstances, an 80% grant may be obtained. Klickitat County is eligible for EDA financial assistance because of high unemployment. If the economic development plan in the region includes or is updated to include the new port access road, this project would be eligible.

**Community Economic Revitalization Board (CERB) (State)** - The CERB makes low interest loans available to finance the construction of public facilities which will result in specific private sector investment and permanent job opportunities. No specific local match is required.

**Transportation Improvement Account (TIA) (State)** - The TIA is administered by the Transportation Improvement Board (TIB). There are several things that increase the chance of a project being funded. Coordination between governmental agencies - The City of Bingen would need to be the lead agency in applying for this financing, but by involving the Port, Klickitat County, and possibly WSDOT this project would receive a higher ranking. The project should demonstrate economic development. Funding - No local match is required, but the higher the local match the higher the ranking of this project.

If the Port of Klickitat is unable to obtain a new railroad crossing, the Maple Street improvements should be pursued. This will improve access to the site, although the sight is likely to be underdeveloped due to the poor access location.

### **Other SR-14 Improvements**

The following improvements are also needed to improve access between the Hood River Bridge and the Port of Klickitat property. The need for these improvements is not based only on the development of the Port of Klickitat property.

1. SR-14/Hood River Bridge. Possible improvement at this intersection include the addition of a right turn lane and an acceleration lane for northbound traffic with the existing lane becoming a left turn lane. In addition, this intersection warrants a traffic signal. Due to the relatively high volume of northbound right turns (560) and left turns (270) in the 2010 peak hour, these improvements will have a positive impact on level of service. The acceleration lane needs to be design to avoid conflicts with an entrance to a retail establishment. The cost is estimated to be approximately \$200,000. A small amount of right of way will need to be acquired for the acceleration lane. This improvement could have a positive effect on economic development potential by making the Washington side of the Gorge more accessible to traffic. No major traffic disruption is anticipated. However, a more detailed engineering study should be completed before a traffic light is installed.

2. SR-14/Downtown Bingen. Two possible options for improving capacity through downtown Bingen are to develop a center two-way left turn lane or a one-way couplet. The pavement through downtown Bingen can accommodate a center two-way left turn lane and still provide parking on both sides of the street if small portion of angled parking is changed to parallel parking. A one-way couplet would use existing SR-14 for eastbound traffic and Hancock Street for westbound traffic. Either option would increase level of service and safety through Bingen. Creating a center two-way left turn lane would be relatively inexpensive while creating a one-way couplet would cost over \$2,000,000. Right of way would need to be acquired to tie Hancock Street back into existing SR-14. Many of the businesses in downtown Bingen would be negatively effected by potential customers being diverted down a different street. Disruption to traffic could be minimized with either option.

# APPENDICES



## **APPENDIX A**

### **ENGINEER'S REPORT**

#### **SR-14/Maple Street Alternate**

##### Physical Description

The existing Maple Street extension off of SR-14 is the current access to the Klickitat County Port property. The right-of-way varies from 80 feet wide directly south of SR-14 (Steuben Street) to 60 foot width across the Burlington-Northern railroad trackage and, currently, to a 40 foot County road out to the connection with the Bingen Marina access road. Additional right-of-way is being negotiated to provide a minimum of 60 foot right-of-way through this currently restricted section. Current construction is uncurbed asphalt paving approximately 36 feet wide southerly to the SDS mill access entry then continuing at approximately 24 foot width to connect with the Bingen Marina access road. There are rubberized mat crossings under the main line sections of the Burlington-Northern trackage. Approach grade from SR-14 is a minus 1 percent with a short 1.2 uphill percent stretch just prior to the crossing then minus 4.5 percent flattening out to 1.5 percent at the connection with the Bingen Marina access road. Visibility and sight distances are good at all points of entry, intersections, or turn offs of the road. There are traffic conflicts from the SDS mill truck exit road where it adjoins the corner at the west side of the Bingen Marina access road and the Logger's Association road extending straight south from the terminus of the existing paved surface.

##### Recommended Improvements Required

1. The acquisition of additional right-of-way south of the south line of the railroad to provide minimum 60 foot width centered over the existing travelled paved surface.
2. Additional widening of the asphalt on the westerly side of the existing pavement between Maple Street and SDS mill access entry road to provide minimum of 44 foot paving plus additional widening on the east side at SR-14 to provide a right turn lane at the intersection.

