

Columbia River **CROSSING**

Data Collection Program



Data Collection Program Purpose and Scope of Work

The data collection plan as outlined below was performed under Task AB of the Columbia River Crossing (CRC) project. The plan was developed to obtain existing transportation data including I-5 mainline and ramp terminal traffic counts, I-5 lane utilization and speed data, and travel time information to support the CRC transportation analysis. The extent of the data collection plan study area was from the Marquam Bridge in Portland, Oregon to the Pioneer Street Interchange in Ridgefield, Washington.

The transportation data collection program included ramp-to-ramp connection counts (i.e., ramps not controlled by intersection control), ramp terminal turning movement counts, I-5 mainline directional vehicle classification counts, lane utilization and speed counts, travel time runs, and origin-destination patterns. The details of the data collection program are summarized below. Tasks "A" through "F" were conducted concurrently with a few exceptions as noted. Northbound counts were conducted on October 18, 2005 and southbound counts were conducted on October 20, 2005.

During April, 2007, a supplemental data collection effort was completed for Task AD in support of the Draft Environmental Impact Statement (DEIS). This data is included as Task "H" below. Additionally, data listed under Task "I" was collected by the City of Vancouver for the Vancouver City Center Vision & Subarea Plan in 2005 and was used in support of the CRC transportation analysis efforts.

A. Collection of Ramp-to-Ramp Traffic Counts

The on-ramp and off-ramp locations identified in **Table 1** list ramp-to-ramp traffic count locations. These locations lead directly to/from I-5 and represent ramp-to-ramp connections, which are not tied to traffic-controlled (signal or stop sign) interchange ramp terminals. Refer to **Table 2** for traffic-controlled ramp terminals. Ramp-to-ramp terminal counts were collected for the 24-hour period during typical weekday operations, summarized by 15-minute increments, and include typical vehicle classifications (vehicles, light trucks, medium trucks, and heavy trucks). Ramp-to-ramp volumes were collected concurrently throughout the corridor with the ramp terminal counts.

**TABLE 1
RAMP-TO-RAMP CONNECTIONS REQUIRING TRAFFIC COUNTS**

#	Location	Direction	Roadway Facility	Comments
1	I-5 at I-84/Yamhill Street	Northbound	Off-ramp	See note
2	I-5 at Morrison Street	Northbound	On-ramp	See note
3	I-5 at I-84	Northbound	On-ramp	
4	I-5 at I-405	Northbound	Off-ramp	
5	I-5 at Greeley Avenue	Northbound	Off-ramp	
6	I-5 at I-405	Northbound	On-ramp	
7	I-5 at SR-14	Northbound	Off-ramp	
8	I-5 at SR-14	Northbound	On-ramp	
9	I-5 at SR-500/39 th Street	Northbound	Off-ramp	See note
10	I-5 at I-205	Northbound	On-ramp	See note

#	Location	Direction	Roadway Facility	Comments
11	I-5 at I-205	Southbound	Off-ramp	
12	I-5 at SR 500/39 th Street	Southbound	On-ramp	See note
13	I-5 at SR-14	Southbound	Off-ramp	
14	I-5 at SR-14/City Center	Southbound	On-ramp	See note
15	I-5 at I-405	Southbound	Off-ramp	
16	I-5 at Greeley Avenue	Southbound	On-ramp	
17	I-5 at I-405	Southbound	On-ramp	
18	I-5 at I-84	Southbound	Off-ramp	
19	I-5 at Morrison Street	Southbound	Off-ramp	See note
20	I-5 at I-84	Southbound	On-ramp	See note

Note: Where multiple ramps merge prior to entering I-5 or diverge after leaving I-5, counts were conducted so as to obtain both volume components.

B. Collection of Ramp Terminal Turning Movement Counts

To support the I-5 Columbia River crossing traffic operations analysis 24-hour ramp terminal turning movement counts were taken at each ramp terminal listed in **Table 2**. Ramp terminal counts were collected concurrently with the ramp-to-ramp counts.

