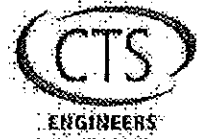


April 1, 2008

Project No. OR07.031.T01  
The Point At Wheeler Landing



Doug W. Hooper  
City Manager  
PO Box 177  
Wheeler OR 97147

**RE: Addendum to the Traffic Impact Study Dated August 29, 2007 for The Point At Wheeler Landing on the west side of Hwy 101 /SW Hemlock Street Intersection in Wheeler, OR.**

Dear Mr. Hooper:

This letter is an addendum to the original traffic study dated August 29<sup>th</sup> 2007. It includes analysis of recent five years of crash history, and right and left turn lane criteria for the proposed The Point at Wheeler Landing development. The development is located on the west side of Hwy 101 /Hemlock Street on a site of approximately 8.9 acres zoned water related commercial / general commercial. As mentioned in the original report, this development will consist of 44 two-story townhomes, 14 three-story live-work townhomes which will have approximately 570 GSF of retail space and a garage on the first floor and the upper two levels as a residence and 3 two-story buildings that will have a total of approximately 19,077 GSF retail space. **Figure 1** contains a vicinity map of the proposed site and surrounding roadway system. Access to the site will be provided via a proposed west leg to the existing intersection of Highway 101 /Hemlock Street (see attached Figures). **Figure 1A** presents a site plan of the proposed development.

#### Traffic Safety

Collision records for the most recent five years of available data (Jan. 2002 to Dec. 2006) were obtained from Oregon Department of Transportation (ODOT) for the intersection of Highway 101 /Hemlock Street in the vicinity of the project site. This was analyzed to determine if traffic safety problems exist at the study area intersection in the vicinity of the site. **Figure 4** shows the location and type of reported incidents. A total of 4 crashes were reported, which equates to an average annual crash rate of 0.39 crashes per million entering vehicles. This number and rate of reported collisions are typical of the crashes experienced on similar roadways throughout the State.

#### Left Turn Lane Warrants

An analysis was conducted to determine if northbound vehicles turning left into the proposed site from Hwy 101 would meet warrants for requiring separate left turn lanes under total future 2010 traffic conditions. These warrants are based on the number of vehicles turning left, the posted speed limit or design speed, advancing volumes, and the opposing conflicting volumes during the critical PM peak hour. As shown in **Table 1** and based on Criterion 1 (vehicular volume) in the **ODOT Left Turn Lane Warrant Criteria**, these projected future 2010 traffic volumes at the proposed site access intersections (Hwy 101 /Hemlock Street) **meets** warrant criterion for requiring a separate northbound left turn lane under both 45mph and 25mph speed zone.

15005 NW TRANSDROME BLVD. # 100  
HILLSBORO OR 97124

PH: 503.291.8000  
FX: 503.244.5227

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**Table 1: Results of Left Turn Warrant Analyses under Total Future 2010 Volume Conditions (Buildout of the The Point at Wheeler Landing)**

Intersection	Total Future 2010 PM Peak Hour			QDOT Criteria	
	Design Speed (mph)	Left Turns (vph)	Opposing Plus Advancing Volume (vph/Lane)	Minimum Criteria (Lt Turns-vph)	Warrant Met?
Northbound Hwy 101 at Hemlock Street (Site Access)	45	26	728	10	Yes
Northbound Hwy 101 at Hemlock Street (Site Access)	25	26	728	12	Yes

**In-bound Vehicle Queue Length Analysis**

Queuing analysis was conducted at the site's access intersections of Hwy 101 / Hemlock Street. As mentioned earlier, the proposed development meets warrants for a northbound left turn lane. Intersection operations reported in the original traffic study were evaluated using the methodology outlined in the 2000 Highway Capacity Manual (HCM). However, for the purpose of queue length, AASHTO 2-minute Rule or SimTraffic analysis software cannot be used at this intersection due to the railroad crossing running parallel to the Hwy 101. In discussions with the Port of Tillamook Bay staff, trains passing through this area are approximately 1,000 to 1,500 feet (20-30 cargo cars) in length and travel at about 10 mph within the City limit. It was also found that a train with 30 cargo cars in length crosses the railroad crossing in about 2-3 minutes. Approximately 30 seconds before arriving at the crossing, the system which closes the gates at a crossing works by sensing the presence of a train on the tracks at a fixed distance from the crossing. That distance is set such that a train moving at the maximum permissible speed (10 mph) for that section of track will not reach the crossing until enough time has passed to allow the gates to fully close (approximately 500 feet at Hemlock Street). After several seconds of flashing lights and ringing bells, the crossing gates begin to lower, which usually takes about 5-10 seconds. This phenomenon can also be verified as follows:

$$C_t = \left[ \frac{L_t + D_d + W_i}{S_t} \right]$$

Where:

- C<sub>t</sub> = Clearance time in seconds
- L<sub>t</sub> = Length of the Train in feet (1,500 feet)
- D<sub>d</sub> = Distance of the detection loop from the road crossing in feet (about 500 feet)
- W<sub>i</sub> = Width of an Intersection (approximately 50 feet)
- S<sub>t</sub> = Speed of the Train is 10mph: (10 mph x 5280) / 3600 = 14.67 ft/sec

$$C_t = \left[ \frac{1,500 + 500 + 50}{14.67} \right]$$

C<sub>t</sub> = 140 sec = 2.33 min. ≈ 3 minutes  
(4 minutes under "worst case" scenario)

As shown in **Figure 7**, total future 2010 traffic volume with full buildout of The Point at Wheeler Landing will generate 26 northbound left turns entering into the site (Hemlock Street) from Hwy 101 during the PM peak hour. This equates to approximately 1 vehicle for every 2 minutes. However, due to railroad crossing at the site access a 4-minute "worst case" scenario is assumed which equates to a queue of 2 vehicles (50 feet). Furthermore, assuming there is a passenger car and a delivery truck in the queue, a storage length of 50-75 feet long should be sufficient.

**Right Turn Lane Warrants:**

An additional analysis was also conducted to determine whether or not increased traffic along Hwy 101 at the proposed site access (Hwy 101 / Hemlock Street) intersections would meet warrants for requiring a separate right turn lane under total future 2010 traffic conditions with full buildout of the proposed development plan. As shown in **Table 2**, and based on Criterion 1 (vehicular volume) in the **ODOT Right Turn Lane Warrant Criteria**, the projected future 2010 southbound right turning vehicles in to the site from Hwy 101 **do not meet** the warrant criteria for requiring a separate right turn lane.

Similar to the analysis for left turn lane storage length, a right turning vehicle may also experience a waiting time of 3-4 minutes. Also, shown in **Figure 7**, total future 2010 traffic volume with full buildout of The Point at Wheeler Landing will generate 23 northbound right turns entering into the site (Hemlock Street) from Hwy 101 during the PM peak hour. This equates to approximately 1 vehicle for every 2 minutes and 2 vehicles (50 feet) queue for the entire waiting period. Thus, it is desirable to provide a right-turn pocket to avoid blocking of thru-vehicles along Hwy 101 at Hemlock Street. Finally, it should be noted that the section of Hwy 101 just north of Hemlock Street is marked with a dashed yellow centerline for northbound vehicles only indicating that passing is permitted. Furthermore, with the buildout of the proposed development, the segment of Hwy 101 will adopt a more urban character. Thus, it is recommended that ODOT should consider re-striping this section of Hwy 101 to a double solid yellow line and investigate moving the existing posted speed limit of 45 mph further to the north (approximately 500-1,000 feet).