3. Signalized crossing at the railroad.

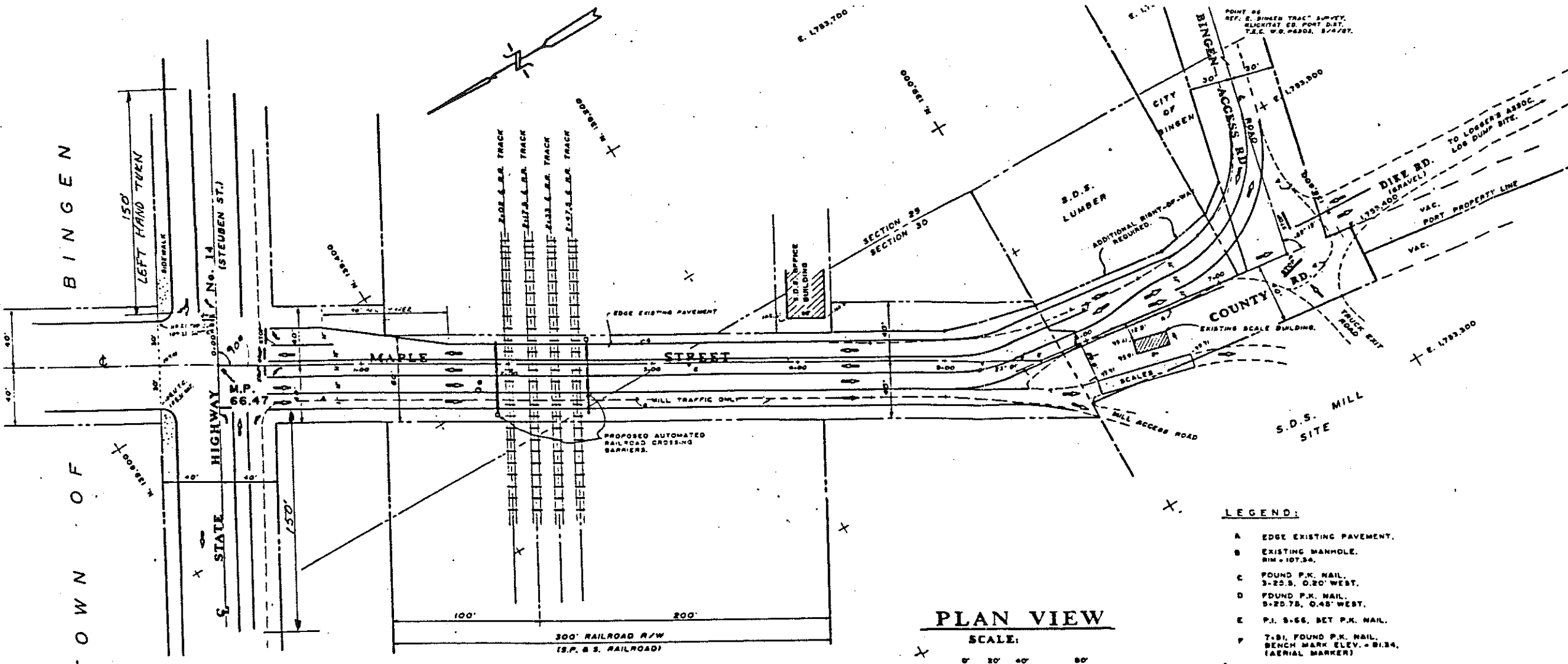
Proper stop signing at the dike road, the SDS mill exit road, and Bingen Marina road plus necessary lane striping.

Estimated Costs

Right-of-way Acquisition Proposed Exchange	No Cost
Paving	\$50,000
Railroad Crossing Signalization	200,000
Signing and Striping	<u>6,000</u>
Subtotal	256,000
PLUS 25% Engineering, Legal, Administrative, Contingencies and Sales Tax	<u>64,000</u>
Total Estimated Project Cost	\$320,000

Not necessary but from an aesthetic standpoint the project would also benefit by the installation of curbs and gutters and low non-sight obscuring landscaping along both edges. Estimated additional cost for this work would be \$30,000.

A plan of proposed improvements is shown on the attached plan and profile map.

