OREGON FREIGHT INTERMODAL CONNECTOR SYSTEM (OFICS) STUDY

Appendix

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1.0 Appendix A - Stakeholder Engagement

There were three key elements of stakeholder engagement that were undertaken as part of this study:

- A freight stakeholder questionnaire was developed and used to conduct a survey of stakeholders.
- A technical advisory committee was formed to guide the work conducted in the study. The Oregon Freight Advisory Committee (OFAC) was also used as a sounding board throughout the study.
- Follow-up phone interviews were conducted to cover stakeholders that did not respond to the questionnaire.

The sections below provide detail on the work that was done to support each of these three bullets.

1.1 Stakeholder Survey

This section describes the implementation of a freight stakeholder questionnaire which was undertaken as Task 6 of this study. The purpose of the survey is to:

- Confirm the alignment of intermodal connectors identified in Task 4
- Inform and validate the issues and concerns for the freight intermodal connectors
- Identify patterns in the types of issues across different connector categories
- Describe potential recommendations to consider to mitigate the issues that are identified.

1.1.1 Data and Methodology

The majority of the data gathered for this study were collected using an Internet-based survey combined with follow-up phone calls and telephone interviews. An initial list of survey questions was developed by the consultant team for ODOT review. After making revisions based on ODOT comments, the survey instrument was converted into an on-line survey for distribution to respondents. Respondents were contacted multiple times by phone and by email during the course of data collection (November 18, 2016 to January 4, 2017) to encourage maximum participation.

The information requested on the surveys were divided into three categories. First, information on the type of survey respondent was collected. This included information on the agency or company that they represent, the specific connector that they are filling out information for, and the specific organization name and respondent name. The second category of information collected was related to the terminal. This included confirmation that the respondent was assigned to the correct terminal(s) and an estimate of truck traffic generated at the terminal. The third portion of the survey was related to the connectors associated with the terminal. This was the longest portion of the questionnaire and requested information on the following topics:

- Identification of appropriate connector
- Estimate of daily truck traffic on connector

- Pavement condition
- Time periods of recurring congestion
- Roadway features (roadway width, rail crossings, bridges)
- Operational Issues/Concerns - Safety, Parking, Signage, Turning Movements, Trains, Mixing with other traffic types and land uses
- Recommendations on improvements

A more detailed discussion of the survey time frame, data collection procedures, and survey recipients may be found in a separate technical memorandum that was developed to capture the survey activities. This memorandum also includes the survey instrument, the actual responses and a definition of the roadway identification numbers that are described in this Chapter.

The survey covered both designated freight intermodal connectors and other roadways that serve as connectors in Oregon. For intermodal connectors located in the Portland region, a variation of the survey was implemented. Information on connectors was collected using an in-person meeting with staff from the Oregon DOT, the City of Portland, Metro, and the Port of Portland covering the same questions as the survey. This was designed to serve as a brainstorming session to allow the transportation planners that are most familiar with these roadways to feed off of each other's comments and to maximize consensus in regards to the existing conditions, issues, concerns, and potential solutions related to connectors in the region.

1.1.2 Description of Survey Respondents

In total there were 132 stakeholders that were contact as part of the survey, including:

- 3 intermodal pipeline terminal operators;
- 7 airport operators;
- 40 intermodal and transload rail terminal operators;
- 30 intermodal and transload marine terminals; and
- 55 city, county, and MPO staff.

Table 1.1 shows the number of stakeholders that responded within each category. Public agency officials were contacted the most as part of this survey. Contacts for many of the port and rail facilities were not able to be located, so the number of stakeholders contacted for these modes is less than the number of intermodal and transload terminals that exist in the State.

The City, County, and MPO staff had the highest response rates with two-thirds of those contacted completing a survey. Because the public agency staff had the most stakeholders contacted and they had the highest response rate, the vast majority of the responses were from these stakeholders. 57 of the 86 connector responses (66 percent) were from public agency stakeholders. The port and rail stakeholders were responsible for another 20 of the 86 responses (23 percent).

Nineteen of the 86 responses included little useful information beyond identifying the name of the agency and the connector referenced as part of the survey (Table 1.2). This resulted in a total number of 67 responses with comprehensive information that are incorporated into the survey response analysis described in this section.

Table 1.3 shows the distribution of these 67 connectors by region. It demonstrates that 50 of the 67 responses were for connectors located in Regions 2 or Region 3. Table 2.4 shows the distribution of the connectors by freight mode. Connectors that access marine ports were the most common type of connector responded to in the survey. The port mode was 31 of the 67 (46 percent) survey responses. The rail mode was a close second with 25 responses. The pipeline mode did not have any responses included in the survey.

Table 1.1 Survey Responses by Stakeholder Type

Type of Stakeholder	Number of Stakeholders Contacted	Number of Stakeholders Attempting at Least One Survey	Percent of Stakeholders Responding
City, County, MPO	55	37	67%
Port	30	7	23%
Rail	40	9	23%
Private Sector (mode unspecified)	0	3	n/a
Airport	7	2	29%
No Response to Stakeholder Type Question	n/a	13	n/a
Total	**132**	**71**	**54%**

Table 1.2 Successful Connector Responses

Type of Stakeholder	Number of Connector Responses Attempted	Number of Connector Responses Successful
City, County, MPO	57	44
Port	10	9
Rail	10	10
Private Sector (mode unspecified)	3	2
Airport	2	2
No Response to Stakeholder Type Question	4	0
Total	**86**	**67**

Table 1.3 Survey Responses by Region

Type of Connector	Number of Responses on Connectors In this Region	Percent of Total
Region 1	9	13%
Region 2	23	34%
Region 3	27	40%
Region 4	4	6%
Region 5	4	6%
Totals	**67**	**100%**

Table 1.4 Survey Responses by Mode

Type of Connector	Number of Responses on Connectors In this Region	Percent of Total
Port	31	46%
Rail	25	37%
Air	11	16%
Pipeline	0	0%
Totals	**67**	**100%**

1.1.3 Identification of Connector Alignment

Table 1.5 summarizes the survey response regarding whether the connector that was identified initially by the project team is the correct one to use for the intermodal terminal. The majority of respondents stated that the connector was identified correctly with 25 percent stating that the connector alignment needed to be altered or that a connector was not needed because the facility was inactive.

Table 1.5 Survey Responses to Question Regarding Correct Identification of Intermodal Connector

Was Connector Identified Correct?	Number of Responses	Percent of Total
Yes	46	69%
No	17	25%
No response	4	6%
Total	**67**	**100%**

The survey responses received in regards to providing an edited set of roads that are used by trucks to access the terminal are as follows:

- North 15th Street in Philomath (R2R34) - 15th, 13th, Main (US20), 19th, College streets
- South 7th Street in Garibaldi (R2P10) - All of S 7th, portion of Commercial Ave between S 7th and Mooring Basin Rd, Mooring Basin Rd, American Ave and S 3rd St (The southern portion of S 7th is one-way to the south, to get out you have to use Mooring Basin Rd which is one-way to the north)
- Sage Road in Medford (R3R46) - I do not know for sure what route trucks take, but it would make more sense to me that trucks go north on Sage, then east on Hwy 238, into Hwy 62, and onto I-5.
- Pine Street in Medford (OR21A) - Generally correct, but Hilton Rd and the Biddle ramps from 62 may need to be added at the south end.
- Industrial Way in Lebanon (R2R32) - Highway 20 to Industrial Way to Terminal
- Greely Avenue in Portland (OR23P) - Hwy 20, Hwy 18, Hwy 22, & I-5
- W. 12th Street in Medford (R3R48) - I don't believe that 12th Street is used and I'd think the route on Fir St should extend south to Barnett, where it would meet up with R3R49.
- SE 9th Avenue in Albany (R2R15) - I don't believe the City has a freight terminal.
- N. River Road in Rogue River (R3R59) - N. River Rd., Classick Dr. and Depot St.
- 1st Street SE in Bandon (R3P22) - No, 1st SouthWEST - not SouthEAST
- Beach Access Road in Umatilla (R5P45) - No, Beach access, launch lane, roxbury, budrapper (total of two connectors)
- Connecting Road to Oregon Chip Terminal in North Bend (R3P33) - No, has no connector as it is already located on US 101
- Connecting Road to Astoria Airport (R2A01) - SE 12th Place; to Alternate Highway 101; to US-101B; to US 101. Flightline to Airport Lane to Alternate Highway 101 is a tertiary route.
- Riverside Drive in Bandon (R3P23) - These sites have not been active in decades, however the Moore Mill Log Yard located at 145 Riverside is still occasionally used as sort/reload yard for processing logs before they are sent to Coos Bay/North Bend export yards.
- Nopal Street in Florence (R2P17) - Trucks can also access via Hwy 126, Quince Street (turns into 2nd at Harbor), Nopal Street for the Port of Siuslaw dock area. For the public boat ramp, Hwy 126, Quince, Harbor Street.
- Front Avenue in Portland (OR11R) - US-30 and I-405
- Joe Wright Road in Klamath Falls (R4A12) - US97 via Joe Wright to the Crater Lake - Klamath Regional Airport is an additional route trucks take to access the airport.

1.1.4 Number of Trucks Estimated

Survey participants provided estimates of the number of trucks generated by the intermodal terminal and the number of trucks operating on the intermodal connectors. Table 1.6 shows the survey response regarding the number of trucks generated at the terminal separately for Tier 1 and Tier 2 connectors as they were defined at the time of the survey. Of the 11 Tier 1 connectors that had responses, five were estimated to generate less than 50 trucks per day. No response to this question was provided for three of the eleven Tier 1 terminals and one respondent did not know the number of trucks generated by the terminal. Two of the Tier 1 terminals were thought to generate between 100 and 999 trucks per day. 21 of the 56 Tier 2 terminals where data were collected were thought to generate less than 50 trucks per day.

Table 1.7 shows the survey responses regarding the number of trucks operating on the intermodal connectors. This table shows that responses for six of the Tier 1 intermodal connectors indicate that there are a handful of the Tier 1 connectors with less than 100 trucks per day. Twenty of the potential Tier 2 connectors were estimated to have less than 50 trucks per day, and another five of the Tier 2 connectors were estimated to have between 50 and 99 trucks per day.

Table 1.6 Estimate of the Number of Trucks Generated at Terminal

	Number of Trucks Estimated	
Truck Volume Range	**Tier 1 Connectors**	**Tier 2 Connectors**
0 to 9	3	10
10 to 49	2	11
50 to 99	0	6
100 to 999	2	11
1,000 or more	0	0
Unknown	1	9
No response	3	9
Total	**11**	**56**

Table 1.7 Number of Trucks Estimated on Connector

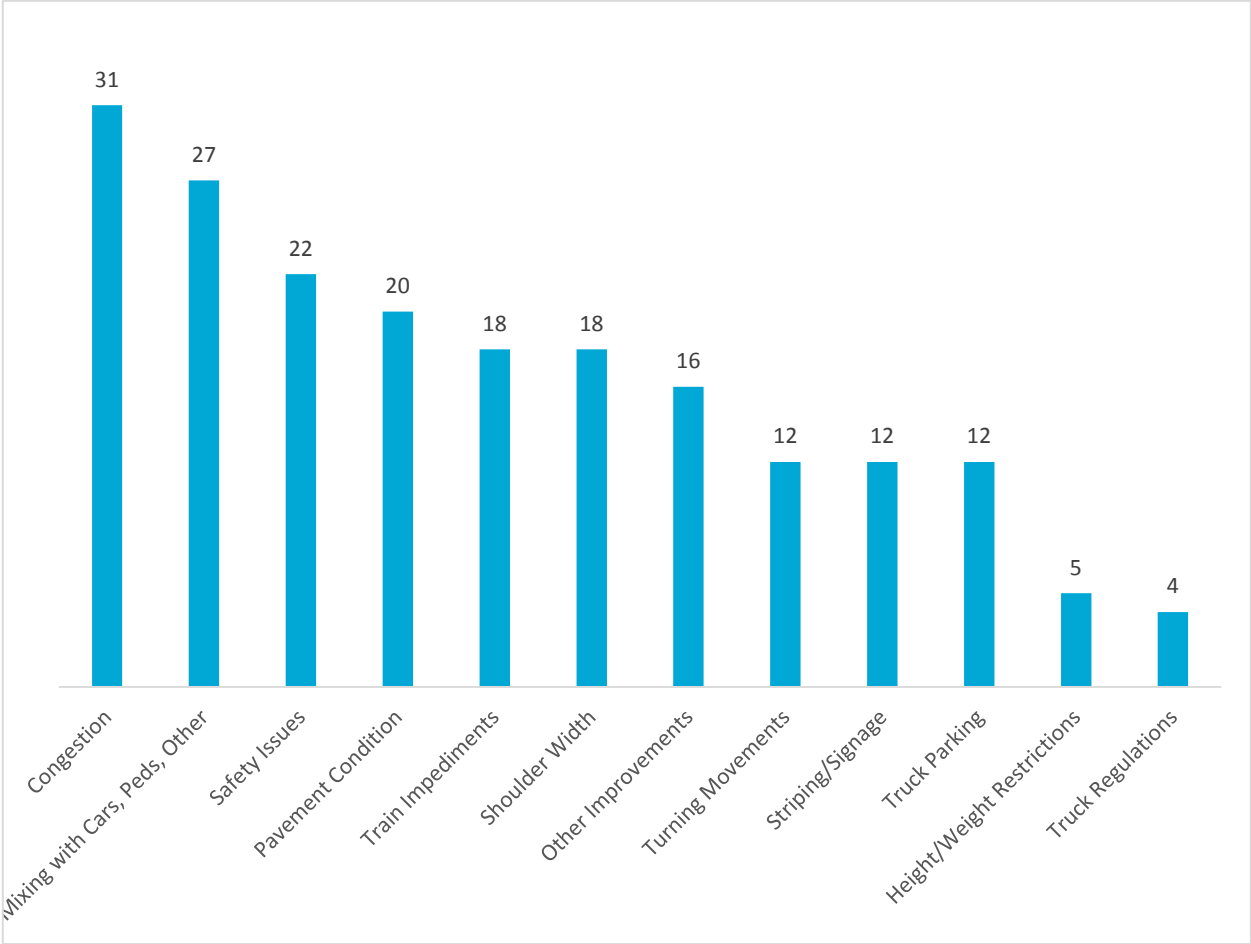
	Number of Trucks Estimated	
Truck Volume Range	**Tier 1 Connectors**	**Tier 2 Connectors**
0 to 9	3	5
10 to 49	3	15
50 to 99	0	5
100 to 999	2	15
1,000 or more	1	2
Unknown	0	5
No response	2	9

Total	**11**	**56**

1.1.5 Summary of Issues Identified Through Survey

In total, 197 separate issues were identified for the intermodal connectors through the survey process. Figure 1.1 shows the distribution of these issues across 12 different categories. Congestion is the largest issue category with 31 of the responses identifying the existence of this type of issue. The second most common issue was the mixing of trucks with cars, pedestrians, bicyclists and incompatible land uses with 27 responses indicating that there were issues relating to this category. Issues related to safety, pavement, impediments from trains, and shoulder width registered between 18 and 22 responses each. Turning movements, striping/signage, and truck parking each had 12 responses. Height/weight restrictions and truck regulations had the fewest responses numbering four and five, respectively. The following sections describe the specific responses within each of these twelve categories.

Figure 1-1 Number of Connector Issues Identified Through Survey by Issue Category



Congestion Issues

Congestion was the most commonly identified issue on the connectors through the survey process. As shown in Table 1.8, 31 of the 67 locations were identified as having congestion issues in the survey, while 29 locations were found to not have congestion issues.

Table 1.8 Surveyed Connectors with Congestion Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	31	46%
No	29	43%
No response	7	10%
Total	**67**	**100%**

The specific time periods of congestion differed across connectors. Two of the main types of congestion were seasonal congestion and recurring commute peak time congestion. The nine specific responses that indicated seasonal congestion were described as follows:

- Harbor Way in Gold Beach (R3P30) - Seasonally. Sportfishing, or tour boat related, with traffic attempting to enter Highway 101 and continue North or South on 101.
- Nopal Street in Florence (R2P17) - During summer travel season, May through September, 10am - 6pm
- NE Skipanon Drive in Warrenton (R2P21) - The road has congestion problems during the summer months
- Lower Harbor Road in Harbor (R3P24) - Summer time
- Port Island Road in Arlington (R4P38) - During harvest, trucks can back up along the road waiting to unload.
- Trans Pacific Parkway in North Bend (R3P27) - A boat ramp is located at MP 4.2 that may cause congestion during salmon fishing season twice per year
- Transpacific Parkway in Coos Bay (OR22P) - Heavy congestion at the intersection of Horsefall Road and Transpacific Lane due to the Oregon Sand Fest in July each year
- Port Island Road in Arlington (R4P38) - During harvest, July - August time frame grain trucks will back up waiting to be unloaded.
- Northwest 13th Street in Warrenton (R2P20) - Congestion experienced during summer months

The 14 specific locations that identified recurring daily congestion were describes as follows:

- North Force Avenue in Portland (R1R12) - I-5 bridge is a real problem coming here along with the access roads on Marine Drive are stand still...

- Connector Road to A&M Reload terminal (R2R29) - Some congestion during afternoon rush hour and during times when trains go by. Also, a nearby State hospital does not allow smoking on the State properties so employees are forced to park along Milliron Road or drive around to smoke a cigarette. The roadway has 5 foot shoulders, some impact to traffic and congestion during breaks and lunch.

- Westport Ferry Road in Clatskaine (R2P09) - Morning - school time; Afternoon - school time; and following ferry landing.

- Rockcrest Street in Rainier (R2P14) - Back up congestion do to HWY 30 and the Lewis and Clark bridge

- Dike Road in Rainier (R2P15) - Lewis and Clark Bridge congestion

- Newport Avenue in Coos Bay (OR5P) - Truck traffic is impeded by heavy traffic from 4pm to 6pm Monday thru Friday

- Southeast Mailwell Drive in Milwaukie (R1R02) - 7am-4pm

- West 1st Avenue in Junction City (R2R27) - Minor congestion during afternoon rush hour. Some congestion during railroad loading and unloading.

- Sage Road in Medford (R3R46) - PM peak hour. More congested closer to I-5 ramps

- Pine Street in Medford (OR21A) - Mainly near the freeway ramps during the pm peak

- Private Road in Junction City (R2R28) - morning/evening

- Southeast 9th Avenue in Albany (R2R15) - 9th Avenue is part of the highway system and can experience congestion during peak AM and PM traffic periods; generally 7:30-8:30 AM and 4:30-5:30 PM.

- N. River Road in Rogue River (R3R59) - 4:00 to 5:00 pm weekdays at I-5 southbound off ramp and Depot St.-Pine St.- Classick Dr. intersection.

- Southeast Capps Road in Clackamas (R1R01) - In the past the primary congestion had been at I-205 exit 12/12A, but with the construction of the Sunrise, the majority of the issues have been addressed.

Other types of congestion, including those with little description, that were captured in the survey are as follows:

- Guano Rock Lane in Coos Bay (R3P25) - Charleston Marina has a large RV campground, several restaurants and shops which draw many tourist throughout the year.

- South 7thStreet in Garibaldi (R2P10) - During busy logs being delivered, lumber being shipped out, fishery products being shipped out
- Airport Lane in LaGrande (R5A09) - 7:00 am and 3:30 - 4:30 when the trailer factory is changing shifts.
- Transpacific Parkway in Coos Bay (OR22P) - Traffic turning from Transpacific onto US 101 can be delayed or cause delays on highway throughout daylight hours.
- Joe Wright Road in Klamath Falls (R4A12) - Intersection of Washburn Way and Joe Wright Road
- Joe Wright Road in Klamath Falls (R4A12) - Both connectors cross two railroad tracks. Both are busy depending upon the day and time. These tracks block access to/from the Airport.
- N. River Road in Rogue River (R3R59) - depot street and classic intersection.
- Southeast Butler Bridge Road in Toledo (R2P19) - Shift changes at GP, rail traffic at multiple crossings

Mixing with Cars, Pedestrians, Bicyclists, and Conflicting Land Use Issues

Issues related to the mixing of truck activity with cars, pedestrians, bicyclists, and conflicting land uses was the second most common issue identified in the survey. As shown in Table 1.9, 27 survey responses identified this as an issue with 8 survey responses saying that it was not an issue and 32 respondents not providing information on this topic.

Table 1.9 Surveyed Connectors with Issues Related to Mixing with Cars, Pedestrians, Bicyclists, and Conflicting Land Use Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	27	40%
No	8	12%
No response	32	48%
Total	**67**	**100%**

Of the specific issues mentioned by survey respondents, 14 mentioned issues related bicyclists. Twelve of the responses mentioned issues related to pedestrians and six mentioned issues related to cars. Land use, design, and buses were mentioned four, four, and two times respectively as an issue in this category. The text of the issues identified related to the mixing of trucks with cars, pedestrians, bicyclists, and conflicting land use issues are as follows:

- Joe Wright Road in Klamath Falls (R4A12) - As mentioned previously, Joe Wright from US97 is not designed for truck traffic and should be evaluated.

- Lower Harbor Drive in Harbor (R3P24) - At the intersection of Lower Harbor Rd. and Shopping Center Ave. it is hard to pull out into traffic from shopping Center due the high amount of traffic coming down the hill, traffic entering from boat launch and peds/bikes trying to cross. We have had complaints from the public about this situation.

- Guano Rock Lane in Coos Bay (R3P25) - Boat Basin Drive has new 8 foot side walks for pedestrians with no on street parking.

- N. River Road in Rogue River (R3R59) - Conflicts with school busses (stopping at rail crossing) and commuter busses. Bicycle and pedestrian conflicts due to lack of crosswalks between downtown area north of the river and the Rogue River Greenway bicycle/pedestrian path to the south and residential area and parks south of the river.

- Airport Way in North Bend (R3A07) - lack of designated bike lanes along route

- Southeast Butler Bridge Road in Toledo (R2P19) - Narrow area for pedestrian traffic. Shared bike traffic. Large community park/ball fields in the same area and high traffic from the Post Office.

- Connector road to Astoria Airport (R2A01) - Narrow paved shoulders. Occasional bike riders ride in the traffic lane.

- North 15th Street in Philomath (R2R34) - narrow roads makes this route dangerous for pedestrians and bicyclists. S 19th Street runs beside the primary and middle schools.

- California Avenue in North Bend (R3P32) - near boat ramp facility

- California Avenue in Coos Bay (OR4P) - no improved pedestrian path north of Florida

- Dock Road in Port Orford (R3P35) - no shoulder to speak of - walking pedestrian turn it into a one lane road

- South 7th Street in Garibaldi (R2P10) - On the west side of S 7th there are pedestrian/truck movement conflicts. There are no designated bicycle lanes. Trucks veer into oncoming traffic lanes to make turning movements. Trucks veer into oncoming traffic lane on American Ave to avoid off-tracking at children's playground

- Nopal Street in Florence (R2P17) - On-street parking on Nopal and Bay Street can make deliveries difficult.

- Joe Wright Road in Klamath Falls (R4A12) - Passenger cars, Air National Guard Base

- Northwest 13th Street in Warrenton (R2P20) - Passenger cars, pedestrians and bicyclists use the Warrenton trail which ends at the West end of 13th Street. 13th Street serves as a connector and extension of the trail

- NE Skipanon Drive in Warrenton (R2P21) - Pedestrians and recreational trailers carrying boats to the Marina

- Transpacific Parkway in Coos Bay (OR22P) - Pedestrians walking on the shoulder of roadway during the yearly Sand Fest may slow truck traffic.
- Airport Lane in LaGrande (R5A09) - Shoulders are narrow and cause conflicts.
- Connector road to Astoria Airport (R2A01) - Some mixed use, passenger cars, and bicyclists
- N. River Road in Rogue River (R3R59) - south bound exit 48 left hand turn going under freeway.
- Southeast 9th Avenue in Albany (R2R15) - The connector includes part of the highway system, so truck traffic mixed with all modes.
- Westport Ferry Road in Clatskaine (R2P09) - The connector is mixing truck traffic with school traffic with residential traffic. There are few bicyclists using the road, when they do, there is no passing room. Land use to the east of the road is residential. Land use west of the road is a fish-bearing stream (Plympton Creek)
- Blackwell Road in Central Point (R3R41) - The major issue is as trucks try to enter port going Northbound on 99 at Scenic Avenue
- Harbor Way in Gold Beach (R3P30) - The Post Office, Tour boat industry, and public boat ramp share this connector, so periodically, it is a challenge for trucks to negotiate. There are no sidewalks, so pedestrians are on the shoulder.
- Sage Road in Medford (R3R46) - The railroad overpass on McAndrews does not have any bike lanes or sidewalks
- Pine Street in Medford (OR21A) - There are sections of road with high volumes, high speeds, and no bike lanes, such as Table Rock Road to Airport Rd
- Port Island Road in Arlington (R4P38) - There is no designated bike lane, however there is a sidewalk (which needs to be resurfaced with asphalt). RVs, Boats and marina traffic share road too. Occasionally RVs block truck traffic while look for camp site.
- Private road to Junction City Reload terminal in Junction City (R2R28) - We are in a rural area, no issue

Safety Issues

Safety issues were the third most common issue identified in this survey. Of the 67 responses, 22 identified safety has being an issue, while 14 stated that there were no safety issues (Table 1.10). There was no response to the safety issue for 31 of the 67 survey responses.

Table 1.10 Surveyed Connectors with Safety Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	22	33%

No	14	21%
No response	31	46%
Total	**67**	**100%**

There were a wide range of specific safety issues identified. Seven of the specific issues mentioned were related to design. Issues related to rail crossings was cited four times. Safety issues related to bicycles and pedestrians was also mentioned four times. Congestion-related safety issues were mentioned three times. The specific open-ended responses related to safety in the survey are as follows:

- Airport Lane in LaGrande (R5A09) - Bikes and trucks
- Southeast 9th Avenue in Albany (R2R15)- Congestion during peak traffic periods.
- NE Skipannon Drive in Warrenton (R2P21) - Considerable safety issues associated with Rod's Bar and Grill. Also, site distance issues at Warren Condo Stop Sign access to NE Skipanon Drive.
- Joe Wright Road in Klamath Falls (R4A12) - Crossing of two railroad tracks is the main concern.
- N. River Road in Rogue River (R3R59) - Inadequate turn radii at intersections, inadequate width at sharp corner on Classick Dr. and inadequate or no shoulders for pedestrian/bike on Classick Dr. and N. River Rd.
- N. 15th Street in Philomath (R2R34) - narrow road with bike and pedestrian traffic, little to no shoulder on 13th Street.
- Southeast Butler Bridge Road in Toledo (R2P19) - Narrow sidewalks, need more pedestrian crossing points.
- South 7th Street in Garibaldi (R2P10) - On the west side of S 7th there are pedestrian/truck movement conflicts
- Lower harbor Drive in Harbor (R3P24) - Pedestrian and bikes crossing. congested intersection at Lower Harbor Rd. and Shopping Center Ave.
- Airport Way in North Bend (R3A07) - queuing at gated entrance to Coast Guard station
- Joe Wright Road in Klamath Falls (R4A12) - Rail Crossing, intermittent
- California Avenue in North Bend (R3P32) - railroad crossing
- Sheridan Avenue in Coos Bay (OR4P) - railroad crossing
- Airport Road in Florence (R2A03) - Site vision issue south bound at Kingwood and 9th Street.
- North Force Avenue in Portland (R1R12) - Suttle road has had trucks bottom out. Our entrance off of Force Avenue is difficult for big trucks to make the turn

- Riverside Drive in Bandon (R3P23) - The bridge located on Filmore has a emergency 4 ton weight limit placed on it.
- Port Island road in Arlington (R4P38) - The main safety issue is traffic driving above posted speed - 15 mph zone.
- Blackwell Road in Central Point (R3R41) - There is a safety issue with trucks leaving terminal using South 99 at Scenic Avenue, high speeds and cross traffic.
- Westport Ferry Road in Clatskaine (R2P09) - This is also a residential area. Driveways connect directly to the travel lane. No shoulder on housing side. Deep slope on creek side. Traffic is 'pushed' to the residential side of the road.
- Private Road to Junction City Reload in Junction City (R2R28) - too congested , no room for passing
- Harbor Way in Gold Beach (R3P30) - Trucks travel well on this connector, but have issues with Moore St. intersection, another connector used for the airport and port.
- Transpacific Parkway in Coos Bay (OR22P) - Turning North from Transpacific onto US101, or from northbound US101 to Transpacific, truck traffic must cross hwy speed traffic without traffic controls

Pavement Condition

Respondents were requested to rate the pavement conditions of the connectors as good, fair, or poor. Good condition were defined as pavement that is smooth with no potholes, bumps, or rough spots. Fair condition was defined as mostly smooth with few and minor potholes, bumps, or rough spots. Poor pavement condition was defined as major potholes, bumps or rough spots. Table 1.11 shows how survey respondents were distributed across these categories. Poor pavement conditions were identified for 11 of the 67 connectors (17 percent). Nearly half of the connectors (29 out of 67) were identified as having fair condition.

Table 1.11 Pavement Condition on Connectors

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Good	22	33%
Fair	29	44%
Poor	11	17%
No response	5	6%
Total	**67**	**100%**

Pavement condition issues were identified in the following 20 specific locations:

- Dock Road in Port Orford (R3P35) - Culvert not holding up on
- Harbor Way in Gold Beach (R3P30) – Port Drive

- North 15th Street in Philomath (R2R34) – N 15th Street
- Old U.S. Hwy 30 in Astoria (R2P07) – Portway Avenue, Hamburg
- Blackwell Road in Central Point (R3R41) – Highway 99 South of Exit 35 to Scenic Avenue
- Connector road to Astoria Airport (R2A01) – Flightline
- Connector road to Astoria Airport (R2A01) - The 800' connection from SE 12th to Airport Lane is in poor condition with the rest of the route in good condition.
- Port Island Road in Arlington (R4P38) – Fromm the UP railroad tracks to the end of Port Island Way
- Nopal Street in Florence (R2P17) – The approach to Hwy 101 from Nopal is rough, however, that will be addressed in 2018 during ODOT's resurfacing project
- Sheridan Avenue in Coos Bay (OR4P) - E 10-feet and W 10-feet of street surface from Hwy 101 to Florida Ave.
- NE Skipanon Drive in Warrenton (R2P21) - southern 600' in fair condition, the southern 200' in poor condition
- California Avenue in North Bend (R3P32) - at railroad crossing
- North Force Avenue in Portland (R1R12) - Suttle Road and at the street entrance to the terminal. Our yard on Force Avenue is in fair shape.
- Westport Ferry Road in Clatskaine (R2P09) - Ferry Road - Inadequate width; no shoulders; no sidewalks;
- Airport Way in North Bend (R3A07) - Virginia Ave.; from OR540 to Maple
- Port Island Road in Arlington (R4P38) - from north side of railroad crossing to the end Island Park Way
- Fleet Street in Hammond (R2P11) - 150' between Pacific and beginning of Point Adams facility
- Newport Avenue in Coos Bay (OR5P) - PCI 36: 0.10 miles from Newport Ave to Mill Yard/Docks
- Southeast Mailwell Drive in Milwaukie (R1R02) - Ozmark
- Transpacific Parkway in Coos Bay (OR22P) - PCI 49, 0.65 miles starting at the intersection of Hwy 101 heading west

Train Impediment Issues

Issues related to train impediments were identified in 18 responses (Table 1.12). This represented 27 percent of all respondents. There were twice as many responses that mentioned that trains were not an

issue and another 13 respondents that did not answer the question relating to train impediments. There were no detailed responses requested for this item.

Table 1.12 Surveyed Connectors where Train Movements Restrict Mobility

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	18	27%
No	36	54%
No response	13	19%
Total	**67**	**100%**

Roadway or Shoulder Width Issues

Roadway or shoulder width issues were identified in 18 of the 67 responses (27 percent), while 41 stated that there were roadway or shoulder width issues (Table 1.13). There was no response to the safety issue for 8 of the 67 survey responses.

Table 1.13 Surveyed Connectors with Roadway or Shoulder Width Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	18	27%
No	41	61%
No response	8	12%
Total	**67**	**100%**

The specific locations with roadway or shoulder width issues are as follows:

- R2P34 - 13th Street has no shoulder and is too narrow
- S. 7th Street in Garibaldi (R2P10) - At S 3rd and Hwy 101, at S 7th and Hwy 101 and at S 7th and American Ave
- N. River Road in Rogue River (R3R59) - classic narrow and sharp left hand turn.
- N. River Road in Rogue River (R3R59) - Classick Dr. from Depot St to N. River Rd and N. River Rd from Classick Dr. to mill
- Private road in Junction City to Junction City Reload terminal (R2R28) - I-5 corridor needs to be expanded to three lanes each way at least through Albany to Eugene area
- Dock Road in Port Orford (R3P35) - In the corner two trucks cannot pass on a hill.