**Table 2: Results of Right Turn Warrant Analyses under Total Future 2010 Volume Conditions (Buildout of the The Point at Wheeler Landing)**

Intersection	Total Future 2010 PM Peak Hour			ODOT Criteria	
	Design Speed (mph)	Right Turns (vph)	Design Hour Volume (vph/Lane)	Minimum Criteria (Rt Turns/vph)	Warrant Met?
Southbound Hwy 101 at Hemlock Street (Site Access)	45	23	393	29	No
Southbound Hwy 101 at Hemlock Street (Site Access)	25	23	393	61	No

**Outbound Vehicle Queuing Analysis**

Based on the request from ODOT staff, CTS Engineers conducted queuing analysis along the site's proposed access (Hemlock Street) location. A review of the site plan for the proposed development shows there is approximately 30 feet (~ 1 Passenger car or small delivery truck) of storage between the highway intersection and the train dynamic envelope. As discussed in the original report, full buildout of the proposed The Point at Wheeler Landing generates about 48 external vehicle trips during the AM peak hour of which 24 are entering vehicles and 24 are exiting vehicles, and 95 vehicle trips during the PM peak hour of which 46 are entering vehicles and 49 are exiting vehicles as shown in the trip generation **Table 5** of the original report. Based on intersection capacity analysis (HCM 2000) results, queuing along the unsignalized intersections will be minimal (0-1 vehicles). Intersection capacity analysis worksheet is attached as an **Appendix** to this report which shows 95<sup>th</sup> percentile queues. In brief, the potential for queue spillback to the railroad track is limited.

However, it is recommended that the applicant install a warning sign (R8-8 in MUTCD) "DO NOT STOP ON TRACKS" and standard railroad (RR) pavement markings to keep cars from stacking on the tracks. It is also recommended that a storage space (W10-11 in MUTCD) sign supplemented by a word message storage distance (W10-11a) "30 FEET BETWEEN TRACKS & HIGHWAY" should be used. These signs should be mounted in advance of the railroad crossing to advise drivers of the space available for vehicle storage between the highway intersection and the highway-rail grade crossing. Furthermore, a storage space (W10-11b) "30 FEET BETWEEN HIGHWAY & TRACKS BEHIND YOU" may be mounted at the highway intersection under the STOP sign intersection to remind drivers of the storage space between the tracks and the highway intersection.

**CONCLUSIONS**

Based on the results of the analyses described in this memo, it is concluded that the proposed The Point at Wheeler Landing can be constructed without adversely affecting traffic operations or safety in the vicinity of the site. A possible mitigation to improve traffic operations at the intersection of Hemlock Street /Hwy 101 would be to install a separate northbound left turn lane and a southbound right turn lane. Furthermore, it is also recommended that ODOT should consider re-striping this section of Hwy 101 to a double solid yellow line and investigate moving the existing posted speed limit of 45 mph further to the north. With full buildout of the proposed development key intersections and roadways in the study area operate at acceptable LOS and capacity as reported in the original report. No other specific off-site roadway improvements are recommended to accommodate this development or mitigate its impact.

If there are any questions related to the data or analyses contained in this memo, please contact Arshad Syed.

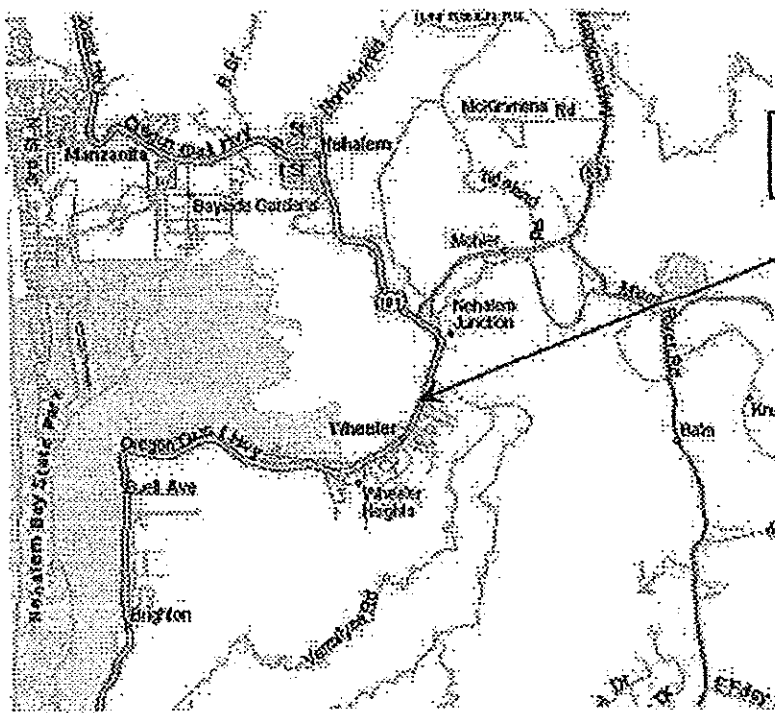
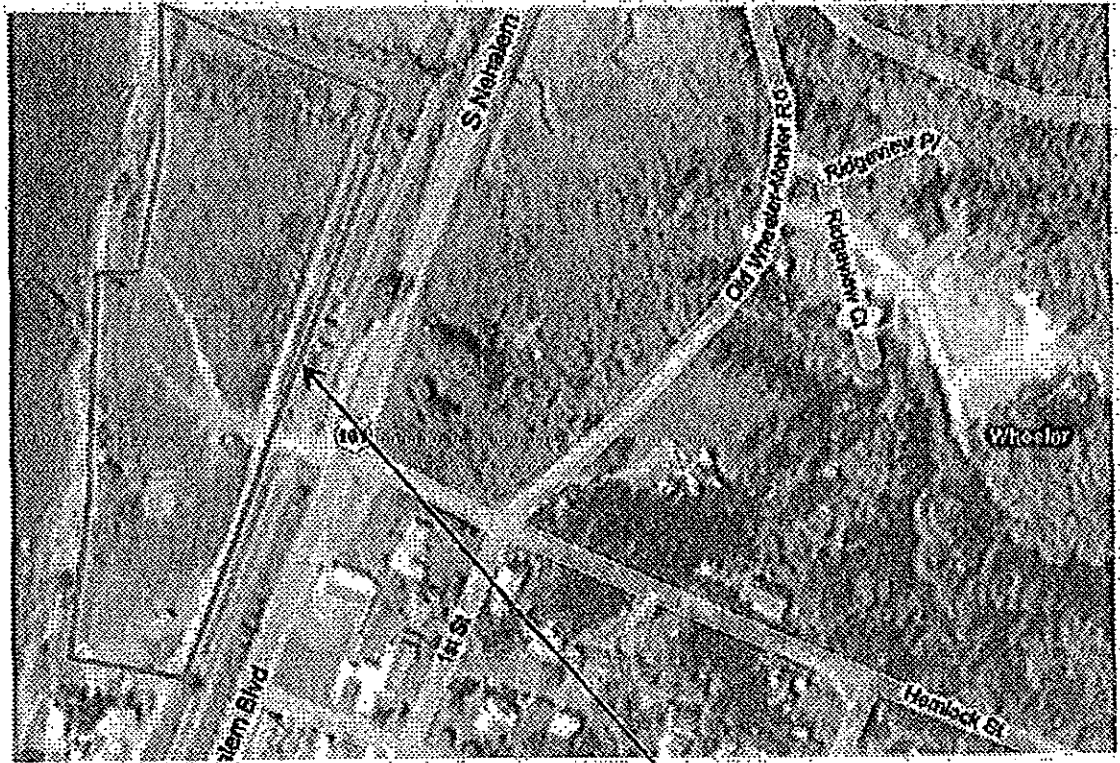
Sincerely,