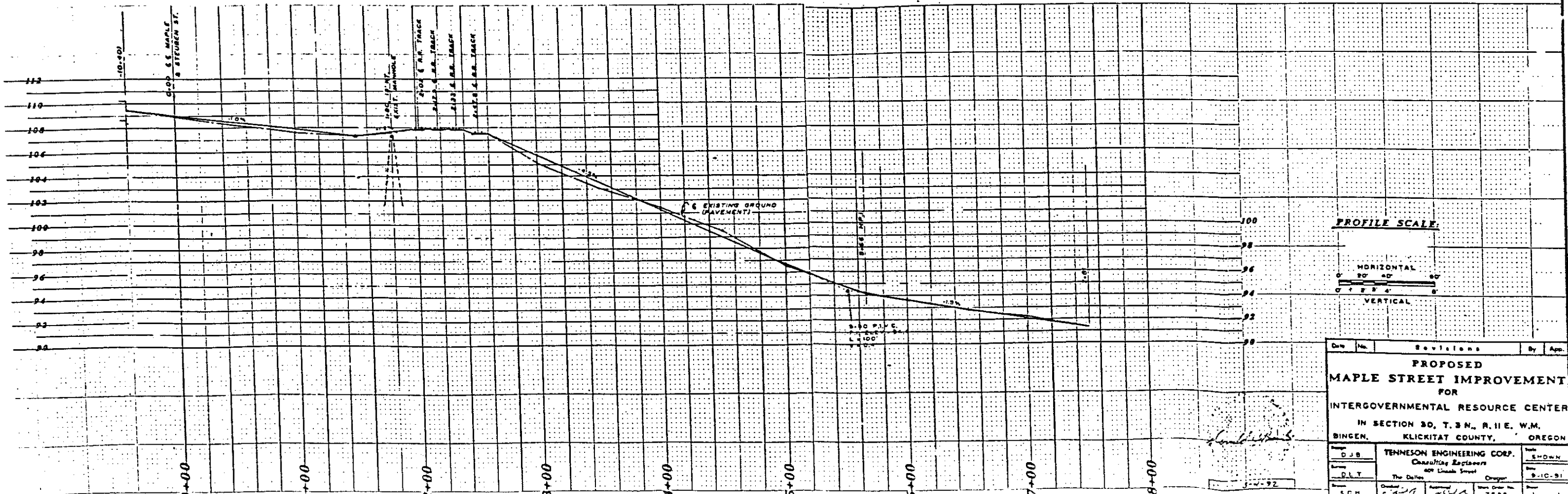


**PLAN VIEW**

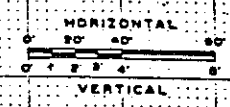


**LEGEND:**

- A EDGE EXISTING PAVEMENT.
- B EXISTING MANHOLE. RIM = 107.34.
- C FOUND P.K. NAIL. 3-25.8, 0.20' WEST.
- D FOUND P.K. NAIL. 9-25.75, 0.45' WEST.
- E P.I. 9-56, BET P.K. NAIL.
- F T.S. FOUND P.K. NAIL. BENCH MARK ELEV. = 81.34. (AERIAL MARKER)



**PROFILE SCALE**



Drawn	No.	Revisions	By	App.
<b>PROPOSED MAPLE STREET IMPROVEMENT FOR INTERGOVERNMENTAL RESOURCE CENTER</b>				
IN SECTION 30, T. 3 N., R. 11 E., W. M., BINGEN, KLIKITAT COUNTY, OREGON				
Prepared by	TENNISON ENGINEERING CORP. Consulting Engineers 409 Lincoln Street The Dalles, Oregon			Scale
Checked by				Sheet
Approved by				7085
Project No.				1

## **SR-14/Eastern At-Grade Access Road**

### Physical Description

At the current time there is no access created at the proposed site of this roadway. At the proposed intersection on SR-14, the southerly right-of-way of SR-14 is converging to the east to a common line with the Burlington-Northern Railroad right-of-way. There is small wedge shaped section of undeveloped private property to cross which, because of the adjacency of these two right-of-way lines, is basically unbuildable. The railroad trackage at this point is located in a cut on the northern side opening to a fill bank on the southerly side. There is a set of signal wire on poles running along the northerly rail. On the southerly right-of-way line of the railroad there is an existing access road to the Mt. Adams Forest Products mill located to the east of the Port property and immediately to the south of that is the paved access road to the Marina Park as owned by the Port District.

From an elevation standpoint, there is an approximately uniform 5 percent downhill grade from the edge of the existing SR-14 pavement meeting at-grade at the existing road elevations on the railroad and continuing down to the Port properties, a distance of approximately 300 feet. SR-14 is almost level at the intersection point, rising very slightly to the east and then following a slight down gradient to the center of town in a nearly straight alignment. There are 140 feet available for stacking between the traffic limits of SR-14 and the railroad trackage and there also is sufficient width on SR-14 right-of-way to provide right and left turn refuges to accommodate traffic wanting to utilize this road. It would also be possible to increase the down grade slightly starting south from SR-14 the first 100 feet then reducing the grade at the rail track approach to provide a stopping platform. It is recommended final engineering design review this option.

The road construction will require a fill of substantial height which will cross the access to the Mt. Adams Forest Products mill and the Port Marina road. Side ramps will have to be built to accommodate that traffic.

### Recommended Improvements Required

1. Acquisition of right-of-way of the small section of privately owned land lying between the south line of SR-14 and the north line of the railroad.
2. Obtain railroad crossing permits from Burlington-Northern Railroad. This permitting process will be quite involved and may possibly require cooperation with SDS mill who now owns the Mt. Adams Forest Products lands in closing or limiting the use of their

presently permitted private at grade crossing some 500 - 600 feet to the east of this proposed crossing site.