**TABLE 2
RAMP TERMINAL INTERSECTIONS REQUIRING TURNING MOVEMENT COUNTS**

#	Location	Direction	Roadway Facility	Comments
1	I-5 at Weidler	Northbound	Off-ramp	
2	I-5 at Broadway/Williams	Northbound	On-ramp	
3	I-5 at Going/Alberta Avenue	Northbound	Off-ramp	See note
4	I-5 at Alberta Avenue	Northbound	On-ramp	
5	I-5 at Portland Boulevard	Northbound	Off-ramp & On-ramp	
6	I-5 at Lombard Street	Northbound	EB & WB Off-ramp	
7	I-5 at Columbia Boulevard	Northbound/Southbound	Off-ramp/On-ramp	
8	I-5 at Victory Boulevard	Northbound	Off-ramp/On-ramp	
9	I-5 at Marine Drive	Northbound	Off-ramp	See note
10	I-5 at Denver/Interstate Ave.	Northbound/Southbound	On-ramp/Off-ramp	See note
11	I-5 at Marine Drive	Northbound	On-ramp	
12	I-5 at Hayden Island	Northbound	Off-ramp	
13	I-5 at Hayden Island	Northbound	On-ramp	
14	I-5 at City Center	Northbound	Off-ramp	

#	Location	Direction	Roadway Facility	Comments
15	I-5 at Mill Plain Blvd	Northbound	Off-ramp/On-ramp	See note
16	I-5 at 4 th Plain Blvd	Northbound	Off-ramp/On-ramp	See note
17	I-5 at 39 th Street	Northbound	On-ramp	
18	I-5 at Main Street	Northbound	Off-ramp	
19	I-5 at Main Street	Northbound	On-ramp	
20	I-5 at 78 th Street	Northbound	Off-ramp/On-ramp	
21	I-5 at 99 th Street	Northbound	Off-ramp/On-ramp	
22	I-5 at 134 th Street	Northbound	Off-ramp	
23	I-5 at 179 th Street	Northbound	Off-ramp	
24	I-5 at 179 th Street	Northbound	On-ramp	
25	I-5 at Pioneer Street	Northbound	Off-ramp/On-ramp	
26	I-5 at Pioneer Street	Southbound	Off-ramp/On-ramp	
27	I-5 at 179 th Street	Southbound	Off-ramp/On-ramp	
28	I-5 at 134 th Street	Southbound	On-ramp	
29	I-5 at 99 th Street	Southbound	Off-ramp/On-ramp	
30	I-5 at 78 th Street	Southbound	Off-ramp/On-ramp	
31	I-5 at Main Street	Southbound	Off-ramp	
32	I-5 at Main Street	Southbound	On-ramp	
33	I-5 at 39 th Street	Southbound	Off-ramp/On-ramp	
34	I-5 at 4 th Plain Blvd	Southbound	Off-ramp/On-ramp	
35	I-5 at Mill Plain Blvd	Southbound	Off-ramp/On-ramp	
36	I-5 at Hayden Island	Southbound	Off-ramp/On-ramp	
37	I-5 at Marine Drive	Southbound	Off-ramp/On-ramp	See note
38	I-5 at Victory Blvd	Southbound	On-ramp	
39	I-5 at Lombard Street	Southbound	WB & EB On-ramp	
40	I-5 at Portland Blvd	Southbound	Off-ramp/On-ramp	
41	I-5 at Alberta/Going Street	Southbound	Off-ramp	See note
42	I-5 at Alberta Street	Southbound	On-ramp	
43	I-5 at Going Street	Southbound	On-ramp	
44	I-5 at Broadway Avenue	Southbound	Off-ramp	
45	I-5 at Weidler/Winning Way	Southbound	On-ramp	

Note: Where multiple ramps merge prior to entering I-5 or diverge after leaving I-5, counts were conducted so as to obtain both volume components.

C. Collection of Directional, 24-hour Vehicle Classification Counts

Directional, 24-hour vehicle classification counts were taken at the following eight locations. ODOT currently counts two of the eight locations as part of their ATR count program. The remaining five locations, plus the I-5 Interstate Bridge location (six total locations), were counted concurrently with the ramp-to-ramp and ramp terminal counts during typical weekday operations (see Classification Counts Map for exact locations):

1. I-5 Mainline (NB & SB) between Broadway & I-405 Ramps
2. I-5 Mainline (NB & SB) between Lombard Street and Columbia Boulevard
3. I-5 Mainline (NB & SB) on Interstate Bridge (Interstate Bridge ATR 26-004 –ODOT)
4. I-5 Mainline (NB & SB) between SR 14 and Mill Plain Boulevard
5. I-5 Mainline (NB & SB) between 78th Street & 99th Street
6. I-5 Mainline (NB & SB) north of I-205 Connection
7. I-205 Mainline (NB & SB) Mile Post 23.5 between I-84 and Columbia Boulevard (September 2004)
8. I-5 Mainline (NB & SB) Mile Post 303.5 (September 2005)