- Southeast 9th Avenue in Albany (R2R15) - Narrow passage on north side of overpass.
- California Avenue in North Bend (R3P32) - on street parking during business hours
- Sheridan Avenue in Coos Bay (OR4P) - pavement width = 24-feet for two-way traffic north of Florida
- Connecting road to Astoria Airport (R2A01) - Road shoulder narrow as drainage ditches exist on both sides
- NE Skipanon Drive in Warrenton (R2P21) - Roadway is adequate width with no shoulder on either side. Shoulder work is needed in a few areas.
- Fleet Street in Hammond (R2P11) - Roadway is narrow (18') with no shoulder
- Northwest 13th Street in Warrenton (R2P20) - Roadway width adequate but no shoulders as drainage runs down both sides
- Milliron Road (R2R29) - Some impact, see Item 7 above.
- Port Island Road in Arlingotn (R4P38) - the shoulders along the entire stretch of road north from railroad crossing to end of island are gone. In some cases 3" drop off, in others edges chipping off.
- Trans Pacific Parkway in North Bend (R3P27) - This portion of Transpacific Lane needs to be added to the National Highway System because of existing multimodal - highway, rail and marine facilities of Southport Forest Products and DB Western.
- Westport Ferry Road in Clatskaine (R2P09) - Travel lanes are under 10' wide. There is no shoulder.
- Joe Wright Road in Klamath Falls (R4A12) - Yes, on the secondary connector mentioned, Joe Wright goes through/past several housing areas where shoulders and roadway width is a concern.

Turning Movement Issues

Of the 67 responses, 12 identified turning movements as being an issue (Table 1.14). This represented 18 percent of all of the respondents. Another 22 percent of respondents stated that there were no turning movement issues. 40 of the 67 respondents did not provide any information related to this topic.

Table 1.14 Surveyed Connectors with Turning Movement Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	12	18%
No	15	22%
No response	40	60%
Total	**67**	**100%**

The issues and observations identified in the survey related to turning movements are as follows:

- Morrow Road in Independence (R2R26) - Can have long wait times at the intersection of Greenwood road and Hwy 22
- N. River Road in Rogue River (R3R59) - Inadequate turn radii at Depot St- Classick Dr. intersection. Lack of left turn lane or signal preference for northbound traffic on Depot St turning onto northbound I-5 on ramp.
- North 15th Street in Philomath (R2R34) - narrow road, no room for turn around. Parking on 15th Street slows trucks from turning onto 15th from College Street and Main Street.
- Airport Way in Florence (R2A03) - North bound Hwy 101 left turn movement onto 9th Street is tight. South bound Hwy 101 right turn onto 9th is also tight due to geometry.
- Westport Ferry Road in Clatskaine (R2P09) - Northbound, Ferry Road to Old Milltown Road has tight swing distances. Turning into the residential driveways is extremely tight, often requiring back-and-fill turning in the middle of the road.
- California Avenue in Coos Bay (OR4P) - one-way truck route
- Southeast 9th Avenue in Albany (R2R15) - Part of one-way couplet, so turns are limited to right in and right out.
- Port Island Road (R4P38) - Pavement has been completely broken up at end of Island Parkway turn around toward elevator.
- Rockcrest Street (R2P14) - Rockcrest and HWY 30 intersection is overloaded
- Dock Road in Port Orford (R3P35) - Seasonal
- Joe Wright Road in Klamath Falls (R4A12) - The intersection of Washburn and Joe Wright could be a roundabout. That would reduce accidents at this intersection.
- South 7th Street in Garibaldi (R2P10) - Turning movement require using oncoming traffic lanes at S 7th and S 3rd at Hwy 101 and at Commercial between S 7th and Mooring Basin Rd and at S 7th and American Ave

- North Force Avenue in Portland (R1R12) - We turn well inside the yard

Striping/Signage Issues

As shown in Table 1.15, of the 67 responses, 12 identified striping or signage as being an issue. This represented 18 percent of all of the respondents. Another 27 percent of respondents stated that there were no striping or signage issues. 37 of the 67 respondents did not provide any information related to this topic.

Table 1.15 Surveyed Connectors with Striping/Signage Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	12	18%
No	18	27%
No response	37	55%
Total	**67**	**100%**

Six of the survey responses mentioned signage issues. Eight of the survey responses identified striping issues. The specific text of the responses to this question are as follows:

- N. River Road in Rogue River (R3R59) - Ineffective/ inadequate truck route signs.
- California Avenue in North Bend (R3P32) - lack of pavement markings at the railroad crossing; lack of centerline stripe east of Sheridan
- Airport Way in North Bend (R3A07) - lack of pavement markings on Maple
- Dock Road in Port Orford (R3P35) - no striping and no signage
- South 7th Street in Garibaldi (R2P10) - On the west side of S 7th there are pedestrian/truck movement conflicts that could be improved with signage and striping
- California Avenue in Coos Bay (OR4P) - railroad crossing pavement marking; lack of centerline stripe
- Southeast Butler Bridge Road (R2P19) - Signage is available, but trucks miss intersections and the truck route, travelling to residential neighborhoods.
- Joe Wright Road in Klamath Falls (R4A12) - Signage to the Airport is poor and is in need of updating. The Airport's name (Crater Lake - Klamath Regional Airport) needs to be reflected on all highway signs.
- Lower Harbor Drive in Harbor (R3P24) - Speed signs and ped/bike signs may need up sized to better alert on coming traffic
- NE Skipanon Drive (R2P21) - Striping is faded should be refreshed

- Westport Ferry Road in Clakstaine (R2P09) - The center line is striped. In the past there have been efforts to stripe a fog line, but the fog line is also the entire width of the shoulder.

- Port Island Road in Arlington (R4P38) - There is no striping on the roadway. No shoulder marks, etc.

Truck Parking Issues

Of the 67 responses, 12 identified truck parking as being an issue (Table 1.16). This represented 18 percent of all of the respondents. Another 24 percent of respondents stated that there were no issues related to truck parking. 39 of the 67 respondents did not provide any information related to this topic.

Table 1.16 Surveyed Connectors with Truck Parking Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	12	18%
No	16	24%
No response	39	58%
Total	**67**	**100%**

The specific text of the responses to this question are as follows:

- N. River Road in Rogue River (R3R59) - Designated truck parking along Classick Dr. is often over used.

- Nopal Street in Florence (R2P17) - Limited parking and congested area of Old Town Florence.

- Milliron Road in Junction City (R2R29) - Limited shoulder width does not allow for truck parking.

- North 15thStreet in Philomath (R2R34) - no parking allowed on the roadway

- Industrial Way in Lebanon (R2R32) - No paved parking.

- Southeast Mailwell Drive in Milwaukie (R1R02) - Not enough, industrial park lacks over flow for tractor trailer

- California Avenue in Coos Bay (OR4P) - on-street parking south of Florida

- Dock Road in Port Orford (R3P35) - Parking not available on the connector

- West 1st Avenue in Junction City (R2R27) - Roadway connector has 5' shoulders, emergency parking only, no truck parking.

- Westport Ferry Road in Clatskaine (R2P09) - There is no parking capacity on the road way. None for trucks nor for light vehicles. At the ferry queuing area there is adequate with for parking, queuing, and two-way traffic.

- Port Island Road in Arlington (R4P38) - Truck parking is on gravel lots adjacent to Island Park Way. Freestyle parking.

- South 7th Street in Garibaldi (R2P10) - Trucks sometimes park in the western most southbound travel lane when the mill is busy

Height/Weight Restrictions

As shown in Table 1.17, of the 67 responses, only five identified height or weight restrictions as being an issue. This represented 7 percent of all of the respondents. Over half of the respondents (54 percent) stated that there were no issues related to height or weight restrictions. 8 of the 67 respondents did not provide any information related to this topic.

Table 1.17 Surveyed Connectors with Height/Weight Issues

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	5	7%
No	54	81%
No response	8	12%
Total	**67**	**100%**

Two of the survey respondents identified issues related to over-dimensional trucks. Three of the respondents identified weight restrictions as an issue. The specific responses related to height or weight restrictions are as follows:

- South 7th Street in Garibaldi (R2P10) - Aerial cable utilities inhibit movements of large commercial sea-vessels on trailers

- Riverside Drive NE in Bandon (R3P23) - The bridge located on Filmore Ave between the intersections of 1st SE and Carolina Street SE is currently under a 4 tons gross vehicle weight limit. This is restricting access to log yard for nearly all commercial traffic. There is a detour for this bridge, but sends commercial trucks through residential neighbors or narrow county roads.

- Westport Ferry Rad in Clatskaine (R2P09) - There have been weight restrictions in the past. Weight restriction are being ameliorated by not staying in the travel lane and driving down the center of the road.

- Southeast Butler Bridge in Toledo (R2P19) - Trucks over 60' accessing A Street from Bus. Hwy 20 require a City of Toledo Oversize Load Permit

- North 15th Street in Philomath (R2R34) - weight on 15th Street and 13th Street

Truck Regulations

Of the 67 responses, four identified regulations an issue (Table 1.18). The vast majority (72 percent) stated that there were no issues related to regulations. 15 of the 67 respondents did not provide any information related to this topic.

Table 1.18 Surveyed Connectors with Issues Related to Regulations

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	4	6%
No	48	72%
No response	15	22%
Total	**67**	**100%**

The issues identified in the survey related to regulations are:

- N. River Road in Rogue River (R3R59) - Designated truck route often ignored resulting in truck traffic on congested Main Street.
- NE Skipanon Drive in Warrenton (R2P21) - uncontrolled access with heavy truck traffic and site distance issues at Warren Estates
- Westport Ferry Road in Clatskaine (R2P09) - Both the heavy weight of the truck place road restriction on use during heavy rain/flooding events. There are no shoulders, so trucks meeting are a close call. The County has placed operating limits on time-of-day of use because of close residential impacts because of noise and rumbling/shaking of the road bed, and transfer of the shaking to the nearby homes.
- Riverside Drive NE in Bandon (R3P23) - 4 ton weight limit

Other Issues Identified

Respondents were given the opportunity to provide comments related to any other issues. This was structured as an open-ended questions that allowed for any response desired by the survey participants. As shown in Table 1.19, 16 respondents identified other issues. The vast majority (72 percent) did not provide any information. Just 3 of the 67 respondents stated that there were no additional issues.

Table 1.19 Surveyed Connectors with Other Improvements Identified

Pavement Condition	Number of Connectors Reported with Pavement Condition	Percent of Total
Yes	16	24%
No	3	4%

No response	48	72%
Total	**67**	**100%**

The other improvements identified in the survey spanned a wide range of topics. The specific text of the responses are as follows:

- Guano Rock Lane in Coos Bay (R3P25) - Boat Basin Drive need to be included with Kingfisher Road to Hwy 542 because it accesses fish processing plants and docks.
- Joe Wright Road in Klamath Falls (R4A12) - I'd recommend avoiding the railroad crossings by creating a new intersection at the corner of Swan Ct. and Joe Wright - and connecting Washburn Way to Swan Ct. This would eliminate both railroad crossings from OR140 to the Airport via Washburn.
- N.River Road in Rogue River (R3R59) - Improve route to I-5 interchange at Valley of the Rogue State Park/Rest Area. Current route to southbound on ramp has to drive through rest area.
- 1st Street SE in Bandon (R3P22) - not much commercial - mostly beer/food trucks for restaurants on the street, issues with 42F connecting to 101
- South 7th Street in Garibaldi (R2P10) - Pavement overlay, torch down striping, ADA updates, turning movement improvements, undergrounding utilities, pedestrian and bicyclist ways, signage, striping, delineation
- NE Skipanon Drive in Warrenton (R2P21) - Pavement reconstruction, underground utilities and address safety issues and congestion.
- Airport Way in Florence (R2A03) - Potential round-about or signalization of 9th and Kingwood streets.
- Port Island Road in Arlington (R4P38) - Resurfacing road, adding stone to shoulders, and stripping will help improve Island Park Way significantly.
- North 15th Street in Philomath (R2R34) - RR crossing arms to be installed at both 19th Street and 15th Street.
- Harbor Way in Gold Beach (R3P30) - Sidewalks on Harbor Way and Port Drive would keep pedestrians off of the roadway. An overlay on Port Drive would extend the life of this short connector.
- Blackwell Road in Central Point (R3R41) - Signal needed at Scenic and 99
- Lower Harbor Drive in Harbor (R3P24) - Signalized Ped/Bike crossing at intersection of Lower Harbor Rd. and Shopping Center Ave. or a roundabout.
- Connecting road to Astoria Airport (R2A01) - The intersection of SE 12th Place and US 101B is geometrically awkward, particularly for tractor-trailer movements. Consideration should be given to reconfiguration.

- W. 12th Street in Medford (R3R48) - The road is currently closed and causing congestion on other streets that have significant traffic, and causing safety and time delays.
- Dock Road in Port Orford (R3P35) - Width/sidwalk
- Westport Ferry Road in Clatskaine (R2P09) - With the development of the county park at the end of Ferry Road, traffic will only increase. At a minimum, the road bed needs repair and the road widened. The best solution would be to follow-through with past Clatsop County TIGER grant proposals to construct a new access directly off US Highway 30 to the ferry landing. The new access would take all truck traffic off a residential street and provide new access to the county park, boat launch and ferry terminal. Teevin Bros has agreed to donate an access corridor to Clatsop County to make a new access corridor possible.

1.2 Meeting with Portland Freight Stakeholders

In November of 2016, representatives of the Oregon DOT, the City of Portland, Metro, the Port of Portland, and the consultant team convened to discuss issues and needs related to the intermodal connectors in the Portland region. This section summarizes the information collected during this meeting.

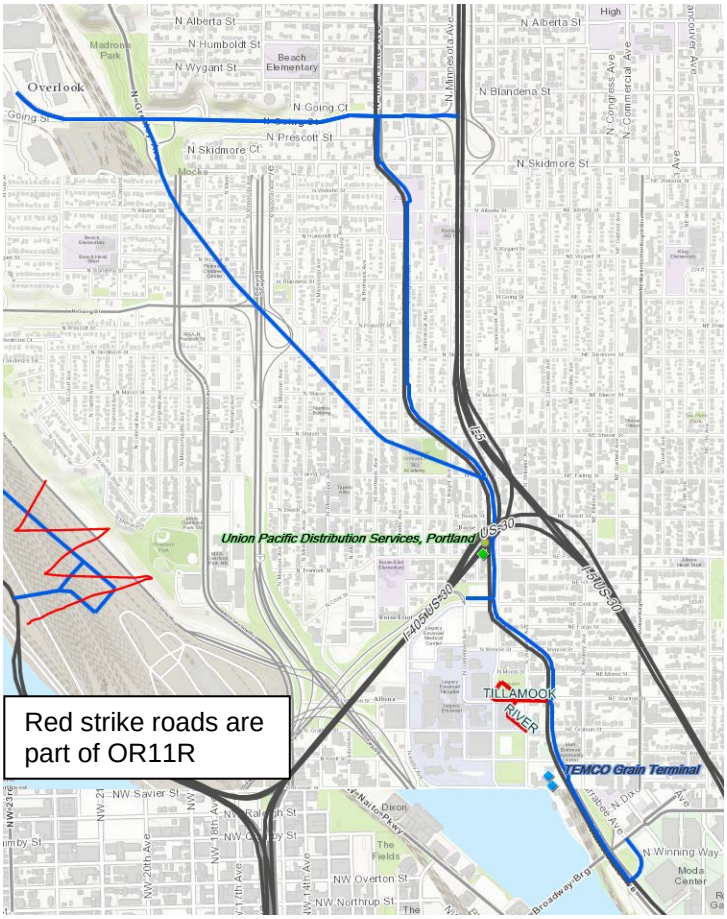
The 11 NHS intermodal connectors in the Portland area are the blue lines in the maps below. The yellow highlighted texts are the needs and improvements to increase mobility and safety for truck operations.

OR12R (Albina Yards), OR23P (Swan Island Ship Repair Yard)

The roads that comprise the OR12R intermodal connectors are Interstate Avenue, Russell Street, Going Street, and Larrabee Street (Figure 1-2). The roads that comprise the OR23P intermodal connector is Greeley Street. The issues associated with these connectors are as follows:

- Going St has a lot of trucks and pavement condition is not good.
- There is a need to remove Going Street west of Greeley Street as an intermodal connector
- There are plans to reduce travel lanes to four 10.5’ lanes from 11’ lanes for bike lanes.
- Light rail was added to this corridor and it decreased mobility for trucks.
- The intersection next to the entrance on Russell Street to access the UP yard needs to be improved.
- Consider changing route at location north of Broadway Avenue

Figure 1-2 Map of OR12R and OR23P



OR11R (Lake Yards), OR10L (NW Industrial Area), OR24P (Port of Portland T1&T2), OR9R (Willridge Yards)

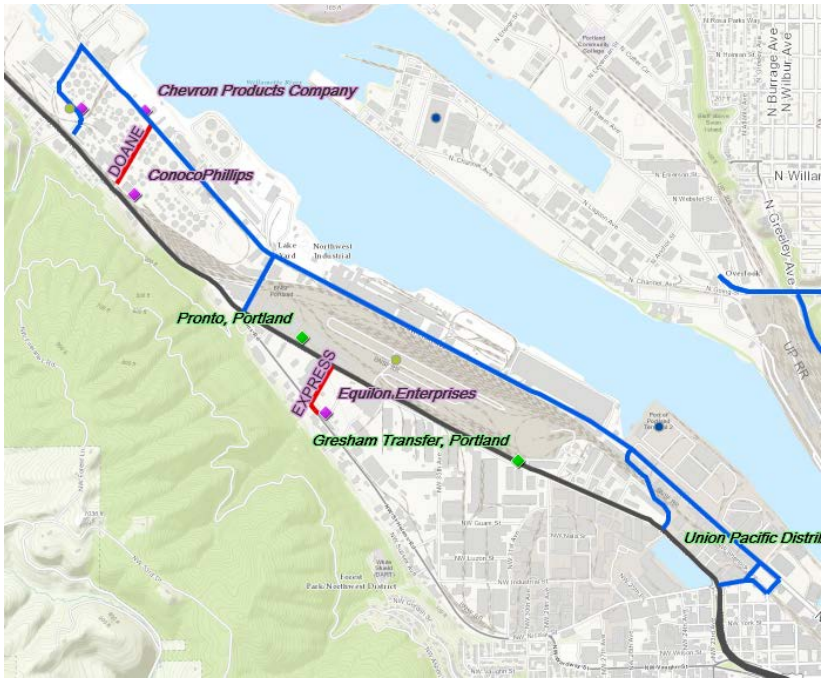
The connector roads associated with OR11R are Front Avenue, Nicolai Street, 21st Avenue, NW Kittridge Avenue, and NW Sherlock Avenue. The connector roads associated with OR10L are Front Avenue, 61st Street, Culebra Avenue, and NW Kittridge Avenue (Figure 1-3). The connector road associated with OR9R is Balboa Avenue. The issues associated with these connectors are as follows:

- Front Avenue pavement is not in good condition.
- In general, the roads in this group are wide and there are two lanes in each direction, so there are no capacity issues.
- The north part of Terminal 1 is not used for intermodal freight. It was recently sold to Lithia Motors indicating that there will be no intermodal use there for several years. The south part of the terminal has been converted to condos.
- There is on-dock rail at Terminal 2.
- The primary route used is (NW 26th Drive) just west of Terminal 2.

- There are no truck issues on Front Avenue, Sherlock Avenue, and Nicolai Street at the southern end of connector.

- Balboa Ave does not connect to US30 any longer. This needs to be updated in the intermodal connector map system.

Figure 1-3 Map of OR11R and OR10L



OR6R (Brooklyn Yard UP)

The connector roads associated with OR6R is Holgate Boulevard (Figure 1-4). The issues associated with these connectors are as follows:

- The alignment of the connector needs to be shortened so that it ends at the entrance to UP Brooklyn Yard

- There is some small queueing just outside of the gate during busy periods at the railyard.

Figure 1-4 Map of OR11R and OR10L

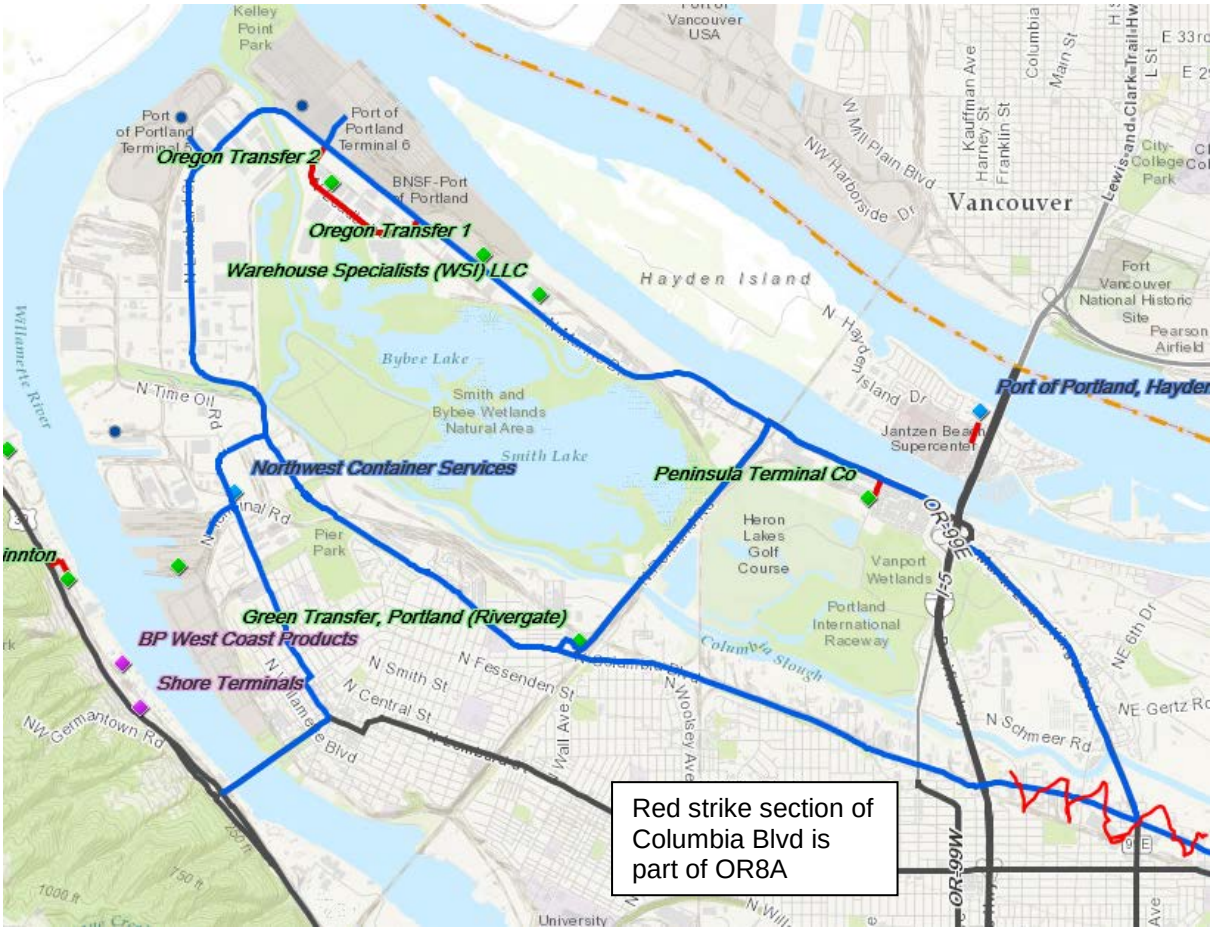
OR13P (Port of Portland T5)

The connector roads associated with OR13P (Port of Portland Terminal 5) are Terminal 5 Access Rd, US30 Business, Ivanhoe Street, N. St Louis Avenue, Burgard Street, Lombard Street, Marine Drive. The connector roads associated with OR120 are N. Portland Road, Columbia Boulevard, and OR99E (Figure 1-5). The observations related to these connectors are as follows:

- There is an old bridge over the railroad line that has structural issues. It is functionally obsolete.
- There is good pavement on Marine Drive on west side of connector
- There is a facility at Oregon Transfer terminal that serves potash production (Cappotex).
- The east side of Marine Drive and Columbia Blvd have a lot of congestion
- Trucks backup at Ledbetter Road onto Marine Drive when the container terminal is open. Trucks queueing to get in the gate in the morning. This could be solved operationally by either implementing a reservation system, operating the port during lunch, operating at least some of the gates for the entire day using a rotating staff. Most of the operational improvements involve negotiations with labor representatives at the port along with port staff. One infrastructure fix to consider is to build a second entrance and grade separate it over the BNSF Hyundai lead within T6.
- Trucks often re-route around Ledbetter when trucks backup
- The mapping of connector needs to be altered to line up with Ledbetter
- BNSF lead needs to be grade separated on Marine Drive at 6100 North Marine Drive (east of Ledbetter Rd) as rail traffic increases.
- There are pedestrian safety issues on the connector close to the St. John neighborhood.

- There is a weight-limited bridge on N. Portland Road at the BNSF mainline rail cut.
- There is a height restriction on Columbia Boulevard west of I-5 due to 16.5 foot railroad bridge.
- The partial interchange has southbound access only which restricts travel. There is a need for a full interchange at Columbia Drive and I-5.
- There is a UP grade separation project in the RTSP on Columbia Boulevard just west of Hurst Avenue.
- The pedestrian bridge on Columbia Boulevard at Midway Street is 16 feet clearance which is too low for over dimension trucks.
- Trucks queue up on Lombard St to get into Northwest Container Services facility. Queueing also occurs on Burgard Street. This road is going to be improved to 3 lanes (from 2 lanes. Additionally, there is a current project to add a left turn pocket at the intersection of Lombard/NW Container/Time Oil Road.
- On west side of river, a proposed bike lane will make truck travel challenging.
- There is poor pavement condition on OR99E between Columbia Blvd and I-5. There is also poor pavement condition on OR99E between Columbia Blvd. and Marine Drive Interchange.
- There is a project to develop a right turn lane from Columbia Blvd to MLK Jr Drive (OR 99). The right-of-way is complete and the design is approximately 90 percent complete. Construction is scheduled to begin in 2017.
- There is recurring congestion during peak periods on this road.
- OR99E north of Columbia has poor pavement condition.
- I-5 at Marine Drive has congestion around 3 P.M. during most weekdays. Traffic backs up west on Marine Drive. A potential improvement to consider is a new or reconfigured interchange as part of or independent of CRC. One suggestion is an eastbound Marine Drive to NB I-5 flyover.

Figure 1-5 Map of OR11R and OR10L



OR15P (Port of Portland T4)

The connector road associated with OR15P is North Terminal Road (Figure 1-6). The observation related to this connector is as follows:

- It is recommended to shorten the connector so it terminates at the Kinder Morgan facility.

Figure 1-6 Map of OR11R and OR10L

OR14P (Port of Portland T6)

The connector road associated with OR14P is North Pacific Gateway Road (Figure 1-7). The issues related to this connector are as follows:

- There is a need to shorten the alignment of the Tier 1 connector to one-third of the length on N. Pacific Gateway Boulevard.
- There is also a need to move the alignment of the connector shown in the map from the middle of port terminal.

Figure 1-7 Map of OR11R and OR10L

OR8A (PDX)

The connector roads associated with OR8A (Portland International Airport) are Columbia Boulevard, 47th Avenue, Cornfoot Road, Alderwood Road, Airtrans Road, 82nd Avenue, Airport Way, and US30BY (Figure 1-8). The issues related to this connector are as follows:

- Any expansion of NE Cornfoot Road is constrained by the nearby slough.
- There is poor pavement condition on NE Cornfoot Road. Additionally, the road has no shoulders. Improvements to consider to this roadway include widening to add capacity, adding shoulders, adding a multi-use path or north side of road
- There is a high level of congestion on Columbia Avenue, typically during commute peak period as autos mix with the steady stream of truck traffic. There is a need to widen the road to add capacity between 60th Street and 82nd Street. Widening should be from 3 to 5 lanes.
- NE Columbia Boulevard between NE Cully Boulevard and NE Alderwood Road needs side-by-side left turn lanes. FedEx, UPS truck operations need to be considered during any modifications to this roadway.
- NE 82nd Way and NE Airport Way has safety and congestion issues. There is a need to grade separate the intersection. This separation is scheduled to occur in three to five years.
- NE Alderwood Road needs to be designated as a connector all the way to Columbia Blvd. NE Alderwood Road is a City road. It does not have sidewalks or bike lanes between Cornfoot and Columbia.

Figure 1-8 Map of OR11R and OR10L

Additional Changes in Connectors Identified

The following additional observations were made and changes were recommended during the November 2016 meeting in Portland:

- For R1R13 (Oregon Transfer 2), Leadbetter may be a Tier 1 facility. 2011 counts has 30% trucks.
- For R1L01 (Equilon Enterprises), St. Helens Road needs to be added to the Tier 2 list of intermodal connectors
- For R1P06 (Knife River and Sundial Marine), Multnomah County has counts on connector road to Knife River and Sundial Marine terminal. There are approximately 50 trucks per day on this connector.
- At the Fred Meyers facility, there is a need to add 106th Avenue as a Tier 2 connector. Also, there is a need to add 130th as a Tier 2 connector. There is an HPMS sample at this location, so classification counts should be available in the coming years.
- For R1R03 (Oregon Transfer, Milwaukie), Omark Road should be removed as a Tier 2 facility. Additionally the remaining connector should be extended just north of Omark to the railroad on the east. A count us scheduled to occur on this roadway as well, but it has not yet occurred.
- For R1R08 (RK Storage, Linnton), the connector should be removed entirely.
- It is also necessary to add N. Rivergate Boulevard as an intermodal connector, likely a Tier 2 connector.

1.3 Technical Advisory Committee

A technical advisory committee (TAC) was formed to provide guidance related to the analytical components of this study. The TAC was formed based on considering the stakeholders for this project including local governments, Oregon Public Ports Association, private ports, railroads, owners of intermodal facilities, ODOT Rail, metropolitan planning organizations (MPOs), League of Oregon Cities, FHWA, forest products businesses, and others. The TAC was supported by a friends of TAC group that also attended TAC meetings and provided input on deliverables and progress over the course of this study.

The TAC met on four occasions for this study covering a wide range of topics. The meeting dates and primary agenda items covered in each meeting are as follows:

- TAC Meeting #1 (August 31, 2016) – Study overview, literature review, IC identification criteria
- TAC Meeting #2 (October 27, 2016) – Review of list of additional intermodal connectors, draft questionnaire, draft performance indicators, demonstration of OFICS GIS tool
- TAC Meeting #3 (December 13, 2016) – Review of list and characteristics of NHS and additional intermodal connectors, survey implementation and findings, strategies for tiering intermodal connectors, supplemental demonstration of OFICS GIS tool
- TAC Meeting #4 (March 29, 2017) – Review of list of connectors and intermodal terminals/businesses, intermodal connectors tiering and needs, prioritization of investments.

At the fourth and final TAC meeting, the TAC endorsed the list of intermodal terminals/businesses, the list of intermodal connectors, the tiering criteria, the intermodal connector needs, and the methodology used for prioritizing investment in the connectors.

1.4 Oregon Freight Advisory Committee

The Oregon Freight Advisory Committee (OFAC) was formalized in 2001 by the Oregon Legislature. The OFAC meets on a regular basis to provide input and guidance on a range of freight planning activities conducted by ODOT. Information from the OFICS study was presented to multiple sessions of the OFAC to ensure that the study for review and comment and to ensure that the OFICS study is supportive of other freight planning activities that are occurring at the State.

1.5 Supplemental Stakeholder Interviews/Survey

1.5.1 Methodology

A two-pronged approach was taken to collect the supplemental information for this portion of the study. An initial survey was completed using information publicly available on the internet. In general, this included looking at aerial and street view images available through Google Maps and Bing Maps, county Geographic Information System (GIS) Maps, County and City Transportation System Plan (TSP) documents), and traffic volume data from ODOT and County GIS maps.

After the preliminary survey was completed additional information was collected by directly contacting agencies by e-mail and phone. Generally, the city/county representative was initially contacted via e-mail to

schedule a time for a phone interview. Phone interviews lasted anywhere from 10 to 35 minutes depending on the number of sites. If e-mail attempts were not successful then attempts were made to contact agencies directly by phone. Most attempts to contact agencies were successful with only three unsuccessfully outreach attempts. The list of agencies contacted include:

- City of Astoria
- City of Banks
- City of Clatskine
- City of Columbia City
- City of Coos Bay
- City of Donald
- City of Eugene
- City of Grants Pass
- City of Medford
- City of Newport
- City of North Bend
- City of Philomath
- City of Rogue River
- City of Salem
- City of Toledo
- City of Woodburn
- Columbia County
- Coos County
- Jackson County
- Lane County
- Linn County
- Marion County
- Washington County

The detailed responses from the interview/survey participants is provided as part of a separate technical memorandum. The key findings of the data collection effort were:

- Many agencies were unaware of the average daily truck volumes on the connectors. A few agencies could respond with qualitative information (a lot, or not many). The interviewees used online data resources from agencies to collect ADT, where possible.

- Various agencies throughout the phone interviews indicated that the identified connectors were either not the primary route to the terminal used by trucks, or that other secondary routes were also used. A few agencies even indicated planning projects which would change or affect the primary route used. These comments were included in the summary spreadsheet.

- A total of 116 issues were identified as part of this supplemental effort. The number of issues by category is provided in Table 1.20.