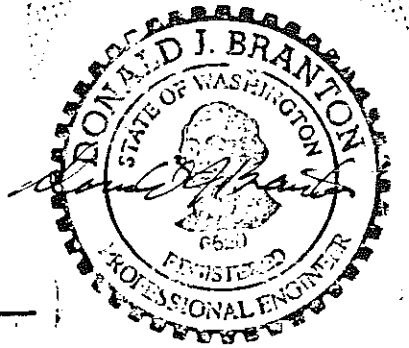
3. Obtain either title or lease use permission from Burlington-Northern Railroad for the extra 200 foot wide right-of-way on the south side of the normal right-of-way at the crossing site so the proposed fill can be extended east and west of the road ramp to provide level entry for the Marian road at the new access road crossing. This will also allow more efficient use of the Port lands in this area.
4. Construct the necessary fills to provide the at-grade access into the property and side ramps connecting Marina Road and the mill access road. It is anticipated this work would be done in cooperation with the general filling of the Bingen point properties.
5. Build 36 foot, curb to curb, paved access road including side ramps to connect Marina Park and Mount Adams Forest Products accesses together with required turn lane refuges at SR-14 intersection, with proper signing and striping.
6. Landscaping as required with the Port's overall development plans.

Estimated Costs

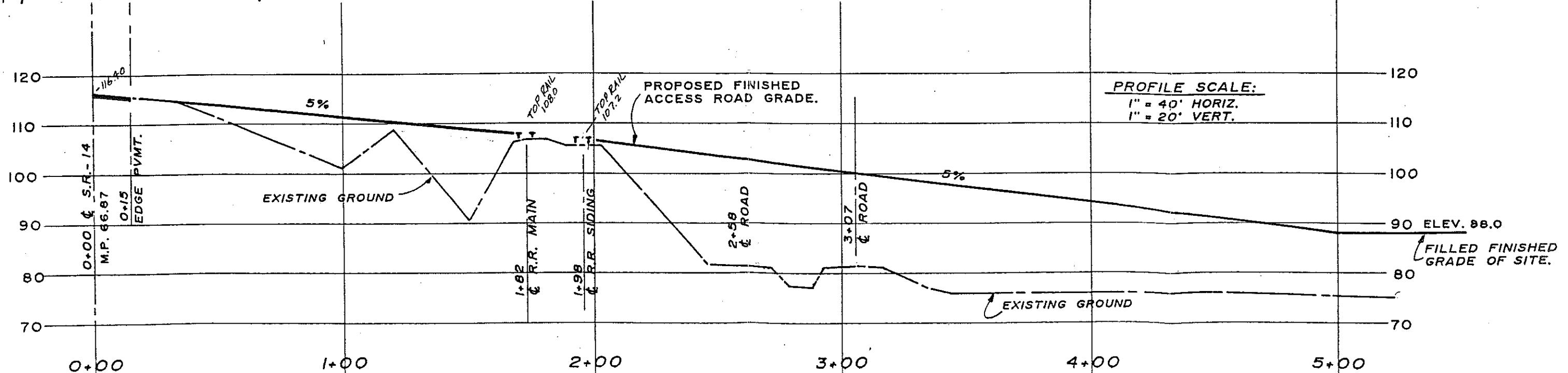
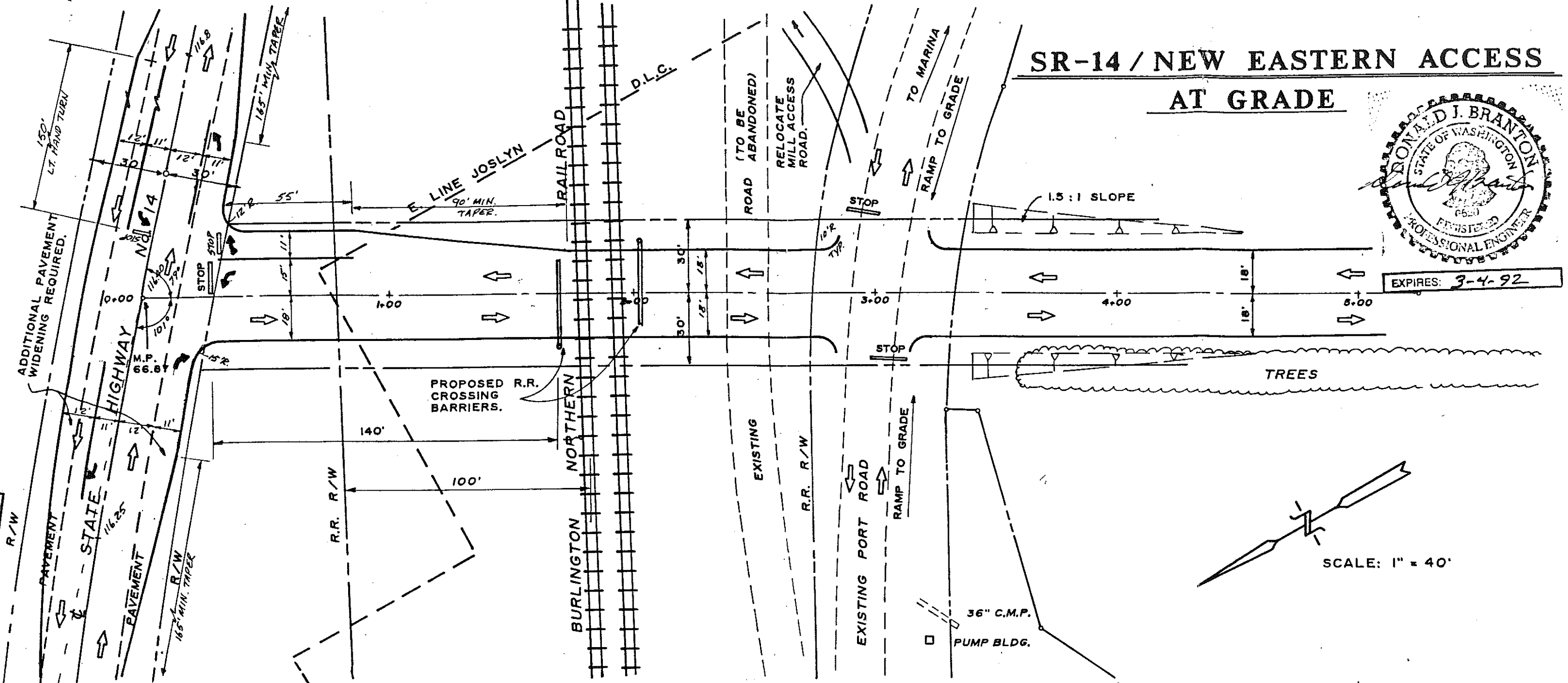
Right-Of-Way, Including Railroad Parcel	\$2,500
BN permitting Process	5,000
Fill: 40,000 cubic yards @ \$2.00/c.y.	80,000
Base Rock: 1,500 cubic yards @ \$15.00/c.y.	22,500
Curbs and Paving	60,000
Signalized Crossing	200,000
Signing and Striping	10,000
Landscaping	<u>20,000</u>
Subtotal	400,000
PLUS 25% Engineering, Legal, Administrative, Contingencies and Sales Tax	<u>100,000</u>
Total Estimated Project Cost	\$500,000