D. Collection of Lane Utilization/Speed Data

Directional lane utilization / speed trends along the I-5 mainline were observed and documented for passenger vehicles and trucks. Northbound and southbound observations/counts were conducted over a 24-hour period during typical weekday operations. The lane utilization/speed data was collected concurrently with Tasks “A” through “E.” The specific locations requiring observations and counts are the following (see Lane Utilization Location Map for exact locations):

1. I-5 mainline midway between I-84 ramps and Broadway/Weidler ramps (Portland)
2. I-5 mainline midway between Broadway/Weidler ramps and I-405 ramps (Portland)
3. I-5 mainline midway between I-405 and Going Street (Portland)
4. I-5 mainline midway between Alberta Street and Portland Boulevard (Portland)
5. I-5 mainline midway between Victory Boulevard and Jantzen Beach (Portland)
6. I-5 Columbia River Bridge (midspan)
7. I-5 mainline midway between SR 14 and Mill Plain Boulevard (Vancouver)
8. I-5 mainline midway between Mill Plain Boulevard and 4th Plain Boulevard (Vancouver)
9. I-5 mainline midway between 4th Plain Boulevard and SR 500/39th Street (Vancouver)
10. I-5 mainline midway between Main Street and 78th Street (Vancouver)

E. Collection of Directional Travel Time Runs

Travel time runs along I-5 and I-205/I-84 were completed during 4-hour AM and 4-hour PM peak hour turning movement counts using GPS units (both directions during peak periods). Travel time runs were completed concurrently with Tasks “A” through “D” to ensure proper model calibration.

F. Collection of Auto Occupancy

Directional auto occupancy counts along the I-5 mainline were observed and documented for all vehicles. Northbound and southbound observations/counts were conducted over a 4-hour AM and 4-hour PM peak period during typical weekday operations. The PM auto occupancy counts were conducted concurrently with the other counts (Tasks “A” through “E”). The AM counts were taken on a separate day from the others. The specific location requiring observation/count was the Evergreen Boulevard overpass in Vancouver.

G. Collection of Origin Destination Data

The origin-destination data collection plan was broken down into three parts. Part one is the collection of the raw data; part two is the reduction of that raw data into a workable format; and part three is the post processing of the data which produces a final report tailored to particular needs.

Data Collection

Origin-destination data was collected with special high speed video cameras on each lane of roadway. The cameras ran constantly and have a time stamp on the screen so that each plate was captured with the corresponding time that it appeared. All of the cameras had their time stamps synched to within 30 seconds. Both the setup and the monitoring of the cameras was labor intensive. The cameras were constantly monitored to determine that the proper shutter setting was being used based on the direction and intensity of the light.

Data Reduction

Once the cameras collected the raw data, the next step was to get that data into a useable format. Each plate needed to be checked visually and hand entered into the database with its corresponding time stamp.

Post Processing

Once the data was entered into the proper format, it was run through a custom program developed to link origin-destination patterns. This data included a route and a time for every vehicle in the study, and that information was broken down into a summary of the origin-destination data for the study period.

Origin-Destination Plan

Due to origin-destination data collection costs, the origin-destination data was only collected for the peak direction during the peak two hour periods. The origin-destination collection plan captured all of the on and off-ramps within the Bridge Influence Area. Mainline data was calculated using actual mainline counts and origin-destination data from the ramps.

Table 3 lists the on and off-ramps collected as part of the origin-destination study. This task did not need to be collected concurrently with the other tasks although mainline volume counts at the northern and southern limits had to be counted concurrently with the origin-destination study in order to calculate all of the traffic patterns.

**TABLE 3
ORIGIN-DESTINATION RAMP COUNTS**

#	Location	Direction	Roadway Facility	# Of Lanes
1	I-5 at Victory/Denver Avenue	Northbound	On-ramp	1
2	I-5 at Marine Drive	Northbound	On-ramp	1
3	I-5 at Hayden Island	Northbound	Off-ramp	1
4	I-5 at Hayden Island	Northbound	On-ramp	1
5	I-5 at SR-14	Northbound	Off-ramp	1
6	I-5 at City Center	Northbound	Off-ramp	1
7	I-5 at SR-14	Northbound	On-ramp	1
8	I-5 at Mill Plain/4 th Plain Blvd	Northbound	Off-ramp	2
9	I-5 at Mill Plain Blvd	Northbound	On-ramp	2
10	I-5 at 4 th Plain Blvd	Northbound	On-ramp	1
11	I-5 at SR-500/39 th Street	Northbound	Off-ramp	2
12	I-5 at SR-500/39 th Street	Southbound	On-ramp	2
13	I-5 at 4 th Plain Blvd	Southbound	Off-ramp	2
14	I-5 at 4 th Plain Blvd	Southbound	On-ramp	1
15	I-5 at Mill Plain Blvd	Southbound	Off-ramp	2
16	I-5 at Mill Plain Blvd	Southbound	On-ramp	1
17	I-5 at SR-14	Southbound	Off-ramp	1
18	I-5 at SR-14/City Center	Southbound	On-ramp	1
19	I-5 at Hayden Island	Southbound	Off-ramp	1
20	I-5 at Hayden Island	Southbound	On-ramp	1
21	I-5 at Marine Drive	Southbound	Off-ramp	1
22	I-5 at Marine Drive	Southbound	On-ramp	1
23	I-5 at Denver/Victory Blvd	Southbound	Off-ramp	2