Table 1.20 Issues Identified in Supplemental Survey Effort

Category of Issues	Number of Issues Identified
Roadway/Shoulder Width Issues	18
Safety Issues	15
Congestion	14
Turning Movement Issues	11
Ttruck traffic mixing with passenger cars, trucks, pedestrians, bicyclists, or surrounding land uses (e.g. schools, parks)	10
Rail Crossing Impediments	8
Pavement Issues	8
Truck Parking Issues	7
Signage or Striping Issues	3
Height or Weight Restriction Issues	0
Regulatory Issues	0
Other Improvements	22
Total Issues Identified	**116**

2.0 Appendix B – Analysis of Existing NHS Intermodal Connectors

This section describes existing information for freight intermodal connectors as part of the Federal Highway Administration (FHWA) designated National Highway System (NHS) freight intermodal connector system. The primary sources of data and information described in this report are the Oregon DOT roadway information database the FHWA Highway Performance Monitoring System (HPMS) database, and online mapping tools

2.1 Vehicle Classification Count Data

Table 2.1 provides information on count data available for Tier 1 connectors. The total vehicle and truck count data were taken from the ODOT vehicle classification database. The forecast of truck volumes is taken from the FHWA HPMS and represent the estimated truck volume for 2040. These data items were available for almost all of the Tier 1 connectors. Where available, the truck volume estimate provided in the survey was also considered. In most cases, the truck volume estimates from the survey were well below the ODOT truck count data.

Table 2.1 Truck and Total Count Data for Tier 1 Connectors

ID	No.	Street Name	ODOT Total Vehicle Count	ODOT Truck Count	Percent Trucks	Forecast Volumes from HPMS	Truck Volume Estimate from Survey
OR1P	1	Hamburg Street	220	21	9.6%	230	N/A
OR1P	1	Industry Street	220	21	9.6%	230	N/A
OR1P	1	Portway Street	1,600	209	13.1%	1,600	N/A
OR2P	1	Boardman Irrigon Road	3,500	952	27.2%	1,750	N/A
OR2P	1	Laurel Road	N/A	N/A	N/A	3,500	N/A
OR2P	1	Marine Drive	290	42	14.4%	310	N/A
OR2P	1	Ullman Blvd	720	196	27.2%	770	N/A
OR4P	1	California Avenue	540	103	19.1%	520	5, 10
OR4P	2	Sheridan Avenue	530	44	8.3%	510	
OR5P	1	Edwards Street	560	81	14.4%	540	12
OR5P	1	Mullen Street	450	129	28.7%	440	
OR5P	1	Newport Avenue	N/A	N/A	N/A	8,400	
OR6R	1	Holgate Blvd	16,650	652	3.9%	25,900	N/A

ID	No.	Street Name	ODOT Total Vehicle Count	ODOT Truck Count	Percent Trucks	Forecast Volumes from HPMS	Truck Volume Estimate from Survey
OR8A	1	Columbia Blvd	22,350	2,057	9.2%	26,700	546
OR8A	1	NE Columbia Pkwy	13,000	305	2.3%	39,300	
OR8A	2	47th Avenue	4,500	953	21.2%	4,700	
OR8A	2	Airtrans Road	2,300	677	29.4%	2,400	
OR8A	2	Alderwood Road	8,300	968	11.7%	8,400	
OR8A	2	Cornfoot Gabreski Road	4,500	953	21.2%	6,975	
OR8A	3	82nd Av	12,400	568	4.6%	13,167	
OR8A	4	Airport Way	44,850	1,323	2.9%	50,125	
OR9R	1	Balboa Avenue	2500	866	34.6%	2,650	N/A
OR10L	1	61st Street	2,500	866	34.6%	2,650	N/A
OR10L	1	Culebra Avenue	2,500	866	34.6%	2,650	N/A
OR10L	1	Front Avenue	2,500	866	34.6%	2,650	N/A
OR10L	1	Kittridge Avenue	3,900	646	16.6%	6,700	N/A
OR11R	1	21st Avenue	730	106	14.6%	740	50
OR11R	1	Front Avenue	3,900	646	16.6%	4,000	
OR11R	1	Nicolai Street	3,000	437	14.6%	3,310	
OR11R	1	Sherlock Avenue	3,000	437	14.6%	1,900	
OR12R	1	Going Street	22,150	3,783	17.1%	17,690	N/A
OR12R	1	Interstate Avenue	9,500	487	5.1%	19,860	N/A
OR12R	1	Larrabee Avenue	3,100	171	5.5%	3,300	N/A
OR12R	1	Russell Street	500	241	48.2%	850	N/A
OR13P	1	Port Access Road	670	123	18.4%	680	N/A
OR13P	2	Burgard Road	7,200	2,740	38.1%	7,800	N/A
OR13P	2	Columbia Blvd	17,300	2,233	12.9%	13,000	N/A
OR13P	2	Columbia Way	N/A	N/A	N/A	10,800	N/A
OR13P	2	Ivanhoe Street	9,200	1,524	16.6%	N/A	N/A
OR13P	2	Lombard Street	8,300	2,850	34.3%	7,675	N/A
OR13P	2	Marine Drive	20,100	4,147	20.6%	20,775	N/A
OR13P	2	Philadelphia Avenue	N/A	N/A	N/A	26,700	N/A
OR13P	2	Swift Hwy 120	22,950	4,748	20.7%	14,900	N/A
OR13P	2	Union Avenue	N/A	N/A	N/A	19,850	N/A
OR14P	1	N Pacific Gateway Blvd	1,900	1,293	68.0%	1,900	N/A
OR15P	1	N Terminal Road	N/A	N/A	N/A	1,500	N/A
OR16A	1	Airport Road	4,300	372	8.7%	6,400	N/A
OR16A	1	Green Hill Road	N/A	N/A	N/A	6,400	N/A

ID	No.	Street Name	ODOT Total Vehicle Count	ODOT Truck Count	Percent Trucks	Forecast Volumes from HPMS	Truck Volume Estimate from Survey
OR16A	1	Lockheed Drive	3,900	175	4.5%	6,400	N/A
OR16A	1	W Pacific Hwy	19,500	1,719	8.8%	21,600	N/A
OR17R	1	Cleveland Street	530	116	22.0%	550	N/A
OR17R	1	Cross Street	300	66	22.0%	320	N/A
OR17R	1	Garfield Street	5,350	791	14.8%	5,400	N/A
OR17R	1	Roosevelt Blvd	6,200	916	14.8%	11,150	N/A
OR21A	1	Airport Road	1,300	71	5.4%	1,100	
OR21A	1	Biddle Road	20,600	1,228	6.0%	16,800	100, 2
OR21A	1	E Pine Street	N/A	N/A	N/A	25,825	
OR22P	1	Transpacific Pkwy	1,300	468	36.0%	1,300	840, 20
OR23P	1	Going Street	N/A	N/A	N/A	17,690	N/A
OR23P	2	Greeley Avenue	19,900	1,974	9.9%	25,680	N/A
OR24P	1	Port Access Road	N/A	N/A	N/A	2,800	N/A

2.2 Truck-Involved Crashes

Between 2007 and 2014, there were 337 truck-involved crashes on Tier 1 freight intermodal connectors in Oregon. The crash data indicate that truck-involved crashes are concentrated on a relatively small number of roads (Table 2.2). One-quarter of the truck-involved crashes occurred on Columbia Boulevard. This roadway was also the location of two of the five truck-involved fatal crashes. The three roadways, Marine Drive, Lombard Street, and Columbia Way, were responsible for another 26 percent of the truck-involved crashes on Tier 1 connectors. The top 19 roadways in terms of truck-involved crashes are responsible for 90 percent of the truck-involved crashes on all of the connector roadways.

Table 2.2 Truck Crash Data on Tier 1 Connectors

ID	No.	Street Name	Truck-Involved Crashes (2007-2014)	Number of Fatal Truck-Involved Crashes (2007-2014)
OR1P	1	Hamburg Street	0	0
OR1P	1	Industry Street	0	0
OR1P	1	Portway Street	0	0
OR2P	1	Boardman Irrigon Road	1	0
OR2P	1	Laurel Road	1	0
OR2P	1	Marine Drive	0	0
OR2P	1	Ullman Blvd	2	0
OR4P	1	California Avenue	1	0

ID	No.	Street Name	Truck-Involved Crashes (2007-2014)	Number of Fatal Truck-Involved Crashes (2007-2014)
OR4P	2	Sheridan Avenue	0	0
OR5P	1	Edwards Street	0	0
OR5P	1	Mullen Street	1	0
OR5P	1	Newport Avenue	4	0
OR6R	1	Holgate Blvd	4	0
OR8A	1	Columbia Blvd	84	2
OR8A	1	NE Columbia Pkwy	4	0
OR8A	2	47th Avenue	0	0
OR8A	2	Airtrans Road	1	0
OR8A	2	Alderwood Road	0	0
OR8A	2	Cornfoot Gabreski Road	4	0
OR8A	3	82nd Av	6	1
OR8A	4	Airport Way	11	0
OR9R	1	Balboa Avenue	0	0
OR10L	1	61st Street	0	0
OR10L	1	Culebra Avenue	0	0
OR10L	1	Front Avenue	0	0
OR10L	1	Kittridge Avenue	0	0
OR11R	1	21st Avenue	1	0
OR11R	1	Front Avenue	5	0
OR11R	1	Nicolai Street	0	0
OR11R	1	Sherlock Avenue	0	0
OR12R	1	Going Street	6	0
OR12R	1	Interstate Avenue	11	1
OR12R	1	Larrabee Avenue	0	0
OR12R	1	Russell Street	0	0
OR13P	1	Port Access Road	0	0
OR13P	2	Burgard Road	4	0
OR13P	2	Columbia Blvd	9	0
OR13P	2	Columbia Way	23	0
OR13P	2	Ivanhoe Street	1	0
OR13P	2	Lombard Street	29	1
OR13P	2	Marine Drive	36	0
OR13P	2	Philadelphia Avenue	8	0
OR13P	2	Swift Hwy 120	8	0
OR13P	2	Union Avenue	6	0

ID	No.	Street Name	Truck-Involved Crashes (2007-2014)	Number of Fatal Truck-Involved Crashes (2007-2014)
OR14P	1	N Pacific Gateway Blvd	0	0
OR15P	1	N Terminal Road	0	0
OR16A	1	Airport Road	0	0
OR16A	1	Green Hill Road	0	0
OR16A	1	Lockheed Drive	0	0
OR16A	1	W Pacific Hwy	19	0
OR17R	1	Cleveland Street	0	0
OR17R	1	Cross Street	0	0
OR17R	1	Garfield Street	2	0
OR17R	1	Roosevelt Blvd	2	0
OR21A	1	Airport Road	0	0
OR21A	1	Biddle Road	9	0
OR21A	1	E Pine Street	18	0
OR22P	1	Transpacific Pkwy	1	0
OR23P	1	Going Street	6	0
OR23P	2	Greeley Avenue	3	0
OR24P	1	Port Access Road	6	0
Total			**337**	**5**

2.3 Pavement Condition Information

Pavement condition information was available for most of the Tier 1 connectors based on information submitted by ODOT to FHWA and included in the HPMS. The pavement condition data is available using International Roughness Index (IRI) values. The IRI measures the smoothness of the roadway using an algorithm based on the longitudinal profile of a section of the road.[1] Lower IRI values indicate better pavement conditions (i.e., smoother) while higher values indicate worse conditions (i.e., rougher). Table 2.3 shows the condition categories for IRI measurements based on the FHWA Conditions and Performance Report.

Table 2.4 shows the IRI pavement condition values for the Tier 1 connectors. This table also includes the pavement condition as expressed by survey respondents for Tier 1 connectors. Survey respondents were asked to rate the connectors as good, fair, or poor based on qualitative descriptions provided in the survey. The survey response information is available on a much smaller number of connector segments.

[1] Federal Highway Administration (1999). Chapter 3—System Conditions, *Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance Report*, Accessed December 11, 2014.

Table 2.5 shows that pavement condition data are available for 92 percent of all of the Tier 1 connector segments. 44 percent of the connector segments have poor pavement condition and 70 percent of connector segments have poor or mediocre pavement condition. This indicates that pavement condition is a significant issue for Tier 1 connectors. For the segments where pavement condition is available from both HPMS and the survey responses, the survey responses generally reported better condition than the HPMS. This may be due to road users overestimating the quality of the pavement or it may be due to pavement condition data collection equipment on connectors overestimating the vibration on connector roads. On roadways that operate at relatively slow speeds, pavement condition data collection equipment has been reported to sometimes overestimate road vibration.

Table 2.3 International Roughness Index Pavement Condition Categories and Description

Condition Term	IRI Rating (inches/mile)			Interstate and NHS Ride Quality
Categories	Interstate	Other	Pavement Condition Description	
Very Good	<60	<60	Newly built or resurfaced and distress-free.	Acceptable 0-170
Good	60-94	60-94	Smooth surface with little to no cracking or rutting.	
Fair	95-119	95-170	Serviceable with shallow rutting and moderate cracks beginning to occur, but does not affect travel speed on the connector.	
Mediocre	120-170	171-220	Same problems as fair but worse, causing some reduction in speed.	Less than Acceptable >170
Poor	>170	>220	Major problems with potholes, etc., causing substantial reductions in speed.	

Source: Federal Highway Administration (1999). Chapter 3—System Conditions, Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance Report.

Table 2.4 Pavement Condition Information on Tier 1 Connectors

ID	No.	Street Name	International Roughness Index from HPMS	Pavement Condition Category	Pavement Condition from Survey
OR1P	1	Hamburg Street	343	Poor	N/A
OR1P	1	Industry Street	350	Poor	N/A
OR1P	1	Portway Street	263	Poor	N/A
OR2P	1	Boardman Irrigon Road	120	Mediocre	N/A
OR2P	1	Laurel Road	130	Mediocre	N/A
OR2P	1	Marine Drive	151	Mediocre	N/A
OR2P	1	Ullman Blvd	160	Mediocre	N/A
OR4P	1	California Avenue	N/A	N//A	Poor, Fair
OR4P	2	Sheridan Avenue	N/A	N/A	
OR5P	1	Edwards Street	400	Poor	Poor, Fair
OR5P	1	Mullen Street	N/A	N/A	

ID	No.	Street Name	International Roughness Index from HPMS	Pavement Condition Category	Pavement Condition from Survey
OR5P	1	Newport Avenue	215	Mediocre	
OR6R	1	Holgate Blvd	324	Poor	N/A
OR8A	1	Columbia Blvd	160	Mediocre	Good
OR8A	1	NE Columbia Pkwy	235	Poor	
OR8A	2	47th Avenue	332	Poor	
OR8A	2	Airtrans Road	191	Mediocre	
OR8A	2	Alderwood Road	154	Fair	
OR8A	2	Cornfoot Gabreski Road	232	Poor	
OR8A	3	82nd Av	125	Fair	
OR8A	4	Airport Way	116	Fair	
OR9R	1	Balboa Avenue	242	Poor	N/A
OR10L	1	61st Street	242	Poor	N/A
OR10L	1	Culebra Avenue	242	Poor	N/A
OR10L	1	Front Avenue	242	Poor	N/A
OR10L	1	Kittridge Avenue	291	Poor	N/A
OR11R	1	21st Avenue	856	Poor	Fair
OR11R	1	Front Avenue	262	Poor	
OR11R	1	Nicolai Street	666	Poor	
OR11R	1	Sherlock Avenue	252	Poor	
OR12R	1	Going Street	175	Mediocre	N/A
OR12R	1	Interstate Avenue	242	Poor	N/A
OR12R	1	Larrabee Avenue	582	Poor	N/A
OR12R	1	Russell Street	881	Poor	N/A
OR13P	1	Port Access Road	480	Poor	N/A
OR13P	2	Burgard Road	168	Fair	N/A
OR13P	2	Columbia Blvd	136	Fair	N/A
OR13P	2	Columbia Way	N/A	N/A	N/A
OR13P	2	Ivanhoe Street	N/A	N/A	N/A
OR13P	2	Lombard Street	150	Fair	N/A
OR13P	2	Marine Drive	183	Mediocre	N/A
OR13P	2	Philadelphia Avenue	185	Mediocre	N/A
OR13P	2	Swift Hwy 120	191	Mediocre	N/A
OR13P	2	Union Avenue	206	Mediocre	N/A
OR14P	1	N Pacific Gateway Blvd	344	Poor	N/A
OR15P	1	N Terminal Road	421	Poor	N/A
OR16A	1	Airport Road	95	Good	N/A

ID	No.	Street Name	International Roughness Index from HPMS	Pavement Condition Category	Pavement Condition from Survey
OR16A	1	Green Hill Road	152	Fair	N/A
OR16A	1	Lockheed Drive	152	Fair	N/A
OR16A	1	W Pacific Hwy	58	Very Good	N/A
OR17R	1	Cleveland Street	235	Poor	N/A
OR17R	1	Cross Street	178	Mediocre	N/A
OR17R	1	Garfield Street	458	Poor	N/A
OR17R	1	Roosevelt Blvd	203	Mediocre	N/A
OR21A	1	Airport Road	223	Poor	Good
OR21A	1	Biddle Road	119	Fair	
OR21A	1	E Pine Street	165	Fair	
OR22P	1	Transpacific Pkwy	162	Fair	Poor
OR23P	1	Going Street	175	Mediocre	
OR23P	2	Greeley Avenue	190	Mediocre	
OR24P	1	Port Access Road	289	Poor	N/A
Average			**259**	**Poor**	

Table 2.5 Number of Connector Segments by Pavement Condition

Pavement Condition Categories	IRI Rating Ranges for Each Category	Number of Connector Segments	Percent of Total
Very Good	<60	1	2%
Good	60-94	1	2%
Fair	95-170	11	18%
Mediocre	171-220	16	26%
Poor	>220	27	44%
Not available (N/A)	N/A	5	8%
Total	**All**	**61**	**100%**

2.4 Roadway and Shoulder Width Data

Information on roadway and shoulder width is available in both the HPMS and from survey responses. Table 2.6 provides the information available from both sources. However, for most connector segments, the data are not available. For example, lane width is available for only 19 of the 61 (31 percent) Tier 1 connector segments. Only three of the readings in HPMS on lane width report that the widths are less narrow than the standard 12 feet. One segment had a lane width of 13 feet and one segment had a lane width of 15 feet.

Table 2.6 Roadway and Shoulder Width Information on Tier 1 Connectors

ID	No.	Street	Lane Width from HPMS	Shoulder Width (Left) from HPMS	Shoulder Width (Right) from HPMS	Roadway and Shoulder Width Issue Identified from Survey (Y/N)	Description of Roadway or Shoulder Width Issue From Survey
OR1P	1	Hamburg Street	N/A	N/A	N/A	N/A	N/A
OR1P	1	Industry Street	11	N/A	N/A	N/A	N/A
OR1P	1	Portway Street	N/A	N/A	N/A	N/A	N/A
OR2P	1	Boardman Irrigon Road	N/A	N/A	N/A	N/A	N/A
OR2P	1	Laurel Road	12	6	N/A	N/A	N/A
OR2P	1	Marine Drive	N/A	N/A	N/A	N/A	N/A
OR2P	1	Ullman Blvd	N/A	N/A	N/A	N/A	N/A
OR4P	1	California Avenue	N/A	N/A	N/A	Yes	pavement width = 24-feet for two-way traffic north of Florida
OR4P	2	Sheridan Avenue	N/A	N/A	N/A		
OR5P	1	Edwards Street	10	N/A	N/A	No	N/A
OR5P	1	Mullen Street	N/A	N/A	N/A		N/A
OR5P	1	Newport Avenue	12	N/A	N/A		N/A
OR6R	1	Holgate Blvd	12	N/A	N/A	N/A	N/A
OR8A	1	Columbia Blvd	12	N/A	N/A	No	N/A
OR8A	1	NE Columbia Pkwy	N/A	N/A	N/A		N/A
OR8A	2	47th Avenue	13	3	N/A		N/A
OR8A	2	Airtrans Road	N/A	N/A	N/A		N/A
OR8A	2	Alderwood Road	N/A	N/A	N/A		N/A
OR8A	2	Cornfoot Gabreski Road	N/A	N/A	N/A		N/A
OR8A	3	82nd Av	12	10	3		N/A
OR8A	4	Airport Way	12	6	1		N/A
OR9R	1	Balboa Avenue	N/A	N/A	N/A	N/A	N/A
OR10L	1	61st Street	N/A	N/A	N/A	N/A	N/A
OR10L	1	Culebra Avenue	N/A	N/A	N/A	N/A	N/A
OR10L	1	Front Avenue	N/A	N/A	N/A	N/A	N/A
OR10L	1	Kittridge Avenue	N/A	N/A	N/A	N/A	N/A
OR11R	1	21st Avenue	N/A	N/A	N/A	No	N/A
OR11R	1	Front Avenue	N/A	N/A	N/A		N/A
OR11R	1	Nicolai Street	N/A	N/A	N/A		N/A
OR11R	1	Sherlock Avenue	N/A	N/A	N/A		N/A

ID	No.	Street	Lane Width from HPMS	Shoulder Width (Left) from HPMS	Shoulder Width (Right) from HPMS	Roadway and Shoulder Width Issue Identified from Survey (Y/N)	Description of Roadway or Shoulder Width Issue From Survey
OR12R	1	Going Street	N/A	N/A	N/A	N/A	N/A
OR12R	1	Interstate Avenue	N/A	N/A	N/A	N/A	N/A
OR12R	1	Larrabee Avenue	N/A	N/A	N/A	N/A	N/A
OR12R	1	Russell Street	N/A	N/A	N/A	N/A	N/A
OR13P	1	Port Access Road	N/A	N/A	N/A	N/A	N/A
OR13P	2	Burgard Road	15	6	N/A	N/A	N/A
OR13P	2	Columbia Blvd	N/A	N/A	N/A	N/A	N/A
OR13P	2	Columbia Way	N/A	N/A	N/A	N/A	N/A
OR13P	2	Ivanhoe Street	N/A	N/A	N/A	N/A	N/A
OR13P	2	Lombard Street	N/A	N/A	N/A	N/A	N/A
OR13P	2	Marine Drive	12	6	N/A	N/A	N/A
OR13P	2	Philadelphia Avenue	10	N/A	N/A	N/A	N/A
OR13P	2	Swift Hwy 120	12	6	N/A	N/A	N/A
OR13P	2	Union Avenue	12	7	N/A	N/A	N/A
OR14P	1	N Pacific Gateway Blvd	N/A	N/A	N/A	N/A	N/A
OR15P	1	N Terminal Road	N/A	N/A	N/A	N/A	N/A
OR16A	1	Airport Road	12	6	N/A	N/A	N/A
OR16A	1	Green Hill Road	N/A	N/A	N/A	N/A	N/A
OR16A	1	Lockheed Drive	N/A	N/A	N/A	N/A	N/A
OR16A	1	W Pacific Hwy	12	10	2	N/A	N/A
OR17R	1	Cleveland Street	N/A	N/A	N/A	N/A	N/A
OR17R	1	Cross Street	N/A	N/A	N/A	N/A	N/A
OR17R	1	Garfield Street	12	N/A	N/A	N/A	N/A
OR17R	1	Roosevelt Blvd	N/A	N/A	N/A	N/A	N/A
OR21A	1	Airport Road	N/A	N/A	N/A		N/A
OR21A	1	Biddle Road	12	4	N/A	No	N/A
OR21A	1	E Pine Street	12	6	N/A		N/A
OR22P	1	Transpacific Pkwy	N/A	N/A	N/A	No	N/A
OR23P	1	Going Street	N/A	N/A	N/A	N/A	N/A
OR23P	2	Greeley Avenue	N/A	N/A	N/A	N/A	N/A
OR24P	1	Port Access Road	N/A	N/A	N/A	N/A	N/A

2.5 Railroad Crossing Data

Railroad crossing data were extracted from the HPMS and supplemented with data from the Federal Railroad Administration as needed (Table 2.7). The data show that 19 of the 61 Tier 1 connector segments have railroad crossings. The vast majority of the segments (15 of the 19) that have crossings were reported as having a single crossing, while three of the segments had two crossings, and one segment (OR11R, Front Street in Portland) had nine crossings. Survey responses on train movements impeding traffic on connectors was collected from only a handful of locations. Most of these correlated relatively well to the HPMS and FRA data.

Table 2.7 Railroad Crossing Data on Tier 1 Connectors

Tier 1 Connector	Connector Number	Street	Number of Railroad Crossings	Train movements at rail crossings issues Identified from Survey (Y/N)
OR1P	1	Hamburg Street	0	N/A
OR1P	1	Industry Street	0	N/A
OR1P	1	Portway Street	1	N/A
OR2P	1	Boardman Irrigon Road	0	N/A
OR2P	1	Laurel Road	0	N/A
OR2P	1	Marine Drive	0	N/A
OR2P	1	Ullman Blvd	1	N/A
OR4P	1	California Avenue	1	Yes
OR4P	2	Sheridan Avenue	1	
OR5P	1	Edwards Street	0	No
OR5P	1	Mullen Street	1	
OR5P	1	Newport Avenue	0	
OR6R	1	Holgate Blvd	0	N/A
OR8A	1	Columbia Blvd	0	N/A
OR8A	1	NE Columbia Pkwy	0	N/A
OR8A	2	47th Avenue	0	N/A
OR8A	2	Airtrans Road	0	N/A
OR8A	2	Alderwood Road	0	N/A
OR8A	2	Cornfoot Gabreski Road	0	N/A
OR8A	3	82nd Av	1	N/A
OR8A	4	Airport Way	0	N/A
OR9R	1	Balboa Avenue	1	N/A
OR10L	1	61st Street	0	N/A
OR10L	1	Culebra Avenue	1	N/A
OR10L	1	Front Avenue	2	N/A
OR10L	1	Kittridge Avenue	0	N/A

Tier 1 Connector	Connector Number	Street	Number of Railroad Crossings	Train movements at rail crossings issues Identified from Survey (Y/N)
OR11R	1	21st Avenue	1	N/A
OR11R	1	Front Avenue	9	N/A
OR11R	1	Nicolai Street	1	N/A
OR11R	1	Sherlock Avenue	0	N/A
OR12R	1	Going Street	0	N/A
OR12R	1	Interstate Avenue	0	N/A
OR12R	1	Larrabee Avenue	0	N/A
OR12R	1	Russell Street	1	N/A
OR13P	1	Port Access Road	0	N/A
OR13P	2	Burgard Road	0	N/A
OR13P	2	Columbia Blvd	0	N/A
OR13P	2	Columbia Way	0	N/A
OR13P	2	Ivanhoe Street	0	N/A
OR13P	2	Lombard Street	0	N/A
OR13P	2	Marine Drive	1	N/A
OR13P	2	Philadelphia Avenue	0	N/A
OR13P	2	Swift Hwy 120	2	N/A
OR13P	2	Union Avenue	0	N/A
OR14P	1	N Pacific Gateway Blvd	1	N/A
OR15P	1	N Terminal Road	0	N/A
OR16A	1	Airport Road	0	N/A
OR16A	1	Green Hill Road	0	N/A
OR16A	1	Lockheed Drive	0	N/A
OR16A	1	W Pacific Hwy	0	N/A
OR17R	1	Cleveland Street	1	N/A
OR17R	1	Cross Street	0	N/A
OR17R	1	Garfield Street	0	N/A
OR17R	1	Roosevelt Blvd	1	N/A
OR21A	1	Airport Road	0	
OR21A	1	Biddle Road	0	No
OR21A	1	E Pine Street	0	
OR22P	1	Transpacific Pkwy	2	Yes
OR23P	1	Going Street	0	N/A
OR23P	2	Greeley Avenue	0	N/A
OR24P	1	Port Access Road	0	N/A

Tier 1 Connector	Connector Number	Street	Number of Railroad Crossings	Train movements at rail crossings issues Identified from Survey (Y/N)
Total			**30**	

2.6 Speed Data

Truck speed data on the Tier 1 connectors was extracted from the FHWA National Performance Monitoring Research Data Set (NPMRDS), while speed limit data was taken from the HPMS. Table 2.8 shows the average truck speeds during the 5:00 p.m. to 6:00 p.m. weekday periods during April of 2016 at each of the connector locations. The speed data are available on 18 of the 61 connectors (30 percent). Locations that had both truck speed data available and speed limit data available showed that actual speeds during the peak period are typically much lower than the speed limits with the average reduction during the peak hour being 39 percent. This indicates that congestion is a significant issue on many of the Tier 1 connectors.

Table 2.8 Truck Speed Data on Tier 1 Connectors

ID	No.	Street	Approx. Speed Limit (mph)	Truck PM Peak Speed (mph, 5-6 p.m.)	Average Reduction in Speed During PM Peak Hour
OR1P	1	Hamburg Street	25	N/A	N/A
OR1P	1	Industry Street	N/A	N/A	N/A
OR1P	1	Portway Street	N/A	N/A	N/A
OR2P	1	Boardman Irrigon Road	N/A	N/A	N/A
OR2P	1	Laurel Road	55	N/A	N/A
OR2P	1	Marine Drive	N/A	N/A	N/A
OR2P	1	Ullman Blvd	N/A	N/A	N/A
OR4P	1	California Avenue	N/A	N/A	N/A
OR4P	2	Sheridan Avenue	N/A	N/A	N/A
OR5P	1	Edwards Street	25	N/A	N/A
OR5P	1	Mullen Street	N/A	N/A	N/A
OR5P	1	Newport Avenue	35	N/A	N/A
OR6R	1	Holgate Blvd	30	18	40%
OR8A	1	Columbia Blvd	35	20	43%
OR8A	1	NE Columbia Pkwy	N/A	N/A	N/A
OR8A	2	47th Avenue	40	N/A	N/A
OR8A	2	Airtrans Road	N/A	N/A	N/A
OR8A	2	Alderwood Road	N/A	N/A	N/A
OR8A	2	Cornfoot Gabreski Road	N/A	N/A	N/A
OR8A	3	82nd Av	25	28	-12%

ID	No.	Street	Approx. Speed Limit (mph)	Truck PM Peak Speed (mph, 5-6 p.m.)	Average Reduction in Speed During PM Peak Hour
OR8A	4	Airport Way	35	22	37%
OR9R	1	Balboa Avenue	N/A	N/A	N/A
OR10L	1	61st Street	N/A	N/A	N/A
OR10L	1	Culebra Avenue	N/A	N/A	N/A
OR10L	1	Front Avenue	N/A	N/A	N/A
OR10L	1	Kittridge Avenue	N/A	N/A	N/A
OR11R	1	21st Avenue	N/A	N/A	N/A
OR11R	1	Front Avenue	N/A	16	N/A
OR11R	1	Nicolai Street	N/A	N/A	N/A
OR11R	1	Sherlock Avenue	N/A	N/A	N/A
OR12R	1	Going Street	N/A	N/A	N/A
OR12R	1	Interstate Avenue	N/A	13	N/A
OR12R	1	Larrabee Avenue	N/A	N/A	N/A
OR12R	1	Russell Street	N/A	6	N/A
OR13P	1	Port Access Road	N/A	N/A	N/A
OR13P	2	Burgard Road	25	24	4%
OR13P	2	Columbia Blvd	N/A	23	N/A
OR13P	2	Columbia Way	N/A	25	N/A
OR13P	2	Ivanhoe Street	N/A	N/A	N/A
OR13P	2	Lombard Street	N/A	17	N/A
OR13P	2	Marine Drive	45	24	47%
OR13P	2	Philadelphia Avenue	35	23	34%
OR13P	2	Swift Hwy 120	45	23	49%
OR13P	2	Union Avenue	55	21	62%
OR14P	1	N Pacific Gateway Blvd	N/A	N/A	N/A
OR15P	1	N Terminal Road	N/A	N/A	N/A
OR16A	1	Airport Road	55	N/A	N/A
OR16A	1	Green Hill Road	45	N/A	N/A
OR16A	1	Lockheed Drive	45	N/A	N/A
OR16A	1	W Pacific Hwy	55	17	69%
OR17R	1	Cleveland Street	25	N/A	N/A
OR17R	1	Cross Street	25	N/A	N/A
OR17R	1	Garfield Street	25	11	56%
OR17R	1	Roosevelt Blvd	N/A	N/A	N/A
OR21A	1	Airport Road	N/A	N/A	N/A

ID	No.	Street	Approx. Speed Limit (mph)	Truck PM Peak Speed (mph, 5-6 p.m.)	Average Reduction in Speed During PM Peak Hour
OR21A	1	Biddle Road	35	N/A	N/A
OR21A	1	E Pine Street	28	N/A	N/A
OR22P	1	Transpacific Pkwy	N/A	N/A	N/A
OR23P	1	Going Street	N/A	N/A	N/A
OR23P	2	Greeley Avenue	N/A	25	N/A
OR24P	1	Port Access Road	N/A	N/A	N/A

2.7 Segment Length, Number of Lanes and Bridge Data

Table 2.9 provides information on segment length, number of lanes and bridge data for the 61 connector segments. The table shows that number of lanes data is available for 55 of the 61 connector segments. The vast majority of the segments where data are available (71 percent) indicate that there are two lanes on the connector segments (Figure 2.1). One location had just one lane, while 16 have more than two lanes.

Most of the Tier 1 connector segments, 43 of the 61, do not have bridges located on them, while ten segments have one bridge and eight connector segments have more than one bridge. The average condition rating for bridges located on connector segments is 80.