  
Robert J. Morast, P.E., P.T.O.E.,  
Transportation Engineer

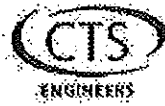




Expires: 12/31/2008

Figure 1: Site Area and Vicinity Map



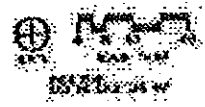
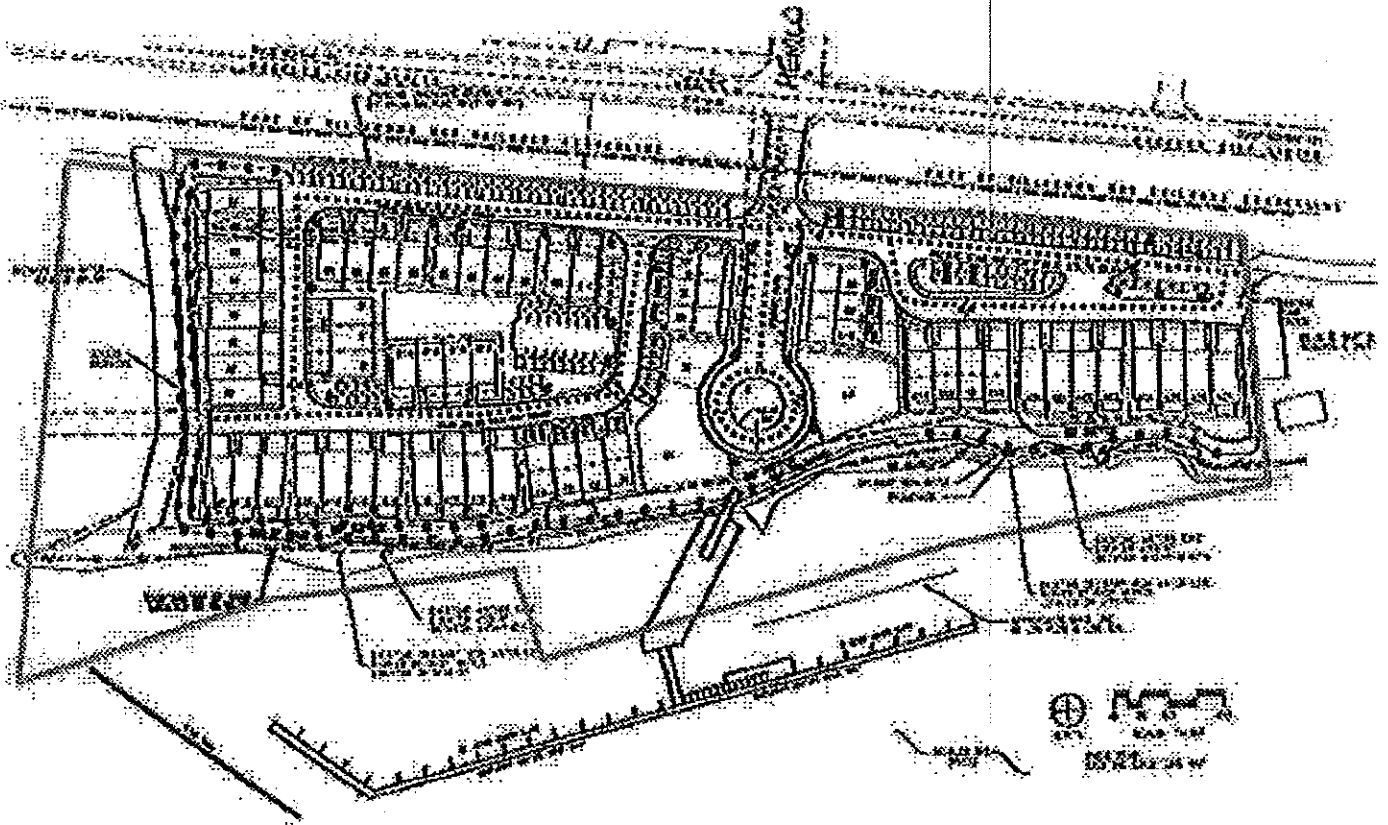
The Point at Wheeler  
Landing





Proposed Site   
Proposed Roadway 

OR07:031.T01 The Point at Wheeler Landing

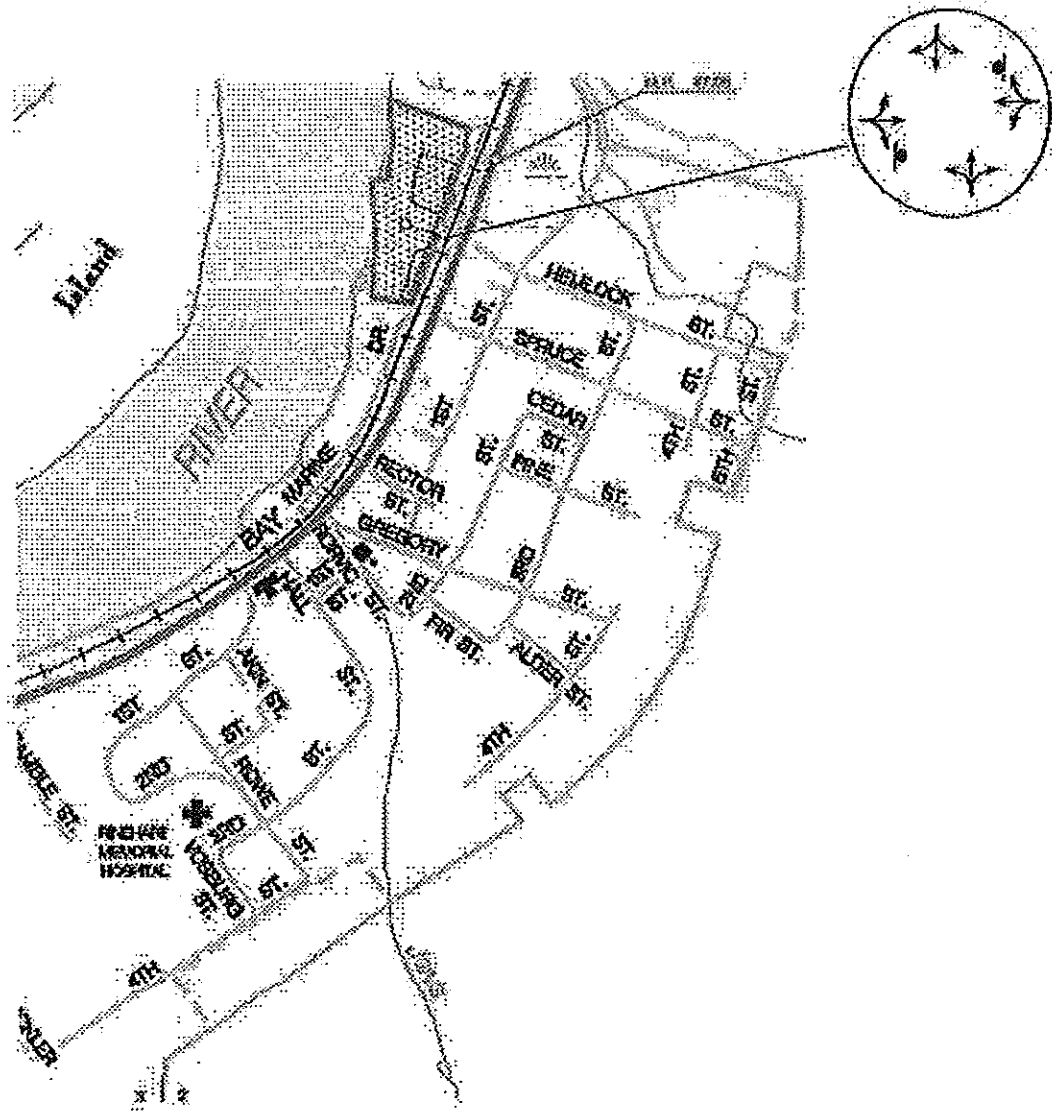
Figure 1A: Proposed Site Plan For The Point At Wheeler Landing



Proposed Site   
Proposed Roadway 



OR07.031.T01 The Point at Wheeler Landing

Figure 2: Study Area Intersections With Existing and TMP-Proposed Lane Configurations