H. Collection of Supplemental Intersection Turning Movements

On Tuesday, April 10, 2007 intersection turning movement counts for cars, heavy vehicles and pedestrians were collected at 34 intersections in Vancouver. Data was collected for the 2-hour morning peak period between 7-9 AM and the 2-hour evening peak period between 4-6 PM. On Wednesday, April 11, similar turning movement data was collected for the two peak periods at 40 intersections in Portland. A list of the intersections for the two cities is presented below in **Table 4** and **Table 5**.

**TABLE 4
VANCOUVER INTERSECTIONS TURNING MOVEMENT COUNTS**

#	N/S Street	E/W Street	Control Type
1	Esther St	W 6th St	Unsignalized
2	Esther St	W 8th St	Unsignalized
3	Esther St	W Evergreen Blvd	Unsignalized
4	Esther St	W 11th St	Unsignalized
5	Columbia Blvd	W McLoughlin Blvd	Signalized
6	D St	E 4th Plain Blvd	Unsignalized
7	E St	E 4th Plain Blvd	Unsignalized
8	Post Cemetery entrance	E 4th Plain Blvd	Unsignalized
9	St. Johns Blvd	E 4th Plain Blvd	Signalized
10	Fort Vancouver Way	Driveways with access to Fort Vancouver Way, west of the Frost Art Center @ Clark College	Unsignalized
11	Fort Vancouver Way	E 4th Plain Blvd	Signalized
12	Main St/Broadway St	29th St	Unsignalized
13	Main St	33rd St	Signalized
14	Main St	E 39th St	Signalized
15	F St	E 39th St	Unsignalized
16	P St	E 39th St	Unsignalized
17	NE 15th Ave	SR-500 off-ramp	Unsignalized
18	Main St	NE 45th St	Signalized
19	Main St	NE Hazel Dell Ave	Signalized
20	NE Hwy 99	NE Ross St	Signalized
21	E Reserve St	E Mill Plain Blvd	Signalized
22	G St	E McLoughlin Blvd	Unsignalized
23	D St	E 22nd St	Unsignalized
24	Columbia St	W 24th St	Unsignalized
25	Main St	W 24th St	Unsignalized

#	N/S Street	E/W Street	Control Type
26	Fort Vancouver Way	St Johns Blvd	Unsignalized
27	F St	E 33rd St	Unsignalized
28	P St	E 33rd St	Unsignalized
29	St Johns Blvd	SR-500	Signalized
30	Kauffman Ave	W 39th St	Unsignalized
31	Columbia St	W 39th St	Signalized
32	Columbia St	NW 45th	Unsignalized
33	H St	E 39th St	Signalized
34	Main St	E 40th St	Signalized

**TABLE 5
PORTLAND INTERSECTIONS TURNING MOVEMENT COUNTS**

#	N/S Street	E/W Street	Control Type
1	NE MLK Jr. Blvd	NE Hancock St	Unsignalized
2	N Interstate Ave	N Tillamook St	Signalized
3	N Interstate Ave	N Greeley Ave	Signalized
4	I-405 Off-ramp / N Gantenbein Ave	N Kerby Ave	Unsignalized
5	Columbia Blvd	W McLoughlin Blvd	Signalized
6	N Williams Ave	N Fremont St	Unsignalized
7	NE MLK Jr. Blvd	N Fremont St	Unsignalized
8	N Greeley Ave (South)	N Going St	Signalized
9	N Greeley Ave (North)	N Going St	Signalized
10	N Interstate Ave	N Going St	Signalized
11	N Interstate Ave	N Alberta St	Signalized
12	N Vancouver Ave	N Alberta St	Signalized
13	N Williams Ave	N Alberta St	Signalized
14	NE MLK Jr. Blvd	NE Alberta St	Signalized
15	N Greeley Ave	N Killingsworth St	Signalized
16	N Interstate Ave	N Killingsworth St	Signalized
17	NE MLK Jr. Blvd	NE Killingsworth St	Signalized
18	N Greeley Ave	N Portland Blvd	Signalized
19	N Denver Ave	N Portland Blvd	Signalized
20	N Interstate Ave	N Portland Blvd	Signalized
21	N Vancouver Ave	N Portland Blvd	Signalized