A plan of the proposed improvements is shown on the attached plan and profile map.

# SR-14 / NEW EASTERN ACCESS AT GRADE



EXPIRES: 3-4-92



## SR-14/Eastern Above Grade Access Road

### Physical Description

At the current time there is no access created at the proposed site of this roadway. The site of this proposed construction would be approximately the same as the proposed site for the at-grade crossing. SR-14, as indicated, is at a very close to level grade rising slightly to the east and dropping very slightly to the west. On the northerly side of the road at the proposed crossing, there is an existing restaurant building which would require that the approach into this proposed overcrossing be located on the east side of the crossing. From an elevation standpoint, it would require extremely long structure approach ramps to provide for a west side approach for the east bound traffic to get up to a sufficient elevation to cross the railroad tracts. Because of the extreme expense, this concept was completely rejected. The concept would be to use an east bound left turn to the north with a long radius approach on fill, climbing to make the necessary structure elevation to provide clearance for the overcrossing of SR-14 of not less than 18 feet and over the BN railroad tracts a minimum required clearance of 21 feet to the bottom of the structure, and extending on out to provide under accesses to the Mount Adams Forest Products mill and Marina Road, and thereafter a substantial fill to bring the road elevation down onto Port land. The height of the fill is going to involve considerable use of Port lands for this approach road fill. The improvement will require minimum 36 foot wide curbed and paved roads on the fills and the concrete structures. Extensive landscaping will be required to meld the high approach road fills in with the adjacent Port land uses of the remaining Port property.