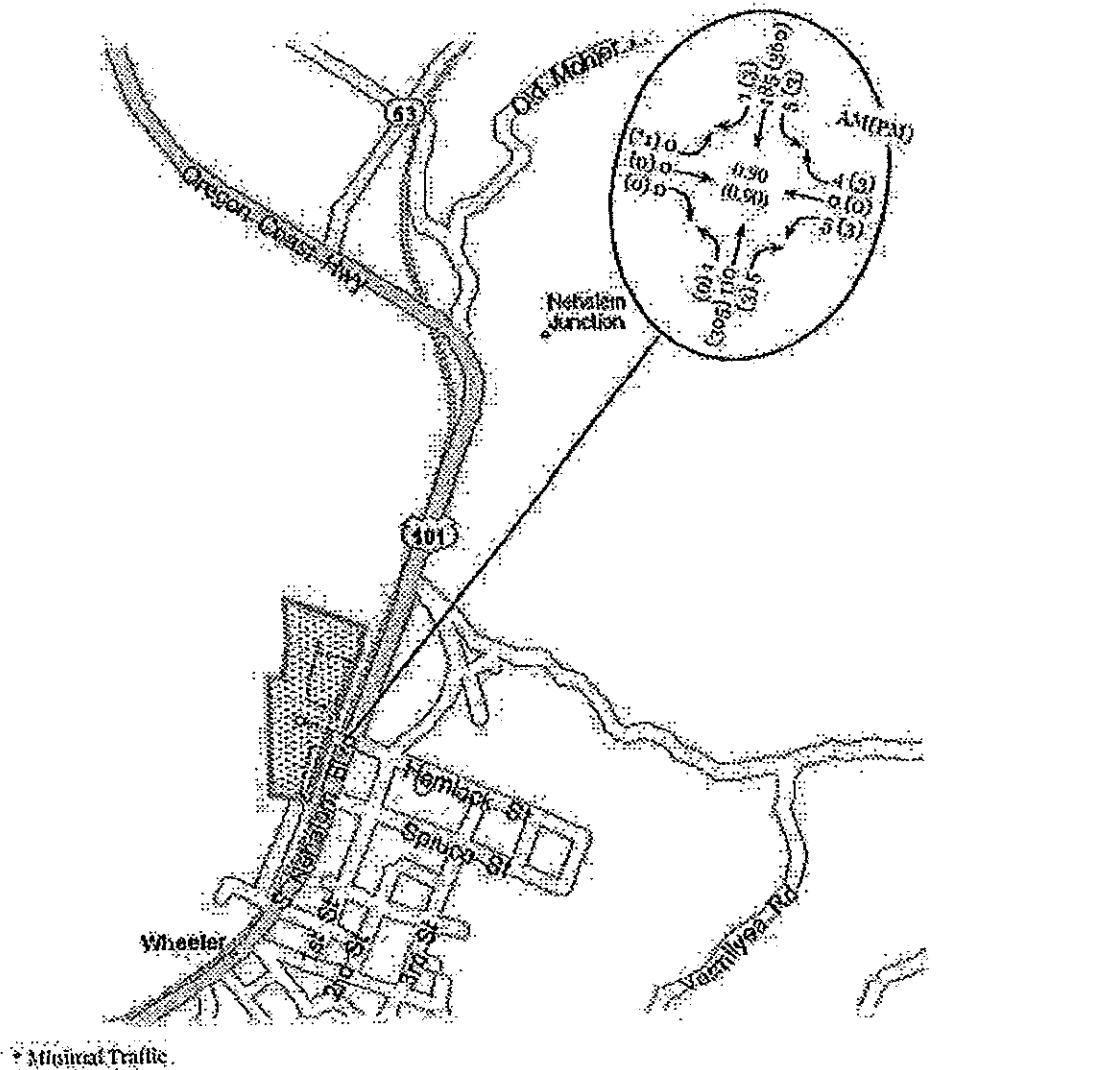
N  
Drawing Not To Scale



Proposed Site:   
Proposed Roadway: 

OR07.031.T01 The Point at Wheeler Landing.

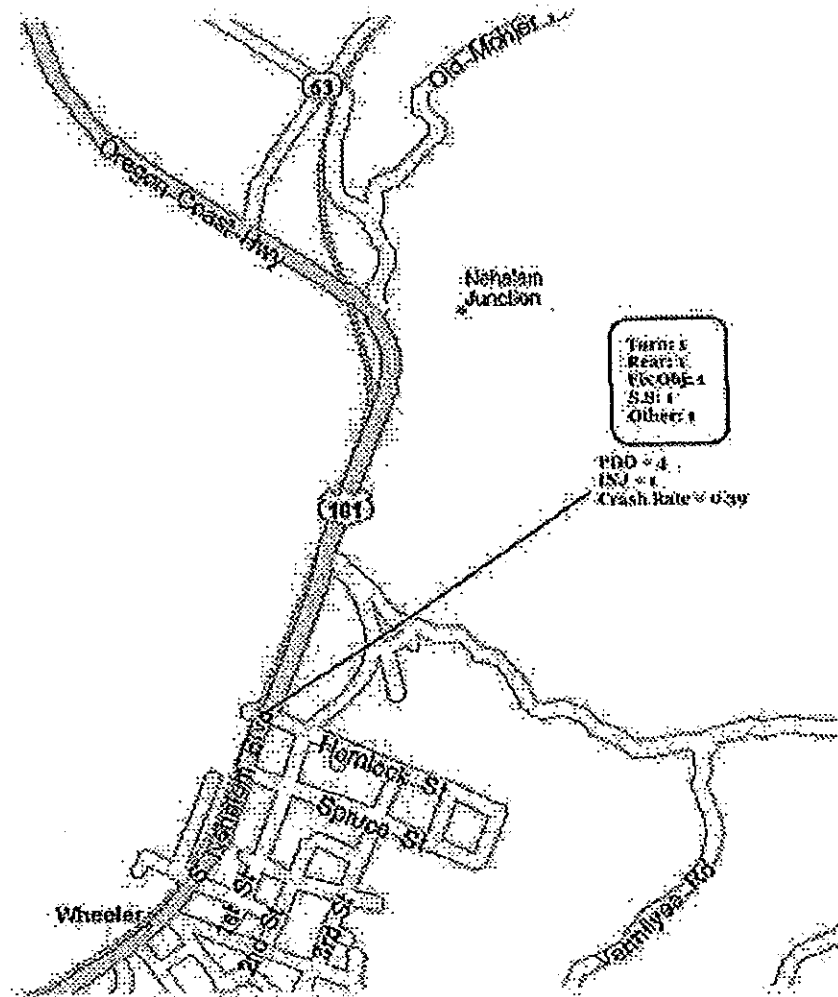
Figure 3: Existing 2007 Weekday Peak Hour Traffic Volumes In The Vicinity Of The Point At Wheeler Landing



OR07.031.T01 The Point at Wheeler Landing



Figure 4: Traffic Accident Patterns Throughout The Study Area  
(Jan 2002 to Dec 2006)