#	N/S Street	E/W Street	Control Type
22	NE MLK Jr. Blvd	NE Portland Blvd	Signalized
23	N Greeley Ave	N Lombard Ave	Signalized
24	N Denver Ave	N Lombard Ave	Signalized
25	N Interstate Ave	N Lombard Ave	Signalized
26	N Vancouver Ave	N Lombard Ave	Signalized
27	NE MLK Jr. Blvd	NE Lombard Ave	Signalized
28	N Denver Ave	N Interstate Ave	Signalized
29	N Interstate Ave	N Argyle St	Signalized
30	N Delaware Ave	N Columbia Blvd	Signalized
31	N Vancouver Ave	N Columbia Blvd	Signalized
32	NE MLK Jr. Blvd	N Columbia Blvd	Signalized
33	N Vancouver Ave	N Schmeer Rd	Unsignalized
34	N Whitaker Rd	N Schmeer Rd	Unsignalized
35	N Whitaker Rd	N Hayden Meadows Dr	Signalized
36	N Expo Rd	N Victory Blvd	Unsignalized
37	N Union Ct	N Hayden Meadows Dr	Unsignalized
38	NE 6th Dr / Faloma Rd	N Marine Dr	Unsignalized
39	N Force Ave	N Marine Dr	Signalized
40	N Portland Rd	N Marine Dr	Signalized

I. Count Data Provided by the City of Vancouver from the VCCV

As part of the Vancouver City Center Vision & Subarea Plan, the City of Vancouver collected traffic data in downtown Vancouver during 2005. This information was provided to the Columbia River Crossing project supplementary to the other data collected by the CRC. The City of Vancouver data was collected for the 2-hour morning peak between 7 and 9 AM as well as the 2-hour evening peak period between 4 and 6 PM. The data includes turning movement counts for cars, heavy vehicles, bicyclists and pedestrians. A list of intersections where data was provided to the CRC project is presented below in **Table 6**.

**TABLE 6
CITY OF VANCOUVER INTERSECTION DATA**

#	N/S Street	E/W Street	Control Type
1	Broadway	4 th Plain	Signalized
2	Broadway	8 th St	Unsignalized
3	Broadway	9 th St	Unsignalized
4	Broadway	11 th St	Unsignalized
5	Broadway	15 th St	Signalized
6	Broadway	Evergreen Blvd	Signalized
7	Broadway	McLoughlin Blvd	Signalized
8	Broadway	Mill Plain Blvd	Signalized
9	Columbia	3 rd St	Unsignalized
10	Columbia	4 th Plain	Signalized
11	Columbia	6 th St	Signalized
12	Columbia	8 th St	Signalized
13	Columbia	9 th St	Unsignalized
14	Columbia	11 th St	Unsignalized
15	Columbia	15 th St	Signalized
16	Columbia	Evergreen Blvd	Signalized
17	Columbia	Mill Plain Blvd	Signalized
18	C St	8 th St	Signalized
19	C St	11 th St	Unsignalized
20	C St	15 th St	Signalized
21	C St	Evergreen Blvd	Signalized
22	C St	Mill Plain Blvd	Signalized
23	Franklin St	Mill Plain Blvd	Signalized
24	F St	4 th Plain	Signalized
25	Fort Vancouver Way	Evergreen Blvd	Signalized
26	Fort Vancouver Way	McLoughlin Blvd	Signalized
27	Fort Vancouver Way	Mill Plain Blvd	Signalized
28	Main St	4 th Plain	Signalized
29	Main St	6 th St	Unsignalized
30	Main St	8 th St	Signalized
31	Main St	9 th St	Unsignalized
32	Main St	11 th St	Unsignalized

#	N/S Street	E/W Street	Control Type
33	Main St	15 th St	Signalized
34	Main St	Evergreen Blvd	Signalized
35	Main St	McLoughlin Blvd	Signalized
36	Main St	Mill Plain Blvd	Unsignalized
37	Washington St	4 th St	Unsignalized
38	Washington St	6 th St	Signalized
39	Washington St	8 th St	Signalized
40	Washington St	9 th St	Unsignalized
41	Washington St	11 th St	Unsignalized
42	Washington St	15 th St	Signalized
43	Washington St	Evergreen Blvd	Signalized
44	Washington St	Mill Plain Blvd	Signalized