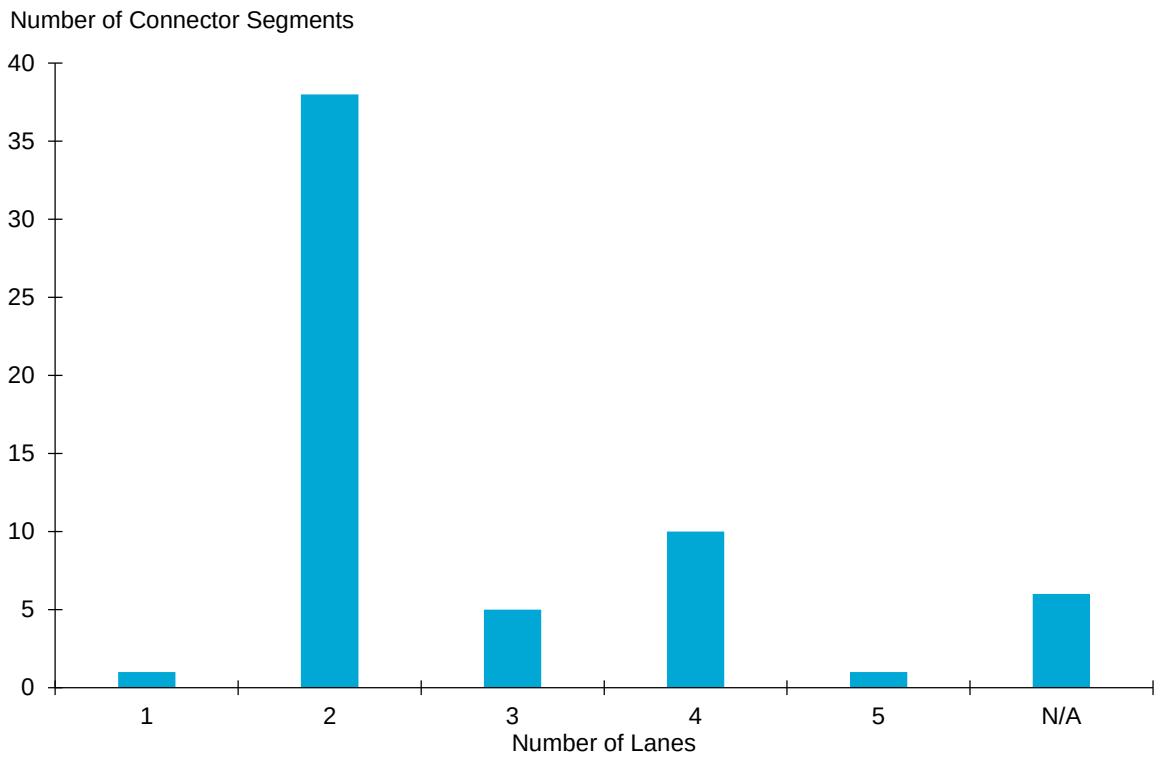
Table 2.9 Segment Length Number of Lane and Bridge Data on Tier 1 Connectors

ID	No.	Street	Segment Length	Number of Lanes	Number of Bridges	Average Bridge Condition
OR1P	1	Hamburg Street	0.1	2	0	N/A
OR1P	1	Industry Street	0.2	N/A	0	N/A
OR1P	1	Portway Street	0.3	2	0	N/A
OR2P	1	Boardman Irrigon Road	1.4	2	1	80
OR2P	1	Laurel Road	0.2	2	0	N/A
OR2P	1	Marine Drive	0.5	2	0	N/A
OR2P	1	Ullman Blvd	0.7	2	1	96
OR4P	1	California Avenue	0.1	N/A	0	N/A
OR4P	2	Sheridan Avenue	0.3	N/A	0	N/A
OR5P	1	Edwards Street	0.1	1	0	N/A
OR5P	1	Mullen Street	0.2	2	0	N/A
OR5P	1	Newport Avenue	0.1	2	0	N/A
OR6R	1	Holgate Blvd	0.5	4	0	N/A
OR8A	1	Columbia Blvd	5.6	3	2	79
OR8A	1	NE Columbia Pkwy	0.4	2	0	N/A

ID	No.	Street	Segment Length	Number of Lanes	Number of Bridges	Average Bridge Condition
OR8A	2	47th Avenue	0.5	2	2	95
OR8A	2	Airtrans Road	0.4	2	0	N/A
OR8A	2	Alderwood Road	0.4	2	0	N/A
OR8A	2	Cornfoot Gabreski Road	1.5	2	0	N/A
OR8A	3	82nd Avenue	1.2	4	0	N/A
OR8A	4	Airport Way	2.2	5	0	N/A
OR9R	1	Balboa Avenue	0.1	2	0	N/A
OR10L	1	61st Street	0.1	2	0	N/A
OR10L	1	Culebra Avenue	0.2	2	0	N/A
OR10L	1	Front Avenue	1.0	2	0	N/A
OR10L	1	Kittridge Avenue	0.2	4	1	73
OR11R	1	21st Avenue	0.1	2	0	N/A
OR11R	1	Front Avenue	2.1	2	1	83
OR11R	1	Nicolai Street	0.2	2	0	N/A
OR11R	1	Sherlock Avenue	0.1	2	0	N/A
OR12R	1	Going Street	1.0	3	1	61
OR12R	1	Interstate Avenue	1.9	2	0	N/A
OR12R	1	Larrabee Avenue	0.1	2	0	N/A
OR12R	1	Russell Street	0.1	2	0	N/A
OR13P	1	Port Access Road	0.2	2	0	N/A
OR13P	2	Burgard Road	0.6	2	0	N/A
OR13P	2	Columbia Blvd	4.7	4	2	93
OR13P	2	Columbia Way	0.1	3	0	N/A
OR13P	2	Ivanhoe Street	0.3	N/A	0	N/A
OR13P	2	Lombard Street	3.7	2	3	79
OR13P	2	Marine Drive	4.6	4	1	92
OR13P	2	Philadelphia Avenue	0.7	4	1	65
OR13P	2	Swift Hwy 120	1.7	2	2	64
OR13P	2	Union Avenue	2.0	4	4	77
OR14P	1	N Pacific Gateway Blvd	0.4	N/A	0	N/A
OR15P	1	N Terminal Road	0.2	N/A	0	N/A
OR16A	1	Airport Road	1.5	2	0	N/A
OR16A	1	Green Hill Road	0.5	2	0	N/A
OR16A	1	Lockheed Drive	0.1	2	0	N/A
OR16A	1	W Pacific Hwy	1.4	4	0	N/A
OR17R	1	Cleveland Street	0.1	2	0	N/A

ID	No.	Street	Segment Length	Number of Lanes	Number of Bridges	Average Bridge Condition
OR17R	1	Cross Street	0.2	2	0	N/A
OR17R	1	Garfield Street	0.6	3	3	N/A
OR17R	1	Roosevelt Blvd	0.5	2	0	N/A
OR21A	1	Airport Road	0.5	2	0	N/A
OR21A	1	Biddle Road	2.7	4	0	N/A
OR21A	1	E Pine Street	0.8	4	3	78
OR22P	1	Transpacific Pkwy	1.6	2	1	78
OR23P	1	Going Street	1.0	3	1	61
OR23P	2	Greeley Avenue	1.1	2	0	N/A
OR24P	1	Port Access Road	0.3	2	1	98

Figure 2.1 Number of Lanes for Connector Segments



2.8 Functional Classification, Ownership, and Rural/Urban Status

Table 2.10 shows the functional classification, governmental ownership type, and rural/urban status of the Tier 1 connectors. The table shows that vast majority (79 percent) of the Tier 1 connectors are either local roads, major collectors, or minor arterials. This is also highlighted in Figure 2.2 which illustrates that local roads are 16 of the 61 connector segments. The same number of connector segments are also minor

arterials. Twelve of the connector segments are major collectors. Five of the connector segments are principal arterials and four have multiple classifications.

The majority of Tier 1 connectors are owned by city or municipal highway agencies with 36 of the 61 connector segments (59 percent) being solely owned by city or municipal highway agencies. Five of the connector segments are owned solely by ODOT and seven have joint ownership between ODOT and either a city or county highway agency.

The location of Tier 1 connectors are primarily in urban areas with 55 of the 61 connector segments (90 percent) being located exclusively in urban areas. Five of the connectors are located in rural areas and one is partially in an urban area and partially in a rural area.

Table 2.10 Functional Classification, Ownership and Rural/Urban Status of Tier 1 Connectors

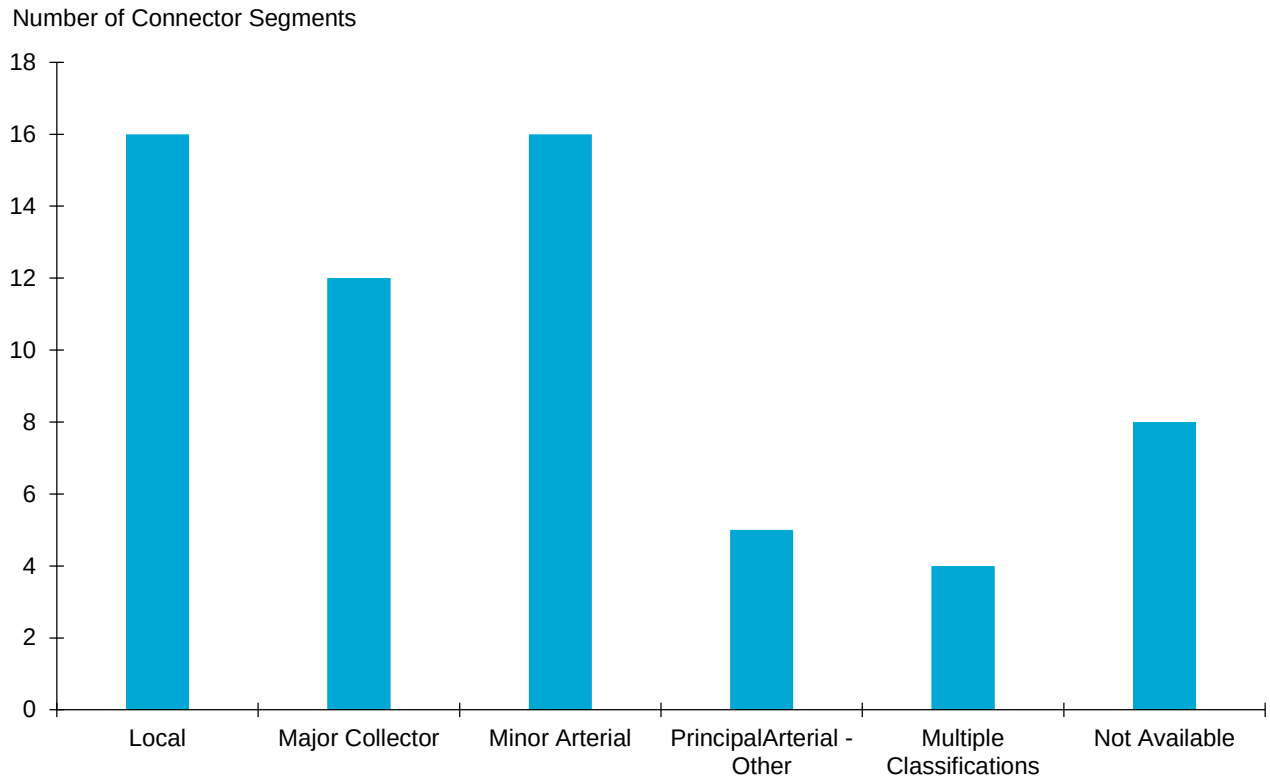
ID	No.	Street	Functional Classification	Governmental Ownership	Rural/Urban Status
OR1P	1	Hamburg Street	Local	City or Municipal Highway Agency	Urban
OR1P	1	Industry Street	Local	City or Municipal Highway Agency	Urban
OR1P	1	Portway Street	Local	City or Municipal Highway Agency	Urban
OR2P	1	Boardman Irrigon Road	Local	City or Municipal Highway Agency	Rural
OR2P	1	Laurel Road	Local	State Highway Agency And City or Municipal Highway Agency	Rural
OR2P	1	Marine Drive	Local	Other Local Agency	Rural
OR2P	1	Ullman Blvd	Local	City or Municipal Highway Agency	Rural
OR4P	1	California Avenue	Local	City or Municipal Highway Agency	Urban
OR4P	2	Sheridan Avenue	Local	City or Municipal Highway Agency	Urban
OR5P	1	Edwards Street	Minor Arterial	State Highway Agency	Urban
OR5P	1	Mullen Street	Local	County Highway Agency	Urban
OR5P	1	Newport Avenue	Principal Arterial – Other And Minor Arterial	State Highway Agency	Urban And Rural
OR6R	1	Holgate Blvd	N/A	N/A	Urban
OR8A	1	Columbia Blvd	Principal Arterial – Other And Minor Arterial	State Highway Agency And City or Municipal Highway Agency	Urban

ID	No.	Street	Functional Classification	Governmental Ownership	Rural/Urban Status
OR8A	1	NE Columbia Pkwy	N/A	N/A	Urban
OR8A	2	47th Avenue	Major Collector	City or Municipal Highway Agency	Urban
OR8A	2	Airtrans Road	Local	Other Local Agency	Urban
OR8A	2	Alderwood Road	Major Collector	City or Municipal Highway Agency	Urban
OR8A	2	Cornfoot Gabreski Road	Major Collector	City or Municipal Highway Agency	Urban
OR8A	3	82nd Av	Principal Arterial – Other	State Highway Agency And City or Municipal Highway Agency	Urban
OR8A	4	Airport Way	Principal Arterial – Other	City or Municipal Highway Agency	Urban
OR9R	1	Balboa Avenue	Local	City or Municipal Highway Agency	Urban
OR10L	1	61st Street	Local	City or Municipal Highway Agency	Urban
OR10L	1	Culebra Avenue	Local	City or Municipal Highway Agency	Urban
OR10L	1	Front Avenue	Local	City or Municipal Highway Agency	Urban
OR10L	1	Kittridge Avenue	Local	City or Municipal Highway Agency	Urban
OR11R	1	21st Avenue	Major Collector	City or Municipal Highway Agency	Urban
OR11R	1	Front Avenue	Minor Arterial	City or Municipal Highway Agency	Urban
OR11R	1	Nicolai Street	Major Collector	City or Municipal Highway Agency	Urban
OR11R	1	Sherlock Avenue	Major Collector	City or Municipal Highway Agency	Urban
OR12R	1	Going Street	Major Collector	City or Municipal Highway Agency	Urban
OR12R	1	Interstate Avenue	Minor Arterial	City or Municipal Highway Agency	Urban
OR12R	1	Larrabee Avenue	Minor Arterial	City or Municipal Highway Agency	Urban
OR12R	1	Russell Street	N/A	N/A	Urban
OR13P	1	Port Access Road	N/A	N/A	Urban
OR13P	2	Burgard Road	Minor Arterial	City or Municipal Highway Agency	Urban
OR13P	2	Columbia Blvd	Minor Arterial	City or Municipal Highway Agency	Urban

ID	No.	Street	Functional Classification	Governmental Ownership	Rural/Urban Status
OR13P	2	Columbia Way	Minor Arterial	City or Municipal Highway Agency	Urban
OR13P	2	Ivanhoe Street	N/A	N/A	Urban
OR13P	2	Lombard Street	Minor Arterial	City or Municipal Highway Agency	Urban
OR13P	2	Marine Drive	Principal Arterial – Other and Minor Arterial	State Highway Agency And City or Municipal Highway Agency	Urban
OR13P	2	Philadelphia Avenue	Minor Arterial	State Highway Agency	Urban
OR13P	2	Swift Hwy 120	Minor Arterial	State Highway Agency and City or Municipal Highway Agency	Urban
OR13P	2	Union Avenue	Principal Arterial – Other	State Highway Agency	Urban
OR14P	1	N Pacific Gateway Blvd	N/A	N/A	Urban
OR15P	1	N Terminal Road	N/A	N/A	Urban
OR16A	1	Airport Road	Minor Arterial	City or Municipal Highway Agency	Urban
OR16A	1	Green Hill Road	Minor Arterial	City or Municipal Highway Agency	Urban
OR16A	1	Lockheed Drive	Minor Arterial	City or Municipal Highway Agency	Urban
OR16A	1	W Pacific Hwy	Principal Arterial – Other	State Highway Agency	Urban
OR17R	1	Cleveland Street	Major Collector	City or Municipal Highway Agency	Urban
OR17R	1	Cross Street	Major Collector	City or Municipal Highway Agency	Urban
OR17R	1	Garfield Street	Principal Arterial – Other	City or Municipal Highway Agency	Urban
OR17R	1	Roosevelt Blvd	Minor Arterial And Major Collector	City or Municipal Highway Agency	Urban
OR21A	1	Airport Road	N/A	N/A	Urban
OR21A	1	Biddle Road	Minor Arterial	State Highway Agency And County Highway Agency	Urban
OR21A	1	E Pine Street	Minor Arterial	State Highway Agency And County Highway Agency	Urban
OR22P	1	Transpacific Pkwy	Major Collector	County Highway Agency	Rural
OR23P	1	Going Street	Major Collector	City or Municipal Highway Agency	Urban

ID	No.	Street	Functional Classification	Governmental Ownership	Rural/Urban Status
OR23P	2	Greeley Avenue	Minor Arterial	City or Municipal Highway Agency	Urban
OR24P	1	Port Access Road	Major Collector	Other Local Agency	Urban

Figure 2.2 Number of Connector Segments in Each Roadway Functional Class



2.9 Summary of Information Available on NHS Connectors

This report has described available for freight intermodal connectors in Oregon. The vast majority of the information available is for Tier 1 connectors. Much of this data is collected by ODOT in part to meet the requirements of the FHWA HPMS and in part to support routine planning and programming efforts in Oregon. Other data sources include the FHWA NPMRDS and the survey conducted as part of this study and described in the Task 6 report. The data available on Tier 1 connectors include:

- Vehicle classification count data
- Truck-involved crash data
- Pavement condition information

- Roadway and shoulder width data
- Railroad crossing data
- Speed data
- Connector segment length
- Number of lanes information
- Bridge data
- Functional classification data
- Roadway ownership data
- Rural/Urban Status

3.0 Appendix C - List of Intermodal Terminals/Businesses

An intermodal terminal/business is defined as a facility that transfers goods between multiple modes. Table 3.1 provides a list of the intermodal terminals/businesses that were identified throughout this study along with their identification number, ODOT region, commodity carried and city where the terminal is located.

Table 3.1 List of Intermodal Terminals/Businesses

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
1	1 (NHS)	R1L02	Kinder Morgan Liquids Terminal	Petroleum Products	Portland
		R1L03	Chevron Products Company	Petroleum Products	
		R1R80	Northwest Industrial Area		
1	1 (NHS)	R1R81	Lake Yards		Portland
1	1 (NHS)	R1R09	Union Pacific Distribution Services		Portland
		R1R82	Albina Yards (UP) – Portland		
1	1 (NHS)	R1P03	Northwest Container Services		Portland
		R1P11	Port of Portland (Terminal 5)		
		R1P12	Port of Portland (Terminal 6)		
		R1P13	Port of Portland (Terminal 4)		
		R1R04	Green Transfer		
		R1R10	Oregon Transfer 1		
		R1R11	Warehouse Specialists (WSI) LLC		
1	1 (NHS)	R1R06	Kinder Morgan	Petroleum Products	Portland
1	1 (NHS)	R1R84	Swan Island Ship Repair Yard		Portland
1	1 (NHS)	R1P14	Port of Portland (Terminals 1 and 2)		Portland
1	1 (NHS)	R1R85	Brooklyn Yard (SP) – Portland		Portland
1	1 (NHS)	R1A18	Portland International Airport		Portland
1	1 (NHS)	R1R86	Willridge Yards		Portland
1	1	R1R15	Rivergate Terminal		Portland
1	1	R1R13	Oregon Transfer 2		Portland
1	2	R1A15	Portland Air Cargo		Portland
1	2	R1L01	Equilon Enterprises		Portland
1	2	R1L06	ConocoPhillips	Petroleum Products	Portland
1	2	R1P02	Cargill Grain Terminal, Portland	Agricultural Products	Portland
		R1P05	TEMCO Grain Terminal	Agricultural Products	

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
1	2	R1R02	Alpine Foods	Food Products	Milwaukie
		R1R03	Oregon Transfer		
1	2	R1R12	Peninsula Terminal Company		Portland
1	3	R1L04	Shore Terminals		Portland
1	3	R1L05	BP West Coast Products	Petroleum Products	Portland
1	3	R1P04	Ross Island Sand and Gravel	Sand/Gravel	Portland
1	3	R1R05	Gresham Transfer		Portland
1	3	R1R07	Pronto		Portland
1	3	R1R14	Carson Oil Company	Petroleum Products	Portland
1	3	R1P06	Knife River and Sundial Marine		Troutdale
1	3	R1R01	Wymore Transfer Company		Clackamas
1	3	R1R67	Lakeside Industries		Hillsboro
		R1R68	Knife River		
1	3	R1R69	Oregon-Canadian Lumber Company	Timber or Forest/Paper Products	North Plains
2	1 (NHS)	R1A16	Mahlon Sweet Municipal Airport – Eugene		Eugene
2	1 (NHS)	R1R83	Eugene Reload Facilities – Eugene		Eugene
		R2R19	A&M Reload		
		R2R20	M&P Reload		
2	1 (NHS)	R1P15	Port of Astoria		Astoria
2	2	R2A05	McNary Field		Salem
2	2	R2P12	Port of Newport		Newport
2	2	R2P14	Teevin Bros. Land and Timber – Rainer Terminal	Timber or Forest/Paper Products	Rainier
		R2P15	U.S. Gypsum Plant	Fertilizer	Rainier
2	2	R2P18	Port of Toledo		Toledo
2	2	R2P19	Georgia-Pacific Corporation	Timber or Forest/Paper Products	Toledo
2	2	R2P51	Port Westward, Columbia Pacific Bio Refinery	Ethanol and related products	Clatskanie
2	2	R2R36	Capital Cold Storage	Food Products	Salem

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
		R2R37	Cascade Warehouse	Timber or Forest/Paper Products	
2	2	R2R73	Stimson Lumber SW of Forest Grove	Timber or Forest/Paper Products	Washington County
2	3	R2P08	Wauna Mill	Timber or Forest/Paper Products	Clatskaine
2	3	R2P16	Port of St. Helens		Columbia City
2	3	R2R24	Hayworth Warehouse		Harrisburg
2	3	R2R28	Junction City Reload		Junction City
2	3	R2R30	Hunton Warehouse		Junction City
2	3	R2R31	Roseburg Forest		Junction City
2	3	R2P07	Port of Astoria, Tongue Point		Astoria
2	3	R2P09	Teevin Bros. Land and Timber – Westport Slough	Timber or Forest/Paper Products	Clatskaine
2	3	R2P20	Nygaard Logging, Tansy Point Terminal	Timber or Forest/Paper Products	Warrenton
2	3	R2P52	Multnomah Industrial Park		St. Helens
2	3	R2P53	Columbia City Industrial Park		Columbia City
2	3	R2R17	Log transload at Crabtree	Timber or Forest/Paper Products	Crabtree
2	3	R2R18	Wilco Farmers	Agricultural Products	Donald
2	3	R2R21	Oregon Reload, Eugene		Eugene
2	3	R2R70	Paktech	Packaging Materials	Eugene
		R2R72	Lane Forest Products	Timber or Forest/Paper Products	
		R2R22	Jerry Brown Company	Petroleum	
		R2R77	Kinder Morgan Eugene Terminal	Petroleum Products	
2	3	R2R25	Crop Production Services	Agricultural Products	Brooks
2	3	R2R27	Cascade Warehouse Company	Timber or Forest/Paper Products	Junction City

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
2	3	R2R29	Swanson Group Reload		Junction City
2	3	R2R32	General Transload at Lebanon		Lebanon
2	3	R2R33	TTT, Philomath (timber)	Timber or Forest/Paper Products	Philomath
2	3	R2R39	R&S Bagg		Shedd
2	3	R2R71	Wilbur-Ellis	Fertilizer	Shedd
2	3	R2R40	Operates a transload facility in Woodburn		Woodburn
2	3	R2R74	Banks Lumber Company	Timber or Forest/Paper Products	Banks
3	1 (NHS)	R1A17	Rogue Valley International Airport-Medford		Medford
3	1 (NHS)	R1P16	Port of Coos Bay – Roseburg Terminals		Coos Bay
		R3P26	Port of Coos Bay, Roseburg Chip Terminal		North Bend
3	1 (NHS)	R3P31	Port of Coos Bay, LNG Terminal	Petroleum Products	North Bend
3	1 (NHS)	R3P51	Port of Coos Bay – Ocean Terminals		North Bend
3	1 (NHS)	R3P51	Port of Coos Bay – Ocean Terminals		North Bend
3	1 (NHS)	R3P50	Port of Coos Bay – Isthmus Slough		North Bend
3	1	R3P27	Port of Coos Bay, Southport Lumber	Timber or Forest/Paper Products	North Bend
3	1	R3P28	Florida Ave Terminal	Timber or Forest/Paper Products	North Bend
3	2	R3A07	Southwest Oregon Regional Airport		North Bend
3	2	R3R43	RVTR		White City
		R3R58	Cascade Wood Products	Timber or Forest/Paper Products	
3	2	R3R52	Boise Cascade	Timber or Forest/Paper Products	White City
		R3R53	Weaver Forest Products	Timber or Forest/Paper Products	
3	2	R3R46	Timber Products	Timber or Forest/Paper Products	Medford

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
3	2	R3R65	Roseburg Forest Products – Coquille	Timber or Forest/Paper Products	Coquille
3	3	R3R41	Blackwell Consolidation		Central Point
3	3	R3R47	Sierra Pine LTD	Timber or Forest/Paper Products	Medford
3	3	R3R50	Harry and David		Medford
3	3	R3P24	Port of Brookings – Harbor		Harbor
3	3	R3P25	Port of Coos Bay, Charleston		Coos Bay
3	3	R3P35	Port of Port Orford		Port Orford
3	3	R3R56	Timber Products	Timber or Forest/Paper Products	White City
		R3R57	Alumaweld Boats	Boats	White City
3	3	R3R55	Plycem USA		White City
3	3	R3R54	Carestream Health		White City
3	3	R3R48	Naumes, Inc.		Medford
		R3R49	Tree Top	Timber or Forest/Paper Products	
3	3	R3R51	H.D. Fowler		Medford
3	3	R3R59	Murphy Softwood Plywood Plant	Timber or Forest/Paper Products	Rogue River
3	3	R3R60	Rogue Valley Door		Grants Pass
3	3	R3R61	Timber Products	Timber or Forest/Paper Products	Grants Pass
3	3	R3R62	Allweather Wood	Timber or Forest/Paper Products	North Bend
3	3	R3R63	Coos Bay Yard of Coos Bay Rail Link		Coos Bay
		R3R64	Thomas & Sons Transportation Systems		
4	2	R4A12	Klamath Falls Airport		Klamath Falls

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
4	2	R4A14	Redmond Municipal Airport – Robert Field		Redmond
4	2	R4R44	Prineville Freight Depot	Chemicals and sand	Prineville
4	3	R4R78	Columbia Forest Products	Plywood	Klamath Falls
4	3	R4R79	Collins Products	Wood siding	Klamath Falls
4	3	R4P38	Port of Arlington – Mid Columbia Producers		Arlington
4	3	R4P39	Mid-Columbia Grain Growers Terminal	Agricultural Products	Biggs Junction
4	3	R4P42	Cargill Grain Terminal	Agricultural Products	The Dalles
4	3	R4R75	Fontana Wood Products	Timber or Forest/Paper Products	Prineville
4	3	R4R76	J&P (Juhl Enterprises)	Lumber and trusses	Klamath Falls
		R4R77	Ed Staub and Sons	Propane	
4	3	R4R80	Prineville Freight Depot Bulk Facility	Magnesium chloride, diesel fuel, golf course sand, fatty acids, antifreeze	Deschutes County
5	1 (NHS)	R5P44	Port of Morrow – Tidewater Wood Chip Terminal	Timber or Forest/Paper Products	Boardman
		R5P48	Tidewater		
		R5P54	Morrow Cold Storage	Food Products	
		R5P55	Watts Bros		
		R5P57	Lamb Weston East		
		R5P58	Oregon Potato	Agricultural Products	
		R5P59	Boardman Foods	Food Products	
		R5P60	Oregon Hay	Agricultural Products	
		R5P70	Port of Morrow – Boardman		
5	2	R5A10	Eastern Oregon Regional Airport		Pendleton
5	2	R5L08	Kaneb Pipeline Operating Partnership	Petroleum Products	Umatilla
		R5P45	Port of Umatilla		
		R5R76	JM Eagle	Pipes	
5	2	R5P56	Lamb Weston West		Boardman

Region	Tier	ITB ID#	Intermodal Terminal/ Business	Commodity	City or County
5	2	R5P43	Port of Morrow – Morrow County Grain Growers	Agricultural Products	Boardman
		R5P61	Cascade Specialties	Timber or Forest/Paper Products	
		R5P62	Pacific Ethanol	Petroleum Products	
		R5P63	Tidewater Petroleum	Petroleum Products	
		R5P64	Northwest Container		
		R5P65	Port of Morrow Freezer	Food Products	
		R5P66	Calbee	Food Products	
		R5R77	ZeaChem	Food Products	
		R5R78	Intermodal Yards		
5	3	R5P47	Patterson Ferry Grain Terminal	Agricultural Products	Irrigon

4.0 Appendix D: Literature and Data Review

This report is a literature review of previous freight planning efforts in Oregon, other states and at the federal level related to freight intermodal connectors. It is the first work task of the Oregon Freight Intermodal Connector System (OFICS) Study and it is intended to be used as a guide throughout the course of the development of the study. One goal of the literature review is to identify potential criteria for designating intermodal connectors. The report also identifies critical intermodal terminals, critical connectors to these terminals, qualitative and quantitative data describing conditions, and potential data about levels of activity at the intermodal terminals and/or the connectors that might be useful in the designation of critical intermodal connectors once criteria have been developed. This will be used as a source of information for the development of recommendations for a draft set of criteria that will be presented to the OFICS Technical Advisory Committee for this study. The criteria will consider federal requirements and guidance with a focus on relevant elements of the recently passed Fixing America's Surface Transportation (FAST) Act. Preliminary criteria considered at the onset of this study included the number of trucks, employment, twenty-foot equivalent units (TEUs), or some other measure of the level of activity associated with an intermodal terminal. Additionally, this review of criteria will likely help identify the most important intermodal or transload facilities for the State of Oregon.

This report is structured into the following five sections:

- Section 1 – introduction to the report;
- Section 2 – description of Oregon plans relating to freight intermodal connectors;
- Section 3 – description of plans in other states/regions related to freight intermodal connectors;
- Section 4 – description of major Federal plans related to freight intermodal connectors; and
- Section 5 – overview of key findings from literature review and recommendations and information for identifying freight intermodal connectors and other tasks associated with the study.

4.1 Oregon Plans Relating to Freight Intermodal Connectors

The following studies, plans and reports provide information about goods movement and freight access in Oregon and other states, as well as from a federal perspective. This section provides a review of the various documents and extracts and highlights information about intermodal connectors, including how and why they received the designation and the mechanisms for identifying them.

4.1.1 Master Plan Update Portland International Airport (2000)[2]

Overview of Study

Portland International Airport (PDX), is owned and operated by the Port of Portland. In 2000, PDX updated its 1993 Master Plan, which focused primarily on facility planning. With growing concerns by the community of the impacts of growth on noise, air and water, the 2000 Master Plan updated cargo and passenger demand forecasts, identified development scenarios to accommodate growth, and investigated potential environmental impacts of the development scenarios and possible mitigation measures, as well as community outreach needs.

Incorporation of Intermodal Connectors into Plan

None specified.

Specific Oregon Intermodal Connectors Listed

None specified.

Implications for Defining Freight Intermodal Connectors in Oregon

This plan reinforces the need to consider community input and environmental factors when analyzing freight intermodal connectors in the Portland metropolitan region. Additionally, it demonstrates the importance of developing an accurate forecast to drive planning activities.

4.1.2 Oregon Transportation Plan (2006)[3]

Overview of Study

The 2006 Oregon Transportation Plan (OTP) is the State's long-range multimodal transportation plan. The OTP is the overarching policy document among a series of plans that together form the State transportation system plan (TSP). The Oregon Transportation Plan outlines goals, policies, and initiatives that aim to resolve the challenges and cultivate the opportunities for Oregon's transportation system. The Plan discusses all modes of transportation.

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[2] Port of Portland, P&D Aviation, *Portland International Airport Master, Summary Report*. September 2000. Plan https://www.portofportland.com/PDFPOP/PDX_MP_Smry_Rpt.pdf

[3] ODOT, *Oregon Transportation Plan.* September 20, 2006. https://www.oregon.gov/ODOT/Planning/Documents/OTP_Volume_I.pdf

Incorporation of Intermodal Connectors into Plan

The OTP identifies key freight-serving facilities and the access needs to these facilities. Specifically, the OTP calls out the following facilities:

- Approximately 80 marine terminals, including 5 deep draft terminal locations and 4 shallow draft terminal locations;
- Four petroleum pipeline operators;
- Three natural gas transmission line operators; and
- Two local natural gas distribution line operators.

Within the plan, there is an overview of intermodal connectors in the overall discussion of transportation system roles and responsibilities, recognizing their importance to the overall flow of the transportation system and economy. Strategy 3.1.6 aims to "*systematically address barriers to efficient truck movements on roads and highways, including intermodal connectors, while balancing the needs and safe access of all modes"* (Oregon Transportation Plan (2006), page 55).