### Estimated Cost

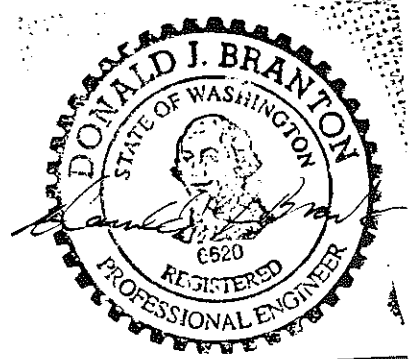
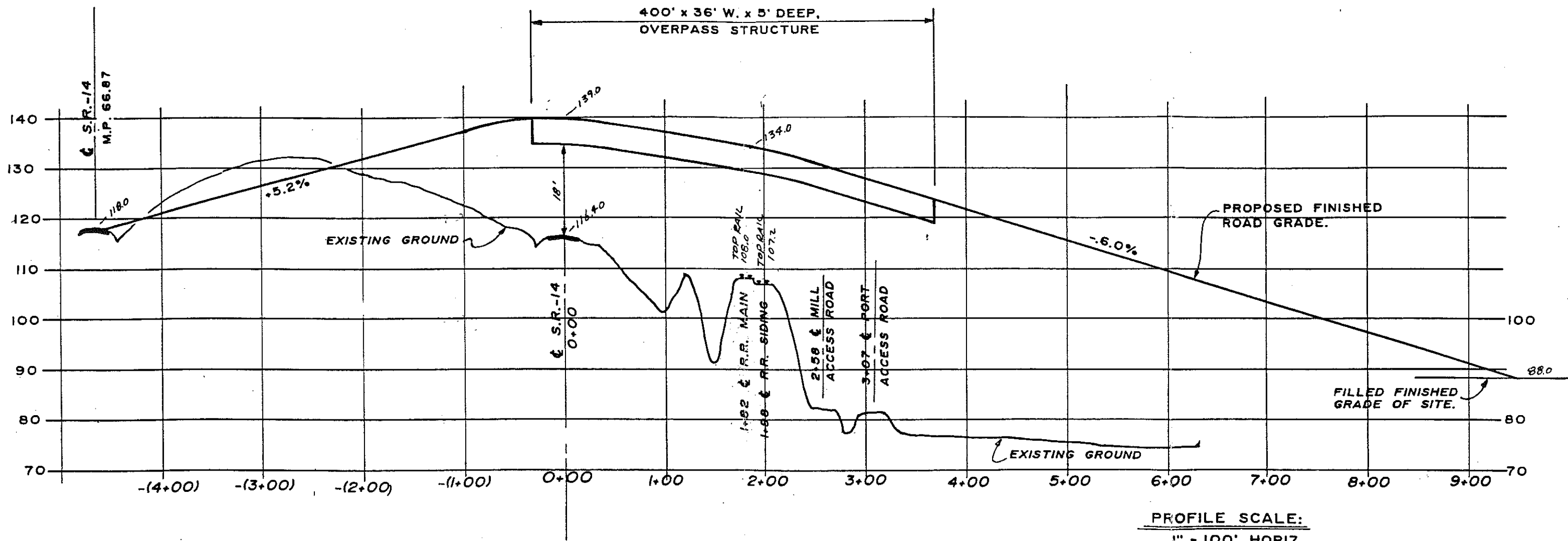
Right-Of-Way Acquisition	\$60,000
Permits	3,500
Approach Fill: 100,000 cubic yards @ \$2/c.y.	200,000
Concrete Structure: 400 lineal feet	2,000,000
Base Rock: 15,000 cubic yards @ \$15/c.y.	22,500
Curb and Paving	60,000
Signing and Striping	10,000
Landscaping	<u>44,000</u>
Subtotal	2,400,000
PLUS 25% Engineering, Legal, Administrative, Contingencies and Sales Tax	<u>600,000</u>
Total Estimated Project Cost	\$3,000,000





# SR-14 / EASTERN OVERCROSSING ALTERNATIVE

SHEET 2 OF 2



EXPIRES: 3-4-92

## **SR-14/Eastern Tunnel Access Road**

### Physical Description

At the present time, no access is created at the present site of this proposed tunnel. Construction would consist of an extremely sharp east bound right-hand turn from SR-14 to the south for the approach, followed by a very short radius curve of nearly 90 degree turn under the railroad to exit onto the Port properties. From an elevation standpoint, it would be necessary leaving SR-14 at approximate elevation 116 feet to get down to an elevation of approximately 85 feet to provide a crossing under the railroad with 18 foot clearance and at least 5 feet between the top of the rail and the top of the tunnel crossing as required by Burlington-Northern. This will place the floor of the tunnel slightly below the Port fill and below the 100 Year Flood Plain. Positive drainage is possible from this elevation into the drainage culvert of Lake Bingen which is artificially controlled at approximately elevation 74 feet.

Construction problems will involve working out a shoo-fly track with Burlington-Northern while making the under crossing and maintaining current rail traffic. There will be relocation of a number of existing residences and at least one business along the south side of SR-14 where the proposed access ramp would run. There is the very practical problem of the less than 100 foot of depth from the southerly right-of-way of Highway 14 to the northerly right-of-way of the Burlington-Northern Railroad available in which to create the necessary turns from the approach off of SR-14 perpendicular to the railroad to run parallel with the railroad and then turning back to come perpendicular to the railroad at the tunnel approach. A minimum 5 percent grade for this approach road to the tunnel will require a minimum of 600 feet of length between the current elevation of SR-14 and the tunnel floor.

A possible alternate to this was looked at in terms of putting the approach road along the north side of SR-14 with the tunnel crossing existing under both the railroad and SR-15. The ground line on SR-14 rises to the north to such an extent that the cost factors of right-of-way acquisition, rock excavation necessary, and additional length of roadway construction appear to make this location totally economically unfeasible.

### Recommended Improvements Required

1. Acquisition of right-of-way along the south side of SR-14 from the proposed tunnel site, approximately 600 feet westerly. This will involve the relocation of a number of residential units in this area.