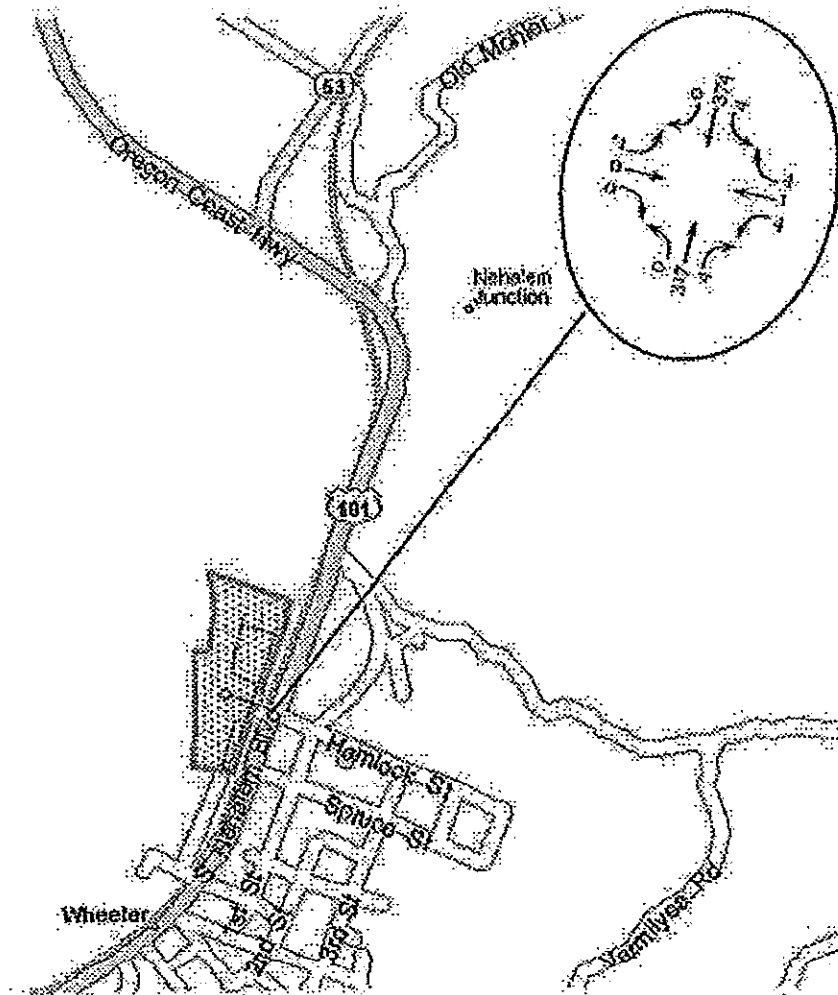


Proposed Site  
Proposed Roadway



OR07.031:101 The Point at Wheeler Landing

Figure 5: Future Background 2010 Weekday Peak Hour Traffic Volumes In The Vicinity Of The Point At Wheeler Landing



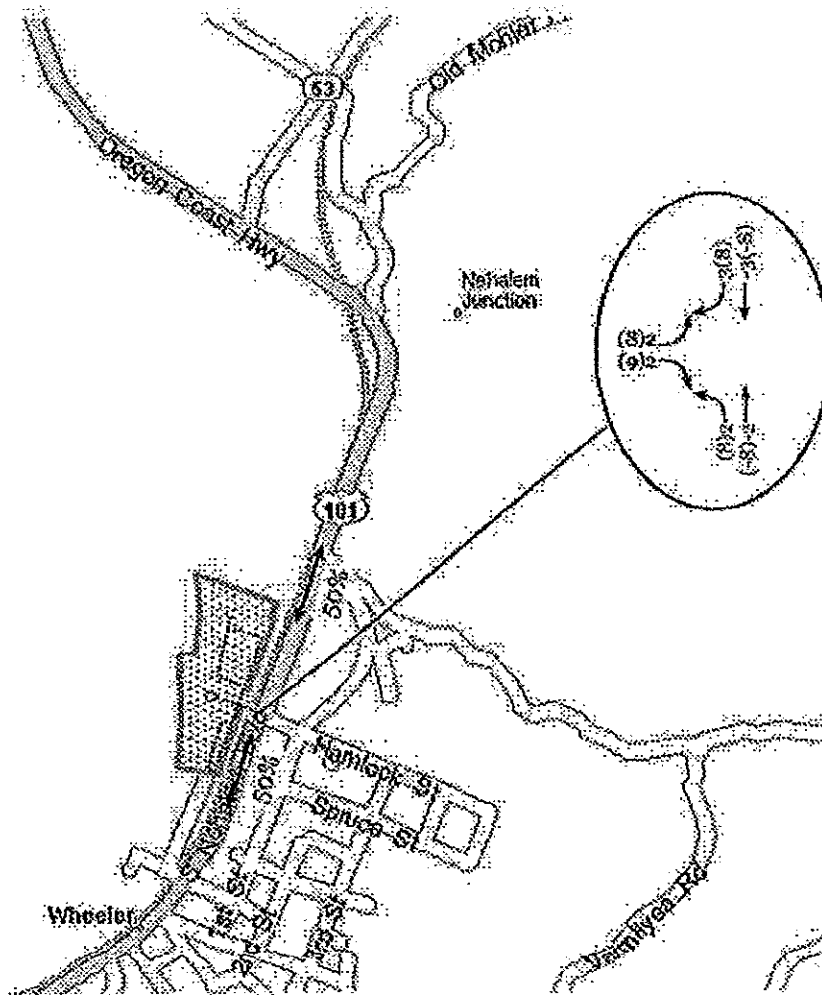
Drawing Not To Scale

- Proposed Site
- Proposed Roadway
- PM/30th Peak Hour Volumes



OR07.031.T01 The Point at Wheeler Landing

Figure 6a: Weekday Pass-By Peak Hour Traffic Volumes Generated By Full Buildout of The Point At Wheeler Landing



Pass-By Site Generated Traffic

	In	Out
AM Peak	5	4
PM Peak	16	17

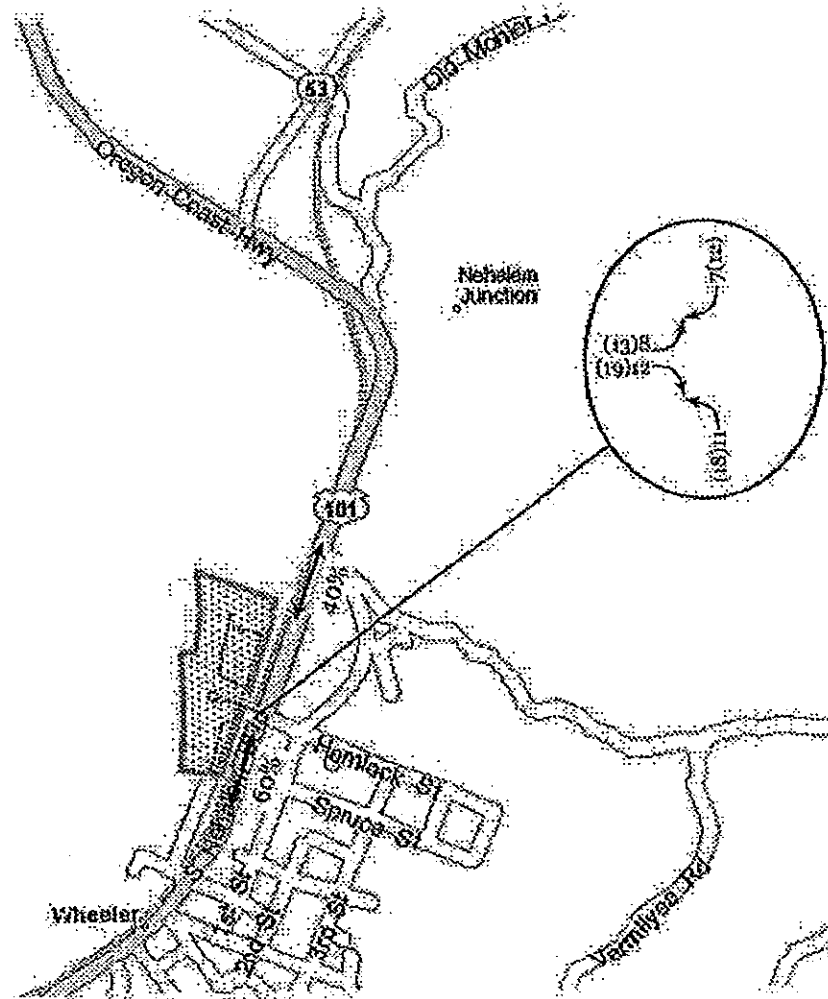


- Proposed Site
- Proposed Roadway
- AM(PM) Peak Hour Volumes



OR07.031.F01 The Point at Wheeler Landing

Figure 6b: Weekday New /Diverted Peak Hour Traffic Volumes Generated By Full Buildout of The Point At Wheeler Landing