Technical Appendix 2 of the Oregon Transportation Plan[4] is a needs analysis that cuts across different modes and components of transportation infrastructure. According to the report, intermodal connectors will experience growth of 1.35 percent for passenger highway travel and 1.4 percent for freight highway travel and require funding of $11.3 million (2004 dollars) in order to meet annual feasible needs through 2035. As defined in this report, "feasible needs" refers to funding needed to maintain the system at a slightly more optimal level than current levels, replace infrastructure and equipment on a reasonable life cycle, bring facilities up to standard, and add capacity in a reasonable way. The findings were based on an analysis of NHS freight intermodal connectors located in Astoria, Boardman, Coos Bay/North Bend, Eugene, Medford, and Portland.

Technical Appendix 2 defines intermodal facilities as transfer points from or to truck, bus, air rail and marine transportation facilities that serve passenger or freight moves. As of the time of this study, Oregon's NHS intermodal connectors covered nearly 60 miles of city, county and state roadways, and accommodated 3.6 billion truck vehicle miles of travel annually. The OTP acknowledged that there are no dedicated annual expenditures for meeting the feasible needs of intermodal connectors in Oregon.

The technical appendix describes that additional detail on the methodology for the needs analysis on intermodal connectors is available in the OTP Transportation Needs Analysis 2005-2030, Summary Report. However, the report is no longer available on the ODOT web site.

The Oregon Transportation Plan provides maps of marine terminals, rail terminals, airport terminals, and pipeline terminals. It also includes a map displaying cities with designated NHS freight and passenger intermodal connectors as shown in Figure 4-1.

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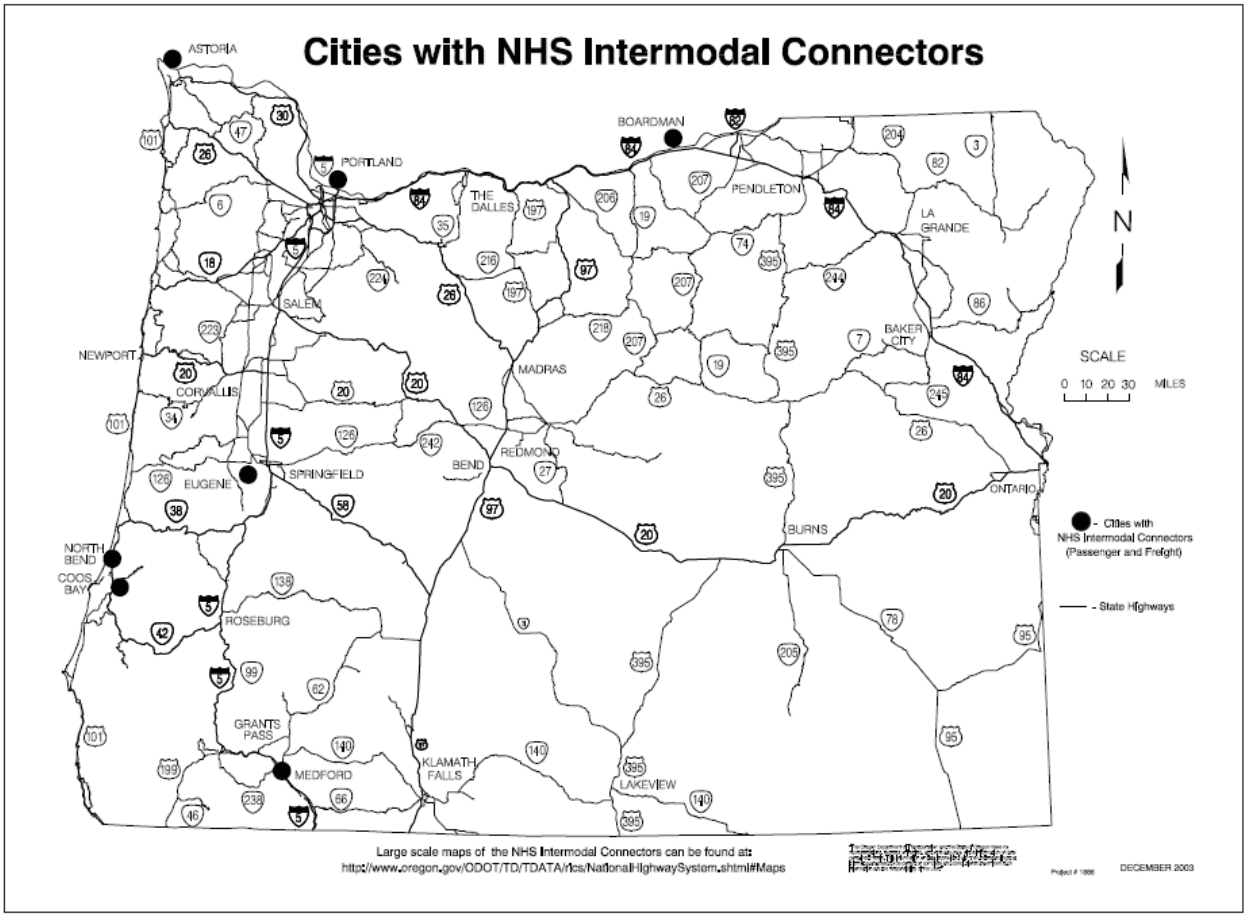
[4] ODOT, *Oregon Transportation Plan Technical Appendices Volume 2.* September 20, 2006. https://www.oregon.gov/ODOT/Planning/Documents/OTP_Volume_II.pdf

Figure 4-1 Map of Cities with NHS Intermodal Connectors



Source: Oregon Transportation Plan, 2011.

Specific Oregon Intermodal Connectors Listed

None specified.

Implications for Defining Freight Intermodal Connectors in Oregon

The Oregon Transportation Plan also identified a funding gap of $491 million annually in 2004 dollars. This implies that the funding for improving freight connectors will face stiff competition from other programs and modes in the State.

4.1.3 Oregon Freight System Performance Measures (2012)[5]

Study Overview

The study seeks to create a set of performance measures for the Oregon Freight System that will evaluate its physical and operational performance. These performance measures will help identify how the system is used, issues and needs, a prioritization of improvements, policy guidance, and strategic investments. This report is a follow-up of the *2011 Freight Performance Measures: Approach Analysis Final Report*.

Incorporation of Intermodal Connectors into Plan

This study identified congestion and unreliable travel time to access major intermodal facilities as Freight Issue No. 3. The study recommends that local and tribal governments work closely with ODOT to identify missing intermodal connectors and add them to the secondary list of NHS intermodal connectors.

The study also includes Freight Issue No. 12, which acknowledges that the "lack of a sustained source of statewide freight funding decreases the ability of the public sector to plan for long- and medium-term freight needs in a comprehensive manner." As part of the NHS, improvements to intermodal connectors could be eligible for federal funding. Freight Issue No. 12 recommends that the State establish a funding source specific to intermodal connectors.

Specific Oregon Intermodal Connectors Listed

Not applicable.

Implications for Defining Freight Intermodal Connectors in Oregon

Not applicable.

4.1.4 Oregon Statewide Aviation Plan (2007)[6]

Overview of Study

There are 97 public use airports in Oregon ranging from small emergency use airports to large commercial service airports. The Oregon Statewide Aviation Plan is a comprehensive evaluation of the State's aviation system and a guide for future aviation development. One of the primary goals of the Oregon State Aviation Plan is to develop a comprehensive summary of the economic impact of each airport to its local community and the total economic value of the State aviation system.

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[5] ODOT, Cambridge Systematics, Inc., *Oregon Freight System Performance Measures, Task 1: Evaluate List of Freight System Performance Measures*. January 2, 2012.

[6] Oregon Department of Aviation, *Oregon Aviation Plan 2007 (OAP 2007)* https://www.oregon.gov/aviation/docs/system_plan/chapter_1_-_introuction.pdf

Incorporation of Intermodal Connectors into Plan

One of the plan's goals is to provide the Oregon Aviation System with proper access from other surface transportation modes. The actions that are outlined in the plan to achieve this goal include the identification of ground access issues to airports, including a ground access approach as part of future plans, communicating with airport owners of future plans, encouraging the integration of airports into other planning efforts. The plan reiterates the specific policy topics of the 2000 Oregon Aviation Plan which includes an element on intermodal accessibility and states that it is important for the plan to "Provide access to the air transportation system and its connections with other modes for people and freight throughout the State."

Specific Oregon Intermodal Connectors Listed

None specified.

Implications for Defining Freight Intermodal Connectors in Oregon

This plan reinforces the importance of freight connectivity with the aviation system in Oregon. It does not provide specific projects or programs to improve connectors.

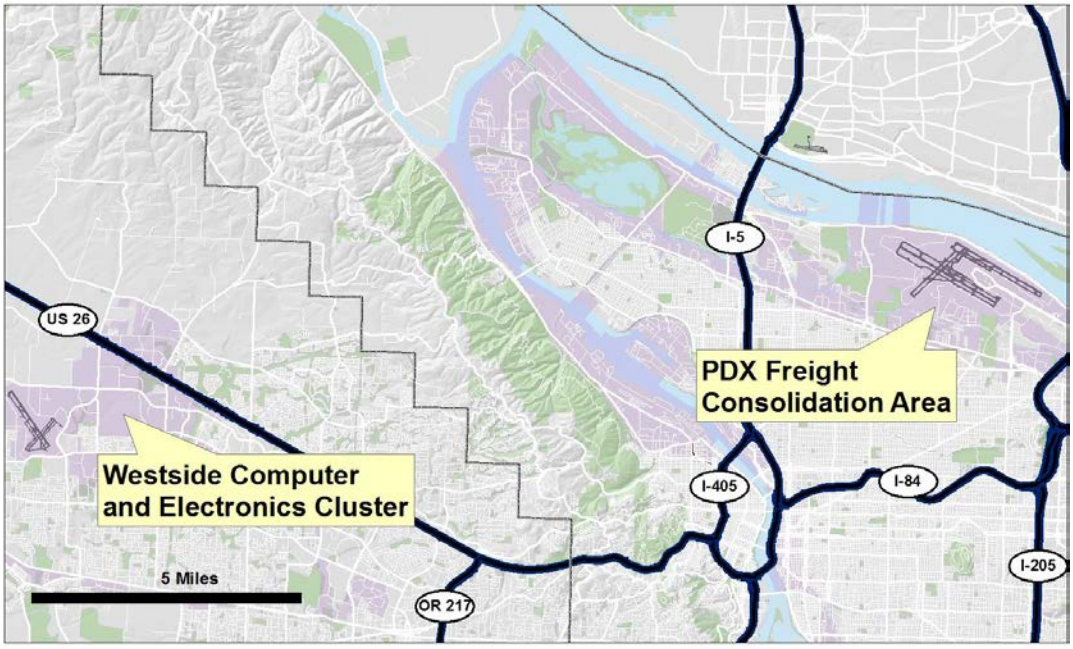
4.1.5 Greater Portland Export Initiative: Portland Region Westside Freight Access and Logistics Analysis (2013)[7]

Study Overview

This study focuses on goods being exported from the Westside Computer and Electronics (C&E) manufacturers to the PDX consolidation area (Figure 4-2). The study focuses only on the key routes between these two points and how to improve the speed, efficiency, and reliability of goods moving on them through near-term projects. The first is US 26 to I-405 north to I-5 north, and the second is Cornelius Pass Road to US 30 then eastbound across the St. Johns Bridge to Columbia Boulevard. Data from INRIX and the American Transportation Research Institute (ATRI) was collected to assess the current conditions of these two routes. The study uses data provided ATRI to analyze truck movements and the travel times were calculated using the INRIX data set. Interviews with stakeholders identified operational influences that effect their supply chain and logistics decisions, information about how they use the corridors, and key issues that impact them. Together, the data and stakeholder input assisted with identifying and prioritizing strategies and projects that would aid in the efficiency of the routes.

[7] DKS Associates, *Greater Portland Export Initiative Portland Region Westside Freight Access and Logistics Analysis.* October 1, 2013. https://www.portofportland.com/pdfpop/Trade_Trans_Studies_Westside_Freight_Access.pdf

Figure 4-2 Greater Portland Export Initiative Study Area



Source: DKS Associates, *Greater Portland Export Initiative, Portland Region Westside Freight Access and Logistics Analysis,* Figure 2. October 1, 2013.

Incorporation of Intermodal Connectors into Plan

While there are no identified connectors listed in the study, the second route which the study focuses on could be potentially defined as connectors. This is Cornelius Pass Road to US 30 then eastbound across the St. Johns Bridge to Columbia Blvd.

Bottlenecks identified by the interviews include mostly non connector roads such as state highways or interstates. The only non-interstate/state highway bottleneck identified is “The St. Johns Bridge, particularly conflicts in the St. Johns neighborhood as freight movements connect to Marine Drive and Columbia Boulevard.”

Specific Oregon Intermodal Connectors Listed

The study identified part of the second route, Cornelius Pass Road to US 30 continuing eastbound across the St. Johns Bridge to Columbia Boulevard as a potential intermodal connector.

Implications for Defining Freight Intermodal Connectors in Oregon

Not applicable.

4.1.6 Rogue Valley Metropolitan Planning Organization (RVMPO) Freight Study Report (2012)[8]

Study Overview

The 2012 Rogue Valley MPO Freight Study provides an update to the 2006 RVMPO Freight study but also acknowledges that most of the statewide studies had not been updated since the 2006 study was completed. The study identifies all modes of freight travel, their relationship to industries, and recommended freight system improvements. The study relied heavily on the input of a Freight Advisory Committee made up of the region's freight industry representatives, as well as local and state engineers and planners involved in freight planning and operations.

Incorporation of Intermodal Connectors into Plan

The study identifies the NHS intermodal connectors and needs and improvements. The needs assessment included a survey of shippers and carriers that asked about barriers and impediments to moving goods and the impacts on their businesses. A few of the responses mentioned connectivity as a problem, especially in the White City Area.

Potential system improvements identified include improved connections to existing facilities, but most of the connectivity issues discussed in the surveys relate to connections between highways and popular routes.

Specific Oregon Intermodal Connectors Listed

The study mentions all routes in the region that are identified by the NHS network, which includes the following NHS intermodal connectors:

- Pine Street, east of I-5, Biddle Road, and Airport Road, providing an intermodal connection to Rogue Valley International – Medford Airport
- Intersections at Biddle road with Table Rock Road and Airport Road are cited as having the some of the highest volumes in truck traffic. Biddle and Table Rock Road intersection had the third highest number of crashes in 2002 with nine.
- Connections to Hwy 62 and I-5 are identified in interviews as being problematic
- The 2011 ODOT corridor study concentrated its improvements on Agate Road, Avenue G, Kirtland Road, and Blackwell road to improve connectivity to White City.

Implications for Defining Freight Intermodal Connectors in Oregon

Not applicable.

[8] Rogue Valley MPO, *Freight Study Report.* September 2006 Updated 2012. https://www.rvmpo.org/images/studies/2012-freight-study/Freight_Study_update_2011_modifieda.pdf

4.1.7 Metro Regional Freight Plan 2035 (2010)[9]

Study Overview

The plan is part of the Regional Transportation Plan Update. The Regional Freight and Goods Movement Task Force and a technical advisory committee, all under the Metro MPO, provide input and guidance to the plan. Having an informed background on the Freight System in the Portland area will help foresee changes and plan accordingly. Current Issues are identified and categorized as Mobility and Accessibility, System Management, Land Use, Environment, Investment Strategies, Coordination, and Research and Data.

Incorporation of Intermodal Connectors into Plan

Intermodal Connectors are not specifically addressed, but rather fall under the umbrella of Highway Chokepoints and are labeled as last-mile chokepoints, such as the Columbia/Cascade River District Projects that include the I-84/257th Avenue Troutdale interchange and SW 124th from Tualatin-Sherwood Road to the I-5/North Stafford interchange.

Specific Oregon Intermodal Connectors Listed

The two specific connectors listed are surrounding the Columbia/Cascade River District Projects that include the I-84/257th Avenue Troutdale interchange and SW 124th from Tualatin-Sherwood Road to the I-5/North Stafford interchange. Besides that, there are no other connectors directly identified.

Implications for Defining Freight Intermodal Connectors in Oregon

Not applicable.

4.1.8 City of Portland Freight Master Plan (2006)[10]

Study Overview

Portland is centrally located between the merging of the Columbia and Willamette River, proving it a key international trade destination since the turn of the 21st century. The master plan creates a system for managing the current and future freight movement in Portland. The plan revolves around the themes of mobility, livability, and economy. The report analyzes freight from three aspects: mobility, livability, and the economy. The mobility portion focuses on system efficiency and its ability to accommodate future growth. The livability aspect focuses on minimizing community impacts. The economic aspect focuses on costs and benefits of investments.

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[9] Metro Joint Policy Advisory Committee on Transportation, *Regional Freight Plan 2035.* June 2010. https://library.oregonmetro.gov/files/regional_freight_plan_june_10.pdf

[10] City of Portland, Office of Transportation, *Freight Master Plan.* May 10, 2006. https://www.portlandoregon.gov/transportation/article/357098

Incorporation of Intermodal Connectors into Plan

Connectors are mentioned as part of the NHS. Goal 5, Economic Development Policies of the Comprehensive Plan Policies for freight states that connectors to multimodal freight transportation systems are vital to the economy and Portland's global competitiveness. The classification of connections is incorporated into Goal 6 of the plan, including Policy 6.9, Freight Classification Descriptions, and Policy 6.30, Truck Mobility.

The plan identifies links between the regional freeway system and truck-served industries and discusses truck operating parameters related to street design, such as the width of the streets, turning radii at intersections, the presence of buildings interrupting the right of way, and the use of right turn lanes.

Generally, this plan mentions the importance of creating proper connectivity between the freight centers and the regional highway system, but it does not recommend specific intermodal connections or even a mechanism for identifying them.

Specific Oregon Intermodal Connectors Listed

Not applicable.

Implications for Defining Freight Intermodal Connectors in Oregon

This study provides goals and policies that could lead to the designation of intermodal connections. If implemented, Portland could identify a number of freight-serving corridors and identify design improvements based on the goals and policies in this study. However, this study does not provide any performance measures or selection criteria for identifying intermodal connectors.

4.1.9 Master Plan Update Portland International Airport (2010)[11]

Overview of Study

The 2010 Portland International Airport plan, *Airport Futures Charting a Course for PDX,* was a collaborative effort between PDX, the City of Portland Bureau of Planning and Sustainability, and the Portland-Vancouver metropolitan region.

Incorporation of Intermodal Connectors into Plan

This plan describes the operating environment of Portland International Airport. In 2001, it transitioned to a permanent land use designation to address the complex issues of airport growth.

Specific Oregon Intermodal Connectors Listed

This report identifies the following key access roads and points. It does not specify whether these locations are used by passenger vehicles, trucks, or a combination of both:

[11] City of Portland Bureau of Planning and Sustainability, Jacobs Consultancy, *Airport Futures Charting a Course for PDX,* March 2010. https://www.portofportland.com/prj_pdx_airport_ftrs_home.aspx

- **NE 82nd Avenue/NE Airport Way Intersection –** Signalized intersection is where vehicles enter or exit the terminal area roadway system. One potential improvement included in the Regional Transportation Plan for this intersection is a grade-separated interchange at this location. This improvement was seen to potentially require demolition to all or part of an on-airport cargo facility.

- **Mt. Hood Interchange Area –** Consists of three intersections (one signalized, one unsignalized, and one roundabout). The interchange is the primary access point for both the Portland International Center and the economy parking lots (Blue and Red). These intersections are noted as having available capacity to accommodate future traffic demand.

- **NE Airport Way/I-205 Interchange Area –** Consists of two signalized intersections and provides access to and from NE Airport Way and Interstate 205 (I-205). Capacity constraints occur at times with the eastbound left turn and the westbound right turn to access I-205 northbound. Only the northbound intersection would be expected to have a capacity constraint in the future. The northbound access would be constrained by the combined eastbound left turns and westbound right turns from NE Airport Way by 2012. Studies completed in 2008 indicated two additional requirements at this interchange. The first was the need for an additional southbound right turn from the I-205 off-ramp to westbound NE Airport Way. This additional lane has been constructed and is in operation. The second is the need to relocate the eastbound to northbound I-205 access. ODOT conducted a study to determine and evaluate alternatives associated with relocating this access via a flyover, loop ramp, or other means. Addressing the eastbound left turning movement at this intersection would allow for adequate intersection operations during the afternoon peak period through 2035. ODOT has selected the preferred alternative. The design process was completed and construction was expected to be completed in 2012 as of the writing of this report.

- **NE 82nd Avenue/NE Alderwood Road –** This intersection is a major access point to and from the Portland International Center, as well as being located on a key roadway providing access to the terminal area. Improvements to this intersection in addition to those currently being planned or constructed were expected to be in place by 2012.

Implications Regarding Definition of Freight Intermodal Connectors in Oregon

There are multiple sections in this report that discuss air cargo. In regards to access to air cargo facilities, the report states “The AirTrans Cargo Center is well designed with excellent landside access for trucking cargo to and from the airport and excellent airside access for aircraft. Therefore, the AirTrans Cargo Center should continue to be the airport’s primary all-cargo processing area.” The report mentions a strategy for developing all-cargo facilities at PDX, but none of these plans are mentioned in conjunction with the need to expand access to the airport.

Implications for Defining Freight Intermodal Connectors in Oregon

This report implies that airport freight intermodal connectors do not experience significant operational issues as of 2010. It does not, however, specify all of the freight connectors that provide access to PDX or the level of usage for these roadways.

4.1.10 Oregon Freight Plan (2011)[12]

Overview of Study

The goal of the Oregon Freight Plan (OFP) is to provide a roadmap for ODOT, other state and local agencies, tribal governments, and the private sector to work together to preserve and enhance the state's freight system. The study included a description of the freight system, identification of issues, along with generalized strategies, but not project specific improvements.

Incorporation of Intermodal Connectors

The OFP is composed of eight chapters, one of which is on the freight system. A subsection of the plan is on connectivity. The subsection on connectors provides a description of system elements (roads, rail lines, marine facilities, airports, and pipelines) that help connect centers of economic activity for freight-dependent industries.

There is no mention of designated freight intermodal connectors in the initial subsection of the Freight System chapter. The OFP provides maps that include the rail intermodal terminals and rail classification yards, the major seaports, and river ports, and the airports in Oregon. It does not mention specific connectors on a modal basis in this subsection.

The OFP defines a Strategic Freight Network based on connecting to eight major industries in the State based on commodity flows in the Oregon Statewide Travel Demand Model. Roads between centers of industry also were identified and included in the network. However, these were expressly noted as different from designated NHS freight intermodal connectors.

Specific Intermodal Connectors Listed

None specified.

Implications for Defining Freight Intermodal Connectors in Oregon

The plan recommends that ODOT identify intermodal connectors that currently are not classified as intermodal connectors in the NHS network. The recommended methodology is to gather input from local transportation planning agencies and tribal governments to locate connectors that provide access to intermodal facilities and other types of freight-generating business. The Oregon Freight Plan also recommends including a set of secondary connector routes as appropriate. The OFP was the genesis of the Oregon Freight Intermodal Connector System Study of which this literature review is a part.

[12] ODOT, *An Element of the Oregon Transportation Plan.* June 15, 2011. https://www.oregon.gov/ODOT/Planning/Pages/Plans.aspx#OFP

4.1.11 Oregon Ports and Airport Freight Chokepoints Study (2013)[13]

Overview of Study

The Oregon Ports and Airport Freight Chokepoints Study identifies locations, impacts, and possible solutions to key freight chokepoints at airports and marine ports in Oregon. The study is designed to help the Oregon Freight Advisory Committee (OFAC) prioritize chokepoints for future improvements.

The data for this study were gathered via an internet-based survey combined with follow-up phone calls and telephone interviews with staff from marine ports and airports in Oregon. The survey questions were developed to identify the key physical and operational constraints impacting goods movement at each airport and marine port. The survey allowed respondents to rate constraints on a simple high-medium-low scale; assess factors, such as the availability of industrial land or land use expansion constraints; and obtain qualitative feedback with specific comments regarding the nature and impacts of freight chokepoints, and potential solutions to address them.

Incorporation of Intermodal Connectors into Plan

The study incorporates access to markets via land-based modes as an issue to be considered for marine port chokepoints and airport chokepoints. In Table 1.1, the report identifies poor highway connections and congestion as constraints for 11 marine ports. Table 1.2 describes landside access problems as a chokepoint for up to nine airports. This includes congestion on access roads, safety or geometric concerns on access roads, and lack of truck gates as the type of highway chokepoints at Oregon airports.

Specific Oregon Intermodal Connectors Listed

At the Port of Portland, a grade separation is sorely needed at Rivergate Boulevard that would serve Canpotex, Columbia Grain, Evraz, Archer Daniels Midland, and other companies. When there is a long train, Rivergate Boulevard is blocked and subsequently, trucks block Lombard Road, shutting down the entire Rivergate Industrial District.

The Columbia River Bridge on the I-5 is a constraint for trucks traveling to and from the Port of Portland due to congestion, particularly in peak travel periods. Moreover, access to the port is impeded because there is no full interchange between Columbia Boulevard and I-5.

The Port of Portland also identified the following two issues as its greatest physical impediments:

- I-5/Marine Drive Interchange congestion, particularly during peak afternoon hours, impedes the ability of trucks to efficiently access the Port; and,
- The lack of a grade separator at Rivergate Boulevard causes road congestion, truck idling, pollution, trouble accessing local businesses, safety issues, etc.

Other Intermodal Connector Issues:

[13] ODOT, *Oregon Ports and Airports Freight Chokepoints Study.* September 30, 2013.

- The Port of Garibaldi was marked as having poor connectivity to the highway system.
- The connectivity from Corvallis Municipal's Airport Rd to OR 99W needs to improve to handle its truck traffic.
- Bend Municipal needs overall better connectivity to the Powell Butte Highway along with improvement to the internal access roads, as they currently cannot safely handle freight trucks.
- The Illinois Valley Airport needs a connection to US199. This project already has applied for funding.
- The Astoria Regional Airport needs a more direct route to U.S. 101. By creating a direct route from the north side of the airport, the access distance would decrease from the current four miles to half a mile. The Port of Astoria needs a general improvement of the network connecting it to the Interstate system, since it takes two hours for trucks to go the 60 miles from the Interstate truly limiting the growth of the port.
- An expansion and overall improvement of OR38 and OR42 would greatly benefit the economic competitiveness of Coos Bay.
- Since US20 is not truck friendly, most access to the Port of Newport consists of city streets and residential areas. A truck bypass would be a solution to this. The Port of Bandon notes that its location is rural and it is a long distance to I-5. There are not good highway or rail connections available to the port.

The greatest physical impediments at marine ports related to freight connectors are listed in the report as:

- **Port of St. Helens –** U.S. 30 is not four lanes all the way through the port district, and Quincy Megler Road which provides access to the port's industrial park is a two-lane county road which impacts ports by restricting high use of trucks as a distribution option and makes the industrial site less attractive for truck-dependent industries.
- **Port of Morrow –** No direct access exists off I-84 to East Beach Industrial Park that constrains current and future growth of the port due to there being only one major access point to the port which is often congested.
- **Port of Hood River –** Has only one access road (I-84 at Exit 63) to the port's largest vacant industrial land parcel which constrains industrial development and as growth occurs, it could impede traffic. Additionally, the Hood River/White Salmon Interstate bridge deck is deteriorating and is a risk of failure for bridge traffic and difficult to navigate by barge.
- **Port of Tillamook Bay Industrial Park, Airport and Railroad –** A second entrance is needed to the industrial park. The existing entrance is a safety concern for passenger and freight traffic.

A list of the greatest physical impediments by airport related to freight connectors are listed in the report without specific locations. In total, 13 airports cited landside access constraints. The specific issues were typically inadequate roads access (e.g., capacity-constrained, two-lane roads) leading to general inefficiencies for businesses and potential safety concerns such as no dedicated turn lane to access the

airport. Table 2.11 lists the types of airport issues related to landside access, but no specific roadways that are mentioned.

As described in the report, PDX has the largest volume of cargo traffic, which the study felt warranted an in-depth coverage. This study identified that highway access issues include the key roads of Alderwood, Airport Way, and Cornfoot – that connect PDX to the highway system (I-205 and I-84) are congested, and there are limited with no options for expansion. Airport Way/I-205 interchange is undergoing some improvements, which is a positive development. However, there is nothing that can be done to improve Cornfoot, the road on which FedEx and UPS are located. During peak PM travel hours, the on ramps going north and south on I-205 at Airport Way are backed up due to a physical constraint, the road design and stop light positioning. A cloverleaf instead of stop lights might alleviate this issue. This issue of road access to PDX and congestion particularly impacts FedEx and UPS when they are running their afternoon and evening operations. It makes it more difficult for the companies to meet their aircraft cut-off times.

Airports also were asked whether they had any specific needs regarding connectivity to the Oregon State Highway System. The following five airports reported the following needs (some of which are listed on the previous page):

1. Illinois Valley Airport needs a highway approach at the north end of the airport property onto US199 (Redwood Highway) – an application for funding is being developed and approval is anticipated;

2. Lake County Airport would like to see better signage from I-5 directing travelers to the airport.

Surveys also were conducted with the private sector, trade association and ODOT Statewide Planning. These surveys included the following responses:

- **US30 to Astoria –** This road becomes two-lanes outside Columbia City, yet there is still nearly 70 miles from there to the Port of Astoria. Passing lanes exist but are poorly spaced, while the terrain can be challenging with lots of hills for trucks to climb. From the John Day River Bridge into downtown Astoria, traffic is slow due to road condition and geometry. During tourist season, the last 12 miles to Astoria typically takes 30-40 minutes. When trucks are trying to move east from the port docks, there are many one-way streets and 90-degree turns that are hard to navigate. Even though Astoria is only 60 miles from I-405, it takes trucks two hours to get there. One survey respondent stated that these issues are “a true limiting factor in the Port of Astoria attracting maritime-related industry.”

- **OR38 to the Port of Coos Bay –** also is problematic for port users (and has been so for over 60 years according to one respondent). The road follows the banks of the Umpqua River and was designed using standards from 100 years ago. Since it is bounded by a river and steep hills, there is little room to enhance or expand the road. OR42 (which approaches Coos Bay from the South) also was cited as a problem area by respondents. Two respondents stated that Coos Bay would greatly benefit from the addition of a four-lane highway connection to Interstate 5. This would make Coos Bay/North Bend much more competitive for Oregon exports, given that Coos Bay is a true deep water port. One respondent felt that Coos Bay is currently “hamstrung” by poor highway connections.

- **US20 to Newport –** has few passing lanes, narrow roadbeds, steep hills prone to slides, and houses which are constructed nearly on the shoulder of the road. Access to the docks at the Port of Newport is via city streets and through residential areas, which creates conflicts with local residents and businesses who do not want the heavy truck traffic. One responded stated that a truck bypass would alleviate this problem. It should be noted that ODOT has a project underway on the west end of US20 to straighten many of the tight curves for trucks.

In general, stakeholders felt that airports enjoy relatively good Interstate connectivity with I-84, I-5, and I-205. As compared to I-90 from the Port of Seattle, I-84 was seen to enable trucks to get through the Cascades without going over the mountains.

Implications for Defining Freight Intermodal Connectors in Oregon.

This report has more information on freight intermodal connectors in Oregon than any other report. It focuses on connectors that are in need of improvements, connectors that need to be built, and connectors between freight terminals, industrial parks and the broader Oregon road system. This study does not develop a systematic inventory of connectors, but it does provide information on landside access issues and places those issues in context with other operational needs by terminal for ports and airports. It will be important for the consulting team to get an electronic version of the survey and survey results from this study as a starting point for the survey to be developed for the Oregon Freight Intermodal Connector Study.

4.1.12 Oregon State Rail Plan (2014)[14]

Overview of Study

The Oregon State Rail Plan presents information and guidance related to improving and maintaining the rail network in Oregon.

Incorporation of Intermodal Connectors

The Oregon State Rail Plan does not discuss freight intermodal connectors at all. It does list the following major rail yards and terminals in Oregon as of 2010:

- Lake Guilds Yard – This yard provides both intermodal and carload services and is BNSF's principal intermodal terminal in Oregon. The Pacific Terminal Railway provides switching services and operates the yard for the Class 1 railroad;
- BNSF/UP Terminal 6 Intermodal Yard; and
- UP Brooklyn Yard.

The connecting roads to these intermodal yards are not described.

[14] ODOT, *Oregon State Rail Plan, An Element of the Oregon Transportation Plan.* September 18, 2014. https://www.oregon.gov/ODOT/Planning/Pages/Plans.aspx#OSRP

Specific Intermodal Connectors Listed

None specified.

Implications Regarding Definition of Freight Intermodal Connectors in Oregon

This plan does not provide information on intermodal connectors. It does describe attributes of the intermodal railyards that will be helpful in providing some information for ranking the connectors to railyards in the State.

4.1.13 Port of Portland Strategic Plan FY 2016-FY 2020 (2015)[15]

Overview of Study

This document sets goals and objectives for the Port of Portland and describes how success will be measured. The four strategic areas of the port over the next five years are industrial land, supply chain and trade, economy, and metro areas as centers of trade and transportation. The plan describes current conditions and potential solutions.

Incorporation of Intermodal Connectors into Plan

Intermodal connectors are mentioned indirectly in a few ways in this study. It was mentioned that community alignments is critical for the successful pursuit and development of industrial land. It is necessary to tell the Port's story better for these projects. This is similar to the requirements to be sensitive to community needs in designing or upgrading freight intermodal connectors at the Port of Portland. In the Supply Chain and Trade section of this plan, the connectivity assets of the port are mentioned as a tremendous advantage. The road connections are not specifically mentioned, but indirectly inferred by this statement. Additionally, with a focus on serving the Portland-Vancouver metropolitan region, the implicit importance of freight connectors is implied.