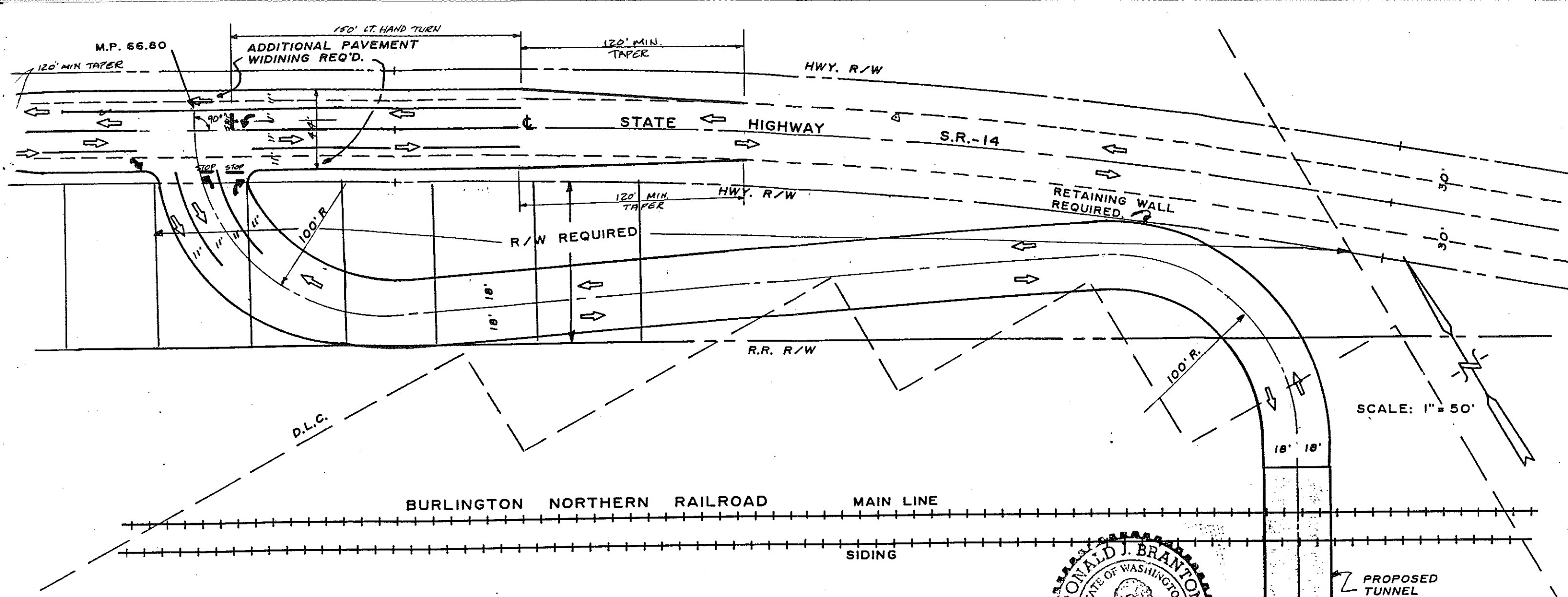
2. Burlington-Northern under crossing permits.
3. Construction of 600 foot approach roads, 36 foot width of paved and curbed roadway.
4. Construction of Burlington-Northern tunnel under crossing--approximately 100 feet, including required lighting and drainage.
5. Construction of curbed and paved road at 36 foot width from end of tunnel to connecting Port road systems with striping and signing.
6. Landscaping of approach road situated between the bank of the SR-14 on the north and the railroad embankment on the south to avoid the appearance of driving into the "Grand Canyon".

Estimated Costs

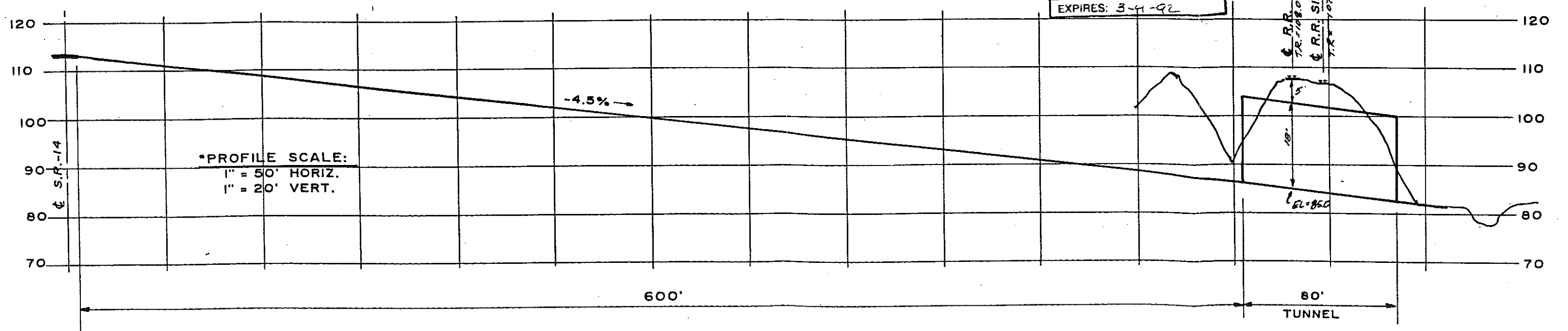
Right-of-way Acquisition: Approximately 8 parcels	\$415,000
Permits	5,000
100' Tunnel, complete with Paving, Lighting, Drainage	1,450,000
Approach roads: 700 lineal feet including grading, base rock, curbs and paving @ 100.00/l.f.	70,000
Signing and Striping	10,000
Landscaping	<u>50,000</u>
Subtotal	2,000,000
PLUS 25% Engineering, Legal, Administrative, Contingencies and Sales Tax	500,000
Total Estimated Project Cost	<u>\$2,500,000</u>