New /Diverted Site Generated Traffic

	In	Out
AM Peak	18	30
PM Peak	30	32



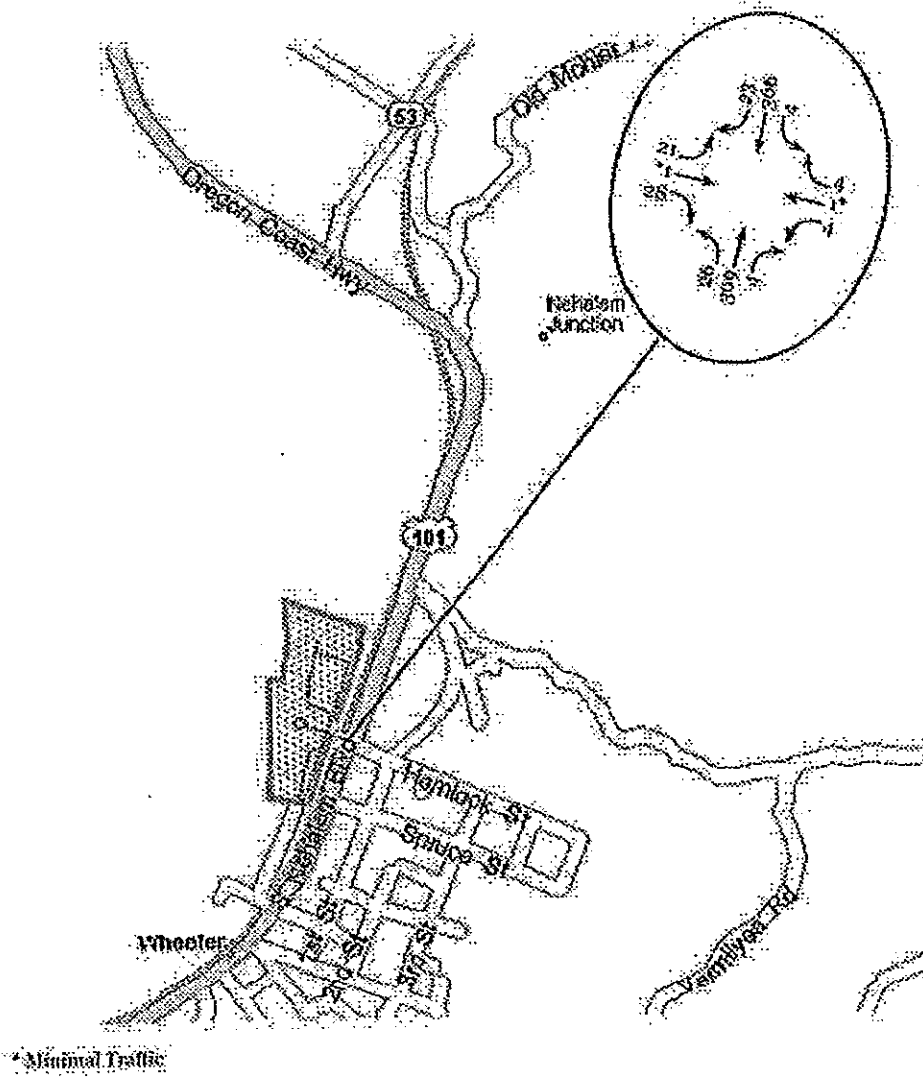
Drawing Not To Scale

Proposed Site  
 Proposed Roadway  
 AM(PM) Peak Hour Volumes



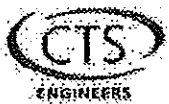
OR07.031.T01-The Point at Wheeler Landing

Figure 7: Total Future 2010 Weekday Peak Hour Traffic Volumes With Full Buildout Of The Point At Wheeler Landing



Drawing Not To Scale

- Proposed Site
- Proposed Roadway
- PM/30th Peak Hour Volumes



OR07.031:FD1 The Point at Wheeler Landing

Project: OR07.031.T01 - The Point at Wheeler Landing

**Crash Analysis Worksheet** Jan 2002 - Dec 2000

Intersection: Hwy. 101 at Hemlock Street

	Percent		Percent
Property		Rear End	1 20%
Damage Only	4 80%	Fix Obj	1 20%
Injury	1 20%	Totals	1 20%
Fatality	0 0%	Ang	0 0%
Total	5 100%	Other	2 40%
		Total	5 100%

PM Peak Hour 675  
ADT 7,110

Obtained from 24-hr Tube count

Crash Rate = (Number of Crashes / 5) / (ADT x 365) \* 1,000,000 Vehicles  
Crash Rate = 0.39 Average number of accidents per million entering vehicles



Date:  
 Project:  
 Project Number:  
 Intersection:  
 North-South Street:  
 East-West Street:  
 Scenario:

March 26, 2008
The Point at Wheeler Landing
OR07.031.T01
Hwy 101 / Hemlock Street
Hwy 101
Site Access / Hemlock Street
PM Peak - Total Future 2010

Stop Controlled (Yes/No)

n
y

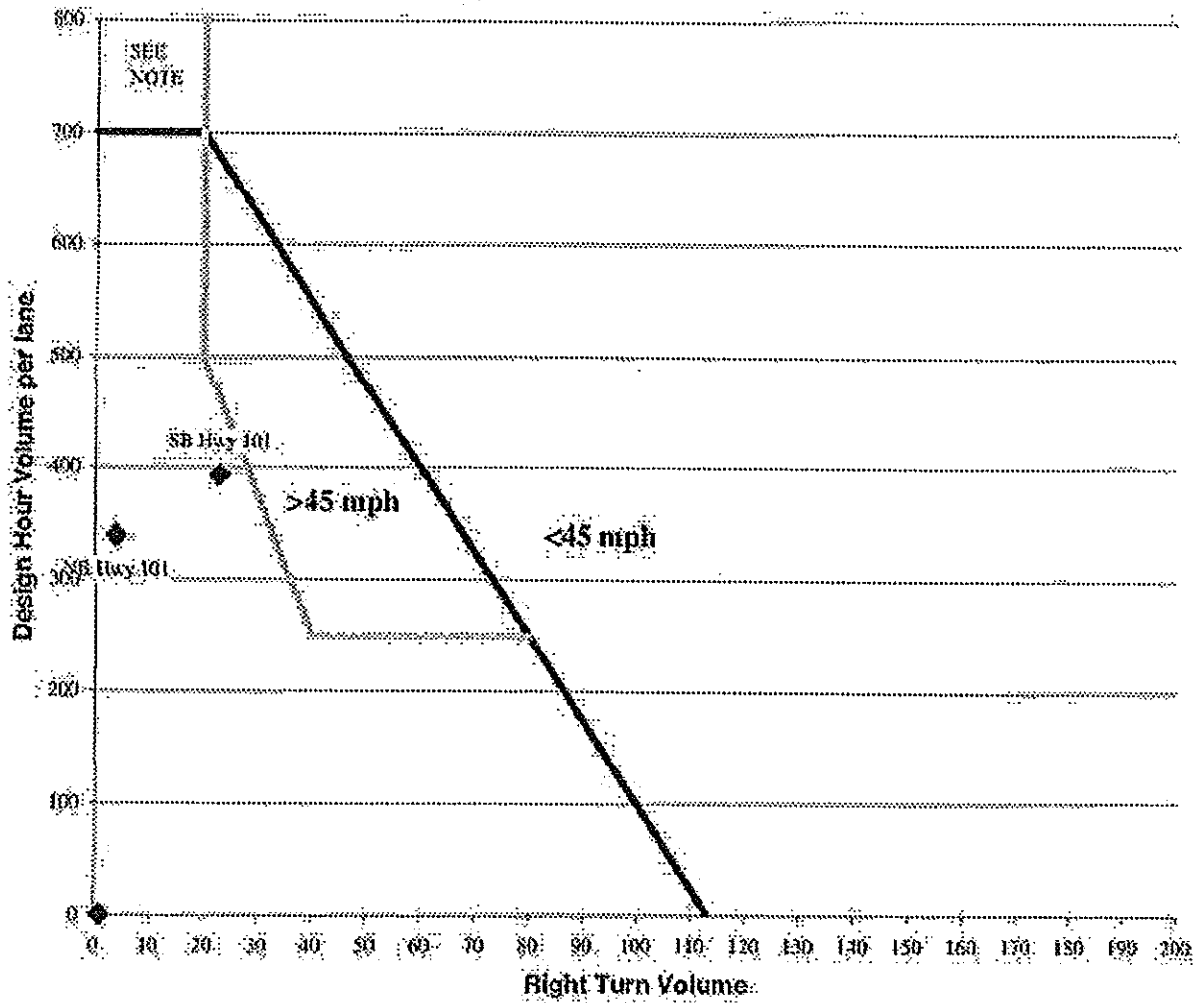
Speed Limit

25
25

No. of Through Lanes:

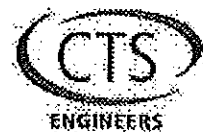
Northbound	Left	26	1
	Through	309	
	Right	4	
Southbound	Left	4	1
	Through	366	
	Right	23	
Eastbound	Left	22	1
	Through	1	
	Right	28	
Westbound	Left	4	1
	Through	1	
	Right	4	

**Right Turn Lane Criterion**



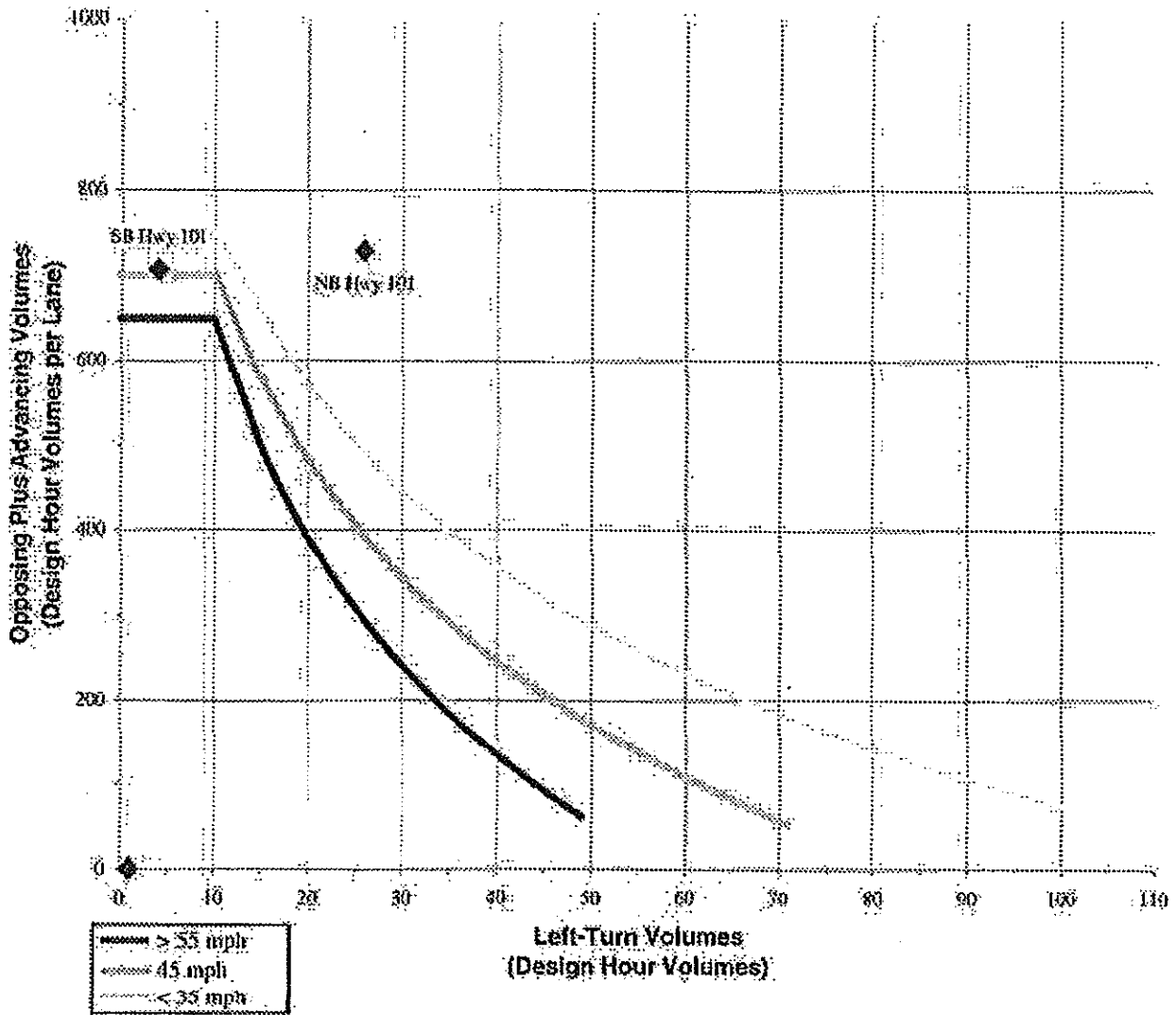
**Right Turn Criterion**

Approach	Right Turn Volume (vph)	Design Hour Volume (vph per Lane)	Minimum Criteria (Right Turns-vph)	Criterion Met
NB Hwy 101	4	339	68	NO
SB Hwy 101	23	393	61	NO



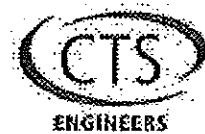


**Left Turn Lane Criterion**



**Left Turn Criterion**

Approach	Left Turns (vph)	Opposing Plus Advancing Volumes (vph/Lane)	Minimum Criteria (Left Turns-vph)	Criterion Met
NB Hwy 101	25	728	12	YES
SB Hwy 101	4	706	13	Check



Date:  
 Project:  
 Project Number:  
 Intersection:  
 North-South Street:  
 East West Street:  
 Scenario:

March 26, 2008
The Point at Wheeler Landing
OR07.031.T01
Hwy 101 / Hemlock Street
Hwy 101
Site Access / Hemlock Street
PM Peak - Total Future 2010

Stop Controlled (Yes/No)