Specific Oregon Intermodal Connectors Listed

None specified.

Implications Regarding Definition of Freight Intermodal Connectors in Oregon

This plan is consistent with planning efforts that support freight connectors to the Port of Portland terminals. However, there is no specific guidance or information that will be useful in that regards.

[15] Port of Portland, *Strategic Plan FY 2016 – FY 2020.* https://www.portofportland.com/PDFPOP/StrategicPlan_16-20.pdf

4.1.14 Keep Oregon Trade Moving: International Trade and Logistics Initiative Steering Committee Report (2016)[16]

Overview of Study

This study is often referred to as the Oregon Transload Study. The Trade and Logistics Initiative is a collaboration between Business Oregon, Oregon Department of Agriculture, ODOT, and the Port of Portland (Steering Committee). The purpose of the committee is to understand the challenges that the shippers may face and to improve containerized freight transport. The goal is to form policy and funding solutions to solve any problems or inefficiencies.

The report lists policy actions to enhance trade in Oregon, with a few relating directly to the intermodal connectors. The Governor's Transportation Vision Panel Recommendations states that there should be investment made to improve intermodal freight connectors. Another policy action item calls to identify significant container movement on intermodal connectors and confirm that those roadways meet minimum design standards.

Incorporation of Intermodal Connectors into Plan

The strategies recommended in this study that require public agency support include:

- Port trucker information system;
- Truck driver training;
- Satellite container yards;
- Columbia River barge/rail service;
- New rail intermodal yard; and
- Portland cold storage and transload opportunities.

Some of these strategies indirectly relate to connectors. The development of a new rail intermodal yard would require a connector road for trucks accessing the facility. The port trucker information system would likely include information on the operating conditions of connector roads. Satellite container yards along with cold storage and transload opportunities also would impact truck usage of roads nearby the Port of Portland.

Specific Oregon Intermodal Connectors Listed

None specified.

[16] ODOT, *International Trade and Logistics Initiatives Steering Committee Report.*

Implications for Defining Freight Intermodal Connectors in Oregon

This report reinforces the importance of connectors, but does not specify connectors that need to be improved.

4.1.15 ODOT Freight Highway Bottlenecks Project (underway)

Overview of Study

This study will identify and analyze highway freight bottlenecks in Oregon. As of the development of this literature, the available information from this study is the data and assessment report. The report describes the key data sources from the study as: National Performance Management Research Data Set (NPMRDS), Highway Economic Requirements System - State Version (HERS-ST), other probe data (as needed for gap filling), the Statewide Integrated Model, and TransGIS.

Incorporation of Intermodal Connectors into Plan

There are several road networks that will be covered in this study, but it will not include designated freight intermodal connectors.

Specific Oregon Intermodal Connectors Listed

None specified.

Implications Regarding Definition of Freight Intermodal Connectors in Oregon

The usage of NPMRDS as the primary truck speed data source will likely be consistent with the source of truck speed data for the OFICS study.

4.2 Plans in Other States/Regions related to Freight Intermodal Connectors

4.2.1 National Highway System Connectors to Freight Facilities in the Delaware Valley Region (2001)[17]

Overview of Study

The study looks at the connectors between the 12 key intermodal facilities, freight terminals, or clusters and the NNHS. The current characteristics of the connectors are noted, including the traffic and physical conditions, which are then addressed with improvement recommendations to alleviate any deficiencies.

Definition of Freight Intermodal Connectors Used

By NHS definition, there are only 10 intermodal facilities that are of key importance, but this study added two more that were deemed critical by the Metropolitan Planning Organization (MPO). While the study does not recommend new NHS connectors for the designated NHS intermodal facilities, it does recommend potential NHS connectors for the two added facilities according to the NHS connector criteria.

Characteristics of Freight Intermodal Connectors Studied

The current conditions of the intermodal connectors include information on pavement conditions, highway on-and-off movements, roadway and shoulder width conditions, turning movements and queuing area conditions, railroad crossings conditions, restrictive overhead bridges, signage conditions, and the possible impacts to the community.

Information Inventory of Freight Intermodal Connectors

Not discussed in report.

Performance Measures and Prioritization of Freight Intermodal Connectors

Not discussed in report.

Investment Strategy Related to Freight Intermodal Connectors

The study develops project concepts with estimated costs as solutions to problems on the connectors. It also identifies potential funding sources. The funding sources include the State and Federal Highway Funds, Regionwide Reconstruction/Restoration/Resurfacing Program, the Delaware Valley Region Planning Commission's (DVRPC's) Annual Planning Work Program, the Pennsylvania Highway Planning Program, state Transportation Improvement Program (TIP) funds, Regionwide Railroad/Highway Grade Crossing Program, resurfacing funds, DOT maintenance funds, and economic development grants.

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[17] Delaware Valley Regional Planning Commission, *National Highway System Connectors to Freight Facilities in the Delaware Valley Region.* October 2001. https://www.dvrpc.org/reports/01017.pdf

Implications for Defining Freight Intermodal Connectors in Oregon

While this study does not provide criteria for identifying intermodal connectors beyond that those already included in the NHS criteria, it does provide a detailed overview of potential funding solutions for recommended projects. Some of these funding options will be relevant to the Oregon Intermodal Connector Study.

This study raises two important points about designating critical intermodal connectors that were not considered in the initial designation of NHS intermodal connectors:

1. Some connectors may serve multiple intermodal terminals, including terminals that are not on the NHS list. Considering all intermodal terminals a connector serves may be important to a determination of how critical the connector is.
2. Connectors that are linked to planned intermodal terminals need to be considered when designating critical intermodal connectors.

4.2.2 National Highway System Connectors to the Freight Facilities in the Delaware Valley Region (2007)[18]

Overview of Study

This study is a follow-up of the 2001 National Highway System Connectors to the Freight Facilities in the Delaware Valley Region study conducted for the Delaware Valley Goods Movement Task Force. One purpose of this study is to evaluate current intermodal facilities and connectors to compare them to the FHWA NHS designation criteria, and then to modify, delete, or add any facilities or connectors deemed necessary. This study also assesses the condition and performance of the connectors, identifies significant deficiencies, and creates a list of connectors and recommendations for improvement projects for the connectors.

Definition of Freight Intermodal Connectors Used

The FHWA NHS intermodal facility and connector designation criteria were used for this study.

Characteristics of Freight Intermodal Connectors That Were Studied

The following characteristics of the connectors were gathered as part of the study:

- Pavement conditions;
- Highway on-and-off movement;
- Roadway and shoulder width;
- Turning movements and queue area rating;

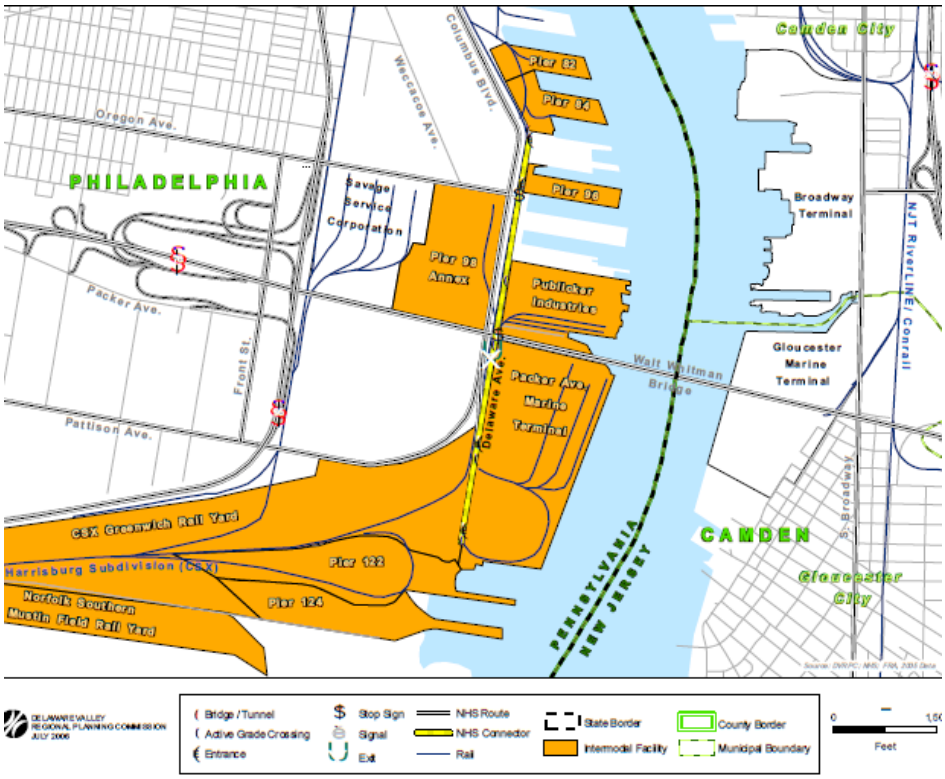
[18] Delaware Valley Regional Planning Commission, *National Highway System Connectors to Freight Facilities in the Delaware Valley Region.* 2007. https://www.dvrpc.org/reports/07024.pdf

- Railroad crossing conditions;
- Bridges restricting overhead movement;
- Signage quality; and
- Impacts on residential community.

The information was gathered through surveys that were distributed by the Delaware Valley Regional Planning Commission (DVRPC) and completed by operators of intermodal facilities. Each of the bullets above is a section of the evaluation form. The form also allows the survey respondents to rate connector characteristics as “Good,” “Fair,” or “Poor” along with providing the option to provide open-ended comments related to each characteristic.

Figure 4-3 shows an example of map developed for this study to demonstrate the alignment of the freight intermodal connector relative to the freight terminals and other elements of the road network.

Figure 4-3 Map of South Philadelphia Rail and Port Complex



Source: National Highway System Connectors to Freight Facilities in the Delaware Valley Region, 2007.

Information on Inventory of Freight Intermodal Connectors

The study describes maintaining the connector inventory that is mentioned in the study. It also identifies two facilities that are under development and will likely qualify for status as a designated freight intermodal connectors.

Performance Measures and Prioritization of Freight Intermodal Connectors

No specific performance measures are mentioned in this study. There was useful information about connector characteristics. Survey respondents rated connector characteristics as "Good," "Fair," or "Poor."

Investment Strategy Related to Freight Intermodal Connectors

The study describes three implementation/next steps to be directed towards intermodal connectors:

- Harness maintenance funds from state DOTs;
- Incorporate recommended improvements into the State TIP Process; and
- Continue planning work in future years.

Implications for Defining Freight Intermodal Connectors in Oregon

The format of the evaluation survey might be adaptable for the Oregon Intermodal Connector Study as it has a very simple layout but still manages to cover all the major topics regarding physical characteristics. It does not delve into issues of speed, congestion, and safety. But keeping it as simple as a question per topic with option for comments, will most likely produce a high reply rate.

4.2.3 Northeast Ohio Areawide Coordinating Agency Intermodal Connector Analysis on the National Highway System (2009)[19]

Overview of Study

The Northeast Ohio Areawide Coordinating Agency (NOACA) region has more than 30 miles of designated NHS connectors. This study aims to create an overview of these connectors, modify the connectors, and add additional connectors along with the facilities they are serving if necessary. The general purpose is to update the NHS connector and facility lists.

Definition of Freight Intermodal Connectors Used

There are no explicit criteria for defining the intermodal connectors or facilities, but the study identifies the largest intermodal facilities based on activity (trucks per year and tonnage) and the roads that most often are used to reach these facilities from the NHS network.

Characteristics of Freight Intermodal Connectors That Were Studied

Connector length was a key characteristic included in the report. The activity of the terminals is described in terms of trucks per day and tons per year. Figure 4-4 shows an example of the characteristics identified in the study for the Norfolk Southern intermodal rail terminal in Cleveland. Figure 4-5 shows

[19] Northeast Ohio Areawide Coordinating Agency, *Technical Memorandum Intermodal Connector Analysis on the National Highway System.* March 2009. http://www.noaca.org/modules/showdocument.aspx?documentid=82

intermodal terminals and facilities on the Cuyahoga River identified in the study. Figure 4-6 shows a map of intermodal connectors for the CSX intermodal terminal in Cleveland.

Figure 4-4 Characteristics of Connectors in NOACA Study

NHS INTERMODAL TERMINAL CONNECTIONS

Terminal: Cleveland

Norfolk-Southern RR Container, Facility ID = OH48R (see Map 6)

Connecting Route:

OH48R, Connector 1 - from I-90 (exit 171) southeast on Broadway Avenue (US422) to facility entrance at East 9th Street, approximately 0.1 miles

Criteria:

1995 - Trucks per day: 100

1995 - Tons per year: 245,980

This facility is currently inactive.

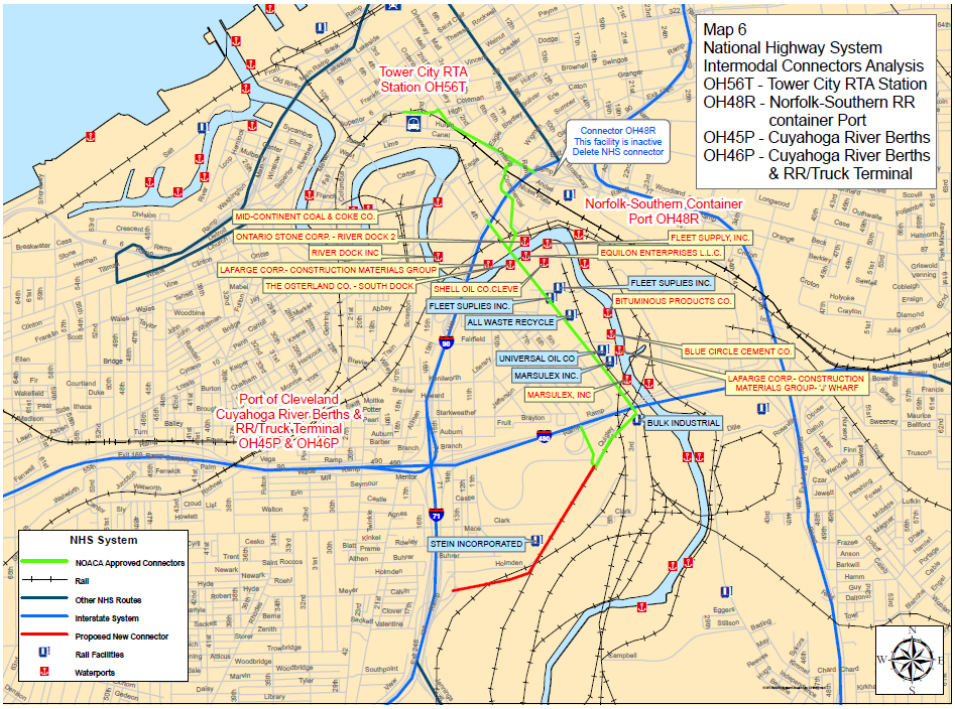
2008 - NOACA recommends removal of this intermodal connector.

Source: NOACA Technical Memorandum on Intermodal Connector Analysis on the National Highway System, 2009.

Information on Inventory of Freight Intermodal Connectors

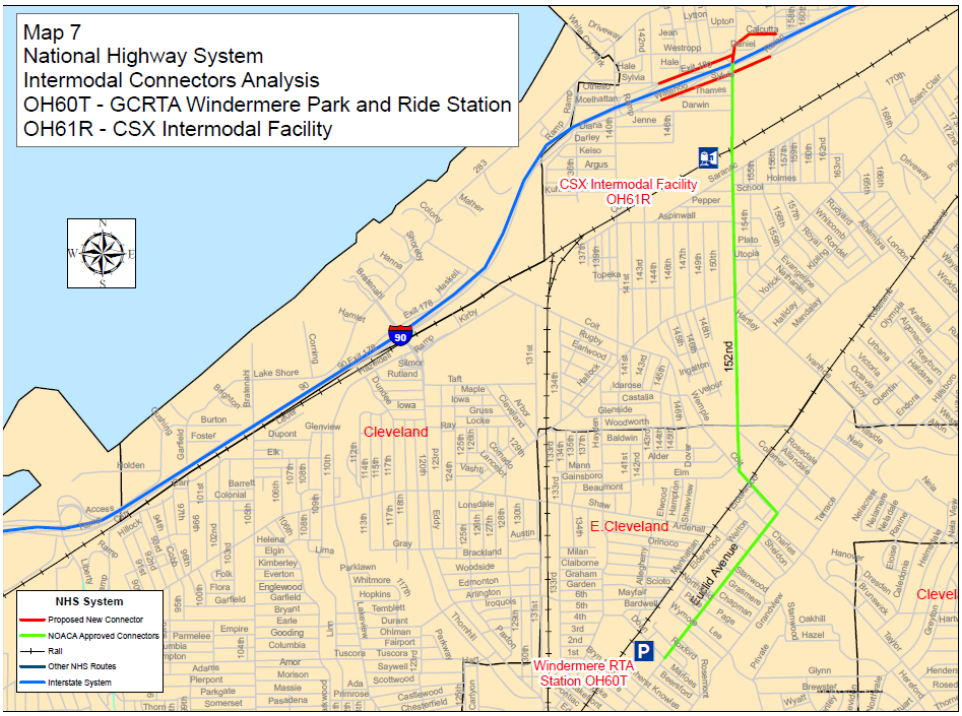
The changes to the NHS Intermodal Connectors sought by the NOACA are based on a state's ability to modify the currently designated NHS System granted by Section 103(b), of Title 23, U.S.C. (cited in Chapter 2).

Figure 4-5 Map of Intermodal Facilities and Terminals on the Cuyahoga River



Source: NOACA Technical Memorandum on Intermodal Connector Analysis on the National Highway System, 2009.

Figure 4-6 Map of Connectors for Cleveland CSX Intermodal Facility



Source: NOACA Technical Memorandum on Intermodal Connector Analysis on the National Highway System, 2009.

Performance Measures and Prioritization of Freight Intermodal Connectors

Not discussed in the final report.

Investment Strategy Related to Freight Intermodal Connectors

The study specified freight connectors to add, delete and modify from the official NHS designation criteria in Ohio (Table 4.1). Connectors that are deleted from the list will no longer be eligible for federal funding sources that are targeted for the NHS. Roadways that are newly designated as NHS freight connectors will be eligible for these funding sources. The Ohio DOT would need to request these changes from FHWA.

Table 4.1 Recommended Changes to Designated NHS Connectors in Cleveland Region

Recommendation	Facility ID	Connector Number	Facility Name	Connector Miles Change
Delete	OH54R	1	Norfolk Southern Class 1 Warehouse	-0.90
Delete	OH54R	2	Norfolk Southern Class 1 Warehouse	-1.00
Delete	OH48R	1	Norfolk Southern Container Facility	-0.10
Delete	OH53T	2	Strongsville Park and Ride facility	-0.20
Modify	OH52T	1	Triskett Rapid Transit Park and Ride station	-0.70
Modify	OH43P	2	Port of Cleveland (east basin)	-0.30
Modify	OH44P	1	Port of Cleveland (west basin)	+0.30
Modify	OH47P	1	Port of Cleveland (Cuyahoga River Berths (off Broadway Ave.))	+0.80
Modify	OH57T	2	Municipal Park and Ride Lot	-0.20
Modify	OH52T	2	Triskett Rapid Transit Park and Ride Station	-0.20
Modify	OH60T	1	Windermere Rapid Transit Park and Ride Station	+1.00
Modify	OH59T	1	Cleveland State University RTA Station	+1.50
Modify	OH62T	1	Green Road Rapid Transit Park and Ride Station	+0.50
Modify	OH53T	1	Strongsville Park and Ride Facility	+0.30
Modify	OH56T	1	Tower City Rapid Transit Station	+0.10
Modify	OH45P	1	Port of Cleveland-Cuyahoga River Berths (W. 3rd St. Peninsula)	+0.20
Add	OH46P	new	Port of Cleveland - Cuyahoga River berths (W. 3rd Street industrial area) (proposed new connector to facility)	+0.90
Add	OH62T	new	Green Road Rapid Transit Park and Ride Station (proposed new connector to facility)	+1.10
Add	new	new	Norfolk Southern intermodal facility in Maple Heights	+1.00
Add	new	new	Westlake Park and Ride Facility	+0.30
Add	new	new	North Olmsted Park and Ride Facility	+0.20
Add	OH55B	new	Greyhound Terminal (proposed new connector to facility)	+0.60
Add	OH47P	new	Port of Cleveland, Cuyahoga River berths (east bank) (proposed new connector to facility)	+0.50

Implications for Defining Freight Intermodal Connectors in Oregon

The format is very clear and should be considered when writing the Oregon Intermodal Connector Study. Each facility has a page dedicated to it with a clear map, photo of the facility, and description of the connecting routes and their length. This same format, but with much greater detail and information, can be used to present the connectors for the Oregon Study.

4.2.4 Defining the Washington State Truck Intermodal Network (2011)[20]

Overview of Study

This report is designed to aid the Washington Freight Mobility Plan in defining the intermodal network, since the State did not at the time have a definition of the freight truck-intermodal system. The purpose of this report is to "define essential freight facilities in Washington State."

The research team's first step was to review the methodology of other states in identifying connectors and freight facilities. They then reviewed the NHS freight connectors and the Bureau of Transportation Statistics (BTS) Intermodal Terminals Database from 2003 to review how they defined facilities and connectors. The team contacted MPOs and regional transportation planning organizations (RTPOs) in Washington and asked them to nominate any other connectors and facilities beyond those mentioned in the NHS or BTS data sets. While they provided additional freight facilities, they did not provide the criteria used to select them.

Definition of Freight Intermodal Connectors Used

Tier 1 (T-1) and Tier 2 (T-2) are used to define the two categories of freight facilities and general freight corridors based on the amount of tons the connectors transport per year. T-1 carries more than 10 million tons per year while T-2 carries anywhere from 4 to 10 million tons per year. WSDOT also expanded the criteria to the following recommended draft criteria for intermodal facilities:

Intermodal facilities:

- Airports: more than 100,000 tons annual cargo volume.
- Marine terminals: 50,000 20-foot equivalents (TEU) or 500,000 tons annually (MAP-21 (Moving Ahead for Progress in the 21st Century Act) definition).
- Rail terminals, Barge Loaders: *has not been defined by the research team.*

Defining intermodal connectors through T-1 and T-2 would miss many important connectors, since the connectors don't carry enough tonnage to be qualified within either category threshold. The University of Washington research team worked to expand and provide a proper criteria for intermodal connectors in Washington. Their research and results are found in the Connectivity Analysis of the Washington State Freight Mobility Plan:

- For each of the intermodal facilities identified as essential, identify the key connector from the intermodal facility to the essential freight network. Classify this route as essential.
- To specifically address critical agricultural facilities (CAF), identify the roadway that connects the Tier 1 and Tier 2 network to crop group-specific critical agricultural facilities or facility clusters. These facilities can/will be established through geographic information system-based network

[20] Goodchild, Anne, *Defining the Washington State Truck Intermodal Network.* WA-RD 783.1. December 2011. https://www.wsdot.wa.gov/research/reports/fullreports/783.1.pdf

analysis resulting from coordination with industry leaders of the specified crop who have intimate, data-driven knowledge of both the year-round and seasonal significance of the facilities or facility clusters

Part of the study conducted research on how other states and plans defined the freight generators. One common trend emerged, the freight generator ranking and activity was partially based on the industry sector they belonged in. The Regional Goods Movement Study by the San Francisco Metropolitan Transportation Commission divided the freight generators into three tiers (also known as GM Ranking) based on their industry:

- **Tier 1: Goods Movement Dependent Groups –** These are businesses/industries that have goods movement as a central focus of their activity and that typically exhibit frequent freight vehicle trips inbound and outbound. Goods movement access is important to location decision-making for these businesses/industries.

- **Tier 2: Goods Movement User Groups –** These are businesses/industries that depend on regular goods movement, although it is of less importance to business operations and secondary to other business purposes. For these groups, goods movement access is typically not as important as other factors in making location decisions.

- **Tier 3: Incidental Goods Movement Customers –** These are businesses/industries that use goods movement services incidentally, and most do not ship or receive goods in significant volume.

The goods movement ranking of each industry is provided in Table 4.2.

Table 4.2 WSDOT
GM Ranking by Industry

GM Rank	Industry Group
1	Air Carriers
1	Airports
1	Postal, Parcel, & Express
1	Maritime Industries
1	Seaports
1	Rail Carriers
1	Pipelines & Refineries
1	Resource Extraction
1	Truck Carriers
1	Fuel Dealers
1	Household Goods (HHG) Carriers
1	Local Manufacturing
1	Local Wholesale
1	Waste Management
1	Local/Regional Manufacturing
1	Local/Regional Wholesale
1	Regional Manufacturing
1	Regional Wholesale
1	Truck Rental & Leasing
1	Warehousing
2	Utilities & Telecom
2	Vehicle Towing
2	Construction
2	Agriculture & Husbandry
2	Equipment Rental
2	Transport Support
2	Computer & Electronics Mfg.
2	Pharmaceutical & Biotech Mfg.
2	*Big Box Retailers*
2	*Gas Stations*
3	*Accommodations & Food Services*
3	*Education & Health Care*
3	*Entertainment & Recreation*
3	*Finance & Insurance*
3	*Industrial Services*
3	*Information Industry*
3	*Organizations & Government*
3	*Passenger Transport*
3	*Real Estate*
3	*Repair & Maintenance*
3	*Retail Trade*
3	*Services*

Characteristics of Freight Intermodal Connectors That Were Studied

Not discussed in the final report.

Information Inventory of Freight Intermodal Connectors

Not discussed in the final report.

Performance Measures and Prioritization of Freight Intermodal Connectors

Not discussed in the final report.

Investment Strategy Related to Freight Intermodal Connectors

Not discussed in the final report.

Implications Regarding Definition of Freight Intermodal Connectors in Oregon

The definition used for intermodal terminals in this study can serve as a basis that can be modified for Oregon.

4.2.5 Houston-Galveston Area Council (H-GAC) Freight Plan (2013)[21]

Overview of Study

The H-GAC Freight Plan provides the necessary planning to support and provide improvements to the current freight network in the Houston-Galveston region. By making appropriate investments, the region can gain a competitive edge in the international supply chain. The planning is based on analysis and outreach to regional stakeholders so that all challenges and opportunities are uncovered.

The plan gives an overview of the current goods movement in the region, maps significant corridors and facilities, identifies commodity flow patterns, and identifies key industries using the goods movement system. The study also outlines key trends that are impacting the goods movement system and analyzes important trends in employment and population growth, international trade, supply chains, transportation industry developments, and regulation and policy.

Key issues and trends are presented with potential solutions and further recommendations to improve the vitality of the region's goods movement. This is done specifically for intermodal connectors after they have been prioritized.

Definition of Freight Intermodal Connectors Used

The plan relies on the originally defined intermodal connectors presented in the NHS and input from stakeholders. The input from the stakeholders did not change the criteria of the intermodal connectors, but connectors mentioned by the stakeholders were added to the connector list.

Characteristics of Freight Intermodal Connectors That Were Studied

Intermodal connectors are mentioned as having issues with geometric design, truck capacity, pavement quality, safety, drainage, access control, real-time traffic information, traffic signalization timing, and limited driver wayfinding.

Information Inventory of Freight Intermodal Connectors

The report includes a list of all the connectors that are identified and have physical and/or operational inefficiencies.

Performance Measures and Prioritization of Freight Intermodal Connectors

The study applied the following criteria to filter out nonpriority connectors:

[21] https://www.h-gac.com/taq/freight-planning/freight-resources.aspx

- Connector is not designated by the Federal Highway Administration (FHWA) as an official NHS Intermodal Freight Connector and does not provide connectivity to the region's stakeholder-defined freight significant corridor network;
- Is privately owned; or
- May impose significant community or environmental impacts (such as identified land use conflicts) or does not serve any of the region's chief intermodal facilities identified in the Regional Goods Movement Profile.

Freight intermodal connectors that successfully passed through the above mentioned filters, became priority connectors. For many of the priority connectors a near-term, interim-term, and/or long-term possible solution is noted when necessary.

Investment Strategy Related to Freight Intermodal Connectors

There is no discussion of investment strategy specific to intermodal connectors, but rather general freight opportunities.

Implications for Defining Freight Intermodal Connectors in Oregon

The prioritization methodology is very clear and could be easily implemented in the Oregon Freight Intermodal Connector Study.

4.2.6 2010 SIS Strategic Plan: Implementation Guidance for Changes to Designation Criteria and Thresholds (Florida, 2014)[22]

Overview of Study

The 2014 updates of the 2010 SIS Strategic Plan identifies changes in the designation criteria and implementation guidelines. The original 2010 Strategic Intermodal System (SIS) Strategic Plan confirmed the policy framework originally established by the 2005 designation and continuous updates to ensure that the facilities and corridors with the greatest importance and impact are prioritized in planning.

Definition of Freight Intermodal Connectors Used

Hub-to-corridor, hub-to-hub, and military installation-to-corridor connectors are the only connectors eligible for SIS designation. The criteria for the hub-to-corridor designation has been altered to provide greater flexibility. New criteria for the hub-to-hub is created along with further guidance for military installation-to-corridor connector criteria. The criteria are cited in Table 4.3 for each type of connector.

[22] The Florida Department of Transportation, *2010 SIS Strategic Plan Implementation Guidance for Changes to Designation Criteria and Thresholds.* January 2014. http://www.fdot.gov/planning/sis/designation/desig-change.pdf

Table 4.3 Florida SIS Connector Criteria

Connector Type	Criteria
Hub-to-Corridor	Connects to the nearest or most appropriate SIS or Emerging SIS corridor to facilitate interregional, Interstate, or international trips Meets the following conditions where possible: 1. Ability to accommodate significant flows of interregional, Interstate, or international trips to/from a hub 2. Ability to provide high-speed, high-capacity, limited access service 3. Ability to provide the most direct access 4. Ability to provide two-way directional movement 5. Meets Community and Environmental Screening criteria established for SIS facilities (required for all connectors) It is assumed that a single hub is associated with a single intermodal connector. However, more than one connector to a single hub can be designated if any of the following conditions are met: 6. Hub meets both freight and passenger thresholds, and freight and passenger handling facilities have discrete access points at different locations 7. Hub has multiple terminals or terminal areas with discrete access points 8. Existing interregional flows of people or goods are divided significantly among more than one mode or more than one major geographic flow 9. Separating passenger and freight connections improves overall mobility to/from the hub 10. Allowing multiple options provides needed redundancy and resiliency
Hub-to-Hub	Intermodal freight drayage route: 11. Route provides direct connection from one SIS hub to another SIS hub 12. Route's primary purpose is to move freight from one SIS hub to another SIS hub via public access facilities Intermodal passenger transfer facility: 13. Route provides exclusive-use service with no intermediate stops 14. Majority of trips on route are for interregional or Interstate passengers
Military Installation-to-Corridor	Criteria (must meet one of the following): 15. Designate as "Military Access Facilities" Strategic Highway Network (STRAHNET) roads and Strategic Rail Corridor Network (STRACNET) rail lines serving main entrance(s) of U.S. Department of Defense military installations with at least 0.25% of total U.S. military and civilian personnel. 16. Designate as "Military Access Facilities" Strategic Highway Network (STRAHNET) roads and Strategic Rail Corridor Network (STRACNET) rail lines serving main entrance(s) of military installations designated as the Governor's Continuity of Government site(s).

The report continues to define multiple other factors in the in the Strategic Intermodal System, such as Intermodal Logistics Centers (ILC). The ILC is defined as "facility or group of facilities serving as a point of intermodal transfer of freight in a specific area physically separated from a seaport where activities relating to transport, logistics, goods distribution, consolidation, or value-added activities are carried out and whose activities and services are designed to support or be supported by conveyance or shipping through one or more seaports."

Characteristics of Freight Intermodal Connectors That Were Studied

No characteristics are discussed in the study.

Information on Inventory of Freight Intermodal Connectors

No formal list of connectors is found in the study.

Performance Measures and Prioritization of Freight Intermodal Connectors

There are no performance measured used in the study. The designation of intermodal connectors is based on qualitative assessment that the connector can provide high-speed, high-capacity, limited-access service.

Investment Strategy Related to Freight Intermodal Connectors

Using the definition of ILC and criteria for defining connectors, funding can be allocated to meet the needs of the system under the Intermodal Logistics Center Infrastructure Support Program. This program was created for the purpose of providing funds for roads, rail facilities, or other aspects of the freight system that are vital to its success and maintenance.

Implications for Defining Freight Intermodal Connectors in Oregon

The definition of the Hub-to-Corridor connectors are not necessarily quantitative, but have a very detailed qualitative definition that can be used in the Oregon Intermodal Connector Study as general guidance.

4.2.7 Washington State Freight Mobility Plan (2014)[23]

Overview of Study

The Washington State Freight Mobility Plan aims to maintain and improve the current freight network in order to promote economic growth and trade through well-planned investments. By studying the conditions and performance of the freight system, the plan prioritizes project and programs for the most cost effective growth. This plan will give Washington a competitive edge for federal funding as well.

[23] https://www.wsdot.wa.gov/NR/rdonlyres/4AB1DCDE-5C29-4F08-B5E7-697F432C34D7/0/2014WashingtonStateFreightMobilityPlan.pdf

Definition of Freight Intermodal Connectors Used

The connectors defined by Washington State are all first and last-mile connectors that link to strategic national defense facilities, significant intermodal facilities, warehouse districts, other industrial/commercial lands, distribution centers, and agricultural processing centers. Along with tonnage that defines the freight economic corridors, the study defines first-/last-mile connectors.