It is noted this alternative will have the practical operational difficulties of the very short radius turns because of the narrow distance between SR-14 and the railroad for the approach road and the aesthetic problem of the approach road lying between the higher banks of SR-14 on one side and the railroad on the other side. It would also involve acquisition of several residences and businesses along the route of the proposed roadway.

A plan of the proposed improvements is shown on the attached plan and profile map.



**SR-14 / EASTERN TUNNEL ACCESS ROAD**



## APPENDIX B

### MEMORANDUM

TO: Klickitat County Transportation Policy Committee, RTPO

FROM: Dale Robins, Transportation Planner

DATE: February 11, 1992

SUBJECT: Port of Klickitat Access Study

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At the last Klickitat County Transportation Policy Committee meeting, it was brought to IRC's attention that the land use assumptions for the Port of Klickitat property have changed. The Port of Klickitat Access Study was based on land use assumption from June of 1991, and as of November, the land use assumption differed.

The tables which follow illustrate the difference between the two land use assumptions. The new land use assumption will generate slightly fewer trips over a 24-hour period. However, the new land use assumption will be significantly more peak hour intensive. The new land use assumption is likely to further emphasize the need for a new access to this site.

The purpose of this memo is to receive direction from the Klickitat County Transportation Policy Committee as to updating the Port of Klickitat Access Study. Updating of the Port of Klickitat Access Study is estimated to take approximately 80 hours of IRC staff time. No funds remain for this study, thus any additional cost will be charged to the general Klickitat County RTPO funds.

**VEHICLE TRIP GENERATION**

**OLD LAND USE ESTIMATE**

<u>LAND USE</u>	<u>SIZE</u>	<u>24 HOUR TRIP RATE</u>	<u>** P.M. PEAK **</u>			<u>24 HOUR TRIPS</u>	<u>P.M. PEAK</u>	
			<u>RATE</u>	<u>IN%</u>	<u>OUT%</u>		<u>IN</u>	<u>OUT</u>
Marina	150 berths	3.00	0.170	22	78	405	6	17
Public Beach/Windsurfing	500 parking	3.10	0.279	30	70	1318	42	98
Recreation Homes	250 units	3.16	0.262	60	40	790	40	26
Research Facility	50 employees	2.45	0.438	10	90	123	2	20
Specialty Retail	25,000 Sq ft	40.68	3.492	45	55	712	27	34
Office Park	100,000 Sq ft	11.29	1.360	15	85	1129	20	116
Hotel	100 rooms	18.40	0.664	78	22	1840	52	14
						-----	----	----
						6317	183	310

**VEHICLE TRIP GENERATION**

**NEW LAND USE ESTIMATE**

<u>LAND USE</u>	<u>SIZE</u>	<u>24 HOUR TRIP RATE</u>	<u>** P.M. PEAK **</u>			<u>24 HOUR TRIPS</u>	<u>P.M. PEAK</u>	
			<u>RATE</u>	<u>IN%</u>	<u>OUT%</u>		<u>IN</u>	<u>OUT</u>
Marina	150 berths	3.00	0.170	22	78	405	6	17
Public Park	250 parking	3.10	0.279	30	70	659	21	49
House Boats	21 units	10.06	1.005	82	18	211	17	4
Research Facility	50 employees	2.45	0.438	10	90	123	2	20
Office Park	100,000 Sq ft	11.29	1.360	15	85	1129	20	116
Light Industrial	1,120 Employees	3.02	0.426	18	82	3378	86	391
Log Dump/Storage			*** Existing Use ***			-----	----	----
						5905	152	597

## **END NOTES**

## End Notes

1. 1989 Traffic Volumes for the SR-14/Columbia River Gorge Scenic Area, Washington State Department Of Transportation.
2. Accident Report - May 30, 1986 through May 30, 1989, Washington State Department Of Transportation.
3. Highway Capacity Software, Federal Highway Administration.
4. Traffic Access and Impact Studies for Site Development, Institute of Transportation Engineers, September 1989.
5. Trip Generation, 4th Edition, Institute of Transportation Engineers, 1988.
6. Full build-out land use, discussion with Dave Leland.