n
y

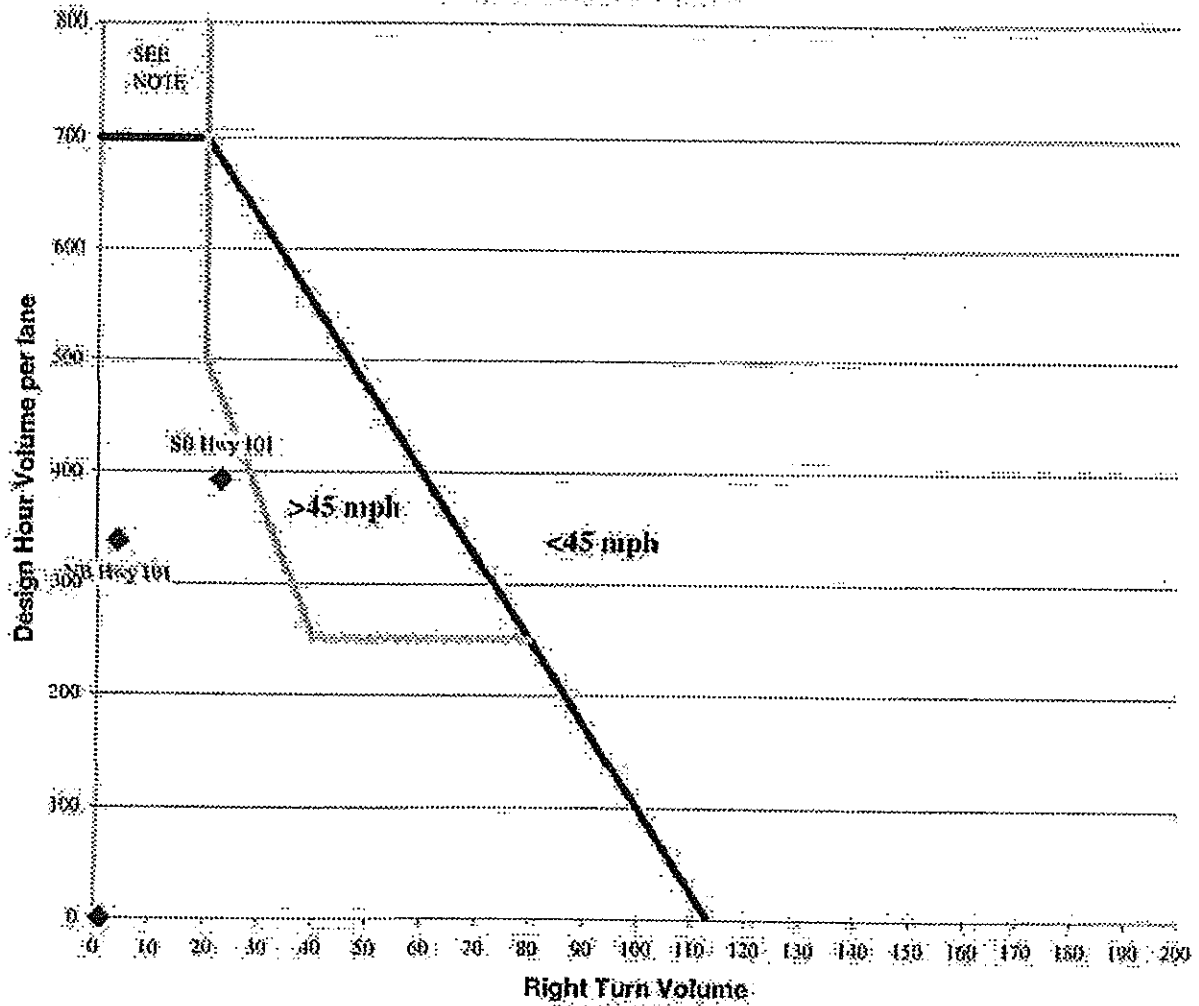
Speed Limit:

45
25

No. of Through Lanes

Northbound	Left	26	1
	Through	309	
	Right	4	
Southbound	Left	4	1
	Through	365	
	Right	23	
Eastbound	Left	22	1
	Through	1	
	Right	28	
Westbound	Left	4	1
	Through	1	
	Right	4	

**Right Turn Lane Criterion**

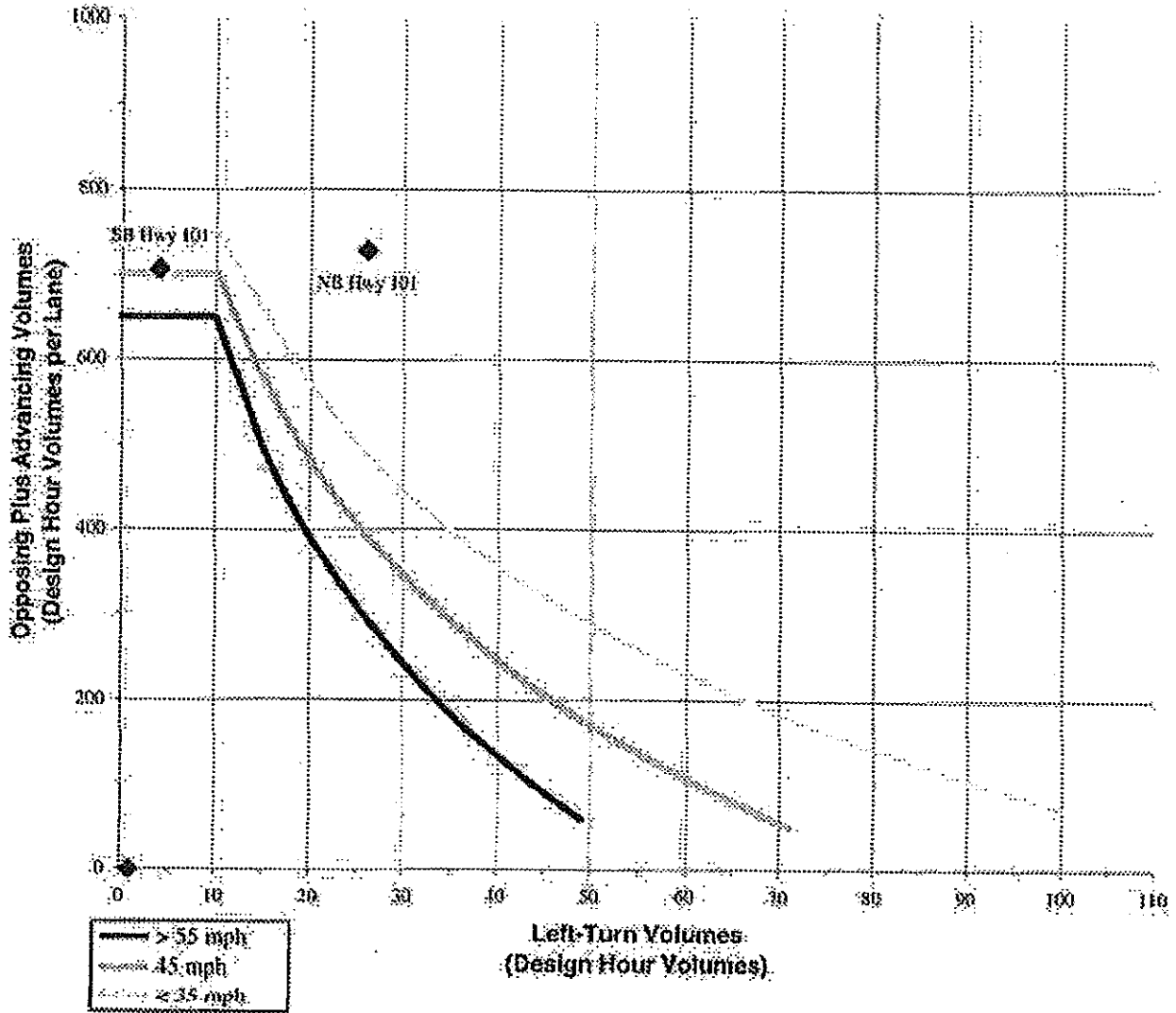


**Right Turn Criterion**

Approach	Right-Turn Volume (vph)	Design Hour Volume (vph per Lane)	Minimum Criteria (Right Turns-sph)	Criterion Met
NB Hwy 101	4	339	33	NO
SB Hwy 101	23	393	29	NO

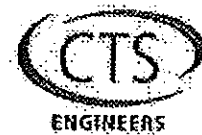


**Left Turn Lane Criterion**



**Left Turn Criterion**

Approach	Left Turns (vph)	Opposing Plus Advancing Volumes (vph/Lane)	Minimum Criteria (Left Turns-vph)	Criterion Met
NB Hwy 101	26	728	10	YES
SB Hwy 101	4	706	10	Check



TOTAL SERVICE 1910 BOUNDARY ROAD ROAD SERVICE TOLLAGE (FOR ROAD) WITH FULL FUNDING OF THE STATE AT WHEELER LANDING (1977-1978) - THE STATE AT WHEELER LANDING

Level of Service Comparison Report Road With Unimproved Method (Future Volume Alternative)

Collection: 12 Hwy 101/Amlock Street

Project Name: Hwy 101 Amlock Street

Approach: North Bound South Bound East Bound West Bound

Control: Uncontrolled Controlled Stop Sign Stop Sign

Table with columns for Volume Module, Lane, and various traffic metrics across four approaches (North, South, East, West Bound).

Table with columns for Control, Control, Control, Control, Control, Control, Control, Control, Control, Control, Control, Control.

Table with columns for Volume Module, Lane, and various traffic metrics across four approaches.

Table with columns for Level of Service, Control, Control, Control, Control, Control, Control, Control, Control, Control, Control, Control.

Level of Service reported in the number of lanes per lane.