The State Truck Freight Economic Corridors have four elements:

1. T-1 freight corridors that carry more than 10 million tons per year.

3. T-2 freight corridors that carry 4 to 10 million tons per year.

4. Alternative freight routes that serve as alternatives to T-1 truck routes that experience severe weather closures, and carry 300,000 to four million tons per year.

5. First-/last-mile connector routes between freight-intensive land uses and T-1 and T-2 freight corridors.

There were several levels of criteria that were used in this plan. The criteria that were used to identify the connector routes are:

- To-and-from T-1 and T-2 truck routes and strategic U.S. defense facilities.
- Over dimension truck freight routes that connect the State's significant intermodal facilities to the T-1 and T-2 highway system.

The urban criteria were used to identify the connector routes are:

- To-and-from the interstate system and the 1) closest major airport with air freight service, 2) marine terminals, ports, barge loaders and other intermodal facilities, and 3) warehouse/industrial lands.
- From high-volume urban freight intermodal facilities to other urban intermodal facilities, e.g., from the Port of Seattle to the BNSF rail yard in Seattle.

The rural criteria were used to identify the connector routes are:

- To-and-from state freight hubs located within five miles of T-1 and T-2 highways; freight hubs are defined as: 1) agricultural processing centers, 2) distribution centers, 3) intermodal facilities, and 4) industrial/commercial zoned land.
- Routes that carry one million tons during three months of the year (reflecting seasonality) of agricultural, timber or other resource industry sector goods.

Characteristics of Freight Intermodal Connectors That Were Studied

Characteristics of the connectors that were analyzed in the Freight Plan include pavement and bridge conditions. Additionally, bottlenecks on connectors were categorized by type: slow speed, reliability, resiliency, restricted access roads for legal loads, and clearance restriction for overheight loads.

Pavement and bridge conditions are part of the WSDOT's internal inventory system that is created through the help of cities and counties. The bottleneck analysis was completed with the use of GPS truck data collected by Washington State and then categorized by the thresholds illustrated in the Table 4.4.

Table 4.4 WSDOT Freight Mobility Plan
Categories of Truck Bottlenecks

Bottleneck	Criteria Threshold	Implications for Freight
Slow Speed	More than 50 percent of sampled trucks traveling below 60 percent of the posted speed (35 mph on urban freeways).	Travel time increases.
Reliability	80th percentile of truck speeds relative to average truck speeds.	Users connect reliably estimate travel times, leading to poor on-time performance.
Resiliency	Disruptions caused by severe weather, natural disasters (earthquakes), or other causes. Minimum average of at least 5,000 trucks per day on the freight corridor. Truck corridor has had at least one full closure lasting longer than 24 hours in a rolling 20-year period.	Facility failure causes large statewide economic impacts for shippers, goods receivers, and carriers.
Restricted Access for Legal Loads	Facility has a posted weight limit below the legal gross vehicle weight of 105,500 pounds or the facility has a posted height limit below 14 feet, the legal height limit for trucks.	Legal truck loads cannot travel on the State truck freight economic corridors.
Clearance Restriction for Overheight Loads	Facility has a height clearance less than 17 feet.	Overheight loads have to take detour routes adding too many additional miles to the trip.

The study also includes freight forecast data from FHWA Freight Analysis Framework for the weight and value for the year 2030. However this was done on an overall freight network scale instead of specifically for intermodal connectors.

Information on Inventory of Freight Intermodal Connectors

This study did not generate a formal list of intermodal connectors. The final chapter of the Washington State Freight Plan has a list of unfunded investments for programmatic improvements categorized into Interstate, highway, local, waterway, rail, and air projects. The projects are further classified based on potential MAP-21 funding eligibility. The eligibility categories are:

- Construction, rehabilitation;
- ITS;
- Environmental impact reduction;
- Rail-highway grade separation;
- Interchange improvements;

- Truck-only lanes;
- Truck climbing and runaway truck lanes;
- Truck parking facilities;
- Real-time traffic information system;
- Intermodal connector improvements; and
- Truck bottleneck improvements.

Performance Measures and Prioritization of Freight Intermodal Connectors

The truck performance measures are a combination of an effort to reduce the negative while trying to improve the positive.

The performance measures to be reduced are:

- **Truck travel time –** To track truck performance on the interstate as required by MAP-21, WSDOT will use the American Association of State Highway and Transportation Officials (AASHTO) recommended performance measure, annual hours of delay. This is defined as travel time above the congestion threshold in units of vehicle hours for commercial vehicles on the Interstate Highway System. In the future, WSDOT will use this measure to track speed performance on Washington's Truck Freight Economic Corridors. To evaluate project proposals, WSDOT uses regional travel demand models to estimate the reduction or change in truck travel time.
- **Direct truck operating cost –** WSDOT bases the value of time on the information collected from national truck carrier surveys, and uses this formula: *change in commercial vehicle hours traveled x truck operating cost per hour = change in direct truck operating cost*.
- **Truck engine emissions –** The U.S. Environmental Protection Agency's Motor Vehicle Emission Simulator (MOVES) modeling system estimates emissions for mobile sources covering a broad range of pollutants and allows multiple-scale analysis. WSDOT uses regional factors derived from MOVES for their analysis.

The elements to be improved are:

- **Economic output –** This is defined as employment, and regional and state economic output. As part of the Freight Plan, WSDOT developed and tested a transparent and robust methodology to account for the economic output of highway projects with truck freight benefits.
- **Network resiliency –** This is defined as the ability to reduce closures of the state's designated Truck Freight Economic Corridors that are due to severe weather or natural disasters and last 24 hours or more.

- **Reliability –** This uses spot speed as part of a formula for the 80th percentile reliability index is: $Freigth\ RI_{80} = \frac{8\text{-}th\ Percentile\ Travel\ Time}{Agency\ Travel\ Time}$

These are general performance measures and prioritization of all roads in the freight economic network and not specific to freight intermodal connectors.

Investment Strategy Related to Freight Intermodal Connectors

The potential funding mechanism for the projects identified in the Freight Mobility Plan include the fuel tax, a vehicles miles traveled (VMT) fee, and state registration fees. The study discusses general funding mechanisms for freight projects but does not delve into intermodal connector-specific projects.

Implications for Defining Freight Intermodal Connectors in Oregon

The definition could be useful in general guidance but no direct quantitative definition was given that could be applicable to the Oregon Intermodal Connector Study. The performance measures of the whole freight system could be useful in applying directly to the intermodal connectors for the Oregon study.

4.2.8 Minnesota Statewide Freight Plan (2015)[24]

Overview of Study

The Minnesota Statewide Freight Plan explores its Principal Freight Network (PFN) in Task 4, Project Development Guidance to the Plan, by creating an overview of its conditions and performance. It uses the established NHS definition for intermodal facilities to confirm if any facilities not currently on the NHS network fall within the NHS definition.

Definition of Freight Intermodal Connectors Used

The Minnesota Statewide Freight Plan uses the NHS definition of intermodal connectors and does not alter it any way. It adds that secondary criteria can identify intermodal connectors that are recognized only in Minnesota and connect to "major facilities." The primary and secondary criteria were used to screen those facilities that are of importance to Minnesota. Two additional criteria were added for the State of Minnesota:

Regional Significance – This criteria relates to whether or not a facility is regionally significant in terms of freight volumes, commodities, or markets served.

Future Growth – This criteria relates to whether or not a facility has potential for high future growth that may translate to future needs.

[24] Minnesota Department of Transportation, Cambridge Systematics, Inc., *Minnesota Statewide Freight System Plan.* May 2015. https://www.dot.state.mn.us/planning/freightplan/pdf/MinnesotaPrincipalFreightNetworkDraftReport.pdf

Characteristics of Freight Intermodal Connectors That Were Studied

The only direct characteristic that was discussed in the report is the proximity of an intermodal connector to major freight routes and systems. However, the study uses trucks per day and TEUs per year to evaluate if the connector falls within the NHS criteria. The projected growth was discussed for some facilities to evaluate the facility within updated criteria for Minnesota.

Information Inventory of Freight Intermodal Connectors

There is no list of intermodal connectors. There is a list of intermodal terminals.

Performance Measures and Prioritization of Freight Intermodal Connectors

No performance measures were included in this report.

Investment Strategy Related to Freight Intermodal Connectors

There is no information on investment strategy in the final report.

Implications for Defining Freight Intermodal Connectors in Oregon

The study expands on the NHS definition of intermodal connectors to consider the overall regional impact a facility has along with the projected growth. This is something that should be considered for the Oregon Freight Intermodal Connector Study.

4.2.9 San Joaquin Valley Freight Connector Study (2016)

Overview of Study

This study currently is underway for MPOs and Regional Transportation Planning Agencies (RTPA) in the San Joaquin Valley of California. The study assesses the conditions and performance of connectors that reach freight generating centers, also known as clusters, and not just intermodal facilities.

Definition of Freight Intermodal Connectors Used

In the study, connectors are defined as "*a roadway that connects a major truck route to/within the vicinity of freight activity centers in the region."* The study did not consider highways on the primary network or primary through-routes as eligible candidates for connectors. To identify the connectors, more than a dozen clusters that are considered important freight activity centers and the freight generating facilities within them are defined first based on location. The clusters were identified using previously collected data on the location of freight generating establishments in the San Joaquin Valley. Then, the connectors that lead to these clusters and facilities were identified and presented to the Technical Advisory Committee members for input.

Characteristics of Freight Intermodal Connectors That Were Studied

Cambridge Systematics currently is collecting information on the following characteristics for this study:

- Daily truck volumes;
- Travel times;
- Safety;
- Intersection geometry; and
- Pavement conditions.

Those connectors that do not have enough data on them are classified as Tier 2 Connectors. Tier 1 connectors are those that have ample data and are on high volume roads that connector to freight generating facilities.

Information on Inventory of Freight Intermodal Connectors

The process of completing the final formal list of connectors is underway. Once the study is completed, there will be a final formal list of connectors in the San Joaquin Valley. This list, and their conditions, will aid in evaluating eligibility of the roadways for funding and creating a freight system for the region.

Performance Measures and Prioritization of Freight Intermodal Connectors

Connectors that serve higher usage freight generating facilities and have high truck volumes are considered Tier 1 connectors. Those that connect to lower usage freight generating facilities and lack data are considered Tier 2 connector.

Investment Strategy Related to Freight Intermodal Connectors

The study reports that aside from connectors that qualify and are designated as NHS intermodal connectors, there is no designated funding set-aside for connector improvements. One goal of the study is to put greater priority on funding improvements to the connectors using local roadway improvement and maintenance funds and to recommend funding at the state level for non-NHS connectors.

Implications for Defining Freight Intermodal Connectors in Oregon

The approach to identifying connectors in this study varies greatly compared to the criteria for identifying them in the Oregon Intermodal Connector Study since the San Joaquin Valley study looks at connections to areas with heavy freight activity. The Oregon Study only focuses on intermodal facilities and connectors to each one specifically rather their general grouping.

4.2.10 Federal Studies Related To Intermodal Connectors

NCFRP Report on Performance Measures for Freight Transportation (2011)[25]

One of the most comprehensive reviews of freight performance measures was conducted for the National Cooperative Freight Research Program (NCFRP) Report 10, *Performance Measures for Freight Transportation*. This report identified a framework for national freight performance measures covering the following broad systemic areas:

1. **Performance.** Freight demand, freight efficiency;
2. **Condition.** Pavement measures, bridge measures, intermodal connector conditions;
3. **Safety.** Truck-involved injury and fatal crashes, highway/rail at-grade crashes;
4. **Environmental impacts.** Freight-related greenhouse emissions, other criteria pollutants; and
5. **Investment.** Highway, rail, and waterways.

The framework includes specific measures within each category and decision areas that are supported. While these performance measures were developed for freight at the national level, they serve as a good starting point for considering the performance of freight intermodal connectors as well. The first category of performance of a freight intermodal connector includes freight demand elements, such as truck volumes and truck percentage, including how these vary by time of day, day of week, and season in year. Many freight intermodal connectors are located in freight-intensive regions, so understanding how much of the truck traffic on the connector is due to a specific intermodal facility also would be a key performance measure to understand, while being potentially difficult to track on a consistent basis due to privacy concerns by facility operators. Freight efficiency can be measured in a number of ways for a freight intermodal connector, including truck and total vehicle speeds, speeds relative to free flow or posted speed limits, along with consideration for how these volumes vary throughout a typical operating day of the facility.

Pavement condition measures are particularly important to freight intermodal connectors. These connectors can sometimes carry more traffic than similarly classed roadways. This is compounded by higher than average percentages of trucks, and sometimes heavily loaded trucks which accelerates pavement deterioration. Additionally, maintenance of freight intermodal connectors may be prioritized lower than other local roadways due to the lack of representation of roadway users in the local project prioritization process. Bridge and crossing conditions also can be important for intermodal connectors that have these features.

Safety issues related to intermodal connectors are similar to other freight-intensive roadways where truck-auto operating conflicts can occur. Additionally, where underinvestment in freight intermodal connectors occur, roadway features, such as median barriers, shoulders, and access management features, may not match the needs of the truck and auto volumes that exist on the facility.

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[25] Gordon Proctor Associates, *National Cooperative Freight Research Program No. 03, Performance Measures for Freight Transportation.* March 18, 2008. https://www.trb.org/Publications/Blurbs/165398.aspx

Environmental impacts of vehicles using freight intermodal connectors can be worse than other similarly classed roads due to the usage of older trucks to perform drayage operations for many intermodal facilities. Typical dray trucks average much less mileage than over-the-road trucks, so the fuel efficiency requirements are not as important, which pushes dray truck operators to older trucks that cost much less, but typically have higher emission rates associated with the older vehicle fleet. These impacts may have environmental justice issues, as well as, many freight facilities are located in lower-income neighborhoods.

Investment related to freight intermodal connectors is an important measure to track due to the mismatch between the regional and national benefits and the local ownership and operation of these roads. This mismatch has the potential to cause investment of these roadways to be less than what is needed, and even potentially less than roadways with lower truck and auto volumes. This can be particularly problematic as freight intermodal connectors tend to have higher truck volumes and therefore more condensed maintenance cycles.

4.2.11 FHWA Freight Intermodal Connector Study (2016)

The FHWA recently completed a study on freight intermodal connectors that included the following tasks:

- Data and Literature Search, Review and Synthesis;
- Outreach and Interviews;
- Case Studies;
- Analysis of NHS Intermodal Connectors Conditions and Performance;
- Planning and Funding for Intermodal Connectors;
- Analysis of Port Facilities; and
- Final Report.

Key Trends Impacting Freight Intermodal Connectors

As part of the data and literature search, the following six key trends impacting freight intermodal connectors were identified:

2. Continued globalization and increasing global consumer population;

    6. Global manufacturing shifts, including near-shoring/resourcing;
    7. Emergence of ecommerce fulfillment centers;
    8. New sources of domestic oil and gas;
    9. Emerging use of liquefied natural gas as a marine transport fuel; and

10. Panama Canal expansion accelerating the use of ultra-large ships.

These also are major trends that have the potential to impact freight intermodal connectors in Oregon.

Definition of Freight Intermodal Connectors

The designated NHS freight intermodal connector criteria are presented in Table 4.5. The primary criteria are based on annual freight volumes, or daily vehicular traffic on one or more principal routes that serve the intermodal facility. The secondary criteria are intended to highlight the importance of an intermodal facility within a specific state.

One element for this research is how recent changes in commodity flow patterns and logistics practices are generating more or different traffic on existing connectors or creating entirely new ones. Hence this literature review and subsequent tasks in this project sought to highlight major freight and economic trends, and how those trends are shaping the use and performance of the nation's intermodal connectors.

Table 4.5 Criteria for Adding to or Modifying the NHS Intermodal Connector Subsystem

Primary Criteria	
Airports	100 trucks per day in each direction on the principal connecting route, or 100,000 tons per year arriving or departing by highway mode.
Ports	Terminals that handle more than 50,000 20-foot equivalent units (TEU) per year, or other units measured that would convert to more than 100 trucks per day in each direction; or Bulk commodity terminals that handle more than 500,000 tons per year by highway or 100 trucks per day in each direction on the principal connecting route.
Truck/Rail	50,000 TEUs per year, or 100 trucks per day, in each direction on the principal connecting route, or other units measured that would convert to more than 100 trucks per day in each direction.
Pipelines	100 trucks per day in each direction on the principal connecting route.
Secondary Criteria	
Intermodal terminals that handle more than 20 percent of freight volumes by mode within a state.	
Intermodal terminals identified either in the Intermodal Management System or the State and metropolitan transportation plans as a major facility.	
Significant investment in, or expansion of, an intermodal terminal.	
Connecting routes targeted by the state, MPO, or others for investment to address an existing, or anticipated, deficiency as a result of increased traffic.	

Source: 23 CFR 470-Appendix D.

Characteristics of Freight Intermodal Connectors

An inventory of NHS freight intermodal connectors demonstrates that these road are primarily comprised of relatively short connectors. The vast majority of the connectors are short in length with 71 percent of the connectors being less than one mile, and 31 percent of the connectors are less than one-quarter of a mile long (Table 4.6).

There are very few long connectors, but they make up the majority of the centerline miles of the NHS intermodal connector system. Twelve percent of the freight intermodal connectors are two miles or longer. From a centerline mile perspective, these longest 12 percent of connectors are responsible for nearly half of the total 1,484 miles of freight intermodal connectors in the U.S. The average length of freight intermodal connectors increases as the roadway functional class increases. Local roads are the shortest connectors with an average of 0.45 miles and principal arterials are the longest connectors with an average of 1.51 miles.

Two-thirds of freight intermodal connectors are owned by city, county, or other local agencies with the other one-third owned by state agencies. In total, 91 percent of local roads are owned by local agencies; 84 percent of collectors are owned by local agencies; and arterials are split roughly evenly between local and state agencies.

The use, condition and performance of freight intermodal connectors also were the focus of a task. The use of connectors was measured by truck and auto volumes. The condition of connectors was measured based on pavement condition from the HPMS. The performance was measured by truck and auto speeds using NPMRDS.

Table 4.6 Distribution of Segment Lengths for Freight Intermodal Connectors

Length (Miles)	Number of Connectors	Percent of Total
0 to 0.99	1,080	71.4%
1.00 to 1.99	245	16.2%
2.00 to 2.99	92	6.1%
3.00 to 3.99	40	2.6%
4.00 to 4.99	20	1.3%
5.00 to 5.99	15	1.0%
6.00 to 6.99	6	0.4%
7.00 to 7.99	5	0.3%
8.00 to 8.99	2	0.1%
9.00 to 9.99	0	0.0%
10 and more	8	0.5%
All	1,513	100.0%

Source: 2013 HPMS.

The study also states that on average, the intermodal connectors have about 762 trucks per day, with 50 percent having less than 500 trucks per day. The pavement condition for the majority of connectors is Fair and below, with the largest share, 37 percent, having poor pavement conditions. On overage the speeds on intermodal connectors drop 11 percent between free-flow and daytime speeds.

Freight Connector Funding Options

To further understand the intermodal connectors, the study completed 18 case studies, which were selected to represent a cross-section of all the regions and modes within the U.S. After the 18 were

located, data was assembled to analyze their current and future condition, reviewing of previous documents and literature, and outreach to stakeholders.

The study then summarizes the key findings and the potential solutions to problems, including funding options. The connectors are eligible for funding from via the following list:

- National Highway Performance Program;
- Surface Transportation Program;
- Highway Safety Improvement Program;
- Congestion Mitigation and Air Quality Improvement Program;
- Project of National and Regional Significant: Section 1120;
- Transportation Investment Generating Economic Recovery;
- Grant Anticipation Revenue Vehicles; and
- Moving Ahead for Progress in the 21st Century (MAP-21):
    - Transportation Infrastructure Finance and Innovation Act; and
    - Projects of National and Regional Significance.

Florida and Texas are the only two states that were identified through this research to have funding sources that are specifically focused on improvement projects on freight intermodal connectors. The names of these programs are the State of Texas' Port Access Account Fund, the State of Florida's Intermodal Access Program, and the Florida DOT "Quick Fix" program.

Planning for Intermodal Connectors

The study included 18 case studies, including a case study at a marine terminal at the Port of Portland and a case study at the Portland International Airport. Information from these case studies will be helpful for developing an inventory of characteristics for the connectors at these terminal locations.

The study also included estimates of the costs to improve freight intermodal connectors in terms of adding capacity to relieve congestion and improving the pavement quality of these roads.

Freight Performance Measures Identified in Other Jurisdictions

The FHWA Freight Intermodal Connector Study also identified that there are a few regions that have taken steps to develop freight-specific performance measures, and many others that evaluate freight activity as part of their project prioritization process. The Florida DOT developed its Strategic Investment Tool as part of the Strategic Intermodal (SIS) program. This tool incorporates metrics, such as truck volume, supporting facilities, safety, and volume-to-capacity ratios, which have both truck and auto impacts. Table 4.7 shows the full list of metrics included in this tool.

Table 4.7 Florida DOT Freight Performance Measure Categories and Metrics

Category	Selection Criteria Metric	
Safety and Security	17.	Crash ratio
	18.	Fatal crashes
	19.	Bridge appraisal rating
	20.	Link to military base
System Preservation	21.	Volume/capacity (v/c) ratio
	22.	Truck volume (AADTT)
	23.	Vehicular volume (AADT)
	24.	Bridge condition rating
Mobility	25.	Connector location
	26.	Volume/capacity (v/c) ratio
	27.	Truck volume (AADTT)
	28.	Vehicular volume (AADT)
	29.	System gap
	30.	Change in V/C – level of service (LOS) (for mainline segments only)
	31.	Interchange operations (for interchanges only)
	32.	Bottleneck/grade separation
	33.	Delay
Economics	34.	Demographic preparedness
	35.	Private-sector robustness
	36.	Tourism intensity
	37.	Supporting facilities
	38.	Economics
Quality of Life	39.	Land and social criteria
	40.	Geology criteria
	41.	Habitat criteria
	42.	Water criteria
	43.	Quality of life

Source: Florida DOT Strategic Intermodal Tool, November 2008.

The Port Authority of New York and New Jersey (PANYNJ) developed measures as part of their Goods Movement Action Plan that can be populated from many existing databases. While these measures were designed to be evaluated at the regional or corridor level, they have some overlapping relevance for intermodal connectors. The PANYNJ measures are as follows:

- Gross regional product;
- Freight tonnage, ton miles and value by mode;
- Travel time in representative freight corridors;
- Travel time reliability in representative freight corridors;
- Freight carrier average operating costs;
- Pavement condition index in representative freight corridors;
- Structurally deficient bridges along representative freight corridors;
- Truck-involved fatalities and serious injuries;
- System redundancy and ready access; and
- Capital investment in regional freight corridors and facilities.

Additionally, recent work such as the Department of Commerce National Advisory Committee on Supply Chain Competitiveness has identified methods for measuring the general performance of supply chains by focusing on average travel times, reliability of travel times, and cost.

4.2.12 Intermodal Component of FHWA Freight Efficiency Index (ongoing)

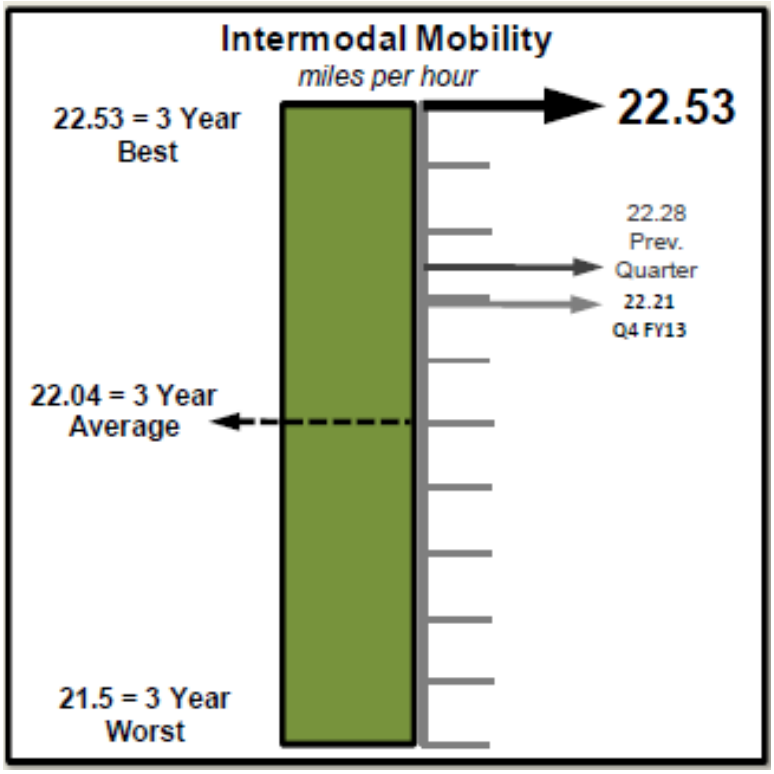
Currently, at the statewide and metropolitan levels, there are few freight performance measures that are tracked on a regular basis. At the federal level, the FHWA recently started tracking a Freight Efficiency Index as part of the Freight Performance Measures program. The Freight Efficiency Index includes four components: 1) intermodal, 2) truck bottlenecks, 3) border crossings, and 4) urban mobility, along with an aggregate measure of freight performance. The intermodal component of the index is based on the following features:

- Approximately 43 miles of intermodal roadways (ports and intermodal facilities) are included in this measure; more than one-half of these roadways are Functional Class Principal Arterial or above with design speeds at 35 miles per hour or higher.
- GIS/SAS algorithms are used to select data for the highway segments at each location for the corresponding quarter.
- Average speeds are placed in a table and the key indicator is an average speed representing all locations. A quarterly measurement is developed based on the average of the average speeds at 30 facilities.

An example of the freight intermodal measure for the fourth quarter of fiscal year 2014 is shown below in Figure 4-7. This graphic shows the current reading, along with the best, worst, and average readings over the last three years. The connectors measured in this index do not match exactly with the designated NHS freight intermodal connectors. Their relationship to the designated connectors will be examined in greater detail as part of Task 5 of this study which will analyze the conditions and performance of a broad set of freight intermodal connectors.

The FHWA has recently released guidance on the development of freight performance measures to be tracked by each State DOT. The coverage of these roadways was focused on interstates and did not include measures targeted towards connecting roads.

Figure 4-7 Intermodal Component of FHWA Freight Efficiency Index



Source: FHWA Quarterly Report of Freight Efficiency Index, Fourth Quarter 2014.

4.3 Findings Based on Literature Review

This section summarizes information gathered in the literature review related to freight intermodal connector data sources. It also describes the findings of the literature review related to identifying freight intermodal connectors. Additionally, it describes the findings of the literature review related to the following four tasks in this study:

- Criteria used to identify freight intermodal connectors (Task 4)
- Inventory of Existing Conditions (Task 5)
- Developing the Freight Stakeholder Questionnaire (Task 6)
- Developing Performance Measures (Task 7)

4.3.1 Freight Intermodal Connector Data Elements

The literature review revealed that the agencies preparing the studies used several types of data to identify connectors and describe their condition and performance. Table 4.8 describes the key data types used in these studies and other types of data that we think will be relevant for identifying and describing freight intermodal connectors in Oregon. Some of this data could be used to develop performance measures (Task 7 of this study).

Table 4.8 Summary of Intermodal Connector Data Identified from Literature Review

Data Type	Data Source	Availability	Coverage and Fidelity	Application	Additional Issues to Consider
Truck counts	ODOT Transportation Systems Monitoring Unit	ODOT	All public roads Every three years	IC Identification criteria and possibly investment strategy. Estimate freight moving on the road	Include all trucks on roadway not just to the terminal. Truck percentages are surrogates in many locations
Vehicle counts	ODOT Transportation Systems Monitoring Unit	ODOT	All public roads Every three years	Determine the amount of total traffic to understand congestion levels.	n/a
Pavement Condition	ODOT roadway characteristics database	ODOT	All public roads	Determine the road condition of connectors	Estimates at many locations
Truck speeds	NPMRDS	FHWA	NHS roads	Estimate operational performance of connectors	Coverage not complete on NHS roads, Sparse data in some locations. Non-NHS roads not included. Requires significant processing
Truck crash data	Oregon crash database	State of Oregon	All public roads	Identify locations where safety improvements may be needed	Few crashes on most connectors makes comparisons difficult
Roadway feature data	Oregon roadway characteristics database	ODOT, internet mapping tools	All public roads	Determine truck-friendliness of roadways	n/a
Intermodal terminal volumes, commodity flows and other characteristics	Terminal operators, Freight Analysis Framework database	At discretion of terminal operator	All terminals	Determine amount of freight moving through terminal and industries served	Accurate and comprehensive data must be collected through independent surveys
Truck origin, destination and routing data	Terminal operators, motor carriers	At discretion of terminal operator, motor carriers	All roads	Determine roadways used by trucks accessing intermodal terminals	Accurate and comprehensive data must be collected through independent surveys

4.3.2 Input for Task 3 – Intermodal Connector Identification Criteria

Definition of Intermodal Facility and Intermodal Connector

One finding from the literature review is that the identification of freight intermodal connectors is a two-step process. The first step is to identify what is an intermodal facility. After defining what an intermodal facility is, it is important to determine the characteristics of the facility that make it significant enough for consideration. This can be based on the physical size of the facility, the amount of freight traffic generated at the facility, number of employees, or other factors. For purposes of the Oregon Freight Intermodal Connector System Study, an intermodal facility is defined as an intermodal terminal where freight is transferred between two modes of transportation with one of the transfers involving trucks.

The second step in the designation process is to determine what an intermodal connector is. The FHWA definition of an intermodal connector is a set of roadways that connect an intermodal terminal to the primary NHS network. One of the primary goals of this project is to identify additional intermodal connectors in Oregon. In order to include intermodal facilities from all parts of the state, it would be helpful to include the entire state highway system (not just the NHS portion) in the study area. The additional intermodal connectors would connect the intermodal facilities to this larger highway system.

FHWA and Oregon Intermodal Connector Criteria

Through this literature review, it is recommended that ODOT develop a two-tier intermodal connector designation criteria. Tier 1 would be the current FHWA designation for NHS freight intermodal connectors. The FHWA connector criteria are shown in Table 4.9. By including Tier 1 as a stand-alone category similar to the FHWA process, ODOT can track the use, condition and performance of freight connectors in a manner that is consistent with how the FHWA considers these roadways. Additionally, the vast majority of planning work both inside and outside of Oregon utilizes the FHWA criteria when considering connectors, so this will provide consistency with how other agencies have measured these roadways.

Table 4.9 Criteria for Adding to or Modifying the NHS Intermodal Connector Subsystem

Primary Criteria	
Airports	100 trucks per day in each direction on the principal connecting route, or 100,000 tons per year arriving or departing by highway mode.
Ports	Terminals that handle more than 50,000 20-foot equivalent units (TEU) per year, or other units measured that would convert to more than 100 trucks per day in each direction; or Bulk commodity terminals that handle more than 500,000 tons per year by highway or 100 trucks per day in each direction on the principal connecting route.
Truck/Rail	50,000 TEUs per year, or 100 trucks per day, in each direction on the principal connecting route, or other units measured that would convert to more than 100 trucks per day in each direction.
Pipelines	100 trucks per day in each direction on the principal connecting route.
Secondary Criteria	
Intermodal terminals that handle more than 20 percent of freight volumes by mode within a state.	
Intermodal terminals identified either in the Intermodal Management System or the State and metropolitan transportation plans as a major facility.	

Significant investment in, or expansion of, an intermodal terminal.
Connecting routes targeted by the state, MPO, or others for investment to address an existing, or anticipated, deficiency as a result of increased traffic.

Source: 23 CFR 470-Appendix D.

Proposed Intermodal Connector Criteria

The following four criteria will be used to identify the Tier 2 Intermodal Connectors of the Oregon Freight Intermodal Connector System:

1. Connector must consist of public roads only.
2. Connector must serve as the primary access for trucks between an intermodal facility and a state highway or an existing NHS intermodal connector.
3. Connector should have a maximum length generally of five miles, however, it may be longer if justified and supported by ODOT and local jurisdiction.
4. The principle connecting street must have truck AADT greater than 50 trucks per day in each direction or the connector must serve a critical industry from an economic competitiveness perspective.

All four of these criteria must be met for a connector to qualify for Tier 2. If the principle connecting street of a connector has truck AADT greater than 100 trucks per day in each direction, the roadway should be considered as a candidate for a new NHS intermodal connector.

4.3.3 Input for Task 4 – Identify Additional Freight Intermodal Connectors

A selection of the studies reviewed for this report included specific roadways that can be considered for examination for designation as a freight connector. The 2013 Oregon Ports and Airports Freight Chokepoints Study involved many intermodal connectors. Outreach was conducted to the operators of the major freight terminals throughout the State and the operators were asked to identify bottlenecks that impact their businesses. This process identified issues on roadways of all functional classifications ranging from I-5 to local roads. The specific roadways and issues mentioned will help us identify intermodal connectors and describe their condition.

Several studies in the literature review mention and analyze freight connectors in a nonsystematic way. In many cases, the connectors were identified as part of outreach. In other cases, they were identified, but only relative to a small number of freight terminals.

It is expected that potential Tier 2 intermodal connectors will initially be identified through a review of:

- List of transload facilities from the ODOT Rail Division
- Modal maps in the 2006 Oregon Transportation Plan that contain airports, marine freight facilities and pipelines.
- The 2013 Oregon Ports and Airports Freight Chokepoints Study
- Input from stakeholder outreach during Tasks 5 and 6

4.3.4 Input for Task 5 – Inventory Existing Conditions

The freight intermodal connector studies completed by the Delaware Valley Planning Regional Commission (DVRPC) and the Northeast Ohio Areawide Coordinating Agency (NOACA) provide information on how to describe the existing conditions of the connectors. The DVRPC study included a comprehensive survey sent to terminal operators to collect an inventory of information related to the freight connectors. This study demonstrates that a survey can be a successful tool for developing a similar inventory in Oregon.

The NOACA study included a set of maps to illustrate the location of the connectors relative to other key freight and non-freight features in the subarea of the freight terminals. The maps are particularly useful to determine the criticality of the connector relative to the terminal, options for capacity expansion if needed, and alternative roadways that can be used if needed. This map provides a starting point for the mapping that will occur as part of the Oregon Freight Intermodal Connector System Study. Additionally, the maps developed for Oregon will incorporate some level of activity data such as truck volumes, pavement condition and speed data. The NOACA study also developed a recommendation list for adding, deleting, and modifying freight connectors relative to the FHWA NHS designation criteria.

4.3.5 Input for Task 6 – Develop Freight Stakeholder Questionnaire

The DVRPC study also provides some information on what to include in the freight stakeholder questionnaire. The ODOT freight stakeholder questionnaire will inform and validate the issues and concerns identified related to freight intermodal connectors. It will also attempt to collect information related to the freight data elements for freight intermodal connectors summarized in Table 5.1. The freight stakeholders that will be included in the survey will include public sector agencies that own and operate freight intermodal connectors. It will also include terminal operators, motor carriers, and shippers that directly or indirectly use freight intermodal connectors. The questionnaire also will include an opportunity for stakeholders to provide information on other potential intermodal connectors for consideration in this study.

4.3.6 Input for Task 7 – Develop Performance Indicators

The 2015 FHWA Freight Intermodal Connector Study provides a framework through which to consider activity on intermodal connectors – use, condition, and performance. It also identifies key data sources for measuring the elements of this framework such as the HPMS and the NPMRDS along with information on the accuracy of key data elements in these databases. Additionally, the FHWA study included detailed analysis of two freight terminals in the Portland, Oregon region that will be a source of information that can be used to create an inventory in the State.

Another key element to consider from the federal work is that the FHWA currently tracks a handful of freight connectors in the country and measures their speed performance on a regular basis. This can serve as the basis for measuring speeds for freight connectors in Oregon. It also is noted that guidance for freight performance measures was recently released, but these were focused on the Interstate system and not directly related to freight connectors.

Some of the state level studies included freight performance measures that are not specific to freight intermodal connectors. The Washington State Freight Mobility Plan included the following six measures to track performance of truck freight economic corridors:

1. Truck travel time

2. Direct truck operating cost
3. Truck engine emissions
4. Economic output
5. Network resiliency
6. Reliability

Many of these measures can be applied to freight intermodal connectors in Oregon. Travel times and costs can be estimated for trucks moving on connectors. Emissions can be estimated for trucks moving on the corridors. The employment at freight intermodal terminals and the economic value of goods moved through freight terminals can be estimated and related to the freight connectors. Reliability of freight intermodal connectors can also be measured using truck speed data to measure performance over time.

5.0 Appendix E: OFICS Summary Table

Table 5.1 List of Tier 1, 2 and 3 Intermodal Connectors in Oregon

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
1	OR10L	1	1 (NHS)	R1L02	Kinder Morgan Liquids Terminal	Petroleum Products	Portland	Front Avenue between Kitridge Avenue and 61st Street, 61st Street between Culebra Avenue and Front Avenue, Culebra Avenue between Balboa Avenue and 61st Street.	US30	Pavement condition
				R1L03	Chevron Products Company	Petroleum Products				
				R1R80	Northwest Industrial Area					
2	OR11R	1	1 (NHS)	R1R81	Lake Yards		Portland	Front Avenue between Kitridge and Nicolai, Nicolai Street between Yeon Avenue and Front Street.	US30	Connector surveyed, response did not identify any needs, pavement condition
3	OR12R	1	1 (NHS)	R1R09	Union Pacific Distribution Services		Portland	Interstate Avenue between Going Street and Larrabee Avenue, Russell Street between Interstate Avenue and Rail Facility, Going Street between Basin and I-5 (Hwy 1), Larrabee Avenue between Broadway Street and Interstate Avenue.	I-5, US30	Congestion relief, reduced mixing of traffic, pavement condition, intersection improvements
				R1R82	Albina Yards (UP) – Portland					
4	OR13P_1	1	1 (NHS)	R1P11	Port of Portland (Terminal 5)		Portland	Terminal 5 Access Road between Lombard Street and Terminal 5.	OR13P	Bridge issues, congestion, queueing, impacts of train movements, safety, weight restrictions, height restrictions, interchange improvements, mixing with traffic
5	OR13P_2	1	1 (NHS)	R1P03	Northwest Container Services		Portland	US30BY (Hwy 123) between US30 (Hwy 92) and Ivanhoe Street, Ivanhoe Street between US30BY (Hwy 123) and North Saint Louis, North Saint Louis between Lombard Boulevard and Ivanhoe Street, Burgard Street and Lombard Street between Company.	I-5	Discussed at Portland meeting - no needs identified
				R1P11	Port of Portland (Terminal 5)					
				R1P12	Port of Portland (Terminal 6)					
				R1P13	Port of Portland (Terminal 4)					
				R1R04	Green Transfer					
				R1R10	Oregon Transfer 1					

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
				R1R11	Warehouse Specialists (WSI) LLC					
6	OR14P	1	1 (NHS)	R1P12	Port of Portland (Terminal 6)		Portland	North Pacific Gateway Boulevard between North Marine Drive and Terminal 6.	OR13P	Discussed at Portland meeting - no needs identified
7	OR15P	1	1 (NHS)	R1P13	Port of Portland (Terminal 4)		Portland	North Terminal Road between Lombard Street and Terminal 4.	OR13P	Discussed at Portland meeting - no needs identified
				R1R06	Kinder Morgan	Petroleum Products	Portland			
8	OR23P_1	1	1 (NHS)	R1R84	Swan Island Ship Repair Yard		Portland	Going Street between Basin Street and I-5 (Hwy 1) (See Alpina Yards (UP) Portland).	I-5	Pavement condition, intersection improvements
9	OR23P_2	1	1 (NHS)	R1R84	Swan Island Ship Repair Yard		Portland	Greely Avenue between I-5 (Hwy 1) CN 001TQ and Going Street.	I-5	Pavement condition, intersection improvements
10	OR24P	1	1 (NHS)	R1P14	Port of Portland (Terminals 1 and 2)		Portland	Port Access Road between Yeon Street and Front Avenue.	US30	
11	OR6R	1	1 (NHS)	R1R85	Brooklyn Yard (SP) – Portland		Portland	Holgate Boulevard between McLoughlin Boulevard, or 99E (Hwy 81) and UPRR Track.	OR99E	Queueing outside of the gate
12	OR8A_1	1	1 (NHS)	R1A18	Portland International Airport		Portland	Columbia Boulevard between Hwy 123 (Killingsworth Street) and I-5, US30BY (Columbia Boulevard) between Killingsworth and I-205 CN 123AE.	I-5, I-205	Congestion, turning movement
13	OR8A_2	1	1 (NHS)	R1A18	Portland International Airport		Portland	47th Avenue between Columbia Boulevard and Cornfoot Road, Cornfoot Road between 47th and Alderwood Road, Alderwood Road between Cornfoot Road and 82nd Avenue, Airtrans Road between Cornfoot Road and Air Freight Terminals.	OR8A	Expansion constraints, Poor pavement, Needs sidewalks and bike lanes
14	OR8A_3	1	1 (NHS)	R1A18	Portland International Airport		Portland	82nd Avenue between Airport Way and Columbia Boulevard.	OR8A	Congestion, safety
15	OR8A_4	1	1 (NHS)	R1A18	Portland International Airport		Portland	Airport Way between I-205 (Hwy 64) and Portland International Airport Terminal.	I-205	Congestion, safety
16	OR9R	1	1 (NHS)	R1R86	Willridge Yards		Portland	Balboa Avenue between Culebra Avenue and US30 (Hwy 92).	I-205	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
17	R1T1P01	1	1	R1R15	Rivergate Terminal		Portland	North Rivergate Blvd	OR13P	
18	R1T1R02	1	1	R1R13	Oregon Transfer 2		Portland	North Leadbetter Road to North Marine Drive.	OR13P	
19	R1T2A01	1	2	R1A15	Portland Air Cargo		Portland	Northeast Alderwood Road.	OR8A	
20	R1T2L01	1	2	R1L01	Equilon Enterprises		Portland	Northwest Street Helens Road.	US30	
21	R1T2L02	1	2	R1L06	ConocoPhillips	Petroleum Products	Portland	Northwest Doane Avenue.	OR10L	
22	R1T2P01	1	2	R1P02	Cargill Grain Terminal, Portland	Agricultural Products	Portland		OR99W	
				R1P05	TEMCO Grain Terminal	Agricultural Products				
23	R1T2R02	1	2	R1R02	Alpine Foods	Food Products	Milwaukie	Southeast Mailwell Drive to Southeast Main Street.	OR99E	Pavement condition improvement, congestion relief, more truck parking,
				R1R03	Oregon Transfer					
24	R1T2R03	1	2	R1R12	Peninsula Terminal Company		Portland	North Force Avenue.	OR13P	Pavement condition improvement, congestion relief, safety issues
n/a	No IC – On State Highway	1	3	R1L04	Shore Terminals		Portland	None.	US30	
n/a	No IC – On State Highway	1	3	R1L05	BP West Coast Products	Petroleum Products	Portland	None.	US30	
n/a	No IC – On State Highway	1	3	R1P04	Ross Island Sand and Gravel	Sand/Gravel	Portland	None.	OR99E	
n/a	No IC – On State Highway	1	3	R1R05	Gresham Transfer		Portland	None.	US30	
n/a	No IC – On State Highway	1	3	R1R07	Pronto		Portland	None.	US30	
n/a	No IC – On State Highway	1	3	R1R14	Carson Oil Company	Petroleum Products	Portland	None.	US30	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
25	R1T2P02	1	3	R1P06	Knife River and Sundial Marine		Troutdale	Northeast Sundial Road to Northwest Marine Drive.	I-84	
26	R1T2R01	1	3	R1R01	Wymore Transfer Company		Clackamas	Southeast Capps Road to Southeast 130th Avenue.	OR224	
27	R1T2R04	1	3	R1R67	Lakeside Industries		Hillsboro	Southwest Wood Street.	OR219	
				R1R68	Knife River					
28	R1T2R05	1	3	R1R69	Oregon-Canadian Lumber Company	Timber or Forest/Paper Products	North Plains	Northwest Commercial Street to Northwest Glencoe Road.	US36	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
29	OR16A	2	1 (NHS)	R1A16	Mahlon Sweet Municipal Airport – Eugene		Eugene	Airport Road between Green Hill Road and OR99 (Hwy 91), Green Hill Road between Airport Road and Lockheed Road, Lockheed Drive between Greenhill Road and the Passenger Terminal, OR99 (Hwy 91) between Airport Road and	OR569	Congestion, safety, lighting
30	OR17R	2	1 (NHS)	R1R83	Eugene Reload Facilities – Eugene		Eugene	Garfield Street between 7th Avenue and Cross Street, Cross Street between Garfield Street and Cleveland Street, Cleveland Street between Cross and Roosevelt, Roosevelt Boulevard between Cleveland Street and OR99 (Hwy 91).	OR99	Pavement condition, safety, shoulders, truck parking, signage, turning movements
				R2R19	A&M Reload					
				R2R20	M&P Reload					
31	OR1P	2	1 (NHS)	R1P15	Port of Astoria		Astoria	Hamburg Street between US101 (Hwy 009) and Industry Street, Industry Street between Hamburg Street and Portway Street, Portway Street between US101 and Pier 1.	US101	Congestion, turning movements, rail crossing
32	R2T2A02	2	2	R2A05	McNary Field		Salem	25th Street Southeast.	OR22	Congestion, turning movements, mixing with bikes, safety, sidewalk, signalization
33	R2T2P05	2	2	R2P12	Port of Newport		Newport	Southeast Marine Scenic Drive.	US101	None identified.
34	R2T2P06	2	2	R2P14	Teevin Bros. Land and Timber – Rainer Terminal	Timber or Forest/Paper Products	Rainier	Dike Road to Rockcrest Street.	US30	Congestion, turning movements
				R2P15	U.S. Gypsum Plant	Fertilizer	Rainier			
35	R2T2P07	2	2	R2P18	Port of Toledo		Toledo	Southwest Altree Lane to Bay Boulevard.	US20B	
36	R2T2P08	2	2	R2P19	Georgia-Pacific Corporation	Timber or Forest/Paper Products	Toledo	Southeast Butler Bridge Road to Northwest 1st Street to Northwest A Street.	US20B	Congestion, truck length restrictions, safety improvements, signage improvements, pedestrian issues
37	R2T2P09	2	2	R2P51	Port Westward, Columbia Pacific Bio Refinery	Ethanol and related products	Clatskanie	Kallunki Road to Quincy Mayger Road to Beaver Falls Road to Northwest 5th Street to Nehalem Street.	US30	Roadway shoulders

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
38	R2T2R17	2	2	R2R36	Capital Cold Storage	Food Products	Salem	Salem Industrial Drive Northeast to Cherry Avenue.	OR99	Congestion, railroad crossings
				R2R37	Cascade Warehouse	Timber or Forest/Paper Products				
39	R2T2R22	2	2	R2R73	Stimson Lumber SW of Forest Grove	Timber or Forest/Paper Products	Washington County	Southwest Scoggins Valley Road.	OR47	None identified.
n/a	No IC – On State Highway	2	3	R2P08	Wauna Mill	Timber or Forest/Paper Products	Clatskaine	None.	US30	
n/a	No IC – On State Highway	2	3	R2P16	Port of St. Helens		Columbia City	None.	US30	
n/a	No IC – On State Highway	2	3	R2R24	Hayworth Warehouse		Harrisburg	None.	OR99E	
n/a	No IC – On State Highway	2	3	R2R28	Junction City Reload		Junction City	None.	OR99	Congestion, safety, impacts from train movements,
n/a	No IC – On State Highway	2	3	R2R30	Hunton Warehouse		Junction City	None.	OR99	
n/a	No IC – On State Highway	2	3	R2R31	Roseburg Forest		Junction City	None.	OR99	
40	R2T2P03	2	3	R2P07	Port of Astoria, Tongue Point		Astoria	Tongue Point Road to Old Columbia River Highway to Maritime Road.	US30	Pavement condition
41	R2T2P04	2	3	R2P09	Teevin Bros. Land and Timber – Westport Slough	Timber or Forest/Paper Products	Clatskaine	Westport Ferry Road.	US30	Pavement condition, congestion, weight restrictions, roadway width, safety issues, truck parking, striping, turning movements, mixing with other traffic, future truck volumes likely to be much higher
42	R2T2P10	2	3	R2P20	Nygaard Logging, Tansy Point Terminal	Timber or Forest/Paper Products	Warrenton	Northwest 13th Street.	OR104	Congestion, turning movements, mixing with cars/peds/bikes
43	R2T2P11	2	3	R2P52	Multnomah Industrial Park		St. Helens	Old Portland Road to Millard Road.	US30	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
44	R2T2P12	2	3	R2P53	Columbia City Industrial Park		Columbia City	E Street.	US30	
45	R2T2R06	2	3	R2R17	Log transload at Crabtree	Timber or Forest/Paper Products	Crabtree	Crabtree Drive to Cold Springs Road.	OR226	None identified.
46	R2T2R07	2	3	R2R18	Wilco Farmers	Agricultural Products	Donald	Oak Street Northeast to Butteville Road to Ehlen Road Northeast.	I-5	
47	R2T2R08	2	3	R2R21	Oregon Reload, Eugene		Eugene	Foch Street to Roosevelt Boulevard.	OR17R	
48	R2T2R09	2	3	R2R70	Paktech	Packaging Materials	Eugene	Prairie Road to Irving Road.	OR569	None identified.
				R2R72	Lane Forest Products	Timber or Forest/Paper Products				
				R2R22	Jerry Brown Company	Petroleum				
				R2R77	Kinder Morgan Eugene Terminal	Petroleum Products				
49	R2T2R12	2	3	R2R25	Crop Production Services	Agricultural Products	Brooks	Brooklake Road Northwest.	I-5	None identified.
50	R2T2R13	2	3	R2R27	Cascade Warehouse Company	Timber or Forest/Paper Products	Junction City	West 1st Avenue.	OR99	Congestion, truck parking, impacts from train movements
51	R2T2R14	2	3	R2R29	Swanson Group Reload		Junction City	Milliron Road.	OR99	Congestion, shoulder width, truck parking, impacts from train movements
52	R2T2R15	2	3	R2R32	General Transload at Lebanon		Lebanon	Industrial Way.	US20	Survey response completed - no issues identified
53	R2T2R16	2	3	R2R33	TTT, Philomath (timber)	Timber or Forest/Paper Products	Philomath	North 15th Street to College Street to North 19th Street.	US20	Weight restrictions, signalization
54	R2T2R19	2	3	R2R39	R&S Bagg		Shedd	Fayetteville Drive.	OR99E	No shoulders
55	R2T2R20	2	3	R2R71	Wilbur-Ellis	Fertilizer	Shedd	1st Street to Boston Mill Road.	OR99E	None identified.

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal / Business ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
56	R2T2R21	2	3	R2R40	Operates a transload facility in Woodburn		Woodburn	B Street to Young Street.	OR99E	Safety, turning movements
57	R2T2R23	2	3	R2R74	Banks Lumber Company	Timber or Forest/Paper Products	Banks	Northeast Sunset Street.	OR47	Mixing with passenger cars, signage, railroad crossing

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
58	OR21A	3	1 (NHS)	R1A17	Rogue Valley International Airport-Medford		Medford	Pine Street and Biddle Road between I-5 (Hwy 001) and OR62 (Hwy 22), Airport Road between Biddle Road and Biddle Road.	I-5, OR 62	Congestion, sidewalks, lighting
59	OR22P	3	1 (NHS)	R1P16	Port of Coos Bay – Roseburg Terminals		Coos Bay	Transpacific Pkwy between US101 (Hwy 009) and Jordan Cove Road, Jordan Cove Road between Transpacific Parkway and Private Road.	US101	Pavement condition improvement, congestion relief, improved pedestrian facilities, turning movement improvement for safety
				R3P26	Port of Coos Bay, Roseburg Chip Terminal		North Bend			
60	OR22P	3	1 (NHS)	R3P31	Port of Coos Bay, LNG Terminal	Petroleum Products	North Bend	Transpacific Parkway between US101 (Hwy 009) and Jordan Cove Road, Jordan Cove Road between Transpacific Parkway and Private Road.	US101	Pavement condition, congestion, pedestrian facilities, turning movement, safety
61	OR4P_1	3	1 (NHS)	R3P51	Port of Coos Bay – Ocean Terminals		North Bend	California Avenue between Sherman Avenue US101 (Hwy 009) and the Dock Facility.	US101	Pavement condition improvement, wider roadway, improved safey at rail crossing, improved turning movements for one-way portion, improved pedestrian facilities
62	OR4P_2	3	1 (NHS)	R3P51	Port of Coos Bay – Ocean Terminals		North Bend	Sheridan Avenue between US101 (Hwy 009) Port Facility	US101	Pavement condition improvement, wider roadway, improved safey at rail crossing, improved turning movements for one-way portion, improved pedestrian facilities
63	OR5P	3	1 (NHS)	R3P50	Port of Coos Bay – Isthmus Slough		North Bend	Newport Avenue between US101 (Hwy 009) and Edwards Street, Mullen Street between US101 (Hwy 009) and the Nickle and Chip Terminals, Edwards Street between US101 (Hwy 009) and Newport Avenue.	US101	Pavement condition improvement, congestion relief
64	R3T1P03	3	1	R3P27	Port of Coos Bay, Southport Lumber	Timber or Forest/Paper Products	North Bend	Trans Pacific Parkway to Jordan Cove Road.	OR22P	Congestion, roadway designation upgrade, impacts from train movements
65	R3T1P04	3	1	R3P28	Florida Ave Terminal	Timber or Forest/Paper Products	North Bend	Florida Avenue between Sheridan Avenue and Sherman Avenue	US101	None identified.
66	R3T2A03	3	2	R3A07	Southwest Oregon Regional Airport		North Bend	Airport Way to West Airport Way to Maple Leaf Stree to Maple Street to Virginia Avenue.	OR540	Pavement condition, safety, striping, mixing with bike traffic
67	R3T2R24	3	2	R3R43	RVTR		White City	14th Street to Avenue G.	OR140	Truck parking
				R3R58	Cascade Wood Products	Timber or Forest/Paper Products				

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
68	R3T2R27	3	2	R3R52	Boise Cascade	Timber or Forest/Paper Products	White City	6th Street to Avenue C to 7th Street to Antelope Road.	OR140	Congestion, truck parking
				R3R53	Weaver Forest Products	Timber or Forest/Paper Products				
69	R3T2R29	3	2	R3R46	Timber Products	Timber or Forest/Paper Products	Medford	Sage Road.	OR238	Congestion, overpass with no bike lanes or sidewalks
70	R3T2R37	3	2	R3R65	Roseburg Forest Products – Coquille	Timber or Forest/Paper Products	Coquille	South Cedar Point Road.	OR 42	Safety, turning movements, turn lane needed
n/a	No IC – On State Highway	3	3	R3R41	Blackwell Consolidation		Central Point	None.	OR140	Pavement condition, safety, access management, signalization
n/a	No IC – On State Highway	3	3	R3R47	Sierra Pine LTD	Timber or Forest/Paper Products	Medford	None.	OR99	
n/a	No IC – On State Highway	3	3	R3R50	Harry and David		Medford	None.	OR99	
71	R3T2P13	3	3	R3P24	Port of Brookings – Harbor		Harbor	Lower Harbor Road.	US101	Congestion, safety, signage, mixing with traffic
72	R3T2P14	3	3	R3P25	Port of Coos Bay, Charleston		Coos Bay	Boat Basin Road.	OR540	Survey response completed - no issues identified
73	R3T2P15	3	3	R3P35	Port of Port Orford		Port Orford	Dock Road to Harbor Drive.	US101	Pavement condition, roadway width, parking, striping, signage, turning movements, mixing with pedestrians
74	R3T2R25	3	3	R3R56	Timber Products	Timber or Forest/Paper Products	White City	Avenue F to 8th Street.	OR140	None identified.
				R3R57	Alumaweld Boats	Boats	White City			
75	R3T2R26	3	3	R3R55	Plycem USA		White City	5th Street.	OR140	None identified.
76	R3T2R28	3	3	R3R54	Carestream Health		White City	Pacific Avenue.	OR140	None identified.

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal ID#	Intermodal Terminal	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
77	R3T2R30	3	3	R3R48	Naumes, Inc.		Medford	South Fir Street to Barnett Road.	OR99	Impacts from train movements
				R3R49	Tree Top	Timber or Forest/Paper Products				
78	R3T2R31	3	3	R3R51	H.D. Fowler		Medford	South Stage Road.	OR99	Congestion, railroad crossings
79	R3T2R32	3	3	R3R59	Murphy Softwood Plywood Plant	Timber or Forest/Paper Products	Rogue River	North River Road to Classick Drive to Depot Street.	I-5	Congestion, truck parking, railroad crossing
80	R3T2R33	3	3	R3R60	Rogue Valley Door		Grants Pass	Northeast Beacon Drive.	US199	Sidewalk needed
81	R3T2R34	3	3	R3R61	Timber Products	Timber or Forest/Paper Products	Grants Pass	Southeast M Street.	US199	None identified.
82	R3T2R35	3	3	R3R62	Allweather Wood	Timber or Forest/Paper Products	North Bend	Hauser Depot Road.	US101	Congestion, truck parking, turning movements
83	R3T2R36	3	3	R3R63	Coos Bay Yard of Coos Bay Rail Link		Coos Bay	East Hall Avenue.	US101	Congestion, turning movements
				R3R64	Thomas & Sons Transportation Systems					

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal/ Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
84	R4T2A04	4	2	R4A12	Klamath Falls Airport		Klamath Falls	Airport Way to Joe Wright Road to Washburn Way.	OR140/US97	Congestion, shoulder and roadway width, safety, signage, turning movements, impacts from train movements, not designed for truck traffic,
85	R4T2A05	4	2	R4A14	Redmond Municipal Airport – Robert Field		Redmond	Southeast Veterans Way to Southeast Airport Way.	US97	
86	R4T2R38	4	2	R4R44	Prineville Freight Depot	Chemicals and sand	Prineville	Northwest Bus Evans Lane.	US26	
n/a	No IC – On State Highway	4	3	R4R78	Columbia Forest Products	Plywood	Klamath Falls	n/a. On private road	US97	
n/a	No IC – On State Highway	4	3	R4R79	Collins Products	Wood siding	Klamath Falls	n/a. On private road	OR66	
87	R4T2P16	4	3	R4P38	Port of Arlington – Mid Columbia Producers		Arlington	Port Island Road.	I-84	Pavement condition, congestion, shoulder width, safety, truck parking, striping, mixing with traffic, impacts from train movements,
88	R4T2P17	4	3	R4P39	Mid-Columbia Grain Growers Terminal	Agricultural Products	Biggs Junction	Bargeway Lane.	I-84	
89	R4T2P18	4	3	R4P42	Cargill Grain Terminal	Agricultural Products	The Dalles	Bargeway Road to Webber Street.	US30	
90	R4T2R39	4	3	R4R75	Fontana Wood Products	Timber or Forest/Paper Products	Prineville	Northwest Lamonta Road to Northwest Gumpert Road.	US26	
91	R4T2R40	4	3	R4R76	J&P (Juhl Enterprises)	Lumber and trusses	Klamath Falls	Memorial Drive	OR140	
				R4R77	Ed Staub and Sons	Propane				
n/a	No IC – On State Highway	4	3	R4R80	Prineville Freight Depot Bulk Facility	Magnesium chloride, diesel fuel, golf course sand, fatty acids, antifreeze	Deschutes County	None.	OR370	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal/ Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
92	OR2P	5	1 (NHS)	R5P44	Port of Morrow – Tidewater Wood Chip Terminal	Timber or Forest/Paper Products	Boardman	Boardman-Irrigon Road (Ullman to Coyote State Road), Ullman Boulevard (Boardman Road to Port Facility), Marine Drive (Ullman to Ter 3 Access Road), 084HC, Laurel Road (Boardman-Irrigon Road to I-84 Conn 084HC).	I-84	
				R5P48	Tidewater					
				R5P54	Morrow Cold Storage	Food Products				
				R5P55	Watts Bros					
				R5P57	Lamb Weston East					
				R5P58	Oregon Potato	Agricultural Products				
				R5P59	Boardman Foods	Food Products				
				R5P60	Oregon Hay	Agricultural Products				
				R5P70	Port of Morrow – Boardman					
93	R5T2A06	5	2	R5A10	Eastern Oregon Regional Airport		Pendleton	Airport Road.	US30	Survey response completed - no issues identified
94	R5T2L04	5	2	R5L08	Kaneb Pipeline Operating Partnership	Petroleum Products	Umatilla	Launch Lane to Beach Access Road to Roxbury Road to Bud Draper Road.	US730	Pavement condition
				R5P45	Port of Umatilla					
				R5R76	JM Eagle	Pipes				
95	R5T2P21	5	2	R5P56	Lamb Weston West		Boardman	Olson Road to Columbia Avenue Northeast.	OR2P	

Number of Connectors	Intermodal Connector ID#	Region	Tier	Intermodal Terminal/ Business ID#	Intermodal Terminal/ Business	Commodity	City or County	Connector Roads	Connecting Highway or Intermodal Connector	Connector Road Needs
96	R5T2P22	5	2	R5P43	Port of Morrow – Morrow County Grain Growers	Agricultural Products	Boardman	Rail Loop Drive to Lewis and Clark Drive to Columbia Boulevard to Dewey West.	OR2P	
				R5P61	Cascade Specialties	Timber or Forest/Paper Products				
				R5P62	Pacific Ethanol	Petroleum Products				
				R5P63	Tidewater Petroleum	Petroleum Products				
				R5P64	Northwest Container					
				R5P65	POM Freezer	Food Products				
				R5P66	Calbee	Food Products				
				R5R77	ZeaChem	Food Products				
				R5R78	Intermodal Yards					
97	R5T2P20	5	3	R5P47	Patterson Ferry Grain Terminal	Agricultural Products	Irrigon	Patterson Ferry Road.	US730	

6.0 Appendix F: OFICS GIS Tool – Background and Use

As part of the Oregon Freight Intermodal Connector System Study, Cambridge Systematics developed a GIS database to identify and evaluate, and ultimately select intermodal potential Tier I, II, and III NHS Intermodal Connectors. In an effort to reduce project costs, and enhance communication, the project GIS data were made available to the project stakeholders using a web mapping application. This mapping application was also utilized in facilitating stakeholder feedback.

Primary project data layers generated were OFICS_Connectors and four OFICS Intermodal Terminal layers for Airports, Ports, Rail Transload, and Pipelines. The other layers were used for reference or to code attributes. The majority of layers were provided by ODOT or consumed as ODOT web services.

OFICS Connector file was generated using Esri Roads and Aerial basemap layers, with linework being digitized on screen for each road name connecting Intermodal Terminals or Businesses to Oregon State Roads or designated NHS intermodal connectors. This attributes of this data layer are described in Table 6.1.

Table 6.1 Attributes of OFICS GIS Tool Data Layers

Field	Alias	Notes
ICID	Connector ID	This was the Primary Key to link connector with associated intermodal terminals.
Region	ODOT Region	
Tier	NHS Intermodal Connector Tier	
Term_Type	Terminal Type	Primary type of IC Terminal being connected by connector
City_County	City or County	
Connector	Connector Roads	Descriptive text listing all roadways that make up the connector
Conn_TO	Connecting Highway or IC	Terminus of Intermodal Connector
Needs	Connector Road Needs	Summary of needs identified in the OFICS report

Field	Alias	Notes
Seg_Name	Segment Name	Road name of segment making up connector
Seg_NHS	Designated NHS IC	Yes / no
Seg_Length	Segment Length (mi)	
Con_Length	Connector Length (mi)	Total mileage for entire connector (sum of seg_length)
AADT	AADT	Average Annual Daily Traffic – computed from ODOT TOPS 2016 GIS layer, where available
AADTT	AADTT	Average Annual Daily Truck Traffic – TOPS
Comb_AADT	Combination AADT	TOPS
SU_AADT	Single Unit AADT	TOPS
Speed_Lmt	Posted Speed Limit	TOPS
Trk_PM	Recorded Speed	TOPS
Crash	Truck Crash Count . Fatal	Crash counts computed from ODOT Truck-Involved_Crashes_2007-14.gdb
LaneWidth	Lane Width	TOPS
LaneNum	Through Lanes	TOPS
Shldr_Width	Shoulder Width	TOPS
Pvmt_Cond	Pavement Condition	TOPS (IRI values)
BridgeNum	Number of Bridges	The number of bridges on a segment – from ODOT Bridges layer, 2016.
BridgeCond	Bridge Sufficiency Rating	ODOT Bridge 2016 Suf_Rating
Rail_Crossing	Number At Grade Crossing	Number of at grade railroad crossings for segment – used ODOT TransGIS crossing layer

Field	Alias	Notes
IC_Term	Intermodal Terminal ID	ID(s) of OFICS Intermodal Terminal(s) connected

The OFICS Intermodal Terminal / Business layers were generated as points by the project team, using site address information to locate the features. These layers have varying attributes, but the key items were the IC_Term – the ID Number of each Intermodal Terminal, and the ICID –which was the Primary Key to link with the appropriate Intermodal Connector.

All data development was performed within an Esri Geodatabase. The data used in the web map tool were exported from Geodatabase features into shapefiles, zipped, and loaded to ArcGIS Online where they were made available as feature services that were used in the web map and associated mapping application.

The GIS data layers created for this project were loaded to ArcGIS Online, and are listed below:

- OFICS Intermodal Connectors
- OFICS Airport Intermodal Terminal
- OFICS Port Intermodal Terminal/Business
- OFICS Rail Intermodal Terminal/Business
- OFICS Pipeline Intermodal Terminal/Business

The other GIS layers listed below, were provided by ODOT and were utilized in the project, and loaded to the ArcGIS Online web map. These include:

- Existing NHS Intermodal Freight Terminal
- Truck Involved Crashes
- NHS_IC_Pavement
- State Routes
- Oregon DOT Regions

The web map used basemap web services from Esri, and included Topographic and Aerial layers. The web map opens for the user with instructions for use displayed by default. The user has four primary buttons available to them. One is the instructions, so they can access anytime while using the application. There is a legend button that will display the symbolization of the onscreen data layers. Next they have a button that allows the user to toggle between the road map and aerial layers. And finally the user is presented with a layers list, where they can turn on and off the map layers.

The application also has a search tool that is configured to search only the project data layers using Name, ICID, and Term_ID fields. The tools is set to autofill text when the user begins to type a value. In addition to these tools the user had the ability to pan, zoom, and identify features on